Database of Redox Potentials of Porphyrins and Related Macrocycles

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A Thesis

Presented to

the Faculty of the Department of Chemistry

University of Houston

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

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by

Jing Xu

May 2012

Database of Redox Potentials of Porphyrins and Related Macrocycles

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Dedication

This Thesis is dedicated to

my parents, Zhiyou Xu and Shiping Luo.

Acknowledgments

First of all, I would like to express my grateful appreciation to my research advisor, Dr. Karl. M. Kadish for his advising and support for my research in his laboratory.

I would like to give special thanks to my mother, Shiping Luo, for her love and support and to my father, Zhiyou Xu, for his love and encouragement.

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Finally, I would like to acknowledge all of my labmates and the secretary for their help and understanding during my years in the laboratory.

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Abstract

Thermodynamic half wave potentials ($E_{1/2}$) for oxidation and reduction of porphyrins and related macrocycles which have appeared in the literature from 1997 to 2011 are collected and categorized as a function of compound structure and solution conditions with the goal of better understanding, predicting, and "tuning" redox behavior for a given type of molecule. The redox reactions of each porphyrin are categorized in 24 different tables varying from simple to complex which have been organized as a function of compound structure. The values of $E_{1/2}$ are further categorized as a function of the site of electron transfer which may occur at the conjugated π ring system, at the central metal ion or at another redox active group on the molecule. After organizing the data in a specific table, they can then be analyzed as a function of macrocycle structure, type and oxidation state of the central metal ion, type and number of axial ligands, solvent, supporting electrolyte, working electrode and reference electrode. A brief summary of factors related to the determination of porphyrin redox potentials is given in this thesis along with examples of how trends in the electrochemical data on groups of compounds may be used to better understand the chemistry and redox activity of these type molecules. Original literature references and the structures of every compound in the database are shown in the thesis.

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CHAPTER ONE

Introduction and Scope of the Work

1.1 General Introduction and Rationale for Study

Porphyrins have attracted considerable interest because of their applications in catalysis,[1-2] photochemistry,[3-4] pharmacology,[5] and material chemistry.[6-7] Many new synthetic porphyrin derivatives have been prepared over the last five decades[8-15] and characterized by various physicochemical methods, one of which is electrochemistry.

An understanding of metalloporphyrin redox reactions is important to better understand the use of these molecules in biological systems and as essential components in many applications.[12, 16-19] In this regard, numerous synthetic porphyrins with a variety of structures have been prepared and characterized as to their redox reactions in non-aqueous media. The number of published papers on porphyrins has increased significantly over the five decades, going from about 4000 papers in 1960 to more than 30,000 in 2012 as determined by a simple literature search with SciFinder.

Our own interest is in the electrochemistry of porphyrins, with an emphasis on understanding the factors which influence redox potentials in non-aqueous media. Several reviews have been published on porphyrin electrochemistry in non-aqueous media,[20-23] one of which was from our own laboratory[23] and focused on monomeric porphyrins in non-aqueous media. Our laboratory also published a database of porphyrin redox potentials,[21] but this review is now 12 years old and did not include dimers, trimers, or oligomeric porphyrins. It was therefore decided to examine how the field has changed over the last decade with respect to the types of macrocycles now being studied and to then summarize and analyze trends in the electrochemical data of porphyrins and related macrocycles which have appeared in the literature on porphyrins and related macrocycles between 1997 and 2011. Our analysis was intended to be a

continuation of a 1997 M.S. Thesis from the University of Houston[24] and a follow-up review which was published in 2000.[21] The end goal of the "new" and expanded analysis given as part of this thesis is to enable the reader to better examine trends in redox behavior of metalloporphyrins as a function of macrocycle structure, metal ion, axial ligand, and solvent. In order to accomplish this, we began with a similar structural organization as was used in the earlier M.S. Thesis[24] and review[21] but have substantially expanded upon this published work in two ways. The first is that we have cataloged, for the first time, the electrochemistry of porphyrins in terms of a very specific structural features as described on the following pages where we have divided the published data into 24 tables, starting with simple monomeric macrocycles and then proceeding to more complex systems of dimmers, trimers and oligomers as well as donor- and acceptor complexes containing a poprhyrin unit. Unlike the earlier M.S. Thesis[24] and publications,[21, 23] all potentials and experimental conditions are searchable and available in electronic form, something which has never been possible in the past.

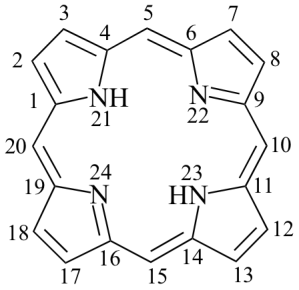
Although we have made on exhaustive search of the literature from 1997 to 2011, we have not attempted to provide a comprehensive description of all known porphyrin electrochemistry, but rather have concentrated on specific types of porphyrin macrocycles, specific groups of metalloporphyrin complexes and on guiding the reader through some of the more practical aspects of the measurement techniques. We describe systematic trends in the data as a function of central metal ion, type of macrocycle and the type of axial ligand, so that the reader can make a comparison with their own results under very specific experimental conditions. It is hoped that this approach will answer the majority of the readers' questions as to what has been done in the past decade while

at the same time enabling the reader to utilize data in the literature to predict and "tune" what might be observed studies involving the electrochemistry of porphyrins which have yet to be synthesized.

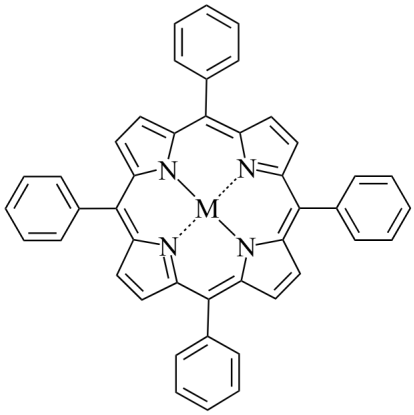
1.2 Brief Background of Porphyrin Structures

The basic structure of a porphyrin consists of four pyrrole units linked by four methine bridges to form an aromatic system which is a 16-atom, 18-electron highly conjugated macrocycle.[25, 26] Figure 1.1 shows the basic structure of porphine whose positions are labeled according to the IUPAC numbering system.[27] The carbons at the four *meso* positions are labeled as 5, 10, 15, and 20 while those at the eight β-pyrrole positions are labeled 2, 3, 7, 8, 12, 13, 17, and 18. All twelve positions on the periphery of the porphyrin macrocycle may be substituted by electron-withdrawing or electron-donating groups to form different synthetic derivatives, the best known of which are tetraphenylporphyrin (TPP) and octaphenylporphyrin (OEP) those structures are shown in Figure 1.1. Structures of other porphyrins with OEP or TPP type skeletons are shown in Figure 1.2 and in Chapter 2 of this thesis.

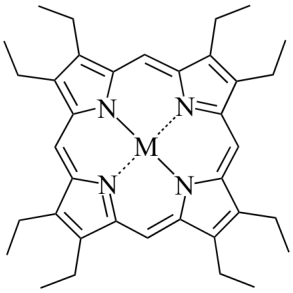
The metal free (free base) porphyrin macrocycle possesses two protons which can be replaced by metal ions in +2, +3, +4, +5 or +6 oxidation states. Almost all transition and main group metals can be complexed by a porphyrin macrocycle to form different metalloporphyrins.[22, 28-31] Metalloporphyrins with no axial ligands are four-coordinate and generally have the metal in the plane of the macrocycle, while those with one or two axial ligands are five- or six- coordinated and may have the metal ion or out of the plane of the four nitrogens. The six-coordinate complexes are often have the metal within the plane of the macrocycle while the five-coordinate complexes often



Porphine $(P)H_2$



(TPP)M



(OEP)M

Figure 1.1. Structure of free base porphine $(P)H_2$, and metalated tetraphenylporphyrin (TPP)M and octaethylporphyrin (OEP)M.

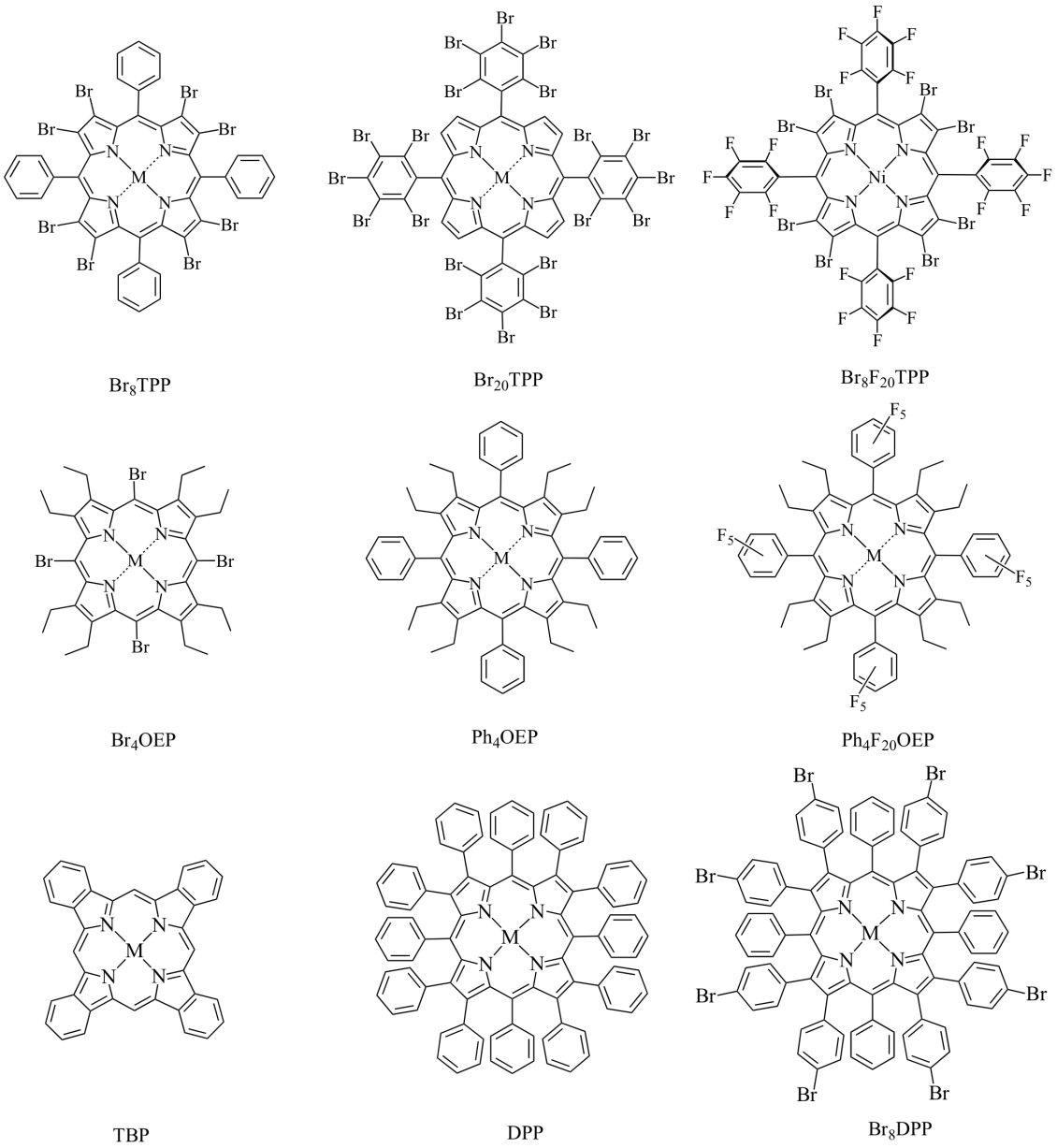


Figure 1.2 Structures of selected substituted porphyrin macrocycles with OEP or TPP type skeletons. Structures of other metalloporphyrins are given in Figures 4.1 to 4.8 of this thesis.

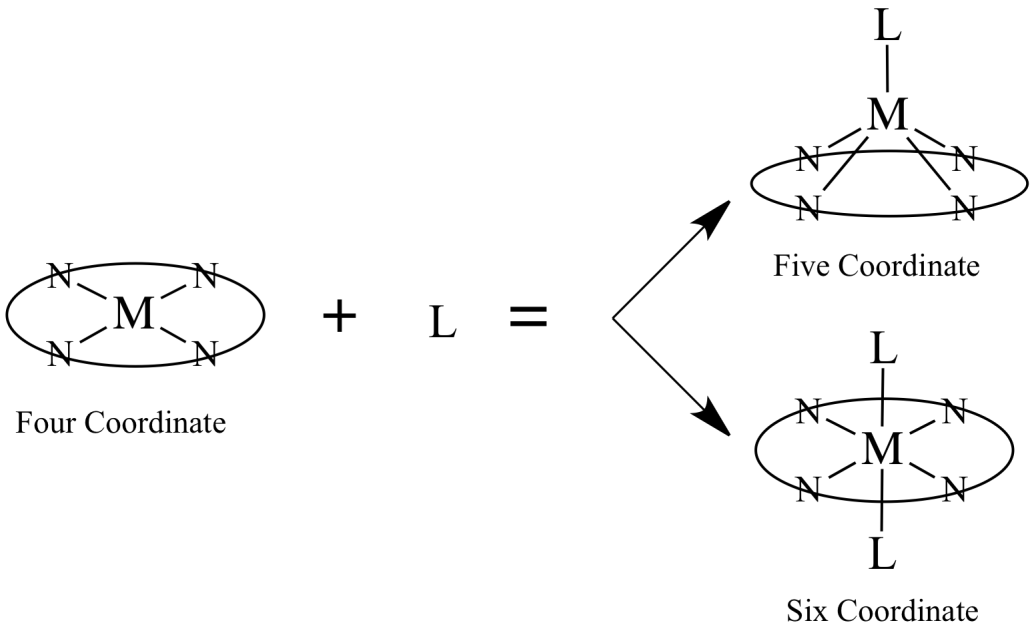
have the metal out of the plane as schematically shown in Scheme 1.[32] The specific coordination number depends on several factors, the most important in which are the specific metal ion, the metal oxidation state and substituents on the macrocycle.[33] A variety of axial ligands have been shown to bind to the porphyrin central metal ion under different experimental conditions. Examples of different ligands are given in several reviews[22, 28, 34] and a list is also given in Table 4.2 of this thesis.

1.3 Electrochemistry of Porphyrins

The electrochemistry of metalloporphyrins will be described from a variety of perspectives. Generally, the site of electron transfer can occur at the conjugated π-ring system of the macrocycle or at the central metal ion if it is electroactive. In some compounds, an electroactive substituent or electroactive axial ligand will be oxidized or reduced. A brief summary of metalloporphyrin electrochemistry is given blow.

The porphyrin macrocycle possesses a highly conjugated π-ring system, which is an ideal location for the addition or abstraction of electrons. Many metalloporphyrins undergo four one-electron transfer reactions in non-aqueous media to yield π-cation radicals and dications on oxidation and π-anion radicals and dianions on reduction.[21-23] Metal-centered redox processes may also be observed for compounds with electroactive central metal ions, examples being iron, cobalt, manganese, silver, platinum, and ruthenium. When these central metal ions are oxidized or reduced to a higher or a lower oxidation state, the redox reactions often occur before the first ring oxidation and also before the first ring reduction, but this is not always the case.[20, 21, 23] In addition to the ring- and metal-centered reactions of porphyrins, some electroactive subsituents or bound electroactive axial ligand might also be oxidized or reduced. In these cases, the

Scheme 1 Schematic illustration of axial ligand (L) binding to central metal ion of a metalloporphyrin. Examples of the different macrocycles and axial ligands are given in Table 4.1 and Table 4.2 of this thesis.



overall number of redox processes may be greater than four, the number expected for seen porphyrins with redox inactive central metals. However, not all of the expected macrocycle-centered redox processes can be observed within the solvent potential window. This may be due to presence of highly electron-donating or highly electron-withdrawing substituents on the macrocycle which might shift the half-wave potentials to very positive or very negative values such that they cannot be observed within the anodic or cathodic potential limit of the utilized solvent (see Table 1.1 for anodic and cathodic limits of selected solvents).

The effect of electron-donating or electron-withdrawing substituents on the porphyrin redox potentials will depend on the type of substituent, its specific location on the macrocycle and the site of electron transfer. Table 1.2 gives examples of substituents, which have been added to the periphery of a macrocycle. The half wave potentials of porphyrin electrode reactions will often vary systematically as the function of the number and type of electron-donating or electron-withdrawing substituents and values of $E_{1/2}$ have often been analyzed as a function of the Hammett substituent parameter σ. Example of substituents are given in Table 1.2 where the value of σ are taken from the literature.[35] When electron-withdrawing substituents such as F^-, Br^-, or CF_3 are attached to the macrocycle, the π-electron density of the conjugated system in the molecule will be decreased. As reductions will become easier while oxidations will become harder (a positive shift of potentials) as compared to the unsubstituted porphyrin. An opposite effect (a negative shift of potentials) is observed in the case of porphyrins having electron-donating substituents such as OCH_3, CH_3, or NH_2. Substitution at the β-pyrrole on *meso* positions of the porphyrin ring will more strongly

Table 1.1 Physical properties and maximum potential range (V vs SCE) of several common solvents used for porphyrin electrochemistry.[36]

Solvent	Abbrev.	e_r[a]	AN[b]	DN[c]	$E_T^N(30)$[d]	Solvent Limit[e]	
						Ox	Red
Tetrahydrofuran	THF	7.58	8.0	20.0	0.207	+1.8	-3.6
Dichloromethane	CH_2Cl_2	8.93	20.4	0.0	0.309	+1.8	-1.9
1,2-Dichloroethane	$EtCl_2$	10.37	16.7	0.0	0.327	+1.8	-1.9
Pyridine	py	12.91	14.2	33.1	0.302	+0.8	-1.8
Benzonitrile	PhCN	25.20	15.5	11.9	0.333	+1.7	-1.8
Acetonitrile	MeCN	35.94	18.9	14.1	0.460	+1.8	-2.0
Dimethylsulfoxide	DMSO	46.68	18.8	29.8	0.444	+0.7	-1.9
N, N'-Dimethylformamide	DMF	36.71	16.0	26.6	0.404	+1.6	-2.5

[a] e_r = dielectric constant, [b] AN = acceptor number, [c] DN = donor number, [d] $E_T^N(30)$ = Dimroth-Reichardt parameter at 30 ºC, [e] Solvent limit defined as potential limit for oxidation or reduction of the solvent.

Table 1.2 List of selected substituents and values of 4σ for para and meta iron-substituted tetraphenylporphyrin (TPP).[37]

Substituent	4σ[a]
p-NO_2	3.12
m-CN	2.72
p-CN	2.64
p-$COOCH_3$	1.80
p-COOH	1.64
m-Br	1.56
m-Cl	1.48
m-F	1.36
m-OCH_2Ph	1.20
p-Cl	0.92
p-F	0.24
p-Ph	0.04
H	0.00
m-CH_3	-0.28
p-CH_3	-0.68
p-$C(CH_3)_3$	-0.80
p-OCH_3	-1.08
p-OH	-1.48
p-OCH_2Ph	-1.64

[a] 4σ = four times Hammett substituent constant.[35]

influence the electrochemical properties than substitution at the four phenyl groups of a tetraphenylporphyrin type compound.[21, 23] Changes in planarity of the macrocycle upon addition of electron-withdrawing or electron-donating to the macrocycle will also affect redox potentials.[38-41] In some cases, the addition of specific substituents to the porphyrin macrocycle may alter mechanistic pathways for electron transfer, as well as influence coupled chemical reactions of the compounds in their oxidized or reduced forms.[38-43]

Studies of substituent effects on porphyrin redox potentials have often been used as a basis for deciding whether a given electrode reaction occurs at the porphyrin π ring system or at the central metal ion. A series of porphyrin derivatives having a similar structures but different substituents may or may not follow similar oxidation/reduction mechanisms. Therefore, it is essential to compare and summarize the reported $E_{1/2}$ values of porphyrins with similar structures in order to better understand the electrochemical behavior of each investigated compound or group of compounds.

The potentials of each porphyrin redox reaction may also vary with changes of type and concentration in the solvent or the supporting electrolyte. This change may be due to differences in axial ligand binding or in the case of the supporting electrolyte it may be due to differences in ionic strength effects. Not only is solubility an important factor in selected a given solvent but one also must consider the ability of the solvent to stabilize anion or cation radicals. Therefore, the selection of a given solvent/supporting electrolyte system will depend on the requirements of the individual experiment.

As indicated above the binding of solvent molecules as well as anions or cations from the supporting electrolytes will effect with the thermodynamic half wave potentials. Examples of bonding solvents are pyridine,[44-46] DMF and DMSO. Diatomic

molecules which bind to the central metal ion of the porphyrin will also effects $E_{1/2}$, the best examples being given by CO[47, 48] or NO.[49, 50] Differences in axial ligation can also lead to changes in the site of electron transfer.

The potential differences ($\Delta E_{1/2}$) between the first porphyrin ring reduction and the first porphyrin ring oxidation has often been used to suggest the site of the electron transfer reaction.[51] For example, an experimental measured difference between the first reversible oxidation and first reversible reduction, (the HOMO-LUMO which is defined as highest occupied molecular orbital and lowest unoccupied molecular orbital) is often 2.25 ± 0.15 V for metalloporphyrins with TPP or OEP type macrocycles. The HOMOs were calculated to be two near-degenerated π orbitals (a_{1u} and a_{2u}), while the LUMOs were calculated to be a set of degenerated π* orbitals (e_g). The experimentally measured electrochemical HOMO-LUMO gap of 2.25 V is in good agreement with a theoretically calculated value of 2.18 V for the difference between the HOMO and LUMO and suggested ring-centered oxidation and reduction.[52] However, it should be pointed out that the HOMO-LUMO gap can vary as the function of both the type of the central metal ion (see Figure 1.3) and the planarity of the porphyrin macrocycle.[53]

A constant potential difference of 0.42 ± 0.05 V between the first and second reductions has been reported for many with OEP and TPP porphyrins while the difference between the first and second oxidations was reported to be 0.29 ± 0.05 V (see Figure 1.4). This diagnostic criteria has often been used to suggest a site of electron transfer reactions in metalloporphyrins.[51] Although exceptions exist, several other indirect means of identifying the site of electron transfer have been used. One of these

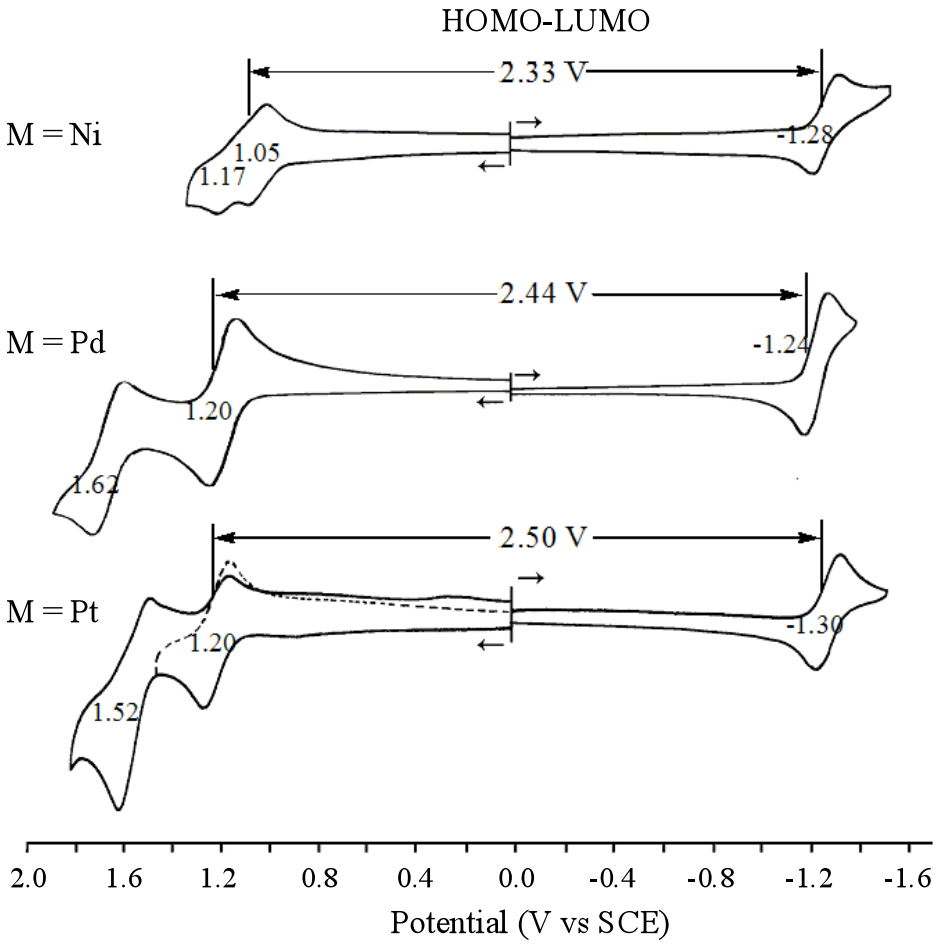


Figure 1.3 Cyclic voltammograms of (TPP)M where M = Ni, Pd, and Pt in CH_2Cl_2 containing 0.1 M TBAP. Adapted from ref. [54].

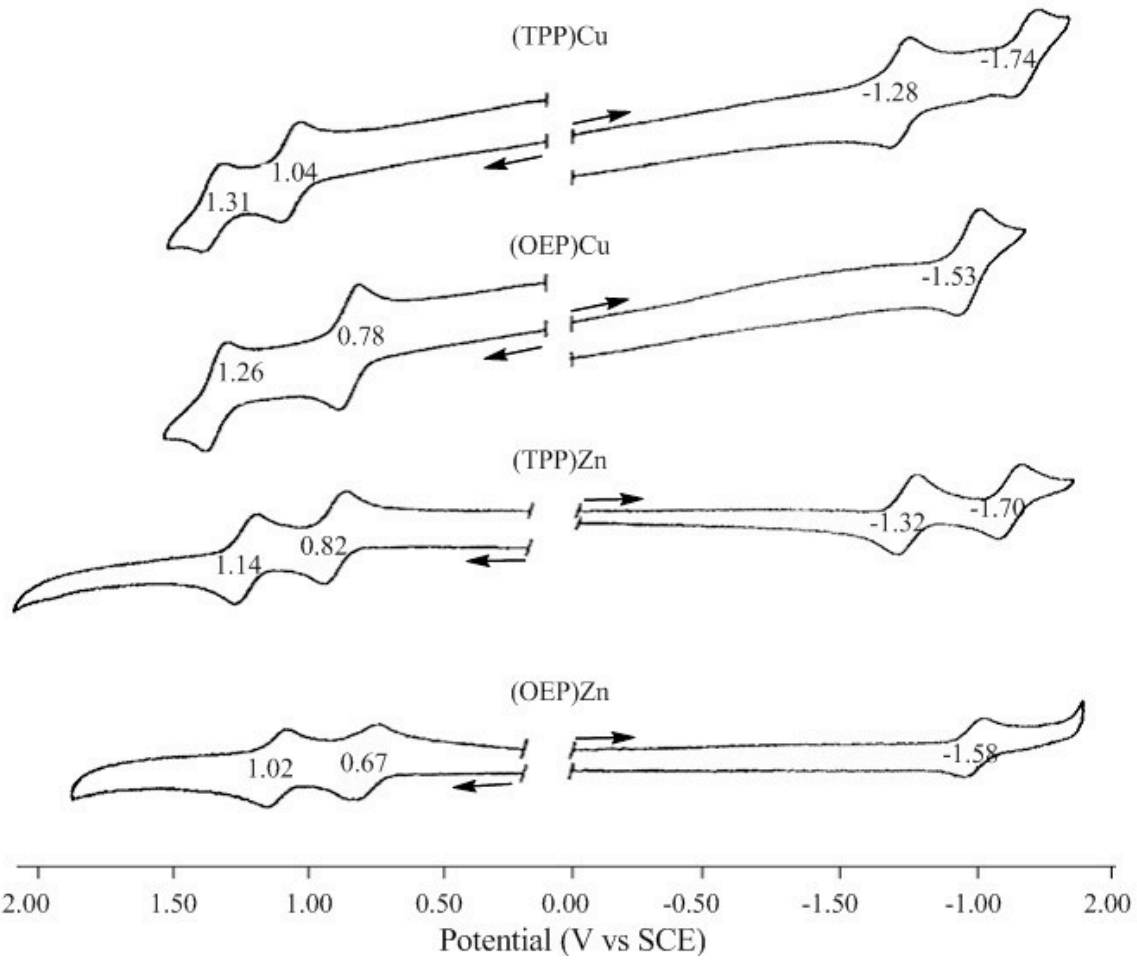


Figure 1.4 Cyclic voltammograms of (P)Cu and (P)Zn where P = TPP or OEP. Adapted from ref. [55].

includes the use of Hammett linear free-energy relationships[54] or the Gutmann donor number of the solvent as a parameter.[22, 55]

Electrochemistry is an effective technique to study the redox reactivity of metalloporphyrins. The applied reducing and oxidizing potentials can be controlled as accurately as ± 2 mV. In addition, the use of electrochemical techniques has made it possible to control redox reations, to characterize the products of the reactions and to evaluate the mechanism of the electrode reaction as well as to tune the electron transfer site.

The first electrochemical studies of synthetic porphyrins began to appear in the early 1950s and mainly involved potentiometry and polaropraphy. These studies were then followed by numerous cyclic voltammetric studies which started to appear in the early 1960s.

At the start of 1960s, the majority of porphyrin electrochemistry studies involved naturally occurring complexes; however, these electrochemical investigations were limited mainly to thermodynamic measurements of standard potentials utilizing potentiometry or to measurements of reduction potentials using polarography at a dropping mercury electrode. In addition, the choice of the measurement technique was limited in large part by the availability of electrochemical instrumentation, almost all of which at that time was home-made and limited almost excluded to electrochemical laboratories.

The situation began to change in the mid-1960s in three important aspects. First, cyclic voltammetric theory was becoming better understood,[56, 57] which led to the popularization of this technique as a rapid and efficient method for obtaining reversible

redox potentials. Second, many laboratories had begun to use non-aqueous solvents for studying electrochemical reactions of organic and inorganic compounds.[58-60] Thirdly, a large number of easily synthesized tetraphenyl- and octaethylporphyrins with a wide variety of different central metal ions were becoming available for study.

In the 1970s, the technique of cyclic voltammetry was used for the majority of electrochemical measurements of porphyrins. However, most utilized instrumentation will still homemade and only few laboratories were actually making the measurements.[22, 61-64]

In the 1980s and 1990s, electrochemical studies of synthetic porphyrins mainly involved derivatives with unusual structures, porphyrins with metal-carbon bonds, porphyrins with central metal ions in low or high oxidation states, and porphyrins which react with small molecules.[20, 65-67] At the same time, some "unusual" macrocycles were synthesized and their redox properties were compared to the oxidation and reduction potentials of OEP or TPP macrocycles which contained the same metal ion.[68, 69] At that point in time the electrochemistry of metalloporphyrins was no longer hindered by the lack of electrochemical instrumentation which had become more available at relatively low cost and was becoming standard analytical equipment in a large number of laboratories around the world.[49, 54, 70-77]

Only a few reviews have systematically summarized results from electrochemical investigations of synthetic and natural porphyrins, with most concentrating in large part on derivatives of octaethylporphyrins (OEP) or tetraphenylporphyrins (TPP), whose properties were described as function of the central metal ion, macrocycle, and porphyrin substitutes of the axial ligands.[20, 22, 61-67] These

types of reviews are useful if people are interested in a specific central metal ion or a specific type of macrocycle. However, they may fail to answer more detailed questions, such as how the reported electrochemical measurements were made, how systematic changes in macrocyclic structure, central metal ion, or solvent conditions might vary for similar compounds or a series of compounds. Also, past reviews did not always address what factors were important that might effect the electrochemistry of the molecules.

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CHAPTER TWO

Experimental:
Collection of Data and Characterization of Porphyrin Redox Reactions

The collected electrochemical data is organized in the form of a database which has fields for the porphyrin macrocycle, central metal ion, axial ligand, solvent, supporting electrolyte, redox potentials for oxidation and reduction, reference electrode, and so on. A database management system is a useful tool for researchers to organize and computerize experimental information, data, and references. To construct a database management system required specialized software, which in this case was commercially available. Details on the software utilized and the procedure for entering data is given below.

2.1 Software

The redox potentials of porphyrins and related macrocycles are summarized in the form of a computerized database using the FileMaker Pro 11.0 program from Claris Corporation.[1] FileMaker Pro uses simple concepts like find, sort, and connect. FileMaker Pro is designed from the ground up for non-technical people who have a real job to do. It's designed to let you get in, build your database, and get back to work. It can handle large amounts of data and let many people share the data.[2] Furthermore, the data you store in your database management system can be in the form of text, photos, PDF and Excel files.

2.2 Procedure

Many methods were used to find the electrochemical redox potentials entered into the FileMaker program. One way was to carry out the search with SciFinder, a system provided by CAS division of the American Chemical Society. SciFinder is a research discovery tool that allows college students and faculty to access a wide

diversity of research from many scientific disciplines, including biomedical sciences, chemistry, engineering, materials science, agricultural science, and more.[3]

In addition to SciFinder, we examined publications from our own laboratory over the last 40 years to find the names of other major laboratories and researchers working in the field of porphyrins and porphyrin electrochemistry and then searched the publications of these people. We made copies and read all published papers which contain electrochemical data from 1997 to 2011.

All published papers that related to porphyrin macrocycles have been checked and their redox potentials and experimental conditions were analyzed not only to the $E_{1/2}$ values but also to the site of electron transfer. Authors' names that appeared in the 1999 database[4] were further searched by SciFinder and any relevant publications collected.

The electrochemical data we have listed appear in many different types of journals around the world. We have routinely cross-checked through those different types of journals to make sure that the electrochemical data collected was mostly complete.

2.3 Limitation of the Database

It should be pointed out that some limitations of our database exist. For instance, sometimes different redox potentials of the same porphyrin compounds are reported under the same experimental conditions. In these cases, both sets of published values are listed and it is up to reader to decide which is the best value for their own research. In some cases, the published redox potentials or experimental conditions in the original manuscript are incomplete. For example, sometimes only oxidations are given and no

reductions or there are reductions and no oxidations. In these cases, the fields for the missing data are left blank. In other cases, the utilized salt, RE, WE, or atmospheric conditions are missing. When this occurs, the entry in these fields is given as NR (not reported).

2.4 Characterization of Porphyrin Redox Reactions

2.4.1 Selection of Appropriate Solvent

Most early investigations of porphyrins in non-aqueous media were made in DMF or DMSO for reductions and in benzonitrile or butyronitile for oxidations. Later studies of porphyrin electrochemistry were made in the nonbinding solvent dichloromethane (CH_2Cl_2) for both oxidations and reductions. The advantage of this solvent is that the radical anions and radical cations could both be electrogenerated in solution and then characterized by ESR, NMR or UV-visible spectroscopy. The selection of which aprotic solvent to utilize may depend on its anodic or cathodic potential range, or its ability to stabilize π-anion and/or π-cation radicals. For instance, the stability of anion radicals is greater in DMF and DMSO than in acentonitrile. This is because of the fact that solvents with a large Gutmann donor number tend to associate with hydrogen donors like water. Therefore, DMF and DMSO are able to stabilize π-anion radicals even when a small amount of water is present in the solvent.

The overall requirements of the individual experiment will dictate the reasons to select a proper solvent. The first requirement is solubility. One must also consider the ease of solvent purification, the chemical reactivity of the solvent, its ability to stabilize π-anion or π-cation radicals and its overall potential range for both oxidation and reduction, the latter of which will depend in part on the type of electrode material. For

example, Hg cannot be utilized for oxidations while Ag and Au both have a limited positive range in solvents containing halide anions. Other practical factors include the cost of the solvent, its toxicity and its general ease of handling.

In addition, the most common nonaqueous solvent utilized for metalloporphyrins reductions have been DMF, DMSO, PhCN, and MeCN. With appropriate supporting electrolyte, the range of these solvents may be extended to -3.0 V by using a Hg electrode. This easily allows for the electrogeneration of π-anion radicals and dianions as well as other electrode reactions involving protonated species which may be observed at potentials between –2.2 and –2.7 V.[1-3] As indicated above, anion radicals are easily stabilized in DMF for investigation by ESR techniques.

Most electrooxidations of porphyrins to give the π-cation radicals and dications have been carried out in CH_2Cl_2, PhCN, or MeCN. Although the anodic-potential range of these solvents does not extend much above +1.5 V, this is often sufficient to view the first two oxidations of most porphyrin complexes. Although many electrogenerated dications may be attacked by nucleophiles to yield an isoporphyrin,[4-7] the solvent of choice is often CH_2Cl_2. This solvent has been utilized by numerous laboratories, although reactions of some low valent metalloporphyrins with CH_2Cl_2 to give sigma-bonded complexes are known with the best examples being in the case of Fe^I and Co^I complexes. One advantage of CH_2Cl_2 as a solvent in that comparisons may be made directly between electrochemical results obtained in this chlorinated solvent and chemical results obtained in other nonboning solvents such as CCl_4 or $CHCl_3$.

One disadvantage of CH_2Cl_2 is its low boiling point. Depending on the cell design, this may present special problems in normal cells upon deoxygenation as well as

in thin-layer spectroelectrochemistry, where time-resolved measurements of small solution volumes might lead to solvent evaporation under the influence of an applied light source. In order to get around this problem one can easily switch to the solvent, 1,2-dichloroethane in place of dichloromethane, CH_2Cl_2, because of its higher boiling point (83.4 ˚C), fewer problems are encountered due to solvent evaporation. The electrochemical mechanisms and ligand-binding properties appear to be similar in these two solvents, so that results can be used interchangeably. However, there are slight differences in absolute potential measurements between the two solvents, after correction for liquid junction potential. The two solvents also have different dielectric contants of 8.93 (CH_2Cl_2) and 10.37 ($C_2H_4Cl_2$).

2.4.2 Selection of Appropriate Supporting Electrolyte

Almost all electrochemical studies of metalloporphyrins in nonaqueous media have utilized tetraalkylammonium salts as a supporting electrolyte, because its higher solubility and commercial availability. The most common salts have been the tetrabutyl- and tetraethylammonium percholorates (abbreviated TBAP and TEAP). Several studies have also utilized tetraalkylammonium salts of BF_4^- or PF_6^-.

Selection of a given supporting electrolyte will depend upon its cost, ease of purification and possible axial coordination of the counteranion. Usually ClO_4^-, BF_4^- and PF_6^- can be considered as non-binding anions. Tetraalkylammonium supporting electrolytes containing all three anions are commercially available or may be easily synthesized from the respective Br^- complexes.[5] However, a ClO_4^- salt with either a tetraethylammonium (TEA^+) or tetra-*n*-butylammonium (TBA^+) cation has usually been the supporting electrolyte of choice. Results obtained are often interchangeable between

measurements made with TBAP and TEAP as supporting electrolytes and thus, given the choice (which depends on availability), TBAP has usually been selected because of its higher solubility.

Mann and Barnes[6] reported data on the potential range of CH_2Cl_2 containing different supporting electrolytes. They indicate that salts of I^-, Br^- or Cl^- may be used for reductions but are not recommended for oxidations due to the fact that the anions are easily oxidized at potentials less than +1.0 V *vs* SCE. The anions might also coordinate to the central metal ion of the porphyrin, thus leading to redox potentials which could be quite different than when the measurements are made in solutions of TBAP. This is especially true for the case of (TPP)Co oxidation where $E_{1/2}$ for the Co(II)/Co(III) reaction ranges from 0.29 to 0.94 V, depending upon the specific anion of the supporting electrolyte.[7]

One must also consider the concentration of the supporting electrolyte. Due to changes in ionic strength, potentials measured with concentrations of 1.0 M TBAP are not identical to those measured with 0.10 or 0.01 M. The differences of potential may amount to several hundred millivolts and will vary as a function of the specific electrode reactions examined.

2.4.3 Measuring and Reporting Redox Potentials

The majority of metalloporphyrin redox reactions involve reversible electron transfers these potentials are reported as $E_{1/2}$ or $E°$ versus a standard reference electrode, and which is most often a saturated calomel electrode (SCE).[8] Some reversible potentials are reported versus the less used reference electrodes like Ag/AgCl or even versus a Pt pseudo-reference electrode which has an ill-defined potentials. Some values

of $E_{1/2}$ are also reported to versus the ferrocene/ferrocenium couple (Fc/Fc^+) in the same nonaqueous solvent but others have been reported to versus the normal hydrogen electrode (NHE). The latter method of reporting potentials is not recommended in large part because it has involved a conversion from real, experimentally measured, potentials to potentials versus a not often used theoretical reference standard.

Also, it should be indicated that "irreversible" electrode reactions of a given metalloporphyrin must be labeled with respect to the experimental conditions and not just combined with $E_{1/2}$ values for reversible electrode reactions. This is because an "irreversible reaction" may be electrochemically irreversible due to slow electron transfer kinetics or it might be irreversible due to the occurrence of a coupled chemical reaction, in which case the experimentally observed potentials could be removed from the thermodynamic important values.[8, 9] As indicated earlier, no attempts were made in this review to convert potentials measured against one reference electrode to another standard reference system. Sometimes, Fc/Fc^+ was used to measure the potentials. The approximate value of the Fc/Fc^+ couple generally ranges from 0.45 to 0.55 V *vs* SCE depending on the solvent and the experimental setup, however these values need see what exact experimental conditions.[10, 11]

2.4.4 Measuring and Reporting the Numbers of Electrons Transferred

Many of metalloporphyrin redox reactions involve one-electron transfer and the few examples of reported porphyrin multi-electron processes in the literature which are overlapping one-electron transfers where the two redox reactions occur at very similar potentials. There are actually very few cases of porphyrin two-electron transfer processes to the same redox site (one involves the conversion of Sn(II) to Sn(IV)[12] and

another the reduction of $[(TMpyP)M]^{4+}$ to $[(TMpyP)M]^{2+}$ where M = H_2, Cu, Zn, and VO).[13, 14] Thus, we need pay attention when discussing what appears to be a multi-electron transfer. In this regard, it should be indicated that cyclic voltammetry theory predicts a peak to peak separation of 59 mV for a reversible one-electron transfer process, while a true two-electron transition would have a peak to peak separation of approximately 30 mV.[8, 9] The peak current for a real two-electron transfer by cyclic voltammetry would also be approximately 2.8 times higher than a one-electron transfer since this value is proportional to the 3/2 power of the number of electrons transferred.[8]

2.4.5 Assigning Site of Electron Transfer

The site of electron transfer in metalloporphyrins may be assigned on the basis of spectroscopic data or electrochemical criteria, or alternatively it may be assigned on the basis of comparison with the known chemistry and electrochemistry of related systems.

2.4.6 Selection of Appropriate Porphyrin Reference Compound

The most common used comparison compounds against which the results of newly synthesized metalloporphyrins are derivatives of TPP and OEP. For example, Zn (II) derivatives of tetramesitylporphyrin (TMP)[15] and octabromotetraphenylporphyrin (Br_8TPP)[16] are oxidized , respectively, at 0.86, 1.20 and 0.88, 1.14 V vs SCE in CH_2Cl_2 and all two potential values can be compared to (TPP)Zn[17] which is oxidized at potentials of 0.79, 1.07 V vs SCE in CH_2Cl_2 under very similar experimental conditions. However, TPP and OEP derivatives are not available to be reference compounds with all known metal ions, in cases when the data are available, it might only be in another solvent or supporting electrolyte system, which would require a new

measurement. In a word, TPP and OEP derivatives are good reference compounds for most cases, but other similar macrocycle systems are needed to take into account if TPP and OEP derivatives might not be comparison compounds.

2.4.7 Factors Influencing Half Wave Potentials

The factors which the most influence metalloporphyrin redox potentials can be concluded as which related to the properties of the solvent and supporting electrolyte and those which relate to the porphyrin itself. The properties of the porphyrin including such as the type and oxidation state of the central metal ion, (ii) type and number of axially coordinated ligands, and (iii) type and planarity of the conjugated macrocycle.

The simple way to investigate the relationship between redox potentials and axial ligation is to complex the porphyrin axially under known experimental solution conditions and to measure the redox potential under these conditions. Absolute values of $E_{1/2}$ may then be related to a given set of axial ligands or the spin state.

Examples of how changes in axial ligation will affect porphyrin ring- and metal-centered redox reactions have been demonstrated in many cases with one good example is provided by the Fe(III)/Fe(II) reactions of (TPP)Fe(L) which can vary over a range of 1.0 or more volts just as a function of the axial ligand.[18-21]

Changes in the nature of the axial ligand may lead to smaller changes in the macrocycle-centered reactions of a given metalloporphyrin but this also is depend on the degree of interaction between the metal center and the macrocycle. In contrast, the redox potentials for porphyrin π-anion or π-cation radical formation will vary with changes in the central metal ion. For example, (OEP)Ag(II) is converted to a π-anion radical at $E_{1/2}$ = -1.29 V *vs* SCE as compared to (OEP)Co which is converted to a π-

anion radical at a reversible half wave potential of -1.68 V *vs* SCE.[22]

Potential shifts in $E_{1/2}$ for formation of porphyrin π-cation or π-anion radicals can can also result from systematic changes in the macrocycle or systematic changes in the substituents on the macrocycle. For the electrochemical reactivity, the most studied correlations have been those involving substituent effects on half wave potentials. The type of substituent effects on metalloporphyrin redox potentials will depend on many parameters such as number and type of substituents, location of substituents, Hammett substituent constants, planarity of porphyrin macrocycle, properties and type of central metal ion, oxidation state of central metal ion, and site of electron transfer. For instance, the different type of substituents showed the different effect on redox potential shifts for $E_{1/2}$, because of different Hammett substituent constants of each substituent. The higher Hammett substituent constant is more positive shifts of redox potential shifts for $E_{1/2}$ due to the electron-deficient characteristics of its macrocyle with higher Hammett substituent constant substituent connected to macrocycle. Generally, the addition of electron-donating groups to the porphyrin macrocycle with facilitate oxidation and hinder reduction at either the metal center or the porphyrin π-ring system. In contrast, the addition of electron-withdrawing substituents to the porphyrin ring will remove electron density from the reaction site and lead to easier reductions and harder oxidations.

A large range of redox potentials can be obtained for a variety of metalloporphyrins with the same macrocycle but different central metal ions or with the same metal ion and different metal ions. In these cases, $E_{1/2}$ can often be predicted on the basis of linear free relationships. It should be indicated that many factors of central

metal ion might affect the potential shifts of porphyrin macrocycle such as properties and type of central metal ion, changes in structure or metal oxidation state upon redox reaction, metal out of plane distance, oxidation state of central metal ion, coordination number of central metal ion.

Another factor which often less considered is that how systematic changes in an electrochemical solvent will lead to systematic shifts in potentials for oxidation or reduction of a given metalloporphyrin complex. For example, the oxidation of (TPP)Zn has been examined in more than a dozen different nonaqueous solvents, with values of $E_{1/2}$ in the case of the Zn complex ranging from 0.66 V *vs* SCE in PhCN[23] and 0.78 V *vs* SCE in CH_2Cl_2.[24] Shifts of similar magnitude are seen for other metalloporphyrins, necessitating a compilation of data under numerous experimental conditions or an understanding of how changes in redox potentials upon changing solvents might be predicted by knowing the nature of the porphyrin-solvent interaction.

A number of correlations have been made in the literature between half-wave potentials of a given compounds and the donor or acceptor properties of the electrochemical solvent. The most often utilized solvent parameter has been the Gutmann donor numbers (DN) or acceptor numbers (AN).[25] The specific correlation between $E_{1/2}$ and a given solvent will depend upon the nature of the solvent-porphyrin interaction as well as upon the charge of the reactant from the product. For example, values of $\Delta E_{1/2}$ for the reduction of (OEP)M where M = Zn, Ni, Co, and Cu are linear related to the Gutmann donor number,[26] but this is not the case for all type of porphyrin macrocycles.

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CHAPTER THREE

How to Use the Database and What You Can Find?

3.1 How To Use the Database?

3.1.1 Paper Copy

A two-dimensional presentation of the electronic database prepared as part of this M.S. thesis is given in Chapter 4. This hard copy summarizes reported potentials for more than 3,000 compounds, each of which has multiple oxidations and/or reductions. The redox potentials are displayed in 24 different tables which have been arranged according to the structure of the macrocycle. The list of tables is given in Table 3.1 and is organized from the less complex macrocycle to the more complex molecules, starting with monomeric porphyrins and then progressing to porphyrin dimers, trimers, and oligomeric or polymeric systems. The data in these tables includes porphyrin-corrole dyads, porphyrin-fullerene dyads (including non-covalently bound systems), porphyrin-fullerene-ferrocene triads, porphyrin assemblies, and porphyrins with peripherally bonded inorganic metal complexes.

The two-dimensional paper copy of the database has 16 fields, as shown in Chapter 4, and the data has been sorted alphabetically by ring, metal, L1, L2, solvent, and supporting erlectrolyte (salt). The lists of macrocycles, ligands, solvents, and supoorting electrolytes (salt) are given in Tables 4.1 to 4.4 of Chapter Four. The structures of the porphyrins are also included in the paper copy of the database and are shown in Figures 1 to 24 of Chapter Four. The original literature reference is given in the last column of each data entry and is labeled as “Ref.”.

3.1.2 Electronic Copy

The electronic copy of the database provides more information on the electrochemical data and experimental conditions than does the paper copy. Additional

Table 3.1. List of Tables in the Database.

Table 1. Tetraphenylporphyrin (TPP) macrocycles

Table 2. Octaethylporphyrin (OEP) macrocycles

Table 3. Tetramesitylporphyrin (TMP) and substituted TMP macrocycles

Table 4. *meso*-substituted OEP and porphinone macrocycles

Table 5. *meso*-substituted TPP macrocycles

Table 5a. Picket-fence porphyrins and related derivatives

Table 5b. *meso*-Tetraalkylporphyrins

Table 5c. *meso*-Tetraarylporphyrins

Table 6. β-substituted TPP macrocycles

Table 6a. β-alkyl and β-aryl-substituted TPP macrocycles

Table 6b. β-pyrrole halogenated porphyrins

Table 6c. TPP with mixed β-pyrrole substituents

Table 6d. Nitro-substituted TPP and tetraarylporphyrin (TArP) derivatives

Table 6e. Porphiones

Table 6f. Mono β-pyrrole-substituted porphyrins

Table 7. Dodecaphenylporphyrin (DPP) and substituted DPP macrocycles

Table 8. Porphyrins with fused groups

Table 8a. Quinoxalinoporphyrins

Table 8b. TPP macrocycles with fused groups

Table 3.1. List of Tables in the Databse. (Continued)

Table 9. Core-substituted porphyrins

Table 9a. N-substituted tetraarylporphyrins

Table 9b. Heteroporphyrins

Table 10. Tetrabenzoporphyrins (TBP) and tetraazaporphyrins (TArP)

Table 11. Porphyrins with charged peripheral groups

Table 11a. Tetraarylporphyrins with charged peripheral groups

Table 11b. Octaethylporphyrins with charged peripheral groups

Table 12. Porphyrin dimers

Table 13. Porphyrin trimers

Table 14. Porphyrin-corrole dyads

Table 15. Porphyrin dendrimers, and oligimeric or polymeric porphyrins

Table 16. Porphyrin metal sandwich complexes

Table 17. Porphyrins with mixed meso- and/or β-pyrrole substituents

Table 17a. A_3B *meso*-substituted porphyrins

Table 17b. *cis* and *trans*-A_2B_2 *meso*-substituted porphyrins

Table 17c. *cis* and *trans*-A_2B *meso*-substituted porphyrins

Table 17d. *trans*-A_2BC *meso*-substituted porphyrins

Table 17e. A_2 *meso*-substituted porphyrins

Table 17f. β-pyrrole-substitued porphyrins with less than four *meso*-substituents

Table 18. Porphyrin-ferrocene conjugates

Table 3.1. List of Tables in the Databse. (Continued)

Table 19. Porphyrin-fullerene conjugates and porphyrin-fullerene complexes

Table 20. Porphyrin-C60-ferrocene triads

Table 21. Supramolecular porphyrin assemblies

Table 22. Porphyrins containing peripheral metal complexes

Table 22a. Porphyrins with covalently bonded peripheral metal complexes

Table 22b Porphyrins with non-covalently bonded peripheral metal complexes

Table 23. Natually occurring porphyrins

Table 23a. Heme and related macrocycles

Table 23b. *meso*-substituted etioporphyrin II macrocycles

Table 23c. β-alkyl and *meso*-substituted porphyrins

Table 24. Porphyrins and porphyin-C_{60} conjugates adsorbed on electrode surfaces

information includes the HOMO-LUMO gap, the type of working electrode, the gas over the solution (N_2, Ar, CO, etc) and number of macrocyclic rings. Obviously, the biggest advantage of the electronic database is its searching function. The electronic database allows one to search particular information within the whole database by keywords. These keywords are given in Table 3.2. The user is able to search redox potentials and experimental conditions by each "field" in the electronic database, examples being ring, metal, ligand, solvent, type of working electrode, and so on. The electronic copy of the database is available upon request from Professor Karl Kadish in the Department of Chemistry at the University of Houston. The information in the electronic database can be printed in several different formats. The user determines how they wish to represent the information and sort the data according to any chosen parameters in the database.

3.2 What Can You Find?

The database allows one to examine a number of correlations which might not be evident from a single paper or review. The key factors that influence porphyrin redox potentials are:

(i) Type of macrocycles

(ii) Location and number of substituents

(iii) Type and oxidation state of central metal ion

(iv) Type and number of axial ligands

(v) Nature of the solvent and the supporting electrolyte

Several examples of correlations between redox potentials and the above factors are given on the following pages. Numerous other correlations are possible, depending on the information desired by the reader.

Table 3.2. The List of Key Words/Abbreviations in Electronic Database

(Br4)TPP-TriPP
(CF3)12TPP
(CF3)4TPP
(CH3)4(Ph)4TPP
(CH3)4Ph5Cor
(CH3)6Et2Ph5P
(ClO4)2DPP
(CN)4(Ph)4TPP
(CN)4(Ph)4TPP
(CO2CH3)8TBTPP
(i-Bu)8TPP
(NH2)P
(NH2)TPP
(NO2)2TPP
(NO2)3TPP
(NO2)4DPP
(OCH3)4DPP
(OCH3)4DPP - Keggin type POM
(Ph)8DPP
(Ph)8T(3-Thienyl)P
(Ph)8T(4-OCH3 P)P
(Ph)8TPP
(Ph)8TPPCl12
(R)P
(R)TPP
(RHN)P
(Ru(bpy)2Cl)2-Por-Pt(Cl2)DMSO complex
(SC6H13)8TAP
[Br8T(4-NCH3 Py)P]4+
[Br8TNMePyP]4+
[Br8TPPS]4-
[F16TPPS]4-
[NMePyP]4+
[Por-Cu(Phen)2 dyad]2
[T(2-NCH3 Py)P]4+
[T(2-NEt Py)P]4+
[T(4-Py)P-[Ru(bpy)2Cl]4]2O
[TNCH3PyP]3+
[TNEtPyP]4+
[TPPS]4-
C60-por dyad
Porphyrin tetramer
PQ(5NH2)
(2-Py)2A3 pyridylporphyrin
(3-Py)(4-t-butylP)P tetramer self-assembly
(3-Py)Tri(4-CH3P)P tetramer self assembly
(3-Py)Tri(4-HexP)P tetramer self-assembly
(a^3,b-NHCOFc)TPP
(a^4-NHCOFc)TPP
(a^4-piv)TPP
(Alkyl)P
(bisthiophene)4TPP (meso)
(Boron dipyrromethene)3-porphyrin-C60 pentad
(Br8)TPP-TriPP
(CF3)4DPP
(CH3)4Ph5P
(CH3)4TMP
(CH3)4TPP
(CH3)6Et2PhP
(CH3)NCTPP
(CN)4(CH3)4TPP
(CO2CH3)8TBTPP
(CO2H)DPP
(DAPS)OEP
(DAS)OEP
(DATS)OEP
(Et)8T(Ar)P
(Fc)2-Por-(Fc)2 triad
(ImUP)T(3,5-D-TBuP)P
(ImUP)T(3,5-D-TBuP)P.PUPC$_{60}$
(N-Alkoxycarbozolyl P)P
(NO2)4DPP
(NO2)4OEP
(NO2)P
(NO2)PQ

(O)Cl_8TPPone
(O)TMPone
(OCH3)20DPP
$(OEP)_2$-1,3-DAP
$(OEP)_2$-1,4-DAP
$(OEP)_2$-1,5-AT
$(OEP)_2$-DA
$(OEP)_2$-DAV
$(OEP)_2$-DVDA
$(OEP)_2$-TA
$(OEP)_2$DAT
(Ph)4TPP
(Ph)4TPP
(Ph)8TPP
(R)OEP
(T(4-NCH3Py)P)2-T(35-DCP)P trimer
(TAS)OEP
(TCHP)4-
(TTF)4TPP
(TTF)TPP
[(bipy)4OEP]4+
[(bpy)OEP]+
[(Et)4(NCH3 Py)4P]4+
[(Py)4OEP]4+
[Br8TPPS]4-
[Et8(Py)]4+
[F16TPP(NCH3)4]5+
[F8TPPS]4-
[OEP(Py)2]2+
[OEP(Py)4]4+
[T(2-N(alkyl Im) P]5+
[T(2-N(butyl) Py)P]5+
[T(2-N(Et) Py)P]5+
[T(2-N(hexyl) Py)P]5+
[T(2-N(MOE) Py)P]5+
[T(2-N(octyl) Py)P]5+
[T(2-N(propyl) Py)P]5+
[T(2-N(TDE)Im) P]5+
[T(2-N(TDTEG)Im) P]5+
[T(2-N(TEG) Py)P]5+
[T(2-NCH3 Py)P]5+
[T(2-NEt Py)P]4+
[T(3-NCH3 Py)P]4+
[T(4-NCH3 Py)P]4+
[T(4-NCH3 Py)P]5+
[T(4-NCH3 Py]4+
[T(4-NEt Py)P]4+
[T(4-NV P)P]4+
[T(4-TriMAP)P]5+
[T(DiN-CH3 Im)P]4+
[T(DiN-Et Im)P]4+
[T(DiN-Pr Im)P]4+
[T3NMePyP]4+
[TDM-2-ImP]5+
[TNCH3PyP]4+
[Tri(2-NCH3 Py)PyP]3+
1,3-diacetynyl phenyl bridged porphyrin dimmer
1,4-diacetynyl phenyl bridged porphyrin dimmer
1,5-diacetynyl thienyl bridged porphyrin dimmer
1R-T(methoxy bismethano-octahydroanthtacene-9-yl)P
1S-T(trifluoromethyl bis methano-octahydroanthtacene-9-yl)P
2-PyTri(4-t-ButylP)P
2,5-diacetynyl thienyl bridged porphyrin dimer
4-Pyridyl Fc carboxylate assembly
4-PyTri(4-CH3P)P
5-phenyl-10,15,20-tris(N-methylpyridinum-2-yl)porphyrin
a-diketoporphyrin
A2
A2B
A2B2
A3
a^3,b-$(NHCOFc)_4$TPP
A3B
a^4-$(NHCOFc)_4$TPP
aaaa-T(2-MPAM)P
aaab-TTFCPP

ABC
ABCD
Acene-modified porphyrin
Acredinium inclusion complex
Anthracene fused porphyrin
Anthracenylporphyrin
assembly
Axially bonded porphyrin dimer
b-alkylated corrole
b-alkylated meso-tetraphenylporphyrin
b-alkylated porphyrin
b-brominated porphyrin
b-brominated tetraphenylporphyrin
b-brominated-TPP
b-lakylated chlorin
b-mixed substituted porphyrin
b-mixed substituted TPP
b-octaalkylated porphyrin
b-octaaryl meso-tetraarylporphyrin
b-octabrominated TPP
b-octabromo
b-octabromo meso-pyridylporphyrin
b-octabromo meso-tetraarylporphyrin
b-octabromo meso-tetrakis (sulphonatophenyl)porphyrin
b-octabromo meso-tetramesitylporphyrin
b-octabromo meso-tetrapyridylporphyrin
b-octabromo TPP
b-octachloro meso-tetraarylporphyrin
b-octachloro meso-tetraphenylporphyrin
b-octachloro tetraphenylporphyrin
b-octaethyl meso-tetraarylporphyrin,
b-octaethyl meso-tetrabipyridiniumporphyrin
b-octaethyl meso-tetranitroporphyrin
b-octaethyl meso-tetraphenylporphyrin
b-octaethyl meso-tetrapyridinium porphyrin
b-octaethyl tetraazaporphyrin
b-octaethyl TPP
b-octafluoro
b-octafluoro meso-tetrakis (sulphonatophenyl)porphyrin
b-octafluoro-TPP
b-octanitroporphyrin
b-octaphenyl meso-tetraarylporphyrin
b-octaphenyl meso-tetraphenylporphyrin
b-perbrominated porphyrin
b-pyridyl porphyrin
b-pyrrole
b-pyrrole alkylated porphyrin
b-pyrrole substituted
b-substituted meso-tetraphenylporphyrin
b-substituted porphyrin
b-substituted tetraarylporphyrin
b-substituted TPP
b-substituted TPP
b-tetrabrominated TPP
b-tetrabromo meso-tetraarylporphyrin
b-tetrabromo meso-tetraphenylporphyrin
b-tetrabromo mononitro meso-tetraphenylporphyrin
b-tetrabromo tetraphenylporphyrin
b-tetraethyl tetra-N-methylpyridiniumporphyrin
b-tetraethyl-N-methyl pyridylporphyrin
baaa-thiolate tripivalamido porphyrin
BCA
BCB
BCO
BCS

BCX
bicyclooctadiene fused porphyrin
Bis-u-oxo porphyrin dimer
bisporphyrin
Bisstrap-C_{10}
Bisstrap-C_{12}
Bisstrap-C_8Ph
Boron-dipyrrin-por crown ether-C60 triad assembly
Boron-dipyrrin-zinc por crown ether dyad
Boron-dipyrromethane bridge
boron-dipyrromethane complex
Br16T(35-DMP)P
Br1TPP meso-tetraphenylporphyrin
Br20TPP
Br2TPP
Br3TPP
Br4(CH3)4TPP
Br4(NO2)TPP
Br4(Ph)4TPP
Br4DPP
Br4T(4-butyloxy P)P
Br4TPP
Br4TPP-TriPP
Br5TPP
Br6(NO2)TPP
Br6T(4-CO2CH3 P)P
Br6TPP
Br7(NO2)TPP
Br7TPP
Br8F20TPP
Br8T(2-CH3 P)P
Br8T(2-Py)P
Br8T(3-CH3 P)P
Br8T(3-Py)P
Br8T(4-Br P)P
Br8T(4-CH3 P)P
Br8T(4-CO2CH3 P)P
Br8T(4-CO2Et P)P
Br8T(4-CO2H P)P
Br8T(4-F P)P
Br8T(4-NCH3 Py)P4+
Br8T(4-NO2 P)P
Br8T(Ar)P
Br8T(naphthyl)P
Br8T2PyP
Br8T3PyP
Br8TCPP
Br8TMP
Br8TPP
brominated porphyrin
brominated-TPPS
C-(P-tetraone)
C60
C60-bisporphyrin-C60 triad
C60-oligopor-C60 rods,
C60-por dimer-C60 triad
C60-por-C60 triad
C60-por-Cu(phen)2-(Fc)2 aggregates
C60-Por-Fc triad
C60-Por-TTF triad
C60(Py)2 assembly
C60Im assembly
C70 assembly
Calix[4]phyrin
Calixphyrins
carbaporphyrin
carboxyl
CD
CH3CO2-
Chalcogenaporphyrin
Chiral porphyrin
Chiral porphyrin dimmers
Chlorin
Chlorin-C60 dyad
cis-(a^2,b^2-NHCOFc)TPP
cis-A2B
cis-A2B2
cis-A2BC
Cl12DPP
Cl16TPP
Cl2(bpy)OEP+

Cl20TPP
Cl20TPP
Cl2OEP
Cl4(Ph)4TPP
Cl4F4TPP
Cl4TPP
Cl8(NO2)7TPP
Cl8(NO2)8TPP
$Cl_8[T(3'\text{-}SO_3^-P)P]^{4-}$
Cl8DPP
Cl8F20TPP
Cl8T(4-CF3 P)P
Cl8T(4-CH3 P)P
Cl8T(4-CO2Et P)P
Cl8T(4-F P)P
Cl8T(4-NO2 P)P
Cl8TPP
ClO4-
CNOTPP
co-facial
co-facial porphyrin dimer
Corrole dimer
Cross-conjugated bisporphyrin
Crown ether porphyrin
Crown ether porphyrin / K+
Cyclic porphyrin hexamer
Cyclic-Por-6,
Cyclic-Por-6.T6
cyclodextrin,
D(spirobifluoren-2-yl)P
DAP
DCPTMPP
Dendrimer appended porphyrin
Deuteroporphyrin IX dimethyl ester
diacetynyl bridged porphyrin dimer
diacetynyl vinyl bridged porphyrin dimer
Diaza crown appended porphyrin
diazaheme-III
dimer
dinitro porphyrin
Dioxocyclam appended porphyrin
diphenylporphyrin
divinyl diacetynyl bridged porphyrin dimmer
DNA
DNP-TTF-por-C60 tetrad
dodecaarylporphyrin
dodecaphenylporphyrin
doped polypyrrole film,
double decker sandwich complex
Doubly anthracene fused porphyrin
DPEP b-alkylated porphyrin
DPP
DPyTBPP-Ir(cod)
$DPyTBPP\text{-}IrCl_2(OH_2)$
Et2(CH3)6Cor dimer
Et2(CH3)6EP
Et2(CH3)6PhP
Et2Me6EP
Et4(CH3)4PP b-alkylated porphyrin
Et6(CH3)2Cor dimer
Et8F20TPP
Et8TPP
Etioporphyrin
F12DPP
F12TPP
F16DPPCO2H
F20DPP
F20OETPP
F20TPP
F28DPP
F28TPP
F36DPP
F4DPP
F6TPP-Cu(I)(tmpa) dyad
F6TPP(tmpa)
F8DPP
F8TPP
Fc amido-4-pyridine assembly
Fc-por dimer-C60 triad
Fc-por-C60 triad
Fc-por-Fc triad
Fc-porphyrin tetramer-C60 triad

ferrocenyl
ferrocenyl calix[4]phyrin
ferrocenyl porphyrin
Ferromicroperoxidase
FTMPP
fullerene
Fullerene inclusion complex
Fullerene-porphyrin-ferrocene triad
Fulleropyrrolidine
fulleropyrrolitidine assembly
furylporphyrin
fused porphyrin dimer
Graphene oxide appended porphyrin
H2PO4-
Heme
Heteroporphyrin
Hexaporphyrinato tricyclophosphazene
host-guest complex
hydroquinone
Imidazole fused porphyrin
Iron(III) protoporphyrin IX
L-(P-tetraone)
La@C82
La2@C80
lipoic acid
Lipoic acid appended porphyrin
liquid crystals
M(spirobifluoren-2-yl)P
Mes2PhCor
meso tetrakis(N-ethylpyridinium-2-yl)porphyrin
meso-alkylated porphyrin
meso-bipyridyl
meso-cyclohexadienyl-idene
meso-diarylporphyrin
meso-diphenylporphyrin
meso-meso linked
meso-substituted
meso-substituted porphyrin
meso-substtiuted OEP
meso-tetra(2-furyl)porphyrin
meso-tetra(2-thienyl)porphyrin
Meso-tetra(dimethyl pyrozolium-4-yl)porphyrin
meso-tetra(N-(alkylpyridinium-2-yl)porphyrin
meso-tetraalkylporphyrin
meso-tetraalkylporphyrinogen
meso-tetraarylporphyrin
meso-tetrabenzoyl-OEP
meso-tetracyclophane porphyrin
meso-tetraethynylarylporphyrin
meso-tetraferrocenylporphyrin
meso-tetrafurylporphyrin
meso-tetrakis(1,3-di-N-methylimidazolium-2-yl)porphyrin
meso-tetrakis(N-methyl-4-pyridyl)porphyrin
meso-tetrakis(N-n-butylpyridinium-2(3,4)-yl)porphyrin
meso-tetrakis(N-n-hexylpyridinium-2(3,4)-yl)porphyrin
meso-tetrakis(N-n-octylpyridinium-2(3,4)-yl)porphyrin
meso-tetrakis (sulphanatophenyl) porphyrin
meso-tetraphenylporphyrin
meso-tetraphosphonic acid porphyrin
mesoheme-III
mesoheme-XIII
mixed b-pyrrole substituted
mixed b-pyrrole substituted meso-tetraphenylporphyrin
mixed b-substituted meso-tetraphenylporphyrin
mixed b-substituted porphyrin
mixed meso-substituted heteroporphyrin
mixed meso-substituted porphyrin
Mo(trisDMPHB)-por-Mo(trisDMPHB) triad
modified protoporphyrin IX
monoazaheme-XIII
Monophosphaporphyrin

MWNT,
N-alkyl porphyrin
N-alkyl porphyrinogen
N-alkylated pyridylporphyrin
N-benzyl
N-benzyl substituted
N-Confused porphyrin
N-fused porphyrin
N-methyl meso-tetraphenylprphyrin
N-methyl N-confused meso-tetraphenylprphyrin
N-methylpyridiniumporphyrin
N-methylpyridylporphyrin
N-naphth-2-ylmethyl
N(CH3)NCTPP
N(CH3)TPP
N2O2-core
N2OS-core
N2S2-core
N2SO-core
N3O-core
N3S
N3S-core
N4-N2OS core
N4-N2S2 core
N4-N2SO-core
N4-N3S core
NCTPP
NFP
NMePyP
NMPyP
NO3-
OBrTPP
octa-iso-butyl meso-tetraphenylporphyrin
octacarboxy-TPP
octaethyl meso-dipyridiniumporphyrin
octaethyl meso-petrapyridiniumporphyrin
octaethyl meso-pyridiniumporphyrin
octaethyl meso-tetranitroporphyrin
octaethyl meso-tetrapyridiniumporphyrin
octaethylporphyrin
octaethyltetra(3-thienyl)porphyrin
octaethyltetrakis(pentafluoro phenyl)porphyrin
octaethyltetranitroporphyrin
octaphenylporphyrin
OEP
OEP-u-oxo dimer
OEP(2,3-dione)
OEP(2,4-dione)
OEPdione
OEPone
OET(3-Thienyl)P
OET(Ar)P
OETAP
OETPP
OETPyP
Oligoaniline-porphyrin hybrid
Oxacalix arene
Oxoporphyrinogen
OxP-(bz)2
OxP-(bz)4
OxP-(Pm)2
OxP-(Pm)4
OxP-(Pp)2
OxP-(Pp)4
P-dione
P-TA-P
pac-man porphyrin
PAOEP
Pc-Eu-Pc-Ce-Por triple decker sandwich complex
Pc-Eu-Pc-Eu-Por
Pc-Eu-Pc-Eu-Por triple decker sandwich complex
Pc-Eu-Por-Eu-Pc triple-decker sandwich complex
Pc-por pentamer
Pc-Por-Pc oxo-bridged triple decker complex
PCA

PCB
PCO
PCOx
perfluorinated porphyrin
Perfluorinated-TPP
phenylene diamine appended porphyrin
Phosphaporphyrin
phosphoic acid
phosphonate porphyrin
phosphonic acid porphyrin
Picket-fence porphyrin
PMes2CA
PMes2CO
PMes2COx
PMes2CX
Poly-D(spirobifluoren-2-yl)P film
Poly-M(spirobifluoren-2-yl)P film
Poly-T(spirobifluoren-2-yl)P film
Polyoxometalate-por copolymer
Polyoxometalate-porphyrin copolymer
Polythiophene appended porphyrin
POM
Pophyrin dimer
Por dimer-C60 dyad
Por-(Ru(bpy)2)2 conjugates
Por-(Ru(bpy)2Cl)2 triad
Por-(Ru(bpy)2Cl)3 complex
Por-(Ru(bpy)2Cl)3 tetrad
Por-(Ru(bpy)2Cl)4 pentad
Por-[(Ru3O)]4 pentad
Por-[Ru(bpy)2(Cl)]4 complex
Por-[Ru(bpy)2Cl]2 assembleis
Por-[Ru(bpy)2Cl]2 dyad,
Por-[Ru(NH3)5]4 assembly
Por-[Ru(terpy)2]2 dyad trans-A2B2
Por-[Ru3O]4 assembly
Por-[Ru3O]4 pentad,
Por-binaph-C60 triad
Por-C60 assembly
Por-C60 dyad
Por-C60-por triad assembly
Por-calixarene assembly,
Por-Ce-Nc double-decker sandwich complex
Por-Ce-Pc-Ce-por triple decker sandwich complex
Por-Ce-Por double-decker sandwich complex
Por-crown ether dyad
Por-Cu(Phen)2 dyad
Por-Cu(phen)2-(Fc)2
Por-Cu(phen)2-(Fc)2 aggregate
Por-Cyclodextrin host-guest complex
Por-cyclophane-C60 triad
Por-DNA assembly
Por-Dy-Pc double decker sandwich complex
Por-Er-Pc double decker sandwich complex
Por-Eu-Pc double decker complex
Por-Eu-Pc-Ce-por triple decker sandwich complex
Por-Eu-Pc-Eu-Pc sandwich complex
Por-Eu-Pc-Eu-Pc triple decker complex
Por-Eu-Pc-Eu-Pc triple decker sanwich complex
Por-Eu-Pc-Eu-Por sandwich complex
Por-Eu-Pc-Eu-Por triple decker sandwich complex
Por-Eu-Pc(15C5)4-Eu-Pc(15C5)4
Por-Fc aggregates
Por-Fc dyad
Por-Fe(bpy)3 hexamer
Por-Fe(terpy)2-por triad
Por-fullerene dyad
Por-Gd-Pc double decker sandwich complex
Por-Ho-Pc double decker sandwich complex
Por-IDB conjugates, A3B, mixed mesosubstituted porphyrin

Por-Ir($py)_2Cl_2(H_2O)$ dyad
Por-Ir(terpy)2 dyad
Por-La-Pc double decker sandwich complex
Por-La@C82 dyad
Por-Lu-Pc double decker sandwich complex
Por-Nd-Pc double decker sandwich complex
Por-oPPV-C60 triad
Por-Os(terpy)2-por triad
Por-oxopor-por triad
Por-PDI-por triad
Por-perylene diimide dyad
Por-perylene dyad
Por-POM-Por triad
por-por-C60 triad
Por-porphyrinogen dyad
Por-Pr-Pc double decker sandwich complex
Por-Pt(II)Cl complex pyridylporphyrin
Por-Pt(IV)Cl3 Complex pyridylporphyrin
Por-Pt(terpy) dyad
Por-PtCl2(DMSO) complex
Por-pyromellitimide-C60 triad
Por-quinone dyad
Por-Re(bpy)(CO)3Cl dyad
Por-Re(CO)3(bpy) dyad
Por-Re(CO)3(bpy) tetrad
Por-Ru(bpy)2 conjugates
Por-Ru(bpy)2Cl dyad
Por-Ru(bpy)3 dyad
Por-Ru(bpy)3 hexamer
Por-Ru(II)(bpy)3 dyad
Por-Ru(terpy)2 dyad
Por-Ru2O conjugates
Por-Ru3 cluster coglomerates
Por-Ru3O cluster coglomerates
Por-Sm-Pc double decker sandwich complex
Por-Tb-Pc double decker sandwich complex
Por-tetrathiophene-C60 triad
Por-Tm-Pc double decker sandwich complex
Por-Y-Pc double decker sandwich complex
Por-Yb-Pc double decker sandwich complex
Porphinone
Porphodimethene
Porphyirn catenanes
porphyirn polymer
Porphyrin appended (Pc-Eu-Pc) double decker sandwich complex
Porphyrin appended dendrimer
Porphyrin assembly
porphyrin belts
Porphyrin dimer
Porphyrin dimer assembly
Porphyrin dimer+ SWNTs
Porphyrin double decker sandwich complex
Porphyrin hexamer
Porphyrin nonamer
Porphyrin pentamer
Porphyrin pentamer assembly
Porphyrin phenanthrenequinone
Porphyrin polymer
Porphyrin sandwich complex
Porphyrin tetramer
Porphyrin tetramer assembly
Porphyrin trimer
Porphyrin trimeric assembly
porphyrin with conjugated groups
porphyrin with fused groups
Porphyrin-azulene dyad
Porphyrin-borondipyrromethane dyad
Porphyrin-corrole dyad
Porphyrin-Eu-Pc(15C5)4-Eu-Pc(15C5)4
Porphyrin-ferrocene dyad:
Porphyrin-fullerene catenanes

Porphyrin-fulleropyrrolidine (1.6 eq) assembly
Porphyrin-imide dyad
Porphyrin-modified gold nanocluster
Porphyrin-perylene dyad
Porphyrin-Pt(II)(terpy) dyad
Porphyrin-pyromellitimide-C60 triad
Porphyrin-sapphyrin dyad
Porphyrin-smaragdyrin dyad
Porphyrin-viologen dyad
Porphyrin: Fulleropyrrolidine assembly
Porphyrinogen
porphyrinogen pentamer
Portoporphyrin IX dimethyl ester
PQ
PQ + Sc(OTf)3
PQ-PQ
PQ-QP
PQ(5NO2)
PQ(6NO2)
PQ(NO2)(NH2)
PQ(NO2)2
PQ(OCH3)2
PQ2
PQBr
PQCl2
protoporphyrin IX
Protoporphyrin IX dimethyl ester
PyC60
pyrenylporphyrin
pyridylporphyrin
QAP
QCP
QPQ
Quinaxalinoporphyrin
rac-T(bis methano-octahydroanthtacene-9-yl)P
Rotaxanes
Ru(bpy)2Cl-Por-Ru(bpy)2Cl complex
Ru(bpy)3-por-Re(bpy)(CO)3Cl triad
S-T(4'-CH_3P)P
sandwich complex
sanwich double decker complex
Sc3N@C80
self-assembly
silylated porphyrin
single walled nanotube
Strapped porphyrin
Subpc-por dyad
sulphonic acid
supramolecular assembly
supramolecular triad
SWNT
T(2-Furyl)P
T(2-furyl)P meso-tetraarylporphyrin
T(Ar)P
T(2-NH2 P)P
T(2-NO2P)P
T(2-Py)P
T(2-Py)P, meso-tetrapyridylporphyrin
T(2-Thienyl)P
T(2-thienyl)P(TE)4
T(2-Thienyl)P(TES)4
T(2-thienyl)P)PBr4
T(2,4-OCH3 P)P
T(2,4,6-OCH3 P)P
T(2,5-OCH3 P)P
T(2,6-Cl2-3-SO3-P)P me
T(2,6-DM-4CP)P m
T(2,6-F2-3-SO3P)P
T(2,6-OCH3 P)P
T(2,6-OCH3 P)P
T(3-CP)P
T(3-NH2 P)P
T(3-PP)P
T(3-Py)P
T(3-Thienyl)P
T(3,4-OCH3 P)P
T(3,4,5-OCH3 P)P

T(3,4,5-OCH3 P)P
T(3,5-DBuEP)P
T(3,5-DCEP)P
T(3,5-DCP)P
T(3,5-DFP)P
T(3,5-DMP)P
T(3,5-OCH3 P)P
T(3'-ClP)P
T(4-Br P)P
T(4-CF3 PE)P
T(4-CH3 P)P
T(4-CH3 PE)P
T(4-Cl P)P
T(4-Cl PE)P
T(4-CN P)P
T(4-CO2CH3 P)P
T(4-CO2Et P)P
T(4-CO2H P)P
T(4-CP)P
T(4-CPPy)P film
T(4-DEPP)P
T(4-DPAP)P
T(4-Et2N P)P
T(4-F P)P
T(4-FPE)P
T(4-l P)P
T(4-NCH3 Py)P]4+
T(4-NEt2 P)P
T(4-NH2 P)P
T(4-OCH3 P)P
T(4-OCH3 PE)P
T(4-octayloxy P)PBr4
T(4-Octyloxy P)P
T(4-OH P)P
T(4-Pentyl P)P
T(4-PP)P
T(4-propylthiolato phenyl)P
T(4-Py)P
T(4-Py)P-(Ru3O) assembly
T(4-Py)P-[Ru(bpy)2Cl]4 complex
T(4-Py)P-[Ru(bpy)2H2O]4 complex
T(4-Py)P-[Ru3O]4 complex
T(4-t-Butyl P)P
T(4-TMAP)P
T(4-CF_3P)P
T(Alkyl)P
T(Ar)P
T(benzoyl)OEP
T(Benzoyl)P
T(Bz)OEP
T(C3F7)P
T(CH3)P
T(Cyclohexyl)P
T(E)P
T(EAr)P
T(EP)P
T(Et)P
T(Fc)P
T(H OCH3 P)P
T(i-Propyl)P
T(NEC)P
T(NEtC)P
T(PCP)P,
T(pentyl)P
T(PFP)P
T(Propyl)P
T(spirobifluoren-2-yl)P
T(spirobifluorene)P
T(spirobifluorene)P-polymer film
T(t-Butyl)P
T(TFPPO)P
T(TFTMA)P
T(TipSi)P
T(TipSi)P
T(tridecyl)P
T2PyP
T3PyP
T4PyP
TAOEP
TAP
TAPP
TATAP
TBP

TC6TPP
TCF3AP
TCHP
TCPP
TDTBOPP
tetra-N-methylpyridylporphyrin
tetra(dimethyl imidazolium-2-yl)porphyrin
tetra(imidazolium 2-yl)porphyrin
tetra(N-ethyl pyridinium)porphyrin
tetra(N-methylpyridinium)porphyrin
tetraacetynyl bridged porphyrin dimer
Tetraanthrace fused porphyrin
Tetraanthracenylporphyrin
Tetraarylporphyrin
tetraazaporphyrin
tetrabenzoporphyrin
tetracarboxyporphyrin
tetrafurylporphyrin
tetrakis(sulphonatophenyl)porphyrin
tetramer
Tetranucleosides appended porphyrin
tetrapyridylporphyrin
TFMTMPP
TMP
TNMePyP
TPP
TPP-C60 dyad
TPP-fulleropyrrolidine complex
TPP-MV dyad
TPPS
trans-(a^2,b^2-NHCOFc)TPP
trans-(Et)4(TTF)2TPP
trans-(TTF)2TPP
trans-A2
trans-A2B
trans-A2B2
trans-A2BC
trans-A3B
trans-A3B2
trans-AB
trans-QPQ
trimer
trinitro porphyrin
Triple decker dyad
triple decker sandwich complex
triple-decker
Triply anthracene fused porphyrin
Triply fused porphyrin dimer
Trisporphyrin
TTF-Por-C60 triad
TThP
TTP-BDP-S-TTP
TTP-BDP-S_2-TTP
TUP
Twin coronet porphyrin b-alkylated porphyrin
unsymmetrical porphyrin dimer
Unsymmetrical porphyrin triad
Viologen linked porphyrin
With TiO2 Thin Film
ZnPor + 0.5 equiv of Py-C60
ZnPor + 0.5 equiv of Py-SWNT
ZnPor + 1.0 equiv of Py-C60
ZnPor + 1.0 equiv of Py-SWNT
ZnPor + 1.5 equiv of Py-C60
ZnPor + 1.5 equiv of Py-SWNT

3.2.1 Examples of Correlations

Example 1. How do changes in the type and position of macrocyclic substituents effect the redox potentials?

To answer this question, data are analyzed for three types of macrocycles having electron-donating or electron-withdrawing substituents at different locations. These macrocycles are shown in Figure 3.1 and a summary of the data for the first oxidation and first reduction is given in Table 3.3. The $E_{1/2}$ values for both redox processes are shifted positively with increasing electron-withdrawing ability of the substituents (as shown in Figure 3.2 for two sets of compounds). The higher the Hammett constants, the stronger the electron-withdrawing effect of the substituents. As reductions become easier, the oxidations become harder (a positive shift of potentials).

The effect of substituents on redox potentials was analyzed using Equation 3.1 where is the reversible half wave potential for the compound having the substituent parameter σ, $E_{1/2}$H is the potential of the unsubstituted compound, ρ is the slope of the line in the plot of $E_{1/2}$ vs σ.

$$E_{1/2} = E_{1/2}\mathrm{H} + \Sigma\sigma\rho \qquad (3.1)$$

Examples of correlations for the Group B and Group C porphyrins are shown in Figure 3.2 for both the first oxidation (labeled as Ox 1) and the first reduction (labeled as Red 1). A much larger effect is seen for the first reduction of the Group C compounds (ρ = 0.32 V) as compared to the first reduction (ρ = 0.16 V), which indicates that the reduction is twice as sensitive to the substituents than the oxidation. This behavior differences for that of the Group B compounds where a similar substituent effect is seen

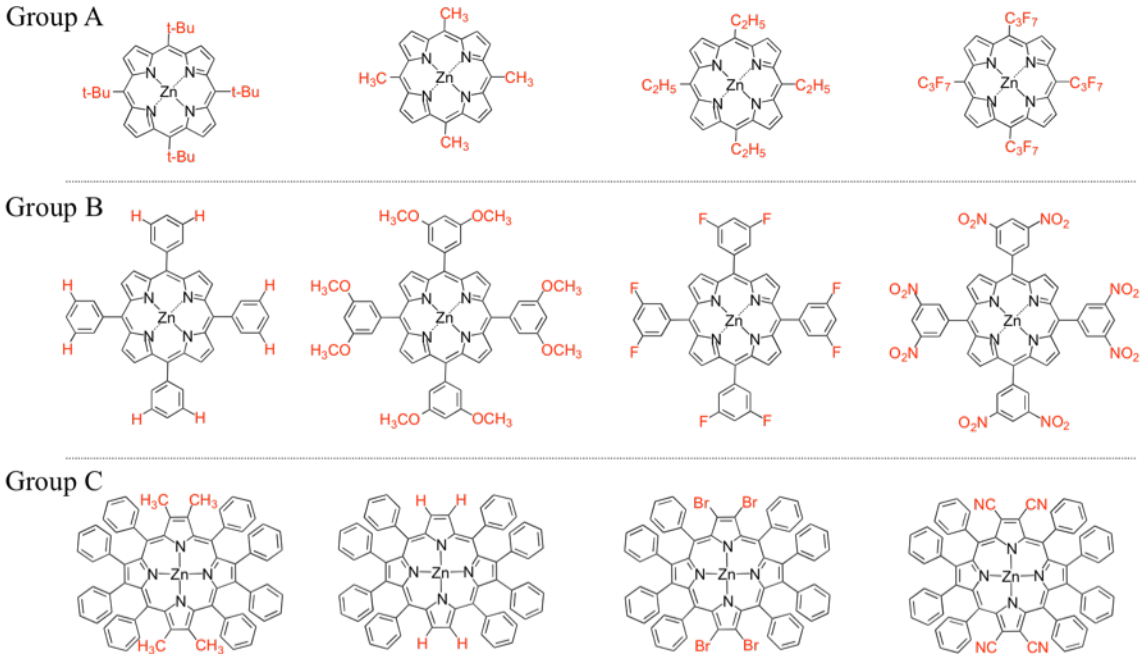


Figure 3.1. Three types of macrocycles with different locations of the substituents.

Table 3.3. Data for compounds in Figure 3.1

Structure[a]	Substituents	σ^b	$\Sigma\sigma$	$E_{1/2}$ Ox 1 (V)	$E_{1/2}$ Red 1 (V)
Group A	t-Bu	-0.20	-0.80	0.60	-1.48
	CH_3	-0.17	-0.68	0.83	-1.36
	C_2H_5	-0.15	-0.60	0.85	-1.39
	C_3F_7	0.48	1.92	1.54	-0.72
Group B	H	0.00	0.00	0.84	-1.36
	OCH_3	0.12	0.96	0.84	-1.36
	F	0.34	2.72	1.00	-1.22
	NO_2	0.71	5.68	1.21	-0.86
Group C	CH_3	-0.17	-0.68	0.38	-1.50
	H	0.00	0.00	0.74	-1.39
	Br	0.23	0.92	0.72	-1.06
	CN	0.66	2.64	1.02	-0.46

[a] See Figure 3.1

[b] Hammett substituent constant σ and taken from the literature.[1]

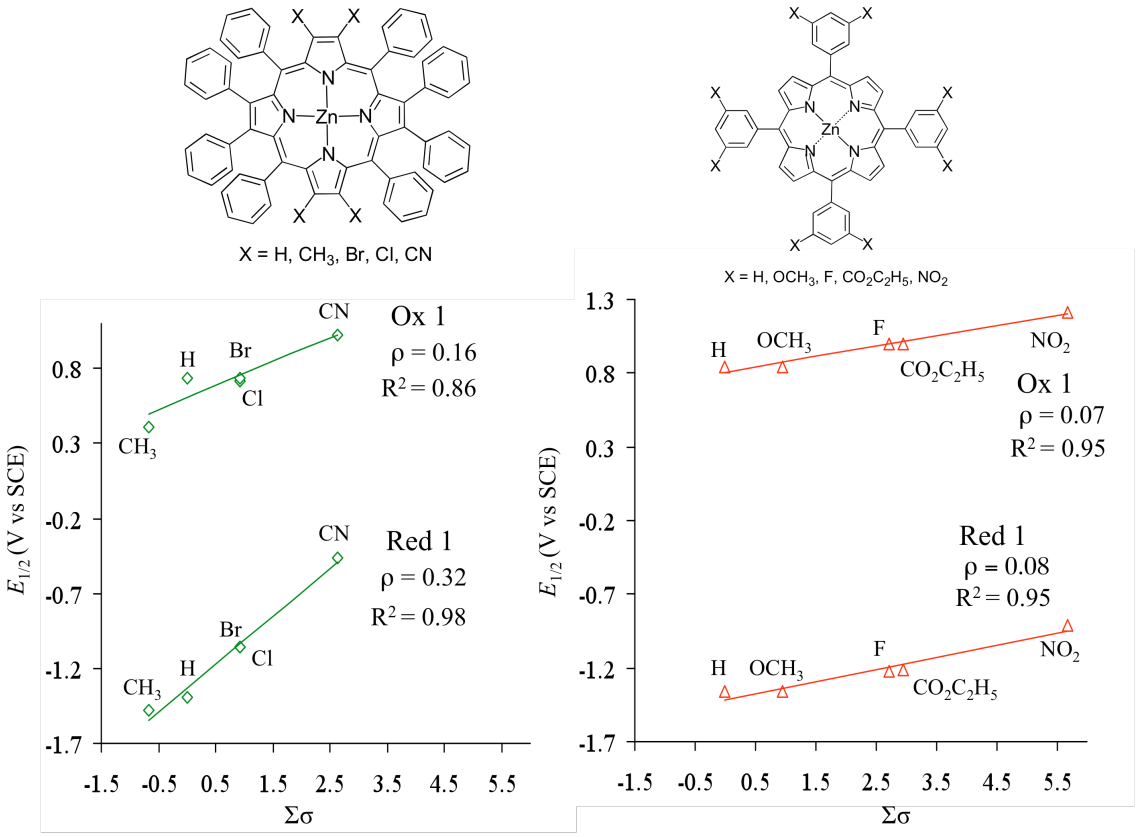


Figure 3.2. Plot of $E_{1/2}$ vs Hammett parameters of substituents for the Group C and Group B porphyrins shown in Figure 3.1. Values of σ and $E_{1/2}$ are given in Table 3.3.

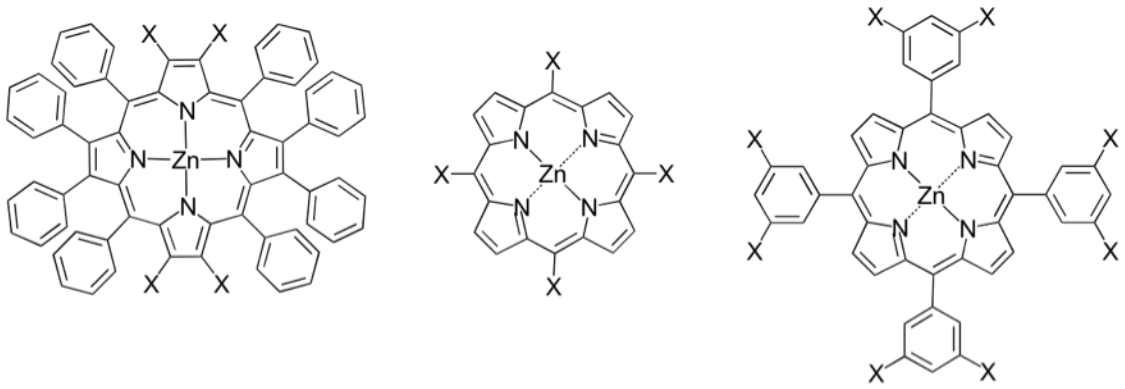
for the oxidation (ρ = 0.07 V) and reduction (ρ = 0.08 V). Similar values of are also seen for the first oxidation and first reduction of the Group A compounds and the data for the three series of compounds is summarized in Figure 3.3. From a structural point of view, it is also expected that the closer substituents are to the conjugated π-ring system, the larger will be the effect on the electron density of the macrocycle and this is what is observed.

Example 2. How does planarity of the macrocycles affect the HOMO-LUMO gap?

Planarity of the porphyrin ring can have a considerable influence on both the reversible oxidation potentials and the electrochemically measured HOMO-LUMO gap which is given by the difference in $E_{1/2}$ between the first oxidation and the first reduction at the conjugated π-ring system of the macrocycle. An example of how the HOMO-LUMO gap changes with planarity is given for six Ni(II) derivatives whose macrocyclic structures are shown in Figure 3.4. Two of the compounds are planar (OEP and TPP) and four are non-planar as described in the literature.[2] Data on the six compounds in Figure 3.4 is shown in Figure 3.5. The HOMO-LUMO gap of planar Ni(TPP) is 2.32 V while that of Ni(OEP) is 2.24 V. However, the non-planar DPP and substituted DPP macrocycles have smaller HOMO-LUMO gaps. Which results from an easier oxidation in each case.

Example 3. How fused groups effect the redox potentials of macrocycle?

In order to probe the effect of additional fused groups redox potentials, a plot of redox potentials vs the macrocycles with fused groups was constructed for the compounds shown in Figure 3.6. The measured HOMO-LUMO gap for these six compounds is shown in Figure 3.7 and ranged from 1.41 V for trans-MAFP to 2.17 V for



Red 1	ρ = 0.32	ρ = 0.28	ρ = 0.08
Ox 1	ρ = 0.16	ρ = 0.30	ρ = 0.07

$$E_{1/2} = E_{1/2}H + \Sigma\sigma\rho$$

Figure 3.3. Different ρ values for three types of macrocycles.

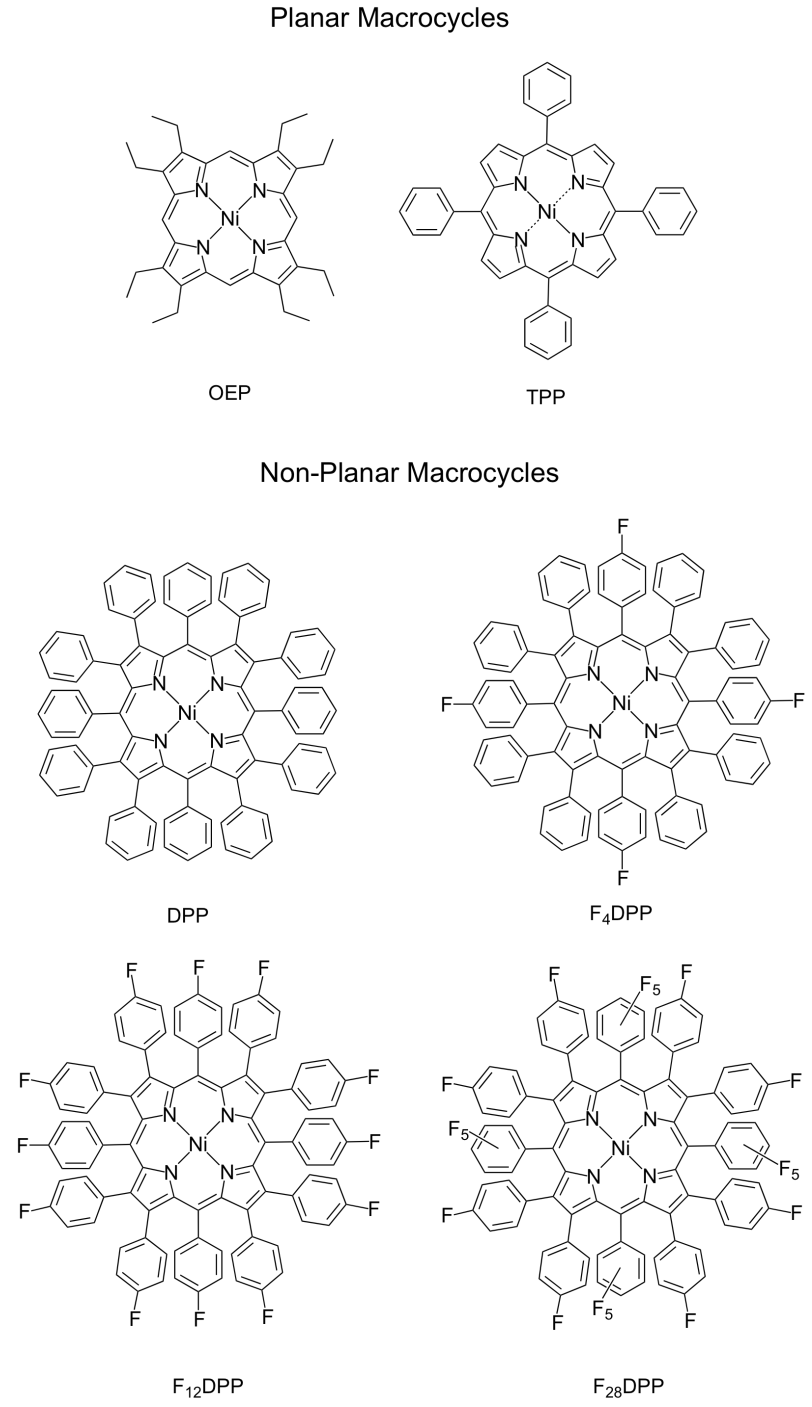


Figure 3.4. Structures of various macrocycles.[2]

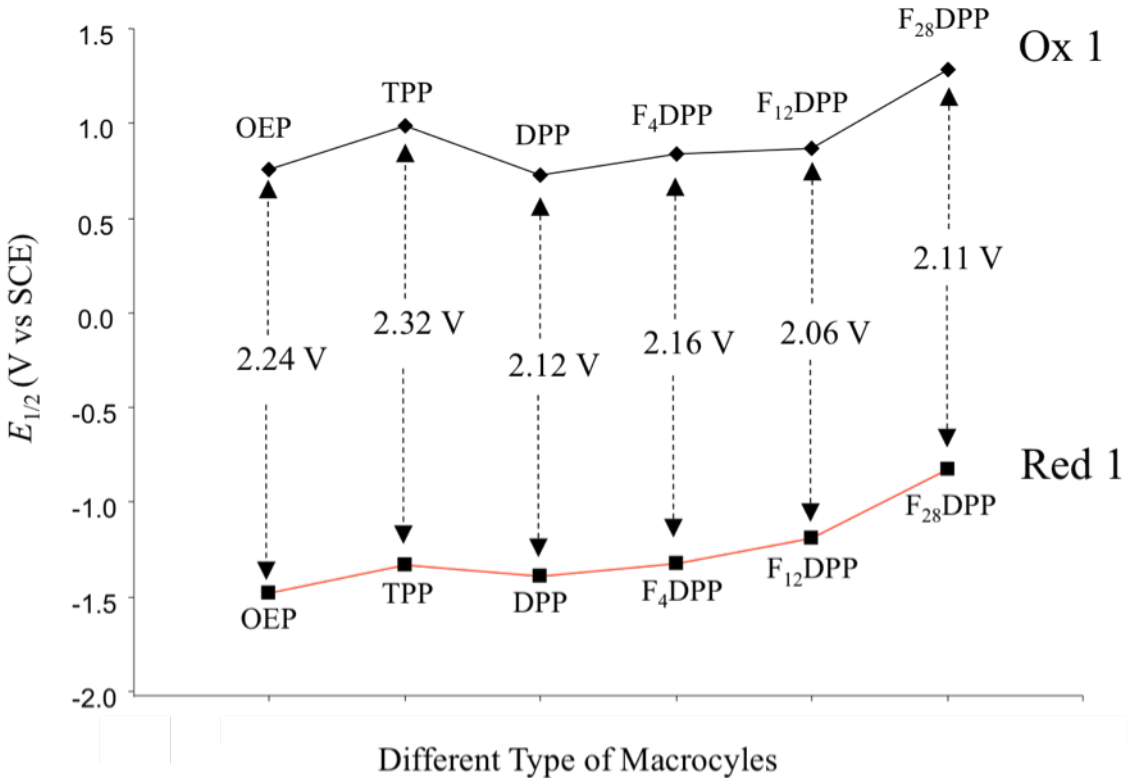


Figure 3.5. Summary of HOMO-LOMO gap for the six Ni(II) porphyrins whose structures are shown in Figure 3.4. The values of $E_{1/2}$ are taken from the database and can be found in Chapter 4.

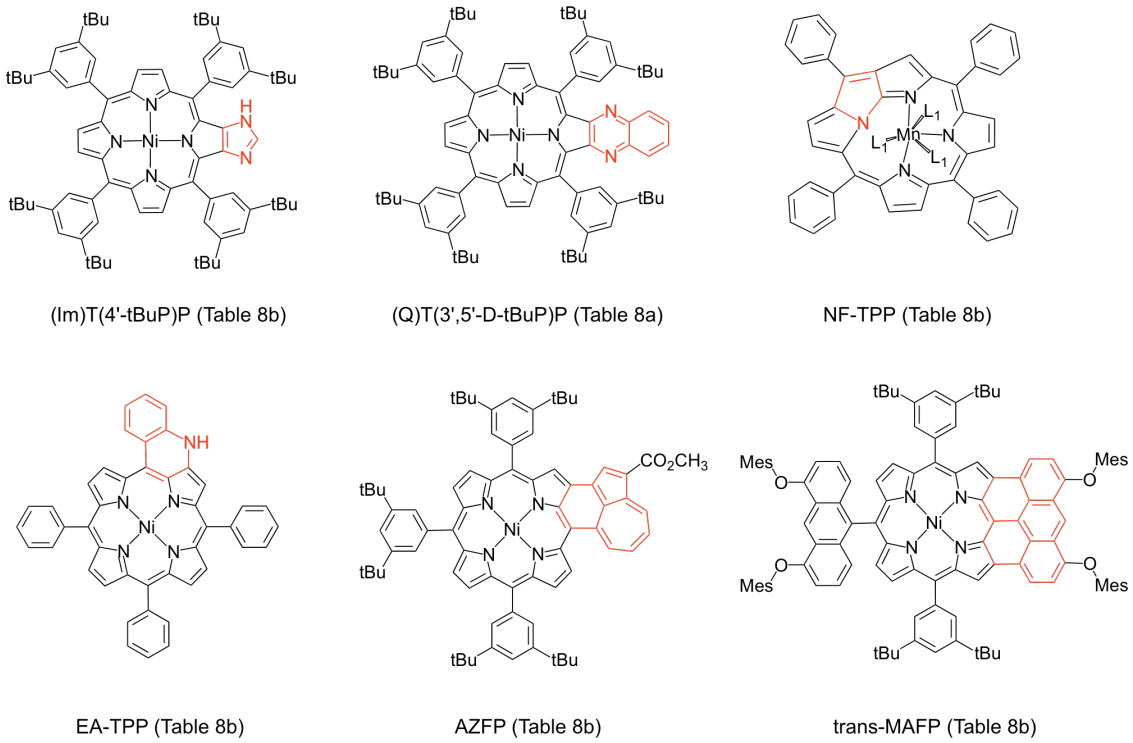


Figure 3.6. Structures of porphyrins with different fused groups on the macrocycles. The potentials for oxidation and reduction are given in the indicated Table of the database and the HOMO-LUMO gap is illustrated in Figure 3.7.

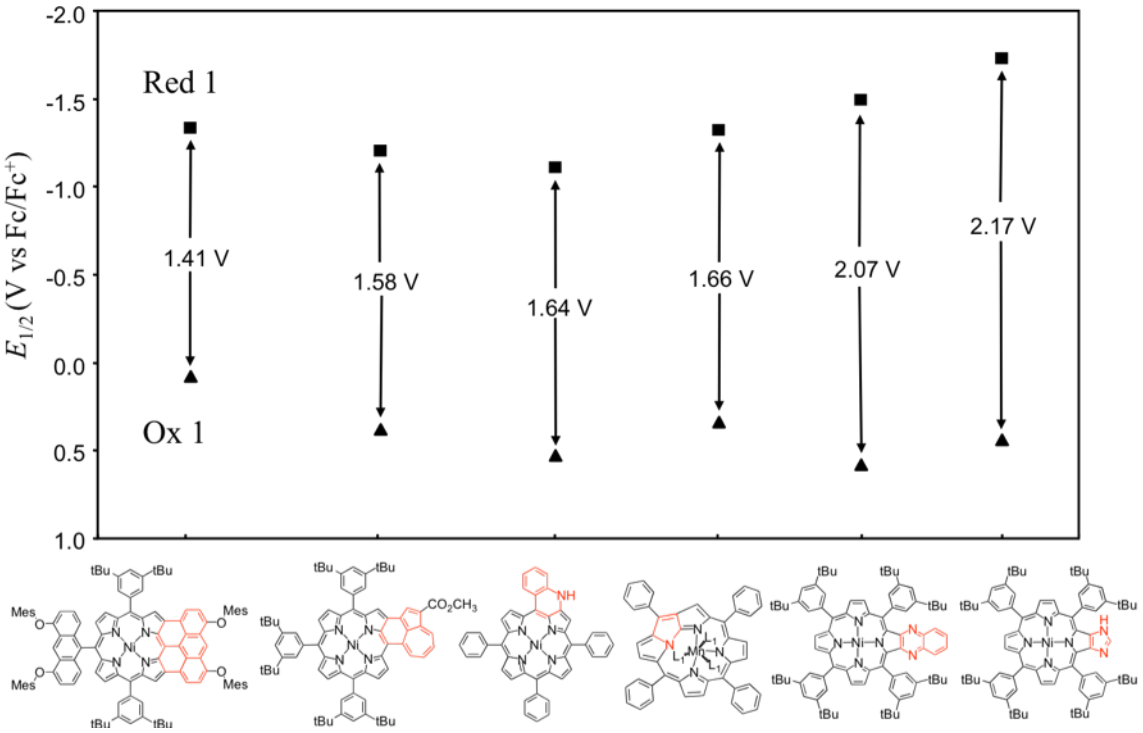


Figure 3.7. Summary of $E_{1/2}$ and HOMO-LUMO gap with additional fused ring systems. An abbreviation for the macrocycle and location of data is shown in Figure 3.6.

(Im)T(4'-tBuP)P. In general, the HOMO-LUMO gap decreases with increase in the number of fused groups conjugated with the porphyrin macrocycle.

Example 4. How different central metal ions effect redox potentials of macrocycle?

The porphyrin ring oxidation and reduction potentials influenced by the central metal ions and its oxidation state. An example of this is shown in Figure 3.8 where $E_{1/2}$ for oxidation is linearly related to the electronegativity of the central metal ion. The data of redox potentials and electronegativity of metals are given in Table 3.4. The positive shift of potentials with increase in electronegativity also occurs for other metal complexes, one example of which is given in Figure 3.9 for quinoxalinoporphyrins.

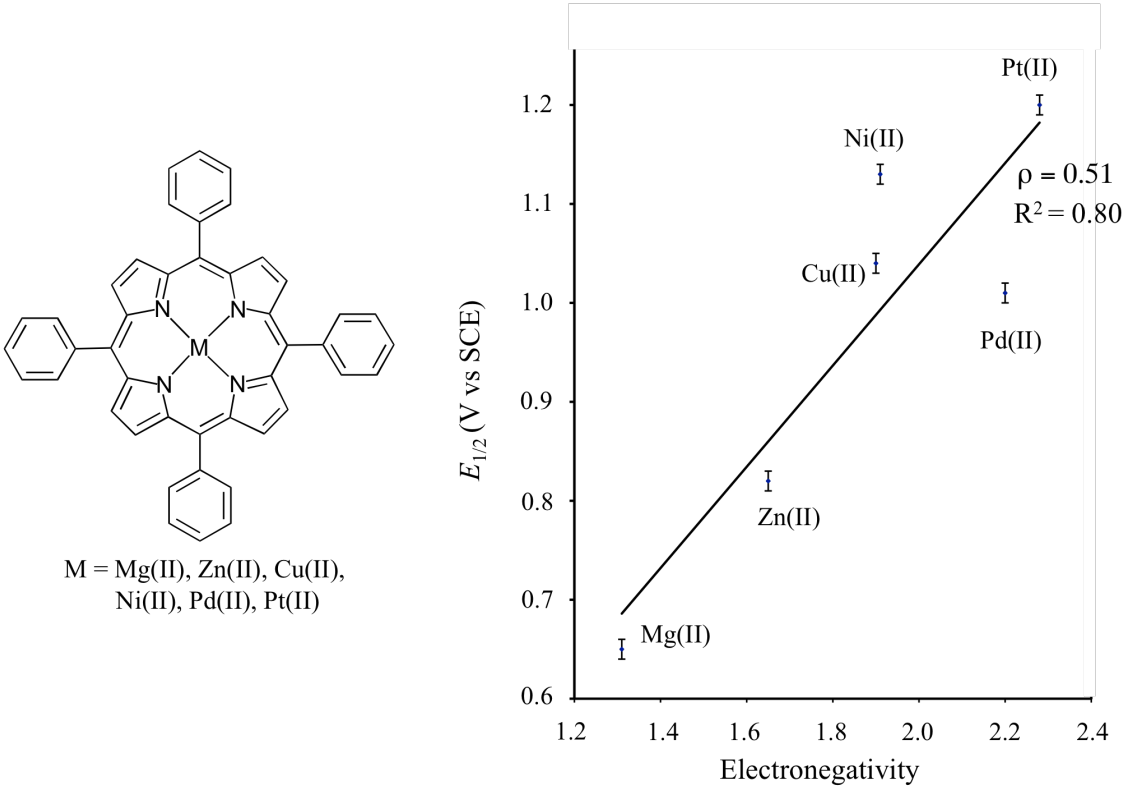


Figure 3.8. Plot of the first oxidation of (TPP)M complexes in CH_2Cl_2 vs the electronegativity of the central metal ions. The half wave potentials are taken from Table 1 and are summarized in Table 3.4 along with the Allred electronegativity.

Table 3.4. Potentials for oxidation and reduction of (TPP)M compounds in CH_2Cl_2. Data taken from Table 1.

Metal	Electronegativity[3]	$E_{1/2}$ Ox 1 (V)	$E_{1/2}$ Red 1 (V)
Cu	1.90	1.04	-1.28
Mg	1.31	0.65	-1.57
Ni	1.91	1.13	-1.12
Pd	2.20	1.01	-1.45
Pt	2.28	1.20	-1.30
Zn	1.65	0.82	-1.32

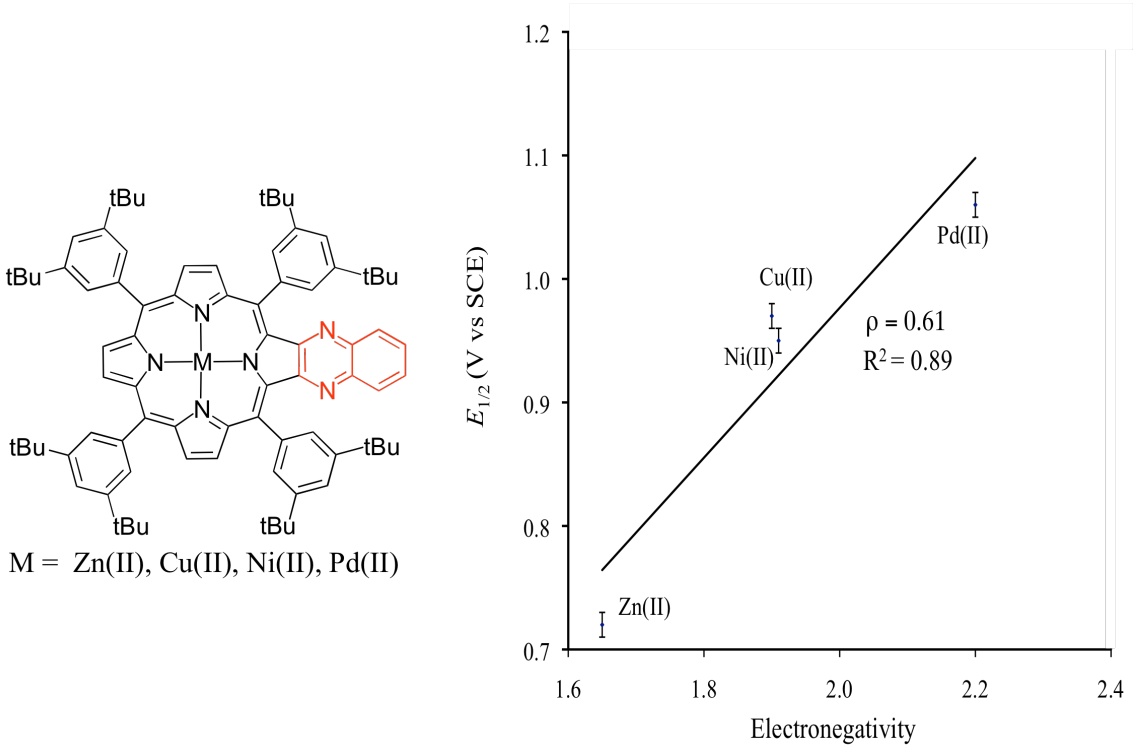


Figure 3.9. Plot of the first oxidation of (PQ)M derivatives in CH_2Cl_2 vs the Allred electronegativity of the central metal ions. The redox potentials are taken from Table 8a of the database and are summarized in Table 3.5.

Table 3.5. Potentials for oxidation and reduction of (PQ)M compounds in CH_2Cl_2. Data taken from Table 8a.

Metal	Electronegativity[3]	$E_{1/2}$ Ox 1 (V)	$E_{1/2}$ Red 1 (V)
Zn	1.65	0.72	-1.31
Cu	1.90	0.97	-1.19
Ni	1.91	0.95	-1.12
Pd	2.20	1.06	-1.16

3.3 References

1. H. H. Jaffe, *Chem. Rev*. **1953**, *53*, 191.

2. Mathias O. Senge. In *The Porphyrin Handbook: Highly Substituted Porphyrins*; Kadish, K. M., Smith, K. M., Guilard, R., Eds.; Academic Press: San Diego, CA, **2000**; Vol. 1, Chapter 6. Pages 255-256, 265-267.

3. A. L. Allred, *J. Inorg. Nucl. Chem*. **1961**, *17*, 215.

CHAPTER FOUR

Database of Porphyrin Redox Potentials

4.1 Organization of the Database

4.1.1 Basic Structure of the Database

The database given in this thesis contains not only the redox potentials of various porphyrin macrocycle types (TPP, OEP, etc), but also includes fields with information on type of central metal ion and its oxidation state, axial ligands, solvent, salt (supporting electrolyte, its concentration), reference electrode (or redox couple), working electrode, temperature, atmosphere over the solution (N_2 or Ar for example), and electrochemical technique employed to gather the data. The listed potentials were in most cases measured by cyclic voltammetry (CV) but other techniques were sometimes used such as differential pulse voltammetry (DPV) and Osteryoung square wave voltammetry (SWV). When this was the case, it is so indicated in a footnote to the table where the potentials are listed. The database is compiled to include potentials for up to three oxidations (*Ox. 1, Ox. 2,* and *Ox. 3*) and three reductions (*red. 1*, *red. 2*, and *red. 3*) if these occur. We also indicate irreversible reactions with an asterisk next to the potential. In general, simple free-base or Zn(II) porphyrins with TPP or OEP macrocycles exhibit two, one-electron oxidations and two, one-electron reductions at the conjugated macrocycle. In some cases, the site of electron transfer is at the metal center or other electroactive groups. When this occurs, the values of $E_{1/2}$ or E_p are given in a field labeled as "metal/other" and located between that of the porphyrin ring-centered oxidations and ring-centered reductions. Most potentials were measured at ambient (RT) temperature conditions but sometimes measurements were made at other temperatures quite different from room temperature. If so the temperature is indicated next to the solvent. The salt or supporting electrolyte concentration employed was

usually 0.1 M, but sometimes different concentrations were used and when this occurs the concentration is indicated next to the supporting electrolyte.

In summary, the database summarizes the reported redox potentials along with the experimental conditions for electrochemical oxidations and reductions of porphyrins, metalloporphyrins and their derivatives in both aqueous and non-aqueous media. The compiled data lists values of $E_{1/2}$ or E_p given in the literature and no attempt was made to modify the reported values from one set of experimental conditions to another (for example, by conversion of the potential from one reference electrode to another). Furthermore, no attempt was been made to eliminate selected data, although in some cases duplication of data occurs under similar or identical conditions when a compound was examined by different authors in different laboratories. In some cases, the summarized redox data or experimental conditions in the tables is incomplete as to the utilized salt, RE, WE or atmospheric conditions. These fields are then left blank. The database has been organized to first include monomeric porphyrins and this is followed by data on porphyrin dimers, trimers and oligomeric or polymeric systems. The summarized data includes porphyrin-corrole dyads, porphyrin-fullerene dyads (including non-covalently bound systems), porphyrin-fullerene-ferrocene triads, porphyrin assemblies, and porphyrins with peripherally bonded inorganic metal complexes. Because of the structural diversity of porphyrins reported in the literature, one of the tables (Table 17) incorporates a variety of substitution patterns of the macrocycle. Finally, the data for naturally occurring porphyrins and their derivatives are listed in Table 24.

4.2 Abbreviations Used in the Database

Most of the utilized abbreviations in the database are easy to understand and are given along with the chemical structures shown in Table 4.1. The database contains not only redox potentials of synthetic analogues but also potentials for oxidation or reduction of some naturally occurring porphyrins. Due to the complex structural pattern of the porphyrins, in some tables, the chemical structure of the macrocycle is given along with the redox data.

4.2.1 Macrocycle (Ring)

The "type of macrocycle" (TPP, OEP etc.) is generally listed as the first entry in column 1 of each table, with examples of representative structures being shown in Figures 4.1 to 4.8. Redox data for porphyrins which are covalented or non-covalently linked to other macrocycles are included in the column for "type of macrocycle". Examples for this are given by complexes of porphyrins with linked fullerenes (C_{60} or C_{70}), graphenes, and single or multiwalled carbon nanotubes. Data on corroles, porphycenes, chlorines, and bacteriochlorins, (all of which are macrocycle related to porphyrins) are excluded from the database.

4.2.2 Central Metal Ion

The type and oxidation state of the central metal ion is given in each table. In some cases, additional metal ions are also present in the compound but these not included in this column which is exclusive for central metal ions. Porphyrin sandwich complexes where metal ions are the bridging ligands are so indicated in the table. The central metal ion influences the redox potentials of the porphyrin π-ring system. Moreover, the redox potentials of the metal ion will vary with the structure of the

Table 4.1 Abbreviation for selected macrocycles used in the tables of electrochemical data.

Table	Abbreviation	Common name
1	TPP	tetraphenylporphyrin
2	OEP	octaethylporphyrin
3	TMP	tetramesitylporphyrin
4	OETPP	octaethyltetraphenylporphyrin
5	T(*o*-piv)PP	*meso*-a, a, a, a -tetrakis(*o*-pivamidophenyl)porphyrin
5	F_{20}TPP	tetrakis-(pentaphenyl)porphyrin
6	Br_8TPP	octabromotetraphenylporphyrin
6	(NO_2)TPP	2-nitro-tetraphenyloporphyrin
7	DPP	dodecaphenylporphyrin
8	(Q)T(3',5'-D-tBuP)P	5,10,15,20-tetrakis(3,5-di-*tert*-butylphenyl) quinoxalino[2,3-b]porphyrin
9	(*N*-Ph)TPP	(*N*-phenyl)-tetraphenylporphyrin
10	TBP	tetrabenzoporphyrin
11	$[TPPS(4)]^{4+}$	tetrakis(*p*-(sodiosulfonato)-phenyl)porphyrin
11	$[TMpy(4)P]^{4+}$	tetrakis(1-methylpyridinium-4-yl)porphyrin
12	$[(TPP)Fe]_2O$	(μ-oxo)bis[5,10,15,20-tetraphenylporphyrinatoiron]
13	$[OEP]_3$-$(Vn)_2$	(E,E)-5,15-bis[2,3,7,8,12,13,17,18-octaethyl-5-porphyrinyl)vinyl]-2,3,7,8,17,18-octaethylporphyrin
14	DEHMP-Ae-MesCorr	1-[(5,15-dimesitylcorrol-10-yl)]-8-[(13,17-diethyl-2,3,7,8,12,18-hexamethylporphyrin-5-yl)]-anthracene
15	Pc-$(Por)_4$	phthalocyanine–tetrakis(tetrakis(5-phenoxy-10,15,20-triphenylporphyrin))
16	$(TriTP)_2$-C_8-M	1,8-bis{4-[10,15,20-tris(4-methylphenyll)porphyrin-5-yl]-phenoxy}octanatocerium
17	3'-PATBPP	5-(3-ethynylphenyl)-10,15,20-tris-(3,5-di-tert-butylphenyl) porphyrin
18	T(Fc)PP	tetraferrocenylphenylporphyrin
23	DPIXDME	deuterioporphyrin IX dimethyl ester
23	Etio	etioporphyrin
23	MPIX	mesoporphyrin IX
23	MPIXDME	mesoporphyrin IX dimethyl ester

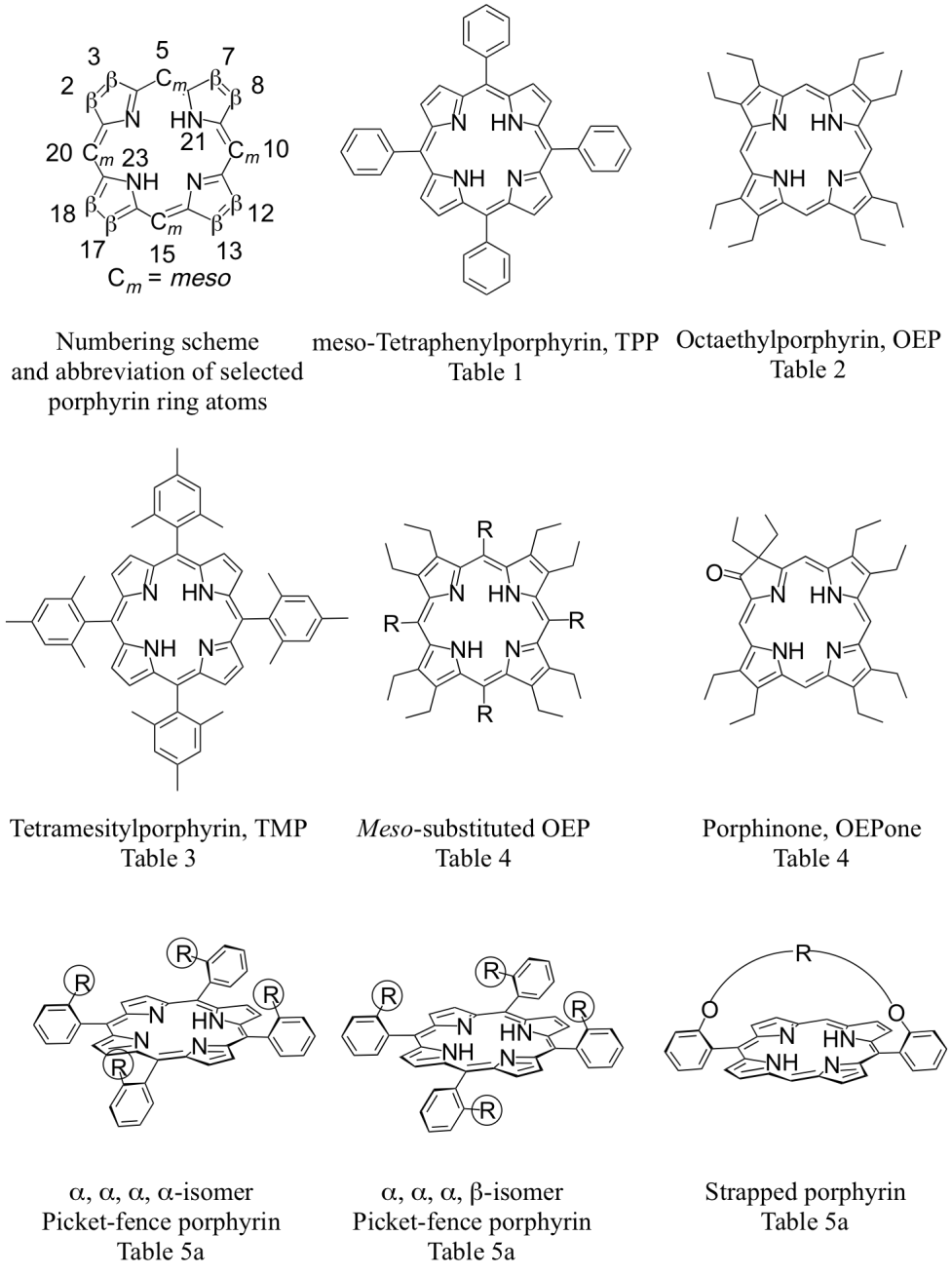
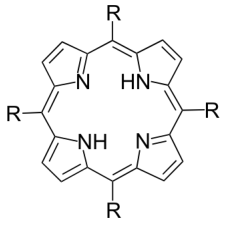
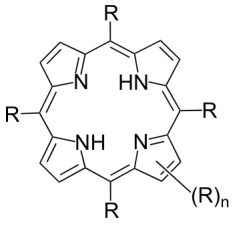


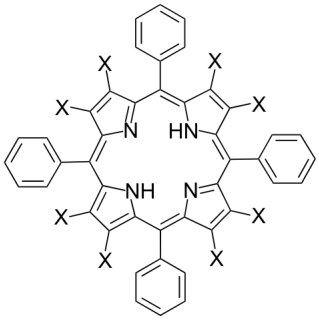
Figure 4.1 Numbering scheme and representative structures of selected porphyrins given in Tables 1-5.



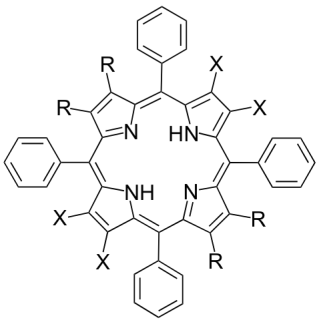
Tetra(alkyl or aryl)porphyrin
R = Alkyl, T(Alkyl)P;
R = Aryl, T(Ar)P
Table 5b and 5c



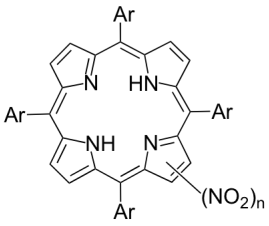
R = Ph, TPP$(NO_2)_n$, n = 2,3
R = Ar, T(Ar)P$(NO_2)_n$, n = 1-8
Table 6a



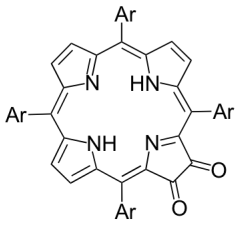
Octa(halo)tetraphenylporphyrin, $TPPX_8$
X = Br, Cl
Table 6b



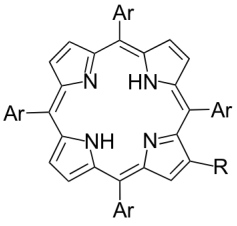
b-Mixed substituted-TPP
R = Ph or CH_3
X = H, Cl, Br, CN
Table 6c



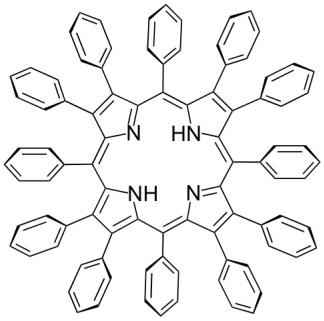
n = 1-8
R = Ph, TPP$(NO_2)_n$
R = Aryl, T(Ar)P$(NO_2)_n$
Table 6d



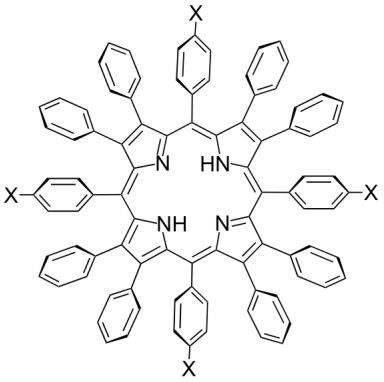
Porphyrin dione
Table 6e



T(Ar)P(R)
Table 6f

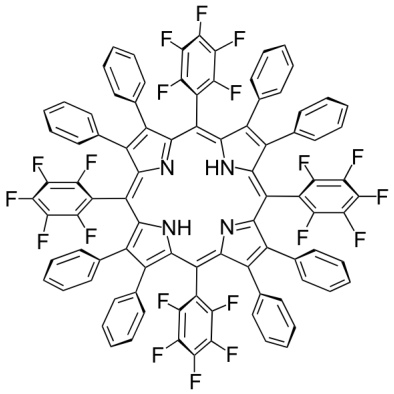


Dodecaphenylporphyrin, DPP
Table 7

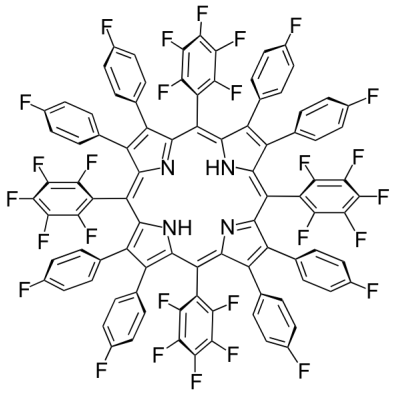


X_4DPP (meso)
X = Br, Cl, F, CF_3, OCH_3, NO_2
Table 7

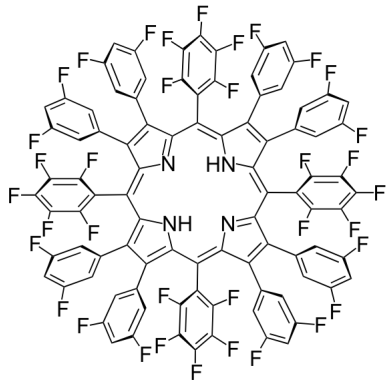
Figure 4.2 Representative structures of porphyrin macrocycles in Tables 5-7.



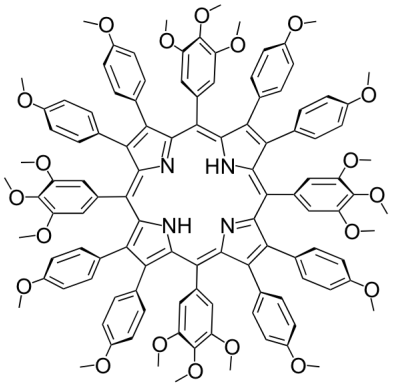
F_{20}DPP (meso)
Table 7



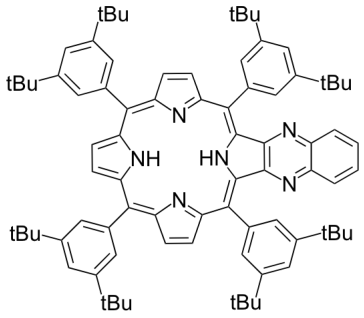
F_{28}DPP
Table 7



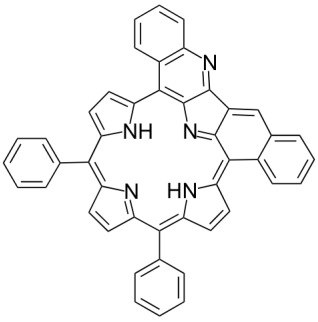
F_{36}DPP
Table 7



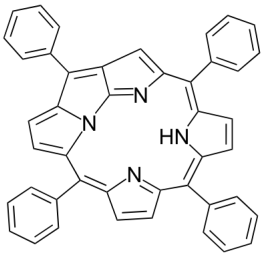
$(OCH_3)_{20}$DPP
Table 7



Porphyrin with fused groups
(Quinoxalinoporphyrin)
Table 8a



Porphyrin with fused groups
(TPP macrocycle)
Table 8b



Porphyrin with fused groups
(TPP macrocycle)
Table 8b

Figure 4.3 Representative structures of selected dodecaphenylporphyrins (DPP) and substituted DPP porphyrin macrocycles with fused groups. Taken from Tables 7 and 8.

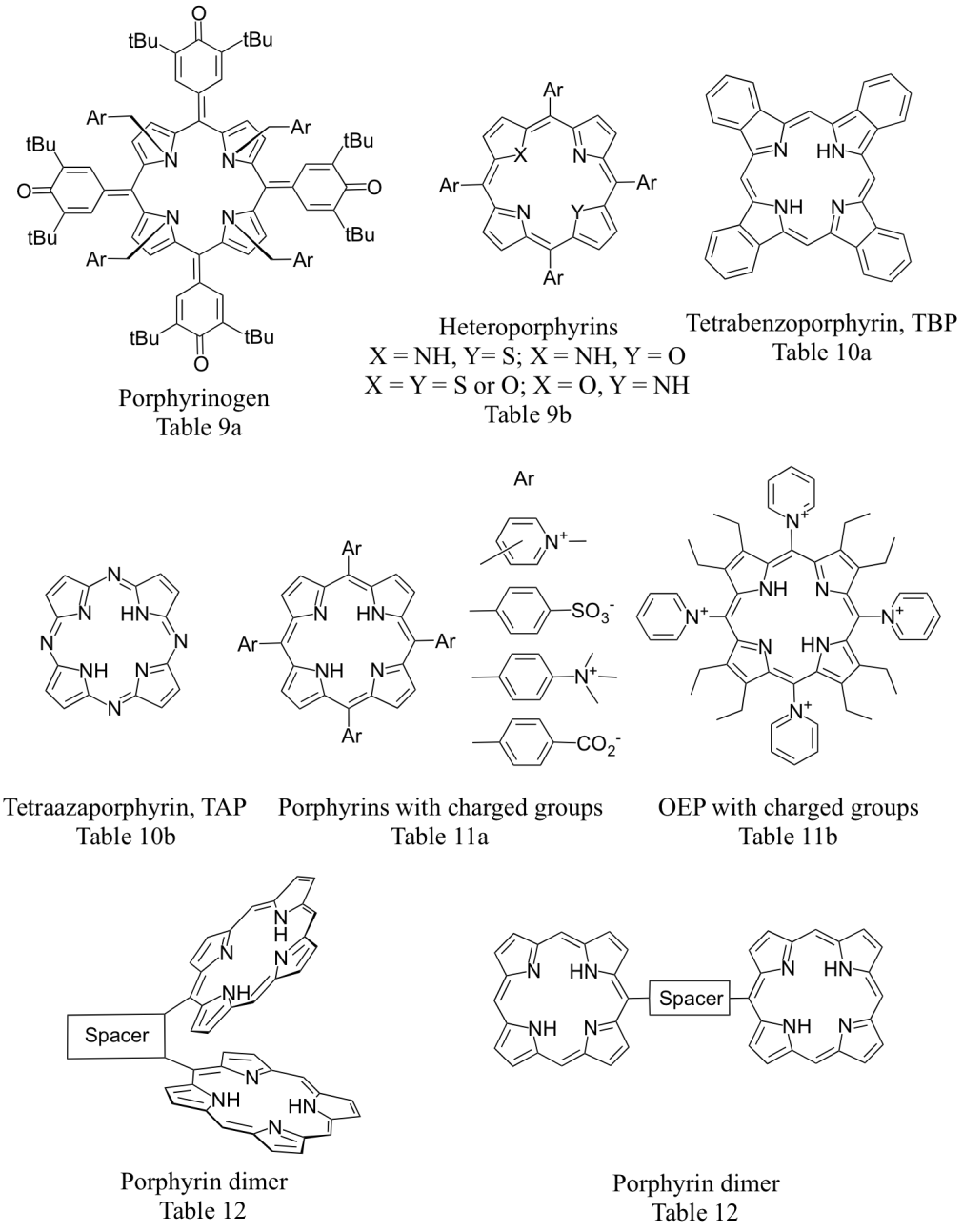
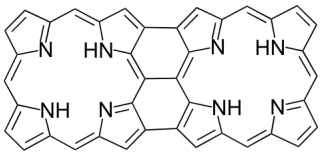
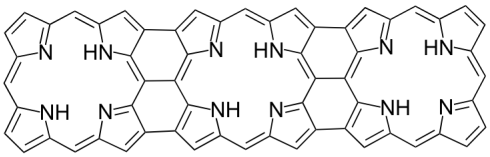


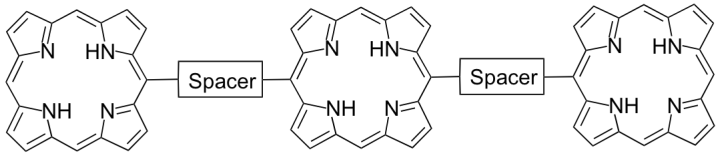
Figure 4.4 Representative structure of selected monomeric (neutral or charged), dimeric and trimeric porphyrin macrocycles in Tables 9-12.



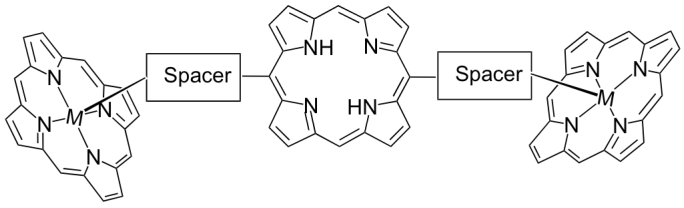
Fused porphyrin dimer
Table 12



Fused porphyrin trimer
Table 13

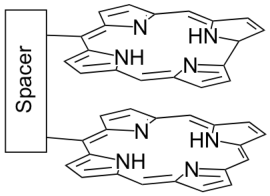


Porphyrin trimer
Table 13

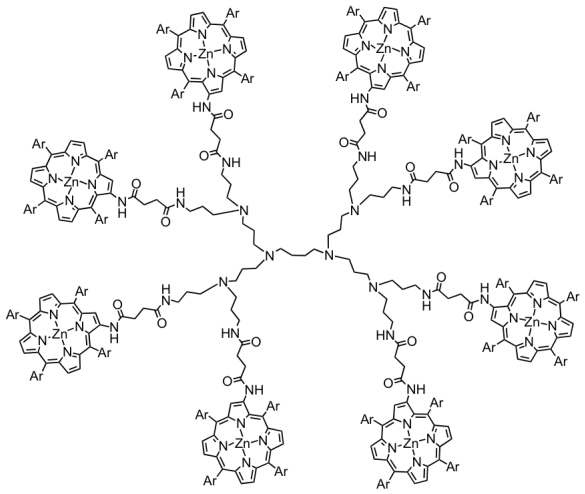


Porphyrin trimer
Table 13

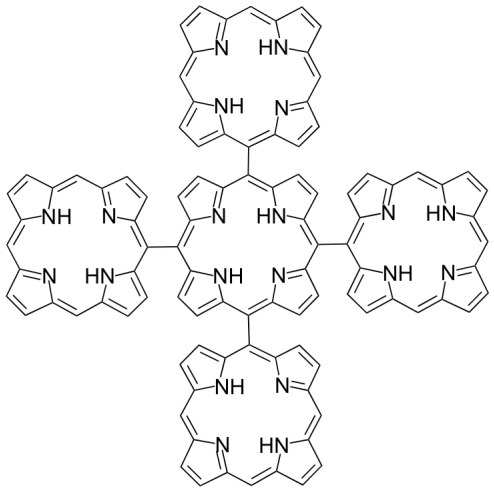
Figure 4.5 Representative structures of selected dimeric and trimeric porphyrin macrocycles in Tables 12 and 13.



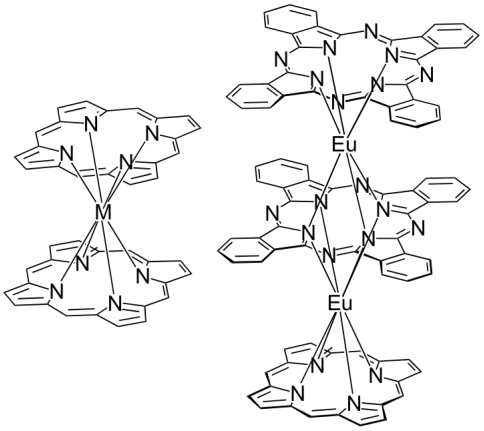
Porphyrin-corrole dyad
Table 14



Porphyrin-dendrimer
Table 15

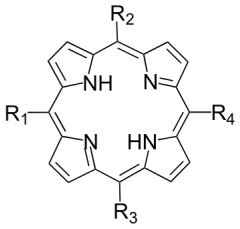


Porphyrin-pentamer
Table 15

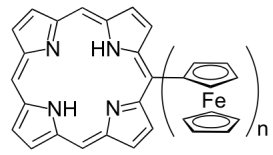


Porphyrin and porphyrin-phthalocyanine
sandwich complexes
Table 16

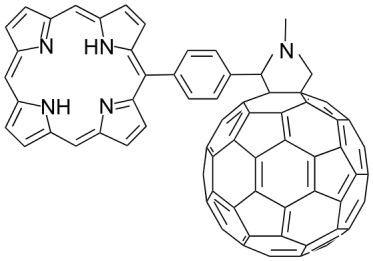
Figure 4.6 Representative structures of selected porphyrin macrocycles in Tables 14-16.



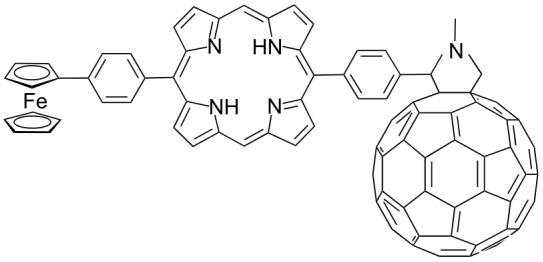
Mixed meso-substituted porphyrin
$R_1 = R_2 = R_3 = A$; $R_4 = B$; A_3B
$R_1 = R_2 = A$; $R_3 = R_4 = B$; A_2B_2
$R_1 = R_2 = A$; $R_3 = B$; $R_4 = H = A_2B$
$R_1 = R_4 = A$; $R_3 = B$; $R_4 = C$; A_2BC
Table 17



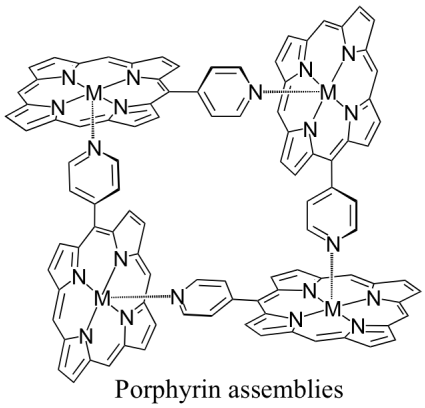
n = 1-4; $T(Fc)_nP$
Porphyrin-ferrocene conjugates
Table 18



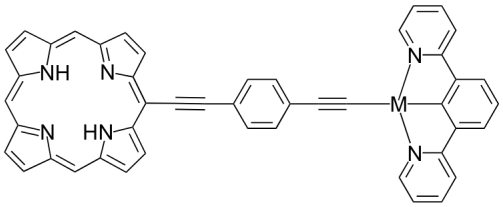
Porphyrin-fullerene dyad
Table 19



Ferrocene-porphyrin-fullerene triad
Table 20

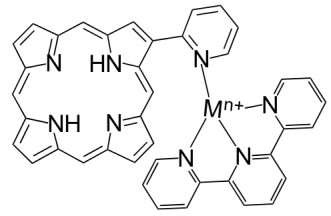


Porphyrin assemblies
Table 21

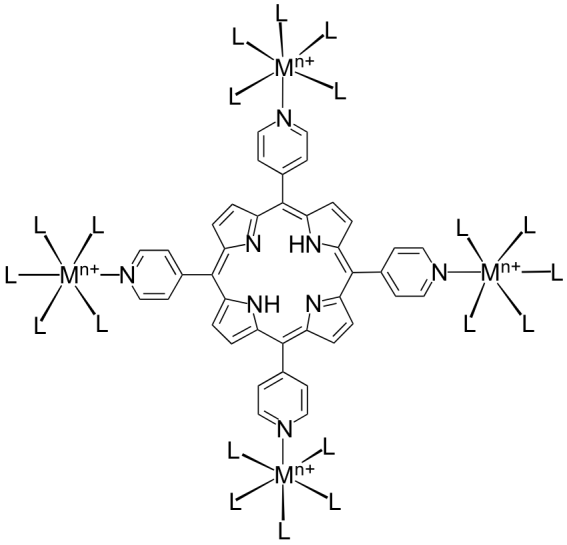


Porphyrin with covalently bonded metal complex
Table 22a

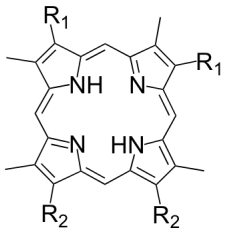
Figure 4.7 Representative structures of selected porphyrin macrocycles in Tables 17-22.

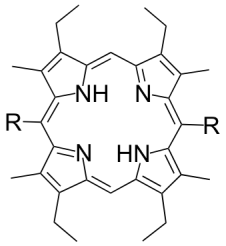


Porphyrin with non-covalently bonded metal complex
Table 22b



Porphyrin with non-covalently bonded metal complex
Table 22b





meso-substituted etioporphyrin II
Table 23b

Macrocycle	abbreviation	R_1	R_2
Protoporphyrin IX,	PPIX	$CH=CH_2$	$C_2H_4CO_2H$
Protoporphyrin IX dimethyester	PPIXDME	$CH=CH_2$	$C_2H_4CO_2CH_3$
Mesoporphyrin IX	MPIX	C_2H_5	$C_2H_4CO_2H$
Hematoporphyrin IX	HPIX	$CH(OH)CH_3$	$C_2H_4CO_2H$
Deuterioporphyrin IX dimethyl ester	DPIXDME	H	$C_2H_4CO_2CH_3$

Table 23a

Figure 4.8 Representative structures of selected synthetic porphyrins and natural porphyrins in Tables 22 and 23.

macrocycle and the coordinating axial ligands. Close to 70 different metal ions, (some in multiple oxidation states) which have been shown to bind to the central nitrogen of metalloporphyrins (see the "Periodic Table of Metallophyrins" in Figure 4.9).

4.2.3 Axial Ligands

Each table lists the axial ligands as reported in the cited manuscript. The ligands at the fifth and sixth axial positions on the metal (denoted as L1 and L2) are neutral or anionic groups. The names and abbreviations of the listed axial ligands are given in Table 4.2. Structures of some complex ligands are given when the abbreviation is not clear.

4.2.4 Solvents

Each table indicates the solvent in which the listed potentials were measured. Names and abbreviations of the solvents in the database are listed alphabetically in Table 4.3.

4.2.5 Supporting Electrolytes (Salts)

The supporting electrolyte used in the original reference is given in each table. Table 4.4 summaries the different supporting electrolytes given in the original references. In most of cases, the concentration of the supporting electrolyte was 0.1 M, but some variations do exist.

4.2.6 Reference Electrodes (or Reference Redox Couples)

The reference electrode or electrode couple (such as Fc/Fc^{+}) to which the redox potentials are referred are also given in each table. The abbreviations of the reference electrodes and the reference couples employed in the different solutions are summarized in Table 4.5.

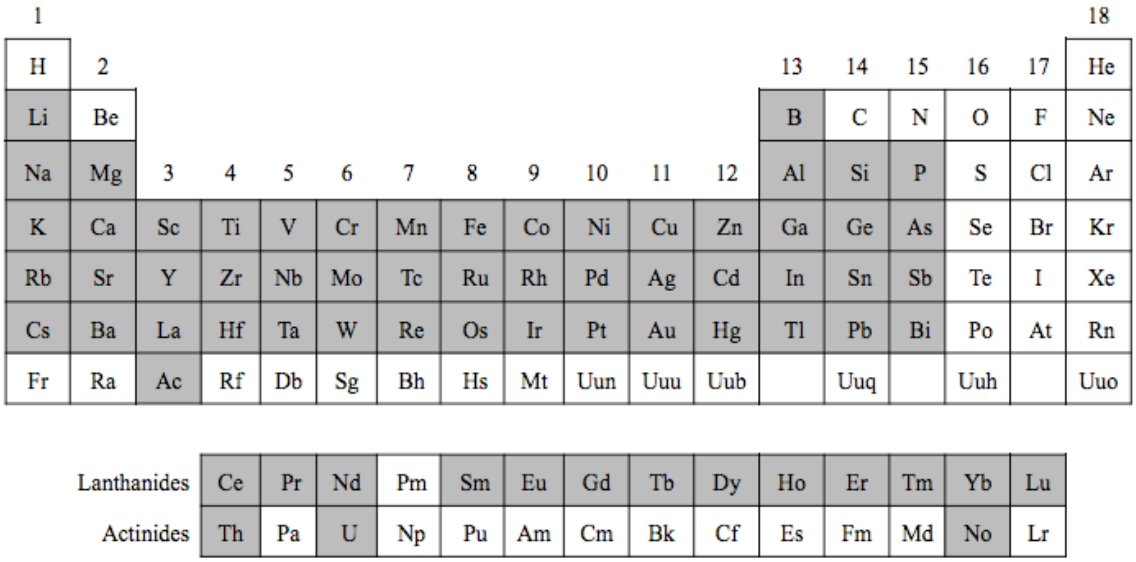


Figure 4.9 Periodic Table of Metalloporphyrins. Shaded elements indicate specific elements which have been incorporated into a given porphyrin macrocycle. Taken from ref. "The Porphyrin Handbook" volume 8, page 4 which published in 2000.

Table 4.2 Axial Ligands Used in the Database.

AsF_6^-	EtS^-	O^{2-}
Br^-	EtSH	ONO^-
$CF_3CO_2^-$	F^-	O_2NO^-
$CF_3SO_3^-$	H_2O	OH^-
CH_3^-	HCO_2^-	$P(OCH_3)_3$
$CH_3CO_2^-$	I^-	PF_3
1-(CH_3)Im	Im	PH_2Ph
CH_3O^-	n-Bu^-	Ph_3PO
CH_3OH	N_3^-	$PHPh_2$
Cl^-	$NH(CH_3)_2$	PPh_3
ClO_4^-	NH_2OH	Py
CO	NCS^-	SbF_6^-
DMSO	NH_3	SCN
Et^-	NO	SH^-
EtO^-	NO_2^-	THF
$(Et)_2S$	$NOsO_3$	
EtOH	NS	

Table 4.3 Solvents Used in the Database.

Abbreviation/Formula	Name of solvent
(BMIM)Tf_2N	1-butyl-3-methylimidazolium bis(tri-fluoromethanesulfonyl)imide)
n-BuCN	Butyronitrile
C_6H_6	Benzene
$CDCl_3$	Chloroform-d
CH_3CN	Acetonitrile
CH_3OH	Methanol
$CHCl_3$	Trichloromethane (chloroform)
DCB	1,2-dichlorobenzene
DCE	1,2-dichloroethane
DCM	Dichloromethane
DFB	1,2-difluorobenzene
DG	Di(2-methoxyethyl) ether
DME	1,2-dimethoxyethane
DMF	N,N- dimethylformamide
DMSO	Dimethylsulfoxide
EtOH	Ethanol
H_2O	Water
N-MP	N-methyl pyrrolidone
PC	Propylene carbonate
PhCN	Benzonitrile
Py	Pyridine
TCE	1,1,2,2-tetrachloroethane
THF	Tetrahydrofuran
Tol.	Toluene

Table 4.4 Supporting Electrolytes (Salts) Used in the Database.

Abbreviation/ Formula	Cation	Anion	Name of Supporting Electrolyte
H_2SO_4	$2H^+$	SO_4^{2-}	Sulfuric acid
HCl	H^+	Cl^-	Hydrochloric acid
$HClO_4$	H^+	ClO_4^-	Perchloric acid
KCl	K^+	Cl^-	Potassium chloride
KNO_3	K^+	NO_3^-	Potassium nitrate
KOH	K^+	OH^-	Potassium nydroxide
KPF_6	K^+	PF_6^-	Potassium hexafluorophosphate
Li_2SO_4	$2Li^+$	SO_4^-	Lithium sulfate
$LiClO_4$	Li^+	ClO_4^-	Lithium perchlorate
$[BMIM]BF_4$	$[BMIM]^+$	BF_4^-	1-butyl-3-methylimidazolium tetrafluoroborate
$[BMIM]Tf_2N$	$[BMIM]^+$	Tf_2N^-	1-butyl-3-methylimidazolium bis-(trifluoromethanesulfonyl)imide
Na_3PO_4	$3Na^+$	PO_4^{3-}	Sodium phosphate
Na_2SO_4	$2Na^+$	SO_4^{2-}	Sodium sulfate
NaCl	Na^+	Cl^-	Sodium chloride
$NaClO_4$	Na^+	ClO_4^-	Sodium perchlorate
NaOH	Na^+	OH^-	Sodium hydroxide
$NaPF_6$	Na^+	PF_6^-	Sodium hexafluorophosphate
$P(Ph)_4BF_4$	$[P(Ph)_4]^+$	BF_4^-	Tetraphenylphosphonium tetrafluoroborate
PB			Phosphate buffer

Table 4.4 Supporting Electrolytes (Salts) Used in the Database. (Continued)

Abbreviation/ Formula	Cation	Anion	Name of Supporting Electrolyte
$TBAAsF_6$	$[TBA]^+$	AsF_6^-	Tetra-n-butylammonium hexafluoroarsenate
$TBABF_4$	$[TBA]^+$	BF_4^-	Tetra-n-butylammonium tetrafluoroborate
$TBABPh_4$	$[TBA]^+$	BPh_4^-	Tetra-n-butylammonium tetraphenylborate
TBACl	$[TBA]^+$	Cl^-	Tetra-n-butylammonium chloride
TBAOAc	$[TBA]^+$	OAc^-	Tetra-n-butylammonium acetate
TBAOH	$[TBA]^+$	OH^-	Tetra-n-butylammonium hydroxide
TBAP	$[TBA]^+$	ClO_4^-	Tetra-n-butylammonium perchlorate
$TBAPF_6$	$[TBA]^+$	PF_6^-	Tetra-n-butylammonium hexafluorophosphate
$TBASbF_6$	$[TBA]^+$	SbF_6^-	Tetra-n-butyl-ammonium hexafluoroantimonate
$TEAB(C_6F_5)_4$	$[TEA]^+$	$[B(C_6F_5)_4]^-$	Tetraethylammonium tetrakis-(pentafluorophenyl)borate
$TEABF_4$	$[TEA]^+$	BF_4^-	Tetraethylammonium tetrafluoroborate
$N(Et_3)(Ph)Cl^-$	$[N(Et_3)(Ph)]^+$	Cl^-	Triethylphenylammonium chloride
TEACl	$[TEA]^+$	Cl^-	Tetraethylammonium chloride
TEAP	$[TEA]^+$	ClO_4^-	Tetraethylammonium perchlorate

Table 4.4 Supporting Electrolytes (Salts) Used in the Database. (Continued)

Abbreviation/ Formula	Cation	Anion	Name of Supporting Electrolyte
$TEAPF_6$	$[TEA]^+$	PF_6^-	Tetraethylammonium hexafluorophosphate
TFAB	$[TBA]^+$	$[B(C_6F_5)_4]^-$	Tetra-n-butylammonium tetrakis-(perfluorophenyl)borate
THAP	$[THA]^+$	ClO_4^-	Tetra-n-hexylammonium perchlorate
$THAPF_6$	$[THA]^+$	PF_6^-	Tetra-n-hexylammonium hexafluorophosphate
$THTDPPF_6$	$[THP]^+$	PF_6^-	Trihexyl(tetradecyl)phosphonium hexafluorophosphate
TMAOH	$[TMA]^+$	OH^-	Tetramethylammonium hydroxide
TPrAP	$[TPrA]^+$	ClO_4^-	Tetrapropylammonium perchlorate

Table 4.5 Reference Electrodes Used in the Database

Abbreviation/Formula	Reference electrode
Ag/Ag^{+}	Silver-silver ion electrode
Ag/AgCl	Silver-silver chloride electrode
$Ag/AgClO_4$	Silver-silver perchlorate electrode
$Ag/AgNO_3$	Silver-silver nitrate electrode
$Ag/AgPF_6$	Silver-silver hexafluorophosphate electrode
$CuTPP^{0/+}$	Copper tetraphenylporphy/ copper tetraphenylporphyrin cation
Fc/Fc^{+}	Ferrocene/ferrocinium
NHE	Normal hydrogen electode
Pt Wire	Platinum wire electrode
SCE	Saturated calomel electrode
SSCE	Saturated sodium chloride electrode
SHE	Saturated hydrogen electrode

4.2.7 Working Electrodes (WE)

The working electrodes used in measurements of $E_{1/2}$ or E_p values are listed in Table 4.6.

Table 4.6 Working Electrodes Used in the Database

Abbreviation/Formula	Name
Au	Gold
Au Wire	Gold wire
Au-SAM	Gold modified self-assembled monolayer
Boron-doped Diamond Disk	Boron-doped diamond disk
EPG	Edge-plane graphite
GCE	Glass carbon
Gold Modified Co(II)-Porphyrin	Gold modified Co(II) porphyrin
In_2O_3	Indium oxide
ITO	Indium tin oxide
ITO Coated Electrode	Indium tin oxide coated
ITO Glass Electrode	Indium tin oxide glass
MWCNT Modified-Au	Multi-walled carbon nanotubes modified gold
OPG	Ordinary pyrolytic graphite
PGE	Pyrolytic graphite
Poly CoTAPP Modified GC	Poly CoTAPP modified glass carbon
Pt	Platinum
VCD	Vitreous carbon disk

Table 1.Tetraphenylporphyrin (TPP) macrocycles. (see structures in Figure 1)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphryin Ox 3	Porphryin Ox 2	Porphryin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
TPP	**1**	2H			CH_3CN	NR	SCE		1.34	1.10		-1.10	-1.48		393
TPP	**1**	2H			CH_3CN/DCE	$TEAPF_6$	SCE		1.34	1.10		-1.10	-1.48		154
TPP	**1**	2H			$CHCl_3$	TBAP (0.2M)	SCE		1.30	1.05		-1.38*			318
TPP	**1**	2H			DCB	TBAP	Fc/Fc^+		0.79	0.53		-1.75	-2.05		57
TPP	**1**	2H			DCB	$TBAPF_6$	Fc/Fc^+			0.53		-1.54			410 (SWV)
TPP	**1**	2H			DCB	$TBAPF_6$ (0.05M)	Fc/Fc^+	1.16	0.94	0.52		-1.75	-2.07		369
TPP	**1**	2H			DCB	$TBAPF_6$ (0.05M)	SCE		1.48	1.05		-1.24	-1.55		13
TPP	**1**	2H			DCM	$TBABF_4$	Ag/AgCl					-1.37	-1.61		192
TPP	**1**	2H			DCM	$TBABF_4$ (0.2M)	Fc/Fc^+			0.98		-1.33	-1.66		382
TPP	**1**	2H			DCM	TBAP	SCE			1.02		-1.20			61
TPP	**1**	2H			DCM	TBAP	SCE		1.25	1.00		-1.23	-1.69		302
TPP	**1**	2H			DCM	TBAP	SCE		1.21	1.05		-1.15	-1.50		318
TPP	**1**	2H			DCM	$TBAPF_6$	Ag/AgCl		1.34	1.00		-1.23	-1.54		23
TPP	**1**	2H			DCM	$TBAPF_6$	Fc/Fc^+		0.82	0.52		-1.67	-1.98		26
TPP	**1**	2H			DCM	$TBAPF_6$	Fc/Fc^+		1.01	0.55		-1.67	-2.00		229
TPP	**1**	2H			DCM	$TBAPF_6$	Ag/AgCl		1.34	1.00		-1.23	-1.54		322
TPP	**1**	2H			DCM	$TBAPF_6$	Fc/Fc^+			0.58		-1.73	-2.06		376
TPP	**1**	2H			DCM	$TBAPF_6$	Fc/Fc^+			0.49		-1.72			525
TPP	**1**	2H			DCM	$TBAPF_6$	SCE			1.03		-1.23	-1.55		555
TPP	**1**	2H			DCM	$THPPF_6$	Ag/AgCl		1.54	1.20		-1.01	-1.32		317

Table 1.Tetraphenylporphyrin (TPP) macrocycles. (see structures in Figure 1)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphryin Ox 3	Porphryin Ox 2	Porphryin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
TPP	**1**	2H			DMSO	TBAP	Ag/AgCl						-0.77	-1.20		210
TPP	**1**	2H			PhCN	$TBAPF_6$ (0.2M)	Fc/Fc^+		0.93	0.60			-1.61	-2.00		349
TPP	**1**	2H			THF	TBAP	Fc/Fc^+			0.60			-1.70			293
TPP	**1**	2H			THF	$TBAPF_6$ (0.5M)	Fc/Fc^+			0.71*			-1.58	-1.98		560
TPP	--	Al(II)	THF	THF	THF	$TBAPF_6$	Fc/Fc^+						-1.39			232
TPP	--	Al(III)			PhCN	$TBAPF_6$	SCE			0.75			-1.08			565 (DPV)
TPP	--	Al(III)	Cl^-		DCM	$TBAPF_6$	Fc/Fc^+						-1.56			232
TPP	--	Bi(III)	$CF_3SO_3^-$		DCM	TBAP	SCE		1.51	1.15						54
TPP	--	Bi(III)	NO_3^-		DCM	TBAP	SCE		1.50	1.16						54
TPP	--	Bi(III)	NO_3^-		PhCN	TBAP	SCE		1.52	1.15						54
TPP	--	Co(II)			DCM	$TBAPF_6$	SCE		1.30	1.20	0.76					53
TPP	--	Co(II)			DCM	$TBAPF_6$	SCE		1.30	1.10	0.90	-0.85				53
TPP	--	Co(II)			DCM	$TBAPF_6$ (0.2M)	SCE		1.30	1.10	0.90					73
TPP	--	Co(II)			DCM	$TBAPF_6$ (0.2M)	SCE		1.30	1.20	0.76					73
TPP	--	Co(II)			DMF	TBAP	SCE				-0.74					384
TPP	--	Co(II)			DMF	TBAP	Ag/AgCl				-0.70					384
TPP	--	Co(II)			DMF	TEAP	SCE				-0.77		-1.87			584
TPP	--	Co(II)			DMSO	TBAP	Ag/AgCl			1.47	0.35	-0.64	-1.68			210
TPP	--	Co(II)			DMSO	TBAP	SCE				0.02	-0.96	-2.02			263
TPP	--	Co(II)			*n*-BuCN	TBAP	SCE				-0.86		-2.02			266

Table 1.Tetraphenylporphyrin (TPP) macrocycles. (see structures in Figure 1)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphryin Ox 3	Porphryin Ox 2	Porphryin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
TPP	--	Co(II)			PhCN	TBAP	SCE				0.90	-0.84				41
TPP	--	Co(II)			PhCN	TBAP	SCE		1.38	1.20	0.56*	-0.84				43
TPP	--	Co(II)			PhCN	TBAP	SCE		1.37	1.19	0.56	-0.84				59
TPP	--	Co(II)			PhCN	$TBAPF_6$	Ag/Ag^+		1.15	0.88	0.15	-1.17	-2.29			212
TPP	--	Co(III)	CH_3^-		$CH_3CN/CHCl_3$	TBAP	SCE			1.20	0.84					70
TPP	--	Co(III)	CH_3^-		DCM	TBAP	SCE				0.95					75
TPP	--	Co(III)	CH_3^-		DCM (-70°C)	TBAP	SCE				0.85					75
TPP	--	Co(III)	CH_3^-	Py	DCM	TBAP	SCE				0.76					75
TPP	**2**	Co(III)	CH_3^-	See Fig.	DCM	TBAP	SCE				0.91					75
TPP	**3**	Co(III)	CH_3^-	See Fig.	DCM	TBAP	SCE				0.88					75
TPP	**4**	Co(III)	CH_3^-	See Fig.	DCM	TBAP	SCE				0.84					75
TPP	**5**	Co(III)	CH_3^-	See Fig.	DCM	TBAP	SCE				0.76					75
TPP	**6**	Co(III)	CH_3^-	See Fig.	DCM	TBAP	SCE				0.73					75
TPP	**7**	Co(III)	CH_3^-	See Fig.	DCM	TBAP	SCE				0.66					75
TPP	--	Co(III)	Et^-		$CH_3CN/CHCl_3$	TBAP	SCE			0.97	0.84*					70
TPP	--	Co(III)	Et^-		$CH_3CN/CHCl_3$	TBAP	SCE				0.84					75
TPP	--	Co(III)	Et^-		$CH_3CN/CHCl_3$	TBAP	SCE				0.83*					75
TPP	--	Co(III)	Et^-		$CH_3CN/CHCl_3$	TBAP	SCE			0.97	0.83*					70
TPP	--	Co(III)	Et^-		DCM (-70°C)	TBAP	SCE				0.84					75
TPP	--	Co(III)	Et^-	Py	DCM (-70°C)	TBAP	SCE				0.68					75

Table 1.Tetraphenylporphyrin (TPP) macrocycles. (see structures in Figure 1)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphryin Ox 3	Porphryin Ox 2	Porphryin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
TPP	**8**	Co(III)	Et^-	See Fig.	DCM (-70°C)	TBAP	SCE				0.77				75
TPP	**9**	Co(III)	Et^-	See Fig.	DCM (-70°C)	TBAP	SCE				0.74				75
TPP	**10**	Co(III)	Et^-	See Fig.	DCM (-70°C)	TBAP	SCE				0.72				75
TPP	**11**	Co(III)	Et^-	See Fig.	DCM (-70°C)	TBAP	SCE				0.69				75
TPP	**12**	Co(III)	Et^-	See Fig.	DCM (-70°C)	TBAP	SCE				0.65				75
TPP	**13**	Co(III)	Et^-	See Fig.	DCM (-70°C)	TBAP	SCE				0.63				75
TPP	--	Co(III)	*n*-Bu^-		DCM	TBAP	SCE				0.96*				75
TPP	--	Co(III)	*n*-Bu^-		DCM (-70°C)	TBAP	SCE				0.81				75
TPP	--	Co(III)	*n*-Bu^-		DMF	TEAP	SCE			0.91		-1.35			584
TPP	--	Co(III)	*n*-Bu^-		DMSO	TBAP	SCE				-1.45				263
TPP	--	Co(III)	NH_2OH	NH_2OH	DCM	TBAP	SCE				-0.78*				578
TPP	--	Co(III)	NO_2^-	Py	CH_3CN	$TBAPF_6$	$Ag/AgNO_3$		1.21	0.90	0.69				396
TPP	**14**	Co(III)	NO_2^-	See Fig.	CH_3CN	$TBAPF_6$	$Ag/AgNO_3$		1.28	1.07	0.71				396
TPP	**15**	Co(III)	NO_2^-	See Fig.	CH_3CN	$TBAPF_6$	$Ag/AgNO_3$		1.27	1.01	0.67				396
TPP	**16**	Co(III)	NO_2^-	See Fig.	CH_3CN	$TBAPF_6$	$Ag/AgNO_3$		1.11	0.92	0.63				396
TPP	--	Co(III)	Ph^-		$CH_3CN/CHCl_3$	TBAP	SCE			1.11	0.79				70
TPP	--	Co(III)	Ph^-		$CH_3CN/CHCl_3$	TBAP	SCE				0.79				75
TPP	--	Co(III)	Ph^-		DCM	TBAP	SCE				0.98				75
TPP	--	Co(III)	Ph^-		DCM (-70°C)	TBAP	SCE				0.89				75
TPP	--	Co(III)	Ph^-	Py	$CH_3CN/CHCl_3$	TBAP	SCE				0.75				75

Table 1.Tetraphenylporphyrin (TPP) macrocycles. (see structures in Figure 1)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphryin Ox 3	Porphryin Ox 2	Porphryin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
TPP	--	Co(III)	Ph^-	Py	DCM	TBAP	SCE				0.78				75
TPP	**17**	Co(III)	Ph^-	See Fig.	$CH_3CN/CHCl_3$	TBAP	SCE				0.79				75
TPP	**18**	Co(III)	Ph^-	See Fig.	$CH_3CN/CHCl_3$	TBAP	SCE				0.78				75
TPP	**19**	Co(III)	Ph^-	See Fig.	$CH_3CN/CHCl_3$	TBAP	SCE				0.75				75
TPP	**20**	Co(III)	Ph^-	See Fig.	$CH_3CN/CHCl_3$	TBAP	SCE				0.75				75
TPP	**21**	Co(III)	Ph^-	See Fig.	$CH_3CN/CHCl_3$	TBAP	SCE				0.73				75
TPP	**22**	Co(III)	Ph^-	See Fig.	$CH_3CN/CHCl_3$	TBAP	SCE				0.69				75
TPP	**17**	Co(III)	Ph^-	See Fig.	DCM	TBAP	SCE				0.91				75
TPP	**18**	Co(III)	Ph^-	See Fig.	DCM	TBAP	SCE				0.89				75
TPP	**19**	Co(III)	Ph^-	See Fig.	DCM	TBAP	SCE				0.86				75
TPP	**20**	Co(III)	Ph^-	See Fig.	DCM	TBAP	SCE				0.78				75
TPP	**21**	Co(III)	Ph^-	See Fig.	DCM	TBAP	SCE				0.76				75
TPP	**22**	Co(III)	Ph^-	See Fig.	DCM	TBAP	SCE				0.72				75
TPP	**23**	Co(III)	See Fig.		DMF	TEAP	SCE			0.91		-1.30			584
TPP	**24**	Co(III)	See Fig.		DMF	TEAP	SCE			0.74		-1.25			584
TPP	**25**	Co(III)	See Fig.		DMF	TEAP	SCE			0.76		-1.30			584
TPP	**26**	Co(III)	See Fig.		DMF	TEAP	SCE			0.74		-1.32			584
TPP	**27**	Co(III)	See Fig.		DMF	TEAP	SCE			0.80		-1.17			584
TPP	**28**	Co(III)	See Fig.		DMSO	TBAP	SCE					-1.38			263
TPP	--	Cu(II)			CH_3CN	TBAP	Fc/Fc^+			0.60					448

Table 1.Tetraphenylporphyrin (TPP) macrocycles. (see structures in Figure 1)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphryin Ox 3	Porphryin Ox 2	Porphryin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
TPP	--	Cu(II)			CH_3CN/DCE	$TEAPF_6$	SCE		1.33	1.06			-1.22	-1.68		154
TPP	--	Cu(II)			DCM	TBAP	SCE		1.29	1.04			-1.28	-1.70		38
TPP	--	Cu(II)			DCM	TBAP	SCE		1.27	1.03			-1.29	-1.72		302
TPP	--	Cu(II)			DCM	$TBAPF_6$	Ag/AgCl		1.35	0.97			-1.30	-1.70		23
TPP	--	Cu(II)			DCM	$TBAPF_6$	Ag/AgCl		1.35	0.97			-1.33			322
TPP	--	Cu(II)			DCM	$TBAPF_6$	SCE		1.21	0.98			-1.33	-1.80		555
TPP	--	Cu(II)			DCM	$TBAPF_6$	$CuTPP^{0/+}$			0.00						579
TPP	--	Cu(II)			DCM	$THPPF_6$	Ag/AgCl		1.42	1.08			-1.23	-1.64		317
TPP	--	Cu(II)			PhCN	TBAP	SCE		1.35	1.04			-1.27	-1.72		38
TPP	--	Cu(II)			PhCN	TBAP	SCE		1.31	1.02			-1.28	-1.73		43
TPP	--	Cu(II)			PhCN	TBAP	SCE		1.31	1.02			-1.28	-1.74		59
TPP	--	Fe(II)			DMF	TEAP	SCE						-1.04	-1.65		584
TPP	--	Fe(II)	NO		THF	TBAP	SCE				-1.44		-2.26			583
TPP	--	Fe(III)			DCM	$TBABF_4$	Ag/AgCl				-0.34	-1.16	-1.72	-1.90		192
TPP	--	Fe(III)	CH_3^-		DMF	TEAP	SCE						-0.77			584
TPP	--	Fe(III)	Cl^-		DCM	TBAP	SCE		1.43	1.14						62
TPP	--	Fe(III)	Cl^-		DCM	$TBAPF_6$	SCE		1.55	1.11	-0.36		-1.12			362
TPP	--	Fe(III)	Cl^-		DG/CH_3OH	$TBAPF_6$	Ag/AgCl				-0.07	-1.10				188
TPP	--	Fe(III)	Cl^-		DMF	TBAP	$Ag/AgNO_3$				-0.60	-1.48				189
TPP	--	Fe(III)	Cl^-		*N*-MP	TEAP	SCE				-0.15					451

Table 1.Tetraphenylporphyrin (TPP) macrocycles. (see structures in Figure 1)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphryin Ox 3	Porphryin Ox 2	Porphryin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
TPP	--	Fe(III)	Cl^-		PhCN	TBAP	SCE			1.20	-0.29					41
TPP	--	Fe(III)	Cl^-		PhCN	TBAP	SCE				-0.29		-1.06	-1.73	-1.73	62
TPP	--	Fe(III)	Cl^-		PhCN	$TBAPF_6$	SCE		1.57	1.13	-0.32		-1.08			362
TPP	--	Fe(III)	Cl^-		Py	TBAP	SCE				0.17		-1.45			62
TPP	--	Fe(III)	Im	Im	CH_3CN	$TBAPF_6$	Fc/Fc^+				-0.59					434
TPP	--	Fe(III)	*n*-Bu^-		DMF	TEAP	SCE						-0.78			584
TPP	--	Fe(III)	NH_3	NH_3	THF	TBAP	SCE				-0.09*					578
TPP	**29**	Fe(III)	See Fig.		DMF	TEAP	SCE						-0.80			584
TPP	**30**	Fe(III)	See Fig.		DMF	TEAP	SCE						-0.78			584
TPP	**31**	Fe(III)	See Fig.		DMF	TEAP	SCE						-0.74			584
TPP	**32**	Fe(III)	See Fig.		DMF	TEAP	SCE						-0.76			584
TPP	--	Ge(II)			THF	$TEAB(C_6F_5)_4$	Fc/Fc^+						-1.65	-2.09		236
TPP	--	Ge(IV)	Py	Py	Py	$TEAB(C_6F_5)_4$	Fc/Fc^+						-0.77	-1.24		236
TPP	--	Mg(II)			DCB	TBAP	Fc/Fc^+		0.46	0.07			-2.03*	-2.12		164
TPP	--	Mg(II)			DCB	TBAP	Fc/Fc^+		0.46	0.07						166
TPP	--	Mg(II)			DCM	TBAP	SCE		0.94	0.65			-1.57			78
TPP	--	Mn(III)	Cl^-		CH_3CN	TBAP	SCE				-0.22					348
TPP	--	Mn(III)	Cl^-		CH_3CN	$TBAPF_6$	NHE				1.49	-0.03	-1.33	-1.90		171
TPP	--	Mn(III)	Cl^-		DCM	TBAP	SCE		1.55	1.16	-0.29		-1.68			302
TPP	--	Mn(III)	Cl^-		NR	NR	NR				-0.23					477

Table 1.Tetraphenylporphyrin (TPP) macrocycles. (see structures in Figure 1)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphryin Ox 3	Porphryin Ox 2	Porphryin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
TPP	--	Mn(III)	Cl^-		PhCN	TBAP	SCE			1.17	-0.29				41
TPP	--	Mn(III)	Cl^-		PhCN	TBAP	SCE				-0.22				68
TPP	**33**	Mn(III)	See Fig.		DCM	$TBAPF_6$	Ag/AgCl				-0.36				174 (DPP)
TPP	**34**	Mn(III)	See Fig.		DCM	$TBAPF_6$	Ag/AgCl				-0.36				174 (DPP)
TPP	**35**	Mn(III)	See Fig.		DCM	$TBAPF_6$	Ag/AgCl				-0.34				174 (DPP)
TPP	**36**	Mn(III)	See Fig.		DCM	$TBAPF_6$	Ag/AgCl				-0.38				174 (DPP)
TPP	**37**	Mn(III)	See Fig.		DCM	$TBAPF_6$	Ag/AgCl				-0.33				174 (DPP)
TPP	**38**	Mn(III)	See Fig.		DCM	$TBAPF_6$	Ag/AgCl				-0.34				174 (DPP)
TPP	**39**	Mn(III)	See Fig.		DCM	$TBAPF_6$	Ag/AgCl				-0.31				174 (DPP)
TPP	**40**	Mn(III)	See Fig.		DCM	$TBAPF_6$	Ag/AgCl				-0.34				174 (DPP)
TPP	**41**	Mn(III)	See Fig.		DCM	$TBAPF_6$	Ag/AgCl				-0.34				174 (DPP)
TPP	**42**	Mn(III)	See Fig.		DCM	$TBAPF_6$	Ag/AgCl				-0.31				174 (DPP)
TPP	--	Ni(II)			DCM	TBAP	SCE			1.05		-1.28			61
TPP	--	Ni(II)			DCM	TBAP	SCE			1.13		-1.12			226
TPP	--	Ni(II)			DCM	TBAP	SCE		1.31	1.01		-1.31			302
TPP	--	Ni(II)			DCM	$TBAPF_6$	Ag/AgCl		1.32	1.02		-1.28	-1.72		23
TPP	--	Ni(II)			DCM	$TBAPF_6$	SCE		1.32	1.01					226
TPP	--	Ni(II)			PhCN	TBAP	SCE		1.15	1.08		-1.28	-1.81		59
TPP	--	Pd(II)			DCM	TBAP	SCE		1.41	1.01		-1.45			302
TPP	--	Pd(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.65		-1.81			544

Table 1.Tetraphenylporphyrin (TPP) macrocycles. (see structures in Figure 1)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphryin Ox 3	Porphryin Ox 2	Porphryin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
TPP	--	Pt(II)			DCM	TBAP	SCE		1.52	1.20		-1.30	-1.82		301
TPP	--	Pt(II)			DCM	$TBAPF_6$	$Ag/AgNO_3$			0.97		-1.51			228
TPP	--	Pt(II)			DMF	TBAP	Fc/Fc^+					-1.65			483
TPP	--	Pt(IV)	Br^-	Br^-	DCM	$TBAPF_6$	Fc/Fc^+			0.89	-0.75	-1.84			229
TPP	--	Rh(III)	Cl^-		DMF	TEAP	SCE				-1.02*	-1.81			581
TPP	--	Rh(III)	Cl^-		DMSO	TEAP	SCE				-0.97*	-1.86			581
TPP	--	Rh(III)	I^-		DMF	TEAP	SCE				-1.09*	-1.85			581
TPP	--	Rh(III)	I^-		DMSO	TEAP	SCE				-0.90*	-1.83			581
TPP	--	Rh(III)	I^-		*n*-BuCN	TBAP	SCE				-1.23*	-1.96			581
TPP	--	Rh(III)	I^-		*n*-BuCN	TBAP	SCE				-1.03	-1.74			581
TPP	--	Rh(III)	I^-		*n*-BuCN	TBAP	SCE				-1.08	-1.57*			581
TPP	--	Rh(III)	I^-		*n*-BuCN	TBAP	SCE				-0.89*	-1.99			581
TPP	--	Rh(III)	$NH(CH_3)_2$	Cl^-	DMF	TEAP	SCE				-1.16*	-1.82			581
TPP	--	Ru(II)	CO		CH_3CN	$TBAPF_6$	Ag/AgCl		1.10	0.75					196
TPP	--	Ru(II)	CO		DCE/CH_3CN	$TBAPF_6$	SCE		1.25	0.83		-1.48	-1.90		438
TPP	--	Ru(II)	CO		DCM (20°C)	$TBAPF_6$	Fc/Fc^+		0.77	0.37					198
TPP	--	Ru(II)	CO	EtOH	DCM	TBAP	SCE		1.25	0.84		-1.41	-1.64		503
TPP	--	Ru(II)	CO	Py	THF	$TBAPF_6$	SCE		1.32	0.97		-1.51	-2.03		283
TPP	--	Ru(II)	NO	H_2O	DCM	TBAP	Fc/Fc^+		1.14*	0.78					421
TPP	--	Ru(II)	NO	Py	DCM	TBAP	Fc/Fc^+					-0.79			421

Table 1.Tetraphenylporphyrin (TPP) macrocycles. (see structures in Figure 1)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphryin Ox 3	Porphryin Ox 2	Porphryin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
TPP	**43**	Ru(II)	NO	See Fig.	DCM	TBAP	Fc/Fc^+					-0.68			421
TPP	**44**	Ru(II)	NO	See Fig.	DCM	TBAP	Fc/Fc^+					-0.90			421
TPP	--	Ru(II)	PPh_3	PPh_3	DCM	$TBAPF_6$	Fc/Fc^+			0.78	-0.11	-2.08*			440
TPP	**45**	Ru(II)	See Fig.	See Fig.	DCM	$TBAPF_6$	SCE		1.37	0.58					206
TPP	**46**	Ru(II)	See Fig.	See Fig.	DCM	$TBAPF_6$	SCE		1.31*	0.58					206
TPP	--	Ru(VI)	O^{2-}	O^{2-}	DCM	$TBAPF_6$	Fc/Fc^+			0.60	-0.97*	-1.72			440
TPP	--	Sb(V)	OH^-	OH^-	CH_3CN	$TEABF_4$	SCE			1.40		-0.51	-0.95		243
TPP	**47**	Sb(V)	OH^-	See Fig.	CH_3CN	$TEABF_4$	SCE			1.50	0.93	-0.46	-0.87		243
TPP	**48**	Sb(V)	OH^-	See Fig.	CH_3CN	$TEABF_4$	SCE			1.55	1.39	-0.46	-0.87		243
TPP	**49**	Sb(V)	OH^-	See Fig.	CH_3CN	$TEABF_4$	SCE			1.76	1.59	-0.46	-0.85		243
TPP	--	Sn(IV)	Cl^-	Cl^-	DCM	TBAP	SCE			1.44		-0.79	-1.25*		25
TPP	--	Sn(IV)	Cl^-	Cl^-	DCM (-75°C)	TBAP	SCE		1.88	1.42		-0.73	-1.15		25
TPP	--	Sn(IV)	OH^-	OH^-	DCM	TBAP	SCE			1.46		-0.94	-1.35		25
TPP	--	Sn(IV)	OH^-	OH^-	THF	$TBAPF_6$ (0.2M)	Fc/Fc^+					-1.42	-1.85		237
TPP	**50**	Sn(IV)	See Fig.	See Fig.	DCM	$TBAPF_6$	SCE			1.40		-0.90			286
TPP	--	Zn(II)			$CDCl_3$	TBAP (0.2M)	SCE		1.09	0.78					318
TPP	--	Zn(II)			CH_3CN	TBAP	Fc/Fc^+			0.39					448
TPP	--	Zn(II)			CH_3CN/DCE	$TEAPF_6$	SCE		1.16	0.80		-1.37	-1.75		154
TPP	--	Zn(II)			DCB	TBAP	Ag/AgCl		1.08	0.82		-0.46	-1.23		138
TPP	--	Zn(II)			DCB	TBAP	Fc/Fc^+		0.62	0.28		-1.92	-2.23		57

Table 1.Tetraphenylporphyrin (TPP) macrocycles. (see structures in Figure 1)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphryin Ox 3	Porphryin Ox 2	Porphryin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
TPP	--	Zn(II)			DCB	TBAP	Fc/Fc^+		0.62	0.28					166
TPP	--	Zn(II)			DCB	$TBAPF_6$ (0.05M)	SCE		1.25	0.91		-1.45			13
TPP	--	Zn(II)			DCB	$TBAPF_6$ (0.05M)	Fc/Fc^+			0.26		-2.09			312
TPP	--	Zn(II)			DCB	$TBAPF_6$ (0.05M)	Fc/Fc^+		0.65	0.39		-1.94	-2.27		320
TPP	--	Zn(II)			DCB/CH_3CN	TBAP	SCE		1.23	0.84		-1.42	-1.78		441
TPP	--	Zn(II)			DCB/DMF	$TBABF_4$	$Ag/AgNO_3$		0.88	0.57					313
TPP	--	Zn(II)			DCM	$TBABF_4$	Fc/Fc^+		0.66	0.34		-1.85	-2.28*		130
TPP	--	Zn(II)			DCM	TBAP	SCE		1.11	0.78		-1.39	-1.84*		53
TPP	--	Zn(II)			DCM	TBAP	SCE			0.78		-1.38			61
TPP	--	Zn(II)			DCM	TBAP	Ag/AgCl		1.13	0.82		-1.31	-1.82*		295
TPP	--	Zn(II)			DCM	TBAP	SCE		1.14	0.82		-1.33			302
TPP	--	Zn(II)			DCM	TBAP	SCE		1.07	0.79		-1.34	-1.78*		318
TPP	--	Zn(II)			DCM	TBAP	SCE		1.10	0.79		-1.32	-1.68		88
TPP	--	Zn(II)			DCM	TBAP	SCE		1.08	0.77		-1.35	-1.71		415
TPP	--	Zn(II)			DCM	TBAP	SCE			0.82		-1.20			494
TPP	--	Zn(II)			DCM	TBAP	SCE		1.11	0.78		-1.39	-1.84*		17
TPP	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		1.15	0.84		-1.36	-1.77		23
TPP	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.71	0.42		-1.79	-2.17*		26
TPP	--	Zn(II)			DCM	$TBAPF_6$	Ag/Ag^+			0.56					163
TPP	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.65	0.34		-1.80			211

Table 1.Tetraphenylporphyrin (TPP) macrocycles. (see structures in Figure 1)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphryin Ox 3	Porphryin Ox 2	Porphryin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
TPP	--	Zn(II)			DCM	$TBAPF_6$	Ag/Ag^+		1.16	0.80			-1.33	-1.66		212
TPP	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		1.24	0.83			-1.36	-1.71		322
TPP	--	Zn(II)			DCM	$TBAPF_6$	SCE			0.80			-1.38			386
TPP	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.29			-1.91			390
TPP	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.69	0.39			-1.77	-2.16		392
TPP	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.36			-1.87			525
TPP	--	Zn(II)			DCM	$TBAPF_6$	SCE		1.11	0.78			-1.39	-1.84		555
TPP	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.71	0.42			-1.79			590
TPP	--	Zn(II)			DCM	$THPPF_6$	Ag/AgCl		1.37	0.89			-1.38	-1.59		317
TPP	--	Zn(II)			DCM/THF	$TBABF_4$	Ag/Ag^+			0.50						46
TPP	--	Zn(II)			*n*-BuCN	$TBAPF_6$	Fc/Fc^+			0.56			-1.58			424
TPP	--	Zn(II)			PhCN	TBAP	SCE		1.14	0.82			-1.32	-1.74		17
TPP	--	Zn(II)			PhCN	TBAP	SCE			0.82			-1.32			41
TPP	--	Zn(II)			PhCN	TBAP	SCE		1.14	0.82			-1.32	-1.70		66
TPP	--	Zn(II)			PhCN	$TBAPF_6$	Fc/Fc^+		0.75	0.35			-1.80	-2.20		211
TPP	--	Zn(II)			PhCN	$TBAPF_6$	SCE		1.05	0.66						565 (DPV)
TPP	--	Zn(II)			THF	TBAP	Fc/Fc^+			0.40			-1.93			293
TPP	--	Zn(II)	PPh_3O		$CDCl_3$	TBAP (0.2M)	SCE		1.15	0.74						318
TPP	--	Zn(II)	Py		DCM	TEAP (0.05M)	NR			0.57						398
TPP	**51**	Zn(II)	See Fig.		DCB	TBAP	Ag/AgCl		1.03	0.79	0.69	0.35	-0.46	-1.23		138

Table 2. Octaethylporphyrin (OEP) macrocycles. (see structures in Figure 2)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
OEP	**52**	2H			DCM	TBAP	SCE		1.40	0.89		-1.44	-1.90		77
OEP	**52**	2H			DCM	TBAP	SCE		1.44	0.94					274
OEP	**52**	2H			DCM	TBAP	SCE		1.30	0.81		-1.46	-1.89		302
OEP	**52**	2H			PhCN	$TBAPF_6$ (0.2M)	Fc/Fc^+		0.89	0.39		-1.90	-2.31		349
OEP	--	Al(III)	CH_3^-		DCM	TBAP	SCE			0.75		-1.49			55
OEP	--	Al(III)	Ph^-		DCM	TBAP	SCE			0.75*		-1.44			55
OEP	--	As(V)	CH_3^-	CH_3^-	DCM	TBAP	SCE		1.71	1.45		-0.96	-1.48		34
OEP	--	As(V)	CH_3^-	CH_3^-	DCM	TBAP	SCE			1.45		-0.96			55
OEP	--	As(V)	CH_3^-	CH_3^-	PhCN	TBAP	SCE		1.62	1.40		-0.86	-1.35		34
OEP	--	As(V)	CH_3^-	CH_3O^-	DCM	TBAP	SCE		1.80	1.49		-0.86	-1.37		34
OEP	--	As(V)	CH_3^-	CH_3O^-	PhCN	TBAP	SCE		1.74	1.45		-0.81	-1.30		34
OEP	--	As(V)	CH_3^-	Et^-	DCM	TBAP	SCE		1.70	1.45		-0.96	-1.51		34
OEP	--	As(V)	CH_3^-	Et^-	DCM	TBAP	SCE			1.45		-0.96			55
OEP	--	As(V)	CH_3^-	Et^-	PhCN	TBAP	SCE		1.62	1.39		-0.88	-1.38		34
OEP	--	As(V)	CH_3^-	EtO^-	DCM	TBAP	SCE		1.79	1.48		-0.87	-1.40		34
OEP	--	As(V)	CH_3^-	EtO^-	PhCN	TBAP	SCE		1.74	1.45		-0.81	-1.29		34
OEP	--	As(V)	CH_3^-	OH^-	DCM	TBAP	SCE		1.78	1.44		-0.86	-1.36		34
OEP	--	As(V)	CH_3^-	OH^-	DCM	TBAP	SCE			1.44		-0.86			55
OEP	--	As(V)	CH_3^-	OH^-	PhCN	TBAP	SCE		1.75	1.43		-0.84	-1.27		34
OEP	**53**	As(V)	CH_3^-	See Fig.	DCM	TBAP	SCE		1.77	1.44		-0.94	-1.48		34

Table 2. Octaethylporphyrin (OEP) macrocycles. (see structures in Figure 2)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
OEP	**54**	As(V)	CH_3^-	See Fig.	DCM	TBAP	SCE		1.80	1.48			-0.88	-1.42		34
OEP	**53**	As(V)	CH_3^-	See Fig.	PhCN	TBAP	SCE		1.70	1.41			-0.86	-1.36		34
OEP	**54**	As(V)	CH_3^-	See Fig.	PhCN	TBAP	SCE		1.74	1.45			-0.82	-1.31		34
OEP	--	As(V)	Et^-	Et^-	DCM	TBAP	SCE		1.73	1.47			-0.97	-1.54		34
OEP	--	As(V)	Et^-	Et^-	DCM	TBAP	SCE			1.47			-0.97			55
OEP	--	As(V)	Et^-	Et^-	PhCN	TBAP	SCE		1.67	1.42			-0.89	-1.40		34
OEP	--	As(V)	F^-	F^-	DCM	TBAP	SCE						-0.58*	-1.39		34
OEP	--	As(V)	F^-	F^-	DCM	TBAP	SCE						-0.58*			55
OEP	--	As(V)	F^-	F^-	PhCN	TBAP	SCE		2.02	1.70			-0.57*	-1.38		34
OEP	--	Bi(III)	$CF_3SO_3^-$		DCM	TBAP	SCE		1.41	1.15						54
OEP	--	Co(II)			DCM	TBAP	SCE		1.17	0.86	0.67	-1.01	-1.63*			8
OEP	--	Co(II)			DMF	TBAP	SCE			0.96	0.35*	-0.98	-2.23			8
OEP	--	Co(II)			DMSO	TBAP	SCE			1.01	0.20*	-1.00	-2.20			8
OEP	--	Co(II)			PhCN	TBAP	SCE		1.30	1.01	0.37	-1.07				59
OEP	--	Co(II)			Py	TBAP	SCE				0.20*	-0.56*	-1.53*			8
OEP	--	Co(III)			DCM	TBAP	Ag/Ag^+			0.31*						588
OEP	--	Cu(II)			CH_3CN	TBAP	Fc/Fc^+			0.48						448
OEP	--	Cu(II)			DCM	TBAP	SCE		1.34*	0.78			-1.56			8
OEP	--	Cu(II)			DCM	TBAP	SCE		1.29	0.80			-1.52			302
OEP	--	Cu(II)			DCM	$TBAPF_6$	$CuTPP^{0/+}$			-0.24						579

Table 2. Octaethylporphyrin (OEP) macrocycles. (see structures in Figure 2)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
OEP	--	Cu(II)			DMF	TBAP	SCE		0.93	0.81		-1.44	-2.04*		8
OEP	--	Cu(II)			DMSO	TBAP	SCE		0.99*	0.88*		-1.43	-1.98*		8
OEP	--	Cu(II)			PhCN	TBAP	SCE		1.26	0.78		-1.53			59
OEP	--	Cu(II)			Py	TBAP	SCE			0.80		-1.50			8
OEP	--	Fe(II)	1-(CH_3)Im	1-(CH_3)Im	DCM	$TBAPF_6$	Pt Wire				-0.70				385
OEP	--	Fe(II)	NO		DCM	TBAP	SCE			1.10	0.71	-1.02			583
OEP	--	Fe(II)	NO		THF	TBAP	SCE		1.15*	0.66*		-1.07	-1.94		583
OEP	--	Fe(III)	AsF_6^-		DCM	$TBAAsF_6$	SCE		1.65	1.22	-0.23	-1.16			181
OEP	--	Fe(III)	BF_4^-		DCM	$TBABF_4$	SCE		1.68	1.24	-0.22	-1.15			181
OEP	--	Fe(III)	Cl^-		DCM	TBAP	SCE		1.40	1.00	-0.64*	-1.28			8
OEP	--	Fe(III)	Cl^-		DCM	TBAP	SCE		1.30	1.08					62
OEP	--	Fe(III)	Cl^-		DMF	TBAP	SCE				-0.38	-1.24	-1.95		8
OEP	--	Fe(III)	Cl^-		DMSO	TBAP	SCE				-0.22	-0.80*	-1.32	-1.90	8
OEP	--	Fe(III)	Cl^-		*N*-MP	TEAP	SCE				-0.34				451
OEP	--	Fe(III)	Cl^-		PhCN	TBAP	SCE				-0.54	-1.26			62
OEP	--	Fe(III)	Cl^-		Py	TBAP	SCE				-0.01	-1.94			8
OEP	--	Fe(III)	Cl^-		Py	TBAP	SCE				-0.02	-1.80			62
OEP	--	Fe(III)	*n*-Bu^-		DMF	TEAP	SCE					-1.05			584
OEP	--	Fe(III)	NO		THF	TBAP	$Ag/AgNO_3$				-1.07				80
OEP	--	Fe(III)	Ph^-		DCM	TBAP (0.2M)	SCE				0.45				67

Table 2. Octaethylporphyrin (OEP) macrocycles. (see structures in Figure 2)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
OEP	--	Fe(III)	Ph^-		DCM (-50 °C)	TBAP (0.2M)	SCE		1.68	1.27	0.47	-0.86				67
OEP	--	Fe(III)	Ph^-		DCM/Py (-50 °C)	TBAP (0.2M)	SCE				0.31					67
OEP	--	Fe(III)	SbF_6^-		DCM	$TBASbF_6$	SCE		1.67	1.22	-0.22		-1.15			181
OEP	**55**	Fe(III)	See Fig.		DCM	TBAP (0.2M)	SCE			1.31	0.64					67
OEP	**56**	Fe(III)	See Fig.		DCM	TBAP (0.2M)	SCE			1.23	0.73					67
OEP	**57**	Fe(III)	See Fig.		DCM	TBAP (0.2M)	SCE			1.22	0.81					67
OEP	**55**	Fe(III)	See Fig.		DCM (-50 °C)	TBAP (0.2M)	SCE		1.70	1.28	0.62	-0.70				67
OEP	**56**	Fe(III)	See Fig.		DCM (-50 °C)	TBAP (0.2M)	SCE		1.73	1.14	0.68	-0.74				67
OEP	**57**	Fe(III)	See Fig.		DCM (-50 °C)	TBAP (0.2M)	SCE		1.83	1.10	0.76	-0.65				67
OEP	**58**	Fe(III)	See Fig.		DCM (-50 °C)	TBAP (0.2M)	SCE		1.83	1.11	0.80	-0.63				67
OEP	**55**	Fe(III)	See Fig.		DCM/Py (-50 °C)	TBAP (0.2M)	SCE				0.49					67
OEP	**56**	Fe(III)	See Fig.		DCM/Py (-50 °C)	TBAP (0.2M)	SCE				0.57					67
OEP	**57**	Fe(III)	See Fig.		DCM/Py (-50 °C)	TBAP (0.2M)	SCE				0.73					67
OEP	**59**	Fe(III)	See Fig.		DMF	TEAP	SCE						-1.08			584
OEP	**60**	Fe(III)	See Fig.		DMF	TEAP	SCE						-1.08			584
OEP	**61**	Fe(III)	See Fig.		DMF	TEAP	SCE						-1.07			584
OEP	**55**	Fe(III)	See Fig.		PhCN	TBAP (0.2M)	SCE			1.31	0.66					67
OEP	**56**	Fe(III)	See Fig.		PhCN	TBAP (0.2M)	SCE			1.19	0.76					67
OEP	--	Ga(III)	Cl^-		DCM	TBAP	SCE			1.00			-1.38			55
OEP	--	Ga(III)	F^-		DCM	TBAP	SCE			1.00			-1.38			55

Table 2. Octaethylporphyrin (OEP) macrocycles. (see structures in Figure 2)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
OEP	--	In(III)	Cl^-		DCM	TBAP	SCE			1.05		-1.29			55
OEP	--	Mn(III)	Cl^-		DCM	TBAP	SCE		1.46	1.07	-0.71	-0.80*	-1.97		8
OEP	--	Mn(III)	Cl^-		DCM	TBAP	SCE		1.46	1.07	-0.71*	-1.97			302
OEP	--	Mn(III)	Cl^-		DMF	TBAP	SCE				-0.37	-1.59	-2.11*		8
OEP	--	Mn(III)	Cl^-		DMSO	TBAP	SCE				-0.43	-1.57	-2.08		8
OEP	--	Mn(III)	Cl^-		Py	TBAP	SCE				-0.54*	-1.60			8
OEP	--	Mn(V)	N^{3-}		DCM	TBAP	Ag/AgCl		1.36	0.90		-1.43			474
OEP	--	Ni(II)			$CHCl_3$	TBAP	SCE			1.09					221
OEP	--	Ni(II)			$CHCl_3$ (40 °C)	TBAP	SCE			1.10					221
OEP	--	Ni(II)			DCM	TBAP	SCE		1.29	0.78		-1.46			8
OEP	--	Ni(II)			DCM	TBAP	SCE		1.32	0.86					274
OEP	--	Ni(II)			DCM	TBAP	SCE		1.24	0.77		-1.46			302
OEP	--	Ni(II)			DCM	$TBAPF_6$ (0.5M)	Ag/AgCl			0.95		-1.06			278
OEP	--	Ni(II)			DCM (-40 °C)	$TBAPF_6$ (0.5M)	Ag/AgCl		0.97	0.68		-1.04	-1.54		278
OEP	--	Ni(II)			DMF	TBAP	SCE		1.00	0.89		-1.39	-2.14*		8
OEP	--	Ni(II)			DMSO	TBAP	SCE			0.93		-1.36	-2.09		8
OEP	--	Ni(II)			PhCN	TBAP	SCE	1.94*	1.23	0.79		-1.49			59
OEP	--	Ni(II)			Py	TBAP	SCE			0.63		-1.42			8
OEP	--	Os(II)	NO	EtO^-	DCM	$TBAPF_6$	Fc/Fc^+			0.42					200
OEP	--	Os(II)	NO	EtS^-	DCM	$TBAPF_6$	Fc/Fc^+	0.84*	0.66	0.42*		-2.02			200

Table 2. Octaethylporphyrin (OEP) macrocycles. (see structures in Figure 2)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
OEP	--	P(V)	CH_3^-	CH_3^-	DCM	TBAP	SCE			1.39		-0.90	-1.37		51
OEP	--	P(V)	CH_3^-	CH_3^-	DCM	TBAP	SCE			1.39		-0.90			55
OEP	--	P(V)	CH_3^-	CH_3^-	PhCN	TBAP	SCE			1.41		-0.80	-1.29		51
OEP	--	P(V)	CH_3^-	CH_3O^-	DCM	TBAP	SCE			1.51		-0.81	-1.34		51
OEP	--	P(V)	CH_3^-	F^-	DCM	TBAP	SCE			1.54		-0.77*	-1.22		51
OEP	--	P(V)	CH_3^-	F^-	DCM	TBAP	SCE			1.54		-0.77*			55
OEP	--	P(V)	CH_3^-	F^-	PhCN	TBAP	SCE			1.40		-0.83*	-1.31		51
OEP	--	P(V)	CH_3^-	OH^-	DCM	TBAP	SCE			1.38		-0.84	-1.33*,		51
OEP	--	P(V)	CH_3^-	OH^-	DCM	TBAP	SCE			1.38		-0.84			55
OEP	--	P(V)	CH_3^-	OH^-	DCM (-70 °C)	TBAP	SCE			1.37		-0.86	-1.26		51
OEP	--	P(V)	CH_3^-	OH^-	PhCN	TBAP	SCE			1.41		-0.81	-1.28*		51
OEP	--	P(V)	CH_3O^-	CH_3^-	PhCN	TBAP	SCE			1.44		-0.77	-1.28		51
OEP	--	P(V)	CH_3O^-	CH_3O^-	DCM	TBAP	SCE			1.58		-0.78	-1.34		51
OEP	--	P(V)	CH_3O^-	F^-	DCM	TBAP	SCE			1.50		-0.80*	-1.32		51
OEP	--	P(V)	CH_3O^-	F^-	DCM	TBAP	SCE			1.54		-0.74	-1.15		51
OEP	--	P(V)	CH_3O^-	F^-	DCM (-70 °C)	TBAP	SCE			1.52		-0.78	-1.17		51
OEP	--	P(V)	CH_3O^-	F^-	PhCN	TBAP	SCE			1.58		-0.74*	-1.31		51
OEP	--	P(V)	Et^-	CH_3O^-	PhCN	TBAP	SCE			1.46		-0.77	-1.28		51
OEP	--	P(V)	Et^-	OH^-	DCM	TBAP	SCE			1.35		-0.84	-1.30*		51
OEP	--	P(V)	Et^-	OH^-	DCM	TBAP	SCE			1.35		-0.84			55

Table 2. Octaethylporphyrin (OEP) macrocycles. (see structures in Figure 2)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
OEP	--	P(V)	Et^-	OH^-	DCM (-70 °C)	TBAP	SCE			1.35		-0.85	-1.27		51
OEP	--	P(V)	Et^-	OH^-	PhCN	TBAP	SCE			1.42		-0.84	-1.36*		51
OEP	--	P(V)	Ph^-	CH_3O^-	DCM	TBAP	SCE			1.64		-0.70	-1.27		51
OEP	--	P(V)	Ph^-	CH_3O^-	PhCN	TBAP	SCE			1.46		-0.77	-1.29		51
OEP	--	P(V)	Ph^-	OH^-	DCM	TBAP	SCE			1.43		-0.82	-1.33*		51
OEP	--	P(V)	Ph^-	OH^-	DCM	TBAP	SCE			1.43		-0.82			55
OEP	--	P(V)	Ph^-	OH^-	DCM (-70 °C)	TBAP	SCE			1.39		-0.83	-1.28		51
OEP	--	P(V)	Ph^-	OH^-	PhCN	TBAP	SCE			1.43		-0.82	-1.32		51
OEP	--	Pd(II)			DCM	TBAP	SCE		1.78	1.04					274
OEP	--	Pd(II)			DCM	TBAP	SCE		1.54	0.82		-1.52			302
OEP	--	Pt(II)			DCM	TBAP	SCE		1.81	1.09					274
OEP	--	Rh(III)	Cl^-		DMSO	TEAP	SCE				-1.18*	-2.17			581
OEP	--	Ru(II)	CO		CH_3CN	$TBAPF_6$	Ag/AgCl		0.90	0.50					196
OEP	--	Ru(II)	CO	Py	DCM	$TBAPF_6$ (0.2M)	SCE		1.18	0.59					197
OEP	--	Ru(II)	NO	$CF_3SO_3^-$	DCM	$TBAPF_6$	Fc/Fc^+			0.68		-0.93*			208
OEP	--	Ru(II)	NO	EtO^-	DCM	$TBAPF_6$	Fc/Fc^+	1.01*	0.67	0.43		-1.83			200
OEP	--	Ru(II)	NO	EtS^-	DCM	$TBAPF_6$	Fc/Fc^+		0.66	0.37*		-1.64			200
OEP	--	Ru(II)	NO	H_2O	DCM	TBAP	Fc/Fc^+		1.13	0.71					421
OEP	--	Ru(II)	NO	Py	DCM	TBAP	Fc/Fc^+					-0.95			421
OEP	**62**	Ru(II)	NO	See Fig.	DCM	TBAP	Fc/Fc^+					-0.67			421

Table 2. Octaethylporphyrin (OEP) macrocycles. (see structures in Figure 2)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
OEP	**63**	Ru(II)	NO	See Fig.	DCM	TBAP	Fc/Fc^+					-1.00			421
OEP	**64**	Ru(II)	NO	See Fig.	DCM	$TBAPF_6$	Fc/Fc^+			0.55	-1.11*	-1.33	-1.77*		208
OEP	**65**	Ru(II)	NO	See Fig.	DCM	$TBAPF_6$	Fc/Fc^+		0.75	0.49	-1.11*	-1.25*			208
OEP	**66**	Ru(II)	See Fig.	See Fig.	DCM	$TBAPF_6$	Fc/Fc^+			1.11	0.11				261
OEP	--	Sb(V)	CH_3^-	CH_3^-	DCM	TBAP	SCE			1.66*		-0.86			55
OEP	--	Sb(V)	Et^-	OH^-	DCM	TBAP	SCE			1.60*		-0.74			55
OEP	--	Si(IV)	OH^-	OH^-	DCM	TBAP	SCE					-1.40			55
OEP	--	Sn(IV)	OH^-	OH^-	DCM	TBAP	SCE					-1.18	-1.59		315
OEP	--	Zn(II)			CH_3CN	TBAP	Fc/Fc^+			0.31					448
OEP	--	Zn(II)			CH_3CN/DCE	$TEAPF_6$	SCE		0.94	0.68		-1.60			159
OEP	--	Zn(II)			CH_3CN/DCE	$TEAPF_6$	SCE		0.94	0.68		-1.60			275
OEP	--	Zn(II)			DCE/CH_3CN	$TBAPF_6$	SCE		0.94	0.68		-1.60			112
OEP	--	Zn(II)			DCM	TBAP	SCE		1.00	0.66		-1.60			8
OEP	--	Zn(II)			DCM	TBAP	SCE		1.02	0.63		-1.61			53
OEP	--	Zn(II)			DCM	TBAP	SCE			0.63		-1.61			55
OEP	--	Zn(II)			DCM	TBAP	SCE		1.02	0.63		-1.61			302
OEP	--	Zn(II)			DMF	TBAP	SCE			0.68		-1.59	-2.00		8
OEP	--	Zn(II)			DMSO	TBAP	SCE		1.03*	0.69		-1.60	-1.95		8
OEP	--	Zn(II)			PhCN	TBAP	SCE		1.02	0.67		-1.58			66
OEP	--	Zn(II)			Py	TBAP	SCE			0.73		-1.64			8

Table 2. Octaethylporphyrin (OEP) macrocycles. (see structures in Figure 2)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
OEP	--	Zn(II)	Py		DCM	TEAP (0.05M)	NR			0.61					398

Table 3. Tetramesitylporphyrin (TMP) and substituted TMP macrocycles. (see structures in Figure 3)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
TMP	**67**	2H			DCM	$TBAPF_6$	Fc/Fc^+		0.98	0.48		-1.88	-2.36		199
TMP	**67**	2H			DCM	$TBAPF_6$	SCE			0.90					582
TMP	--	Bi(III)	$CF_3SO_3^-$		DCM	TBAP	SCE		1.57	1.14					54
TMP	--	Bi(III)	NO_3^-		DCM	TBAP	SCE		1.58	1.08					54
TMP	--	Bi(III)	NO_3^-		PhCN	TBAP	SCE		1.59	1.17					54
TMP	--	Cu(II)			DCM	$TBAPF_6$	$CuTPP^{0/+}$			-0.02					579
TMP	--	Fe(III)	$CF_3CO_2^-$		DCM (-60 °C)	TBAP	SCE			1.09					374
TMP	--	Fe(III)	$CH_3CO_2^-$		DCM (-60 °C)	TBAP	SCE			1.06					374
TMP	--	Fe(III)	Cl^-		CH_3CN	$TBABF_4$	Ag/Ag^+				-0.64				194
TMP	--	Fe(III)	Cl^-		DCM	$TBAPF_6$	SCE			0.92					582
TMP	--	Fe(III)	Cl^-		DCM (-60 °C)	TBAP	SCE			1.10					374
TMP	--	Fe(III)	ClO_4^-		CH_3CN (-35 °C)	TBAP	SCE			1.12					374
TMP	--	Fe(III)	ClO_4^-		DCM (-60 °C)	TBAP	SCE			1.09					374
TMP	--	Fe(III)	F^-		DMF (-60 °C)	TBAP	SCE			1.10					374
TMP	--	Fe(III)	NO_3^-		DCM (-60 °C)	TBAP	SCE			1.11					374
TMP	**68**	Fe(III)	See Fig.		DCM (-60 °C)	TBAP	SCE			1.05					374
TMP	**69**	Fe(III)	See Fig.		DCM (-60 °C)	TBAP	SCE			1.16					374
TMP	--	Fe(IV)	O^{2-}	1-(CH_3)Im	DCM (-60 °C)	TBAP	SCE		1.02	0.77					374
TMP	--	Fe(IV)	O^{2-}	1-(CH_3)Im	DCM (-60 °C)	TBAP	SCE		0.98	0.76					374
TMP	--	Fe(IV)	O^{2-}	$CF_3CO_2^-$	DCM (-60 °C)	TBAP	SCE		1.25	0.96					374

Table 3. Tetramesitylporphyrin (TMP) and substituted TMP macrocycles. (see structures in Figure 3)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
TMP	--	Fe(IV)	O^{2-}	$CH_3CO_2^-$	DCM (-60 °C)	TBAP	SCE		1.26	1.04					374
TMP	--	Fe(IV)	O^{2-}	Cl^-	DCM (-60 °C)	TBAP	SCE		1.26	0.97					374
TMP	--	Fe(IV)	O^{2-}	ClO_4^-	DCM (-60 °C)	TBAP	SCE		1.18	0.88					374
TMP	--	Fe(IV)	O^{2-}	F^-	DCM (-60 °C)	TBAP	SCE		1.25	0.96					374
TMP	--	Fe(IV)	O^{2-}	Im	DCM (-60 °C)	TBAP	SCE			0.80					374
TMP	--	Fe(IV)	O^{2-}	NO_3^-	DCM (-60 °C)	TBAP	SCE		1.21	0.95					374
TMP	**70**	Fe(IV)	O^{2-}	See Fig.	DCM (-60 °C)	TBAP	SCE		1.25	0.99					374
TMP	**71**	Fe(IV)	O^{2-}	See Fig.	DCM (-60 °C)	TBAP	SCE		1.25	0.96					374
TMP	--	Ru(II)	CO		CH_3CN	$TBAPF_6$	Fc/Fc^+		0.91	0.50		-1.90	-2.30		199
TMP	--	Ru(II)	CO		DCM	$TBAPF_6$	Fc/Fc^+		0.87	0.49		-1.89			199
TMP	**72**	Ru(II)	See Fig.		DCM	NR	Fc/Fc^+		0.98	0.19					203
TMP	**73**	Ru(II)	See Fig.		DCM	NR	Fc/Fc^+		0.92	0.32					203
TMP	--	Ru(III)	CO		THF	$TBAPF_6$	Fc/Fc^+			0.53		-2.11	-2.81		199
TMP	--	Ru(VI)	O^{2-}	O^{2-}	DCM	TBAP	Ag/AgCl		1.24	0.70*	-0.48*				207
TMP	--	Ru(VI)	O^{2-}	O^{2-}	DCM	$TBAPF_6$	Fc/Fc^+			0.71	-1.15*	-0.60	-1.67		440
TMP	--	Zn(II)			DCM	$TBABF_4$	SCE		1.20	0.86		-1.40	-1.62		310 (SWV)
TMP	--	Zn(II)			DCM	TBAP	Ag/AgCl		1.11	0.79					114
TMP	--	Zn(II)			DCM	$TBAPF_6$	Ag/Ag^+			0.51					163
TMP	--	Zn(II)	Im		DCM	TBAP	Ag/AgCl		1.32	0.67					114

Table 4. *meso*-Substituted OEP and porphinone macrocycles. (see structures in Figure 4)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
(3'-Thienyl)$_4$OEP	**74**	Ni(II)			DCM	TBAP	SCE		0.89	0.68		-1.59			33
(3'-Thienyl)$_4$OEP	**74**	Ni(II)			DCM	TBAPF$_6$	SCE		1.00	0.67		-1.60			33
(AP)$_4$OEP	**75**	Zn(II)			DCM	TBAP	Fc/Fc$^+$		0.67*	0.25		-1.46			493
Cl$_2$OEP	**76**	Zn(II)			CH$_3$CN/DCE	TEAPF$_6$	SCE		0.95	0.73		-1.41*			275
(DAD3HBT)OEP	**77**	Ni(II)			CHCl$_3$	TBAP	SCE			0.98					221
(DAD3HBT)OEP	**77**	Ni(II)			CHCl$_3$ (40°C)	TBAP	SCE			0.99					221
(DAD4HBT)OEP	**78**	Ni(II)			CHCl$_3$	TBAP	SCE			1.14					221
(DAD4HBT)OEP	**78**	Ni(II)			CHCl$_3$ (40°C)	TBAP	SCE			1.15					221
(DAPS)OEP	**79**	Ni(II)			DCM	TBAP (0.5M)	Ag/AgCl			0.91		-1.15			585
(DAS)OEP	**80**	Ni(II)			DCM	TBAP (0.5M)	Ag/AgCl			0.96		-1.05			585
(DATS)OEP	**81**	Ni(II)			DCM	TBAP (0.5M)	Ag/AgCl			0.91		-1.05			585
F$_{20}$OETPP	**82**	Ni(II)			DCM	TBAP	SCE					-1.19			33
F$_{20}$OETPP	**82**	Ni(II)			DCM	TBAPF$_6$	SCE		1.44	1.04		-1.19			33
(Malonate)OEP	**83**	2H			DCM	TBAPF$_6$	Fc/Fc$^+$		0.56	0.27		-2.01*			42
(Malonate)OEP	--	Zn(II)			DCM	TBAPF$_6$	Fc/Fc$^+$		0.39	0.08		-2.18*			42
(NO$_2$)$_4$OEP	**84**	Fe(II)	Py	Py	DCM	TBAP	Ag/AgCl				0.75				85
(NO$_2$)$_4$OEP	--	Ni(II)			DCM	TBAP	SCE			1.41		-0.64*			33
(NO$_2$)$_4$OEP	--	Ni(II)			DCM	TBAPF$_6$	SCE			1.54		-0.48*			33
(NO$_2$)$_4$OEP	--	V(IV)	O^{2-}		DCM	TBAP	Ag/AgCl		1.55*	1.39*	-1.32*	-0.20	-1.04		168
(NO$_2$)$_4$OEP	--	V(IV)	O^{2-}	Py	DCM	TBAP	Ag/AgCl		1.53*	1.34*	-1.46	-0.25	-1.14		168

Table 4. *meso*-Substituted OEP and porphinone macrocycles. (see structures in Figure 4)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$(NO_2)_4$OEP	--	V(IV)	O^{2-}	THF	THF	TBAP	Ag/AgCl			1.50*	-1.35		-0.17	-1.06		168
OEP(2,3-dione)	**85**	Fe(II)	NO		THF	TBAP	SCE		1.05	0.83			-0.66	-1.68		583
OEP(2,4-dione)	**86**	Fe(II)	NO		DCM	TBAP	SCE		1.20	0.76			-0.69			583
OEP(2,4-dione)	**86**	Fe(II)	NO		THF	TBAP	SCE		1.02	0.80			-0.80	-1.80		583
OEPdione	**87**	Fe(III)	Cl^-		THF	TBAP	$Ag/AgNO_3$				-0.16	-1.15				80
OEPdione	**87**	Fe(III)	NO		THF	TBAP	$Ag/AgNO_3$						-0.80			80
OEPone	**88**	Fe(II)	NO		DCM	TBAP	SCE		1.25	0.77			-0.81			583
OEPone	**88**	Fe(II)	NO		THF	TBAP	SCE		1.19	0.76			-0.86	-1.83		583
OEPone	**88**	Fe(III)	Cl^-		THF	TBAP	$Ag/AgNO_3$				-0.35	-1.23				80
OEPone	**88**	Fe(III)	NO		THF	TBAP	$Ag/AgNO_3$						-0.86			80
OETPP	**89**	Cu(II)			CH_3CN	TBAP	Fc/Fc^+			-0.01						448
OETPP	--	Fe(III)			PhCN	TBAP	SCE			0.93	0.39					70
OETPP	--	Fe(III)	Ph^-		PhCN	TBAP	SCE			1.06	0.27					70
OETPP	**90**	Fe(III)	See Fig.		PhCN	TBAP	SCE			0.80	0.56					70
OETPP	**91**	Fe(III)	See Fig.		PhCN	TBAP	SCE			0.93	0.39					344
OETPP	**92**	Fe(III)	See Fig.		PhCN	TBAP	SCE			0.84	0.48					344
OETPP	--	Ni(II)			DCM	TBAP	SSCE		0.90	0.63						32
OETPP	--	Ni(II)			DCM	$TBAPF_6$	SSCE		0.90	0.54						32
OETPP	--	Zn(II)			CH_3CN	TBAP	Fc/Fc^+			-0.09						448
PAOEP	**93**	Ni(II)			DCM	TBAP (0.5M)	Ag/AgCl			0.91			-1.16			585

Table 4. *meso*-Substituted OEP and porphinone macrocycles. (see structures in Figure 4)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
T(Bz)OEP	**94**	Ni(II)			DCM	TBAP	SCE		1.20	0.94		-1.23			33
T(Bz)OEP	**94**	Ni(II)			DCM	$TBAPF_6$	SCE		1.21	0.93		-1.24			33
TAOEP	**95**	Ni(II)			DCM	TBAP (0.5M)	Ag/AgCl			0.91		-1.09			585
(TAS)OEP	**96**	Ni(II)			DCM	TBAP (0.5M)	Ag/AgCl			0.96		-1.00			585
trans-(2'-OPrOH P)$_2$OEP	**97**	2H			DCM	$TBAPF_6$	Fc/Fc^+					-1.96*			42
trans-(2'-OPrOH P)$_2$OEP	**--**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+					-2.21*			42

Table 5a. Picket-Fence porphyrins and related derivatives. (see structures in Figure 5a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
Bis-strap-C_{10}	**98**	Rh(III)	Cl^-		DMF	TEAP	SCE				-0.25*	-1.03*	-1.81			581
Bis-strap-C_{12}	**99**	Rh(III)	Cl^-		DMF	TEAP	SCE				-0.40*	-1.34*	-2.07			581
Bis-strap-C_8Ph	**100**	Rh(III)	Cl^-		DMF	TEAP	SCE				-0.14*	-1.08*	-1.83			581
Bis-strap-T(Ar)P	**101**	2H			DCM	$TBAPF_6$	Fc/Fc^+			0.46						101
Bis-strap-T(Ar)P	**--**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.39						101
Bis-strap-TBTMP	**102**	2H			CH_3CN	$LiClO_4$	SCE			0.73			-0.91	-1.31		450
Bis-strap-TBTMP	**--**	Fe(III)	See Fig.		CH_3CN	$LiClO_4$	SCE			0.84	-1.10		-1.55			450
Strap-DCPP	**103**	Fe(III)	See Fig.		DMF	$LiClO_4$	SCE			1.01	-0.28		-1.42	-1.90		556
Strap-DMP	**104**	Fe(III)	See Fig.		DMF	$LiClO_4$	SCE			0.92	-0.34		-1.48	-1.97		556
Strap-TBTMP	**105**	2H			CH_3CN	$LiClO_4$	SCE			0.68			-1.07			450
StrapP-3	**106**	Zn(II)			DCM	TBAP	SCE		1.08	0.79			-1.31	-1.59	-1.71	88
TCNP	**107**	Fe(III)			CH_3CN	$TBABF_4$	Ag/Ag^+				-1.03					194
($\alpha,\beta,\alpha,\beta$-DPA)TNP	**108**	2H			THF	TBAP	Fc/Fc^+				0.28		-1.63			499
($\alpha,\beta,\alpha,\beta$-PPDA)TNP	**109**	2H			THF	TBAP	Fc/Fc^+				0.25	-0.10	-1.64			499
($\alpha,\beta,\alpha,\beta$-PrA)TNP	**110**	2H			THF	TBAP	Fc/Fc^+						-1.60			499
(α^3-$NHCOCF_3$)(β-$Ru(bpy)_3)^{2+}$TPP	**111**	2H			DCM	TBAP	Ag/AgCl			0.56	1.19		-0.47			145
(α^3-$NHCOCF_3$)(β-$Ru(bpy)_3)^{2+}$TPP	**--**	Mn(III)	Cl^-		DCM	TBAP	Ag/AgCl			0.92	-0.39	1.11				145
(α^3-$NHCOCF_3$)(β-$Ru(bpy)_3)^{2+}$TPP	**--**	Zn(II)			DCM	TBAP	Ag/AgCl			0.62	1.18		-0.62			145
(α^3-NMIm)(β-F_3Im)TPP	**112**	Fe(II)			H_2O	$NaClO_4$	NHE		0.27*	0.18*						420
(α^3-NMIm)(β-F_3Im)TPP	**112**	Fe(II)			H_2O	$NaClO_4$ (0.25M)	NHE		0.26*	0.17*						420

Table 5a. Picket-Fence porphyrins and related derivatives. (see structures in Figure 5a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
(α^3-NMIm)(β-F_3Im)TPP	**112**	Fe(II)			H_2O	$NaClO_4$ (0.5M)	NHE		0.24*	0.15*					420
(α^3-NMIm)(β-F_3Im)TPP	**112**	Fe(II)			H_2O	$NaClO_4$ (1.0M)	NHE		0.23*	0.14*					420
(α^3-piv)(α'-SR)TPP	**113**	Fe(III)			DCM	TBAP	Ag/Ag^+				0.94 -0.53				193
(α^3-piv)(α'-SR)TPP	--	Fe(III)	NO		DCM	TBAP	Ag/Ag^+				0.81 -0.43				193
(α^3-PrIm)(β-F_3Im)TPP	**114**	Fe(II)			H_2O	KNO_3	NHE		0.17*	0.06*					420
(α^3-PrIm)(β-F_3Im)TPP	**114**	Fe(II)			H_2O	KPF_6	NHE		0.13*	0.03*					420
(α^3-PrIm)(β-F_3Im)TPP	**114**	Fe(II)			H_2O	$N(Et)_3(Ph)Cl$	NHE		0.25*	0.14*					420
(α^3-PrIm)(β-F_3Im)TPP	**114**	Fe(II)			H_2O	$NaClO_4$	NHE		0.17*	0.07*					420
(α^3-PrIm)(β-F_3Im)TPP	**114**	Fe(II)			H_2O	TBACl	NHE		0.28*	0.16*					420
(α^3-PrIm)(β-F_3Im)TPP	**114**	Fe(II)			H_2O	TEACl	NHE		0.21*	0.10*					420
(α^3,β-$NHCOCF_3$)TPP	**115**	2H			DCM	TBAP (0.5M)	Ag/AgCl			0.28		-0.93			145
(α^3,β-$NHCOCF_3$)TPP	--	Mn(III)	Cl^-		DCM	TBAP	Ag/AgCl			0.92	-0.42				145
(α^3,β-$NHCOCF_3$)TPP	--	Zn(II)			DCM	TBAP	Ag/AgCl			0.74		-0.95			145
α^4-$(piv)_4$TPP	**116**	Fe(III)			CH_3CN	TPrAP (0.05M)	SHE				-0.71				580
α^4-$(piv)_4$TPP	--	Fe(III)	NO		CH_3CN	TPrAP (0.05M)	SHE				0.38				580
α^4-$(piv)_4$TPP	--	Fe(III)	NO	NO_2^-	CH_3CN	TPrAP (0.05M)	SHE				0.54				580
α^4-$(piv)_4$TPP	--	Fe(III)	NO_2^-		CH_3CN	TPrAP (0.05M)	SHE				-0.68				580
α^4-$(piv)_4$TPP	--	Fe(III)	NO_2^-	NO_2^-	CH_3CN	TPrAP (0.05M)	SHE				-0.96				580
(α^4-DPA)TNP	**117**	2H			THF	TBAP	Fc/Fc^+				0.28	-1.65			499 (DPV)
(α^4-MPMF)TPP	**118**	2H			DCM	TBAP	Ag/AgCl			0.70		-0.81			108

Table 5a. Picket-Fence porphyrins and related derivatives. (see structures in Figure 5a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
(α^4-MPMF)TPP	**119**	Co(II)			DCM	TBAP	Ag/AgCl			0.89			-0.90			108
(α^4-MPMF)TPP	--	Cu(II)			DCM	TBAP	Ag/AgCl			0.83			-0.91			108
(α^4-MPMF)TPP	--	Ni(II)			DCM	TBAP	Ag/AgCl			0.80			-1.03			108
[(α^4-NMPy)P]$^{4+}$	**120**	Mn(III)	H_2O		H_2O	NaCl	NHE				-0.03					563
(α^4-PPDA)TNP	**121**	2H			THF	TBAP	Fc/Fc$^+$				0.24	-0.12	-1.66			499
(α^4-PrA)TNP	**122**	2H			THF	TBAP	Fc/Fc$^+$						-1.63			499

Table 5b. *meso*-Tetraalkylporphyrins. (see structures in Figure 5b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
T(C_6H_{11})P	**123**	2H			DCM	TBAP	SCE		1.44*	0.83*		-1.30	-1.67		61
T(C_6H_{11})P	--	Ni(II)			DCM	TBAP	SCE	1.56	1.17*	0.81		-1.49			61
T(C_6H_{11})P	--	Zn(II)			DCM	TBAP	SCE		0.80	0.57		-1.52			61
T(CH_3)P	**124**	Ni(II)			DCM	TBAP	SCE		1.15	0.83		-1.36			302
T(Et)P	**125**	Ni(II)			DCM	TBAP	SCE		1.15	0.85		-1.39			302
T(i-Pr)P	**126**	Ni(II)			DCM	TBAP	SCE		1.18	0.81		-1.44			33
T(i-Pr)P	**126**	Ni(II)			DCM	$TBAPF_6$	SCE		1.20	0.83		-1.46			33
T(*n*-C_3F_7)P	**127**	Ni(II)			DCM	TBAP	SCE		1.54	1.54		-0.72			33
T(*n*-C_3F_7)P	**127**	Ni(II)			DCM	$TBAPF_6$	SCE		1.67	1.54		-0.73			33
T(Pn)P	**128**	Zn(II)			DCM	TBAP	SCE			0.67					86
T(t-Bu)P	**129**	Ni(II)			DCM	TBAP	SCE		0.93	0.60		-1.48			33
T(t-Bu)P	**129**	Ni(II)			DCM	$TBAPF_6$	SCE		0.93	0.64		-1.50			33
T(TD)P	**130**	Zn(II)			DCM/THF	$TBABF_4$	Ag/Ag^+			0.25					46
TUP	**131**	2H			DCM	TBAP	SCE		1.26*	0.85		-1.28	-1.69		302
TUP	**131**	2H			PhCN	TBAP	SCE		1.28*	0.91		-1.25	-1.62		302
TUP	--	Cu(II)			DCM	TBAP	SCE		1.19	0.82		-1.42			302
TUP	--	Cu(II)			PhCN	TBAP	SCE		1.17	0.81		-1.43	-1.91		302
TUP	--	Mn(III)	Cl^-		DCM	TBAP	SCE		1.48*	0.97	-0.53*	-1.75			302
TUP	--	Mn(III)	Cl^-		PhCN	TBAP	SCE		1.45*	0.95	-0.48*	-1.53	-1.68		302
TUP	--	Ni(II)			DCM	TBAP	SCE		1.18	0.87		-1.40			302

Table 5b. *meso*-Tetraalkylporphyrins. (see structures in Figure 5b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
TUP	--	Ni(II)			PhCN	TBAP	SCE		1.12	0.90		-1.43	-1.93		302
TUP	--	Pd(II)			DCM	TBAP	SCE		1.66*	0.88		-1.40			302
TUP	--	Pd(II)			PhCN	TBAP	SCE		1.52*	0.86		-1.42	-1.93		302
TUP	--	Zn(II)			DCM	TBAP	SCE		1.01	0.64		-1.46			302
TUP	--	Zn(II)			PhCN	TBAP	SCE		1.03	0.64		-1.47	-1.91		302

Table 5c. *meso*-Tetraarylporphyrins. (see structures in Figure 5c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
1R-T(CF_3BMOA)P	**132**	Ru(II)	CO		THF	$TBAPF_6$	Fc/Fc^+		1.01	0.50			-2.16	-2.88		199
1R-T(CH_3OBMOA)P	**133**	2H			DCM	$TBAPF_6$	Fc/Fc^+		0.86	0.39			-1.90	-2.20		199
1R-T(MOBMOA)P	**134**	Ru(II)	CO		DCM	$TBAPF_6$	Fc/Fc^+		0.78	0.20						199
1S-T(CF_3BMOA)P	**135**	2H			DCM	$TBAPF_6$	Fc/Fc^+		1.06	0.63			-1.76	-2.08		199
1S-T(CF_3BMOA)P	--	Ru(II)	CO		DCM	$TBAPF_6$	Fc/Fc^+		0.99	0.40						199
1S-T(CF_3BMOA)P	--	Ru(II)	CO		THF	$TBAPF_6$	Fc/Fc^+			0.63			-2.05	-2.78		199
1S-T(CH_3BMOA)P	**136**	2H			DCM	$TBAPF_6$	Fc/Fc^+		0.88	0.38			-1.91	-2.36		199
1S-T(MBMOA)P	**137**	Ru(II)	CO		DCM	$TBAPF_6$	Fc/Fc^+		0.79	0.18						199
1S-T(MBMOA)P	**137**	Ru(II)	CO		THF	$TBAPF_6$	Fc/Fc^+			0.44			-2.24			199
Cl_{20}TPP	**138**	Mn(III)	Cl^-		NR	NR	NR				0.01					477
Cl_4F_4TPP	**139**	Mn(III)	$CH_3CO_2^-$		CH_3CN	$TBAPF_6$	NHE				1.71	0.09	-1.15	-1.49		171
Cl_8TPP	**140**	2H			DCM	$TBAPF_6$	SCE			1.25						582
Cl_8TPP	--	Co(III)	*n*-Bu^-		DMF	TEAP	SCE			0.91			-1.20			584
Cl_8TPP	--	Cu(II)			DCM	$TBAPF_6$	$CuTPP^{0/+}$			0.03						579
Cl_8TPP	--	Fe(III)	Cl^-		DCM	$TBAPF_6$	SCE			1.30						582
Cl_8TPP	--	Fe(III)	ClO_4^-		CH_3CN (-35°C)	TBAP	SCE			1.46						374

Table 5c. *meso*-Tetraarylporphyrins. (see structures in Figure 5c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
Cl_8TPP	--	Fe(III)	*n*-Bu^-		DMF	TEAP	SCE			0.41			-0.75			584
Cl_8TPP	**141**	Fe(III)	See Fig.		DMF	TEAP	SCE			0.34			-0.72			584
Cl_8TPP	**142**	Fe(III)	See Fig.		DMF	TEAP	SCE						-0.70			584
Cl_8TPP	--	Fe(IV)	ClO_4^-	O^{2-}	CH_3CN (-35°C)	TBAP	SCE		1.25	0.88						374
Cl_8TPP	--	Fe(IV)	ClO_4^-	O^{2-}	CH_3CN (-35°C)	TBAP	SCE		1.59	1.28						374
Cl_8TPP	--	Mn(II)			CH_3CN	TBAP	SCE				-0.08		-1.33	-1.68		267
Cl_8TPP	--	Mn(III)	$CH_3CO_2^-$		CH_3CN	$TBAPF_6$	NHE				1.70	0.07	-1.26	-1.56		171
Cl_8TPP	--	Mn(III)	Cl^-		NR	NR	NR				-0.12					477
Cl_8TPP	--	Ni(II)			DCM	$TBAPF_6$	SCE						-1.22			505
Cl_8TPP	**143**	Ru(II)	See Fig.		DCM	NR	Fc/Fc^+			0.32			-1.88*			203
Cl_8TPP	**144**	Ru(II)	See Fig.		DCM	NR	Fc/Fc^+			0.42			-1.73			203
Cl_8TPP	--	Zn(II)			DCM	$TBAPF_6$	SCE						-1.29			505
$F_{12}TPP$	**145**	Co(II)			*n*-BuCN	TBAP	SCE				-0.79		-1.89			266
$F_{20}TPP$	**146**	2H			DCM	NR	SCE		1.54	1.20			-0.97	-1.40		393
$F_{20}TPP$	**146**	2H			DCM	$TBAPF_6$	Fc/Fc^+			1.08			-1.23*			406
$F_{20}TPP$	--	Co(II)			CH_3CN	$TBAPF_6$	Fc/Fc^+				0.40*	-1.00				547

Table 5c. *meso*-Tetraarylporphyrins. (see structures in Figure 5c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$F_{20}TPP$	--	Co(II)			*n*-BuCN	TBAP	SCE				-0.61		-1.61			266
$F_{20}TPP$	--	Co(II)			PhCN	$TBAPF_6$	Ag/Ag^+		1.52	1.29	0.31	-0.94	-1.94			212
$F_{20}TPP$	--	Cu(II)			DCM	$TBAPF_6$	$CuTPP^{0/+}$			0.44						579
$F_{20}TPP$	--	Fe(II)			DMF	TEAP	SCE						-0.84	-1.32		584
$F_{20}TPP$	**147**	Fe(II)	See Fig.		DCM	NR	Fc/Fc^+			0.35			-1.52			203
$F_{20}TPP$	**148**	Fe(II)	See Fig.	1-(CH_3)	DCM	NR	Fc/Fc^+			0.13			-1.67			203
$F_{20}TPP$	--	Fe(III)	ClO_4^-		DCM/CH_3CN (-60°C)	TBAP	SCE			1.56						374 (DPV)
$F_{20}TPP$	--	Fe(III)	*n*-Bu^-		DMF	TEAP	SCE			0.54			-0.56			584
$F_{20}TPP$	**149**	Fe(III)	See Fig.		DMF	TEAP	SCE			0.55			-0.53			584
$F_{20}TPP$	**150**	Fe(III)	See Fig.		DMF	TEAP	SCE						-0.54			584
$F_{20}TPP$	**151**	Fe(III)	See Fig.		DMF	TEAP	SCE			0.47			-0.55			584
$F_{20}TPP$	**152**	Fe(III)	See Fig.		DMF	TEAP	SCE						-0.54			584
$F_{20}TPP$	--	Fe(IV)	ClO_4^-	O^{2-}	DCM/CH_3CN (-60°C)	TBAP	SCE			1.39						374
$F_{20}TPP$	**153**	In(III)	See Fig.		DCM	TBAP	$Ag/AgNO_3$			1.20*			-0.99	-1.51		234
$F_{20}TPP$	--	Mn(III)	$CH_3CO_2^-$		CH_3CN	$TBAPF_6$	NHE				1.75	0.05	-1.04	-1.47		171
$F_{20}TPP$	--	Mn(III)	Cl^-		NR	NR	NR				0.04					477

Table 5c. *meso*-Tetraarylporphyrins. (see structures in Figure 5c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$F_{20}TPP$	--	Ni(II)			DCM	TBAP	SCE		1.41	1.41		-0.85			33
$F_{20}TPP$	--	Ni(II)			DCM	$TBAPF_6$	SCE		1.67	1.42		-0.90			33
$F_{20}TPP$	**154**	Os(II)	See Fig.	1-(CH_3)	CH_3CN	NR	Fc/Fc^+		1.07	0.06		-1.71			203
$F_{20}TPP$	--	Pt(II)			DCM	$TBAPF_6$	$Ag/AgNO_3$			1.33		-1.06	-1.55		228
$F_{20}TPP$	**155**	Ru(II)	CH_3OH	See Fig.	DCM	NR	Fc/Fc^+			0.63		-1.46			203
$F_{20}TPP$	**156**	Ru(II)	CH_3OH	See Fig.	DCM	NR	Fc/Fc^+			0.65		-1.47			203
$F_{20}TPP$	--	Ru(II)	CO		DCM	NR	Fc/Fc^+			0.84		-1.61			203
$F_{20}TPP$	--	Ru(II)	PH_2Ph	PH_2Ph	DCM	$TBAPF_6$	Fc/Fc^+			0.39		-1.89			201
$F_{20}TPP$	--	Ru(II)	$PHPh_2$	$PHPh_2$	DCM	$TBAPF_6$	Fc/Fc^+			0.31		-2.02			201
$F_{20}TPP$	--	Ru(II)	PPh_3	PPh_3	DCM	$TBAPF_6$	Fc/Fc^+			1.33		-1.83			440
$F_{20}TPP$	**157**	Ru(II)	See Fig.		DCM	NR	Fc/Fc^+			0.46		-1.53			203
$F_{20}TPP$	**158**	Ru(II)	See Fig.		DCM	NR	Fc/Fc^+			0.57		-1.50			203
$F_{20}TPP$	**159**	Ru(II)	See Fig.		DCM	NR	Fc/Fc^+			0.44		-1.55			203
$F_{20}TPP$	**160**	Ru(II)	See Fig.		DCM	NR	Fc/Fc^+			0.77		-1.25			203
$F_{20}TPP$	**161**	Ru(II)	See Fig.		DCM	NR	Fc/Fc^+			0.50		-1.51			203
$F_{20}TPP$	**162**	Ru(II)	See Fig.	1-(CH_3)	CH_3CN	NR	Fc/Fc^+			0.33		-1.63			203

Table 5c. *meso*-Tetraarylporphyrins. (see structures in Figure 5c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
F_{20}TPP	**163**	Ru(II)	See Fig.	$(Et)_2S$	DCM	NR	Fc/Fc^+			0.52			-1.53			203
F_{20}TPP	**164**	Ru(II)	See Fig.	EtSH	DCM	NR	Fc/Fc^+			0.52			-1.53			203
F_{20}TPP	**165**	Ru(II)	See Fig.	See Fig.	DCM	NR	Fc/Fc^+			0.42			-1.90*			203
F_{20}TPP	--	Ru(VI)	O^{2-}	O^{2-}	DCM	$TBAPF_6$	Fc/Fc^+			1.25	-0.64*		-0.25	-1.30		440
F_{20}TPP	--	Sn(IV)	OH^-	OH^-	DCM	TBAP	SCE						-0.46	-0.96		315
F_{20}TPP	--	Zn(II)			DCM	$TBABF_4$	Ag/Ag^+			1.02						509
F_{20}TPP	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.81			-1.49			406
F_{20}TPP	--	Zn(II)	Py		C_6H_6	THAP	SCE						-0.97			142
F_{20}TPP	--	Zn(II)	Py		CH_3CN	TBAP	SCE						-1.04			142
F_{20}TPP	--	Zn(II)	Py		DCM	TBAP	SCE						-1.03			142
F_8TPP	**166**	Co(II)			PhCN	$TBAPF_6$	Ag/Ag^+		1.37	1.21	0.33	-0.85	-1.89			212
F_8TPP	--	Fe(II)			CH_3CN	$TBAPF_6$	Fc/Fc^+				-0.14					183
F_8TPP	--	Fe(III)	Cl^-		CH_3CN	$TBAPF_6$	Fc/Fc^+				-0.53					183
F_8TPP	--	Mn(III)	$CH_3CO_2^-$		CH_3CN	$TBAPF_6$	NHE				1.72	0.09	-1.19	-1.59		171
F_8TPP	--	Zn(II)			DCM	$TBAPF_6$	Ag/Ag^+		1.36	1.26			-1.03			212
rac-T(BMOA)P	**167**	2H			DCM	$TBAPF_6$	Fc/Fc^+		0.89	0.42			-1.89	-2.35		199

Table 5c. *meso*-Tetraarylporphyrins. (see structures in Figure 5c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
rac-T(BMOA)P	--	Ru(II)	CO		CH_3CN	$TBAPF_6$	Fc/Fc^+		0.83	0.41		-1.97	-2.52		199
rac-T(BMOA)P	--	Ru(II)	CO		DCM	$TBAPF_6$	Fc/Fc^+		0.96	0.29					199
rac-T(BMOA)P	--	Ru(II)	CO		DMF	$TBAPF_6$	Fc/Fc^+		0.88*	0.44		-1.97	-2.71		199
rac-T(BMOA)P	--	Ru(II)	CO		THF	$TBAPF_6$	Fc/Fc^+			0.50		-2.20	-2.87		199
rac-T(BMOA)P	--	Ru(II)	PF_3		DCM	$TBAPF_6$	Fc/Fc^+		0.99	0.30					199
rac-T(BMOA)P	--	Ru(II)	PF_3		THF	$TBAPF_6$	Fc/Fc^+			0.50		-2.22	-2.66		199
S-T(4'-CH_3P)P	**168**	H			THF	$TBAPF_6$	SCE			1.03		-1.06			574
T(2'-Furyl)P	**169**	2H			DCM	TBAP	SCE			0.80		-0.98	-1.39		498
T(2'-Furyl)P	--	Mg(II)			DCM	TBAP	SCE			0.68*		-1.40			78
T(2'-Furyl)P	--	Sn(IV)	OH^-	OH^-	DCM	TBAP	SCE					-0.45	-0.86		315
T(2'-NH_2P)P	**170**	2H			DMF	TBAP	Ag/AgCl					-1.09	-1.45		481
T(2'-NH_2P)P	--	Co(II)			H_2O	NaOH	SCE				-0.70 -0.70				478
T(2'-NH_2P)P	--	Fe(II)			DMF	TBAP	Ag/AgCl				-0.24, -1.06 -1.69				481
T(2'-NO_2P)P	**171**	2H			DCM	$TBABF_4$	Ag/AgCl					-0.91*	-1.28*		192
T(2'-NO_2P)P	--	Fe(III)			DCM	$TBABF_4$	Ag/AgCl				-0.21* -0.57*	-1.03*	-1.17*		192
T(2'-Py)P	**172**	Mn(III)	Cl^-		DCM	$TBAPF_6$	SCE				-0.19				2

Table 5c. *meso*-Tetraarylporphyrins. (see structures in Figure 5c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
T(2'-Py)P	**172**	Mn(III)	Cl^-		DCM	$TBAPF_6$	Fc/Fc^+				-0.62				511
T(2'-Thienyl-5'-A)P	**173**	Zn(II)			DCM	$TBABF_4$	Fc/Fc^+		0.66	0.49		-1.68	-2.03*		130
T(2'-Thienyl-5'-Br)P	**174**	Zn(II)			DCM	$TBABF_4$	Fc/Fc^+		0.52	0.61		-1.66*	-1.94*		130
T(2'-Thienyl-5'-TA)P	**175**	Zn(II)			DCM	$TBABF_4$	Fc/Fc^+		0.69	0.49		-1.70*	-2.18*		130
T(2'-Thienyl)P	**176**	2H			DCM	$TBAPF_6$	Ag/AgCl		1.13	0.89		-1.09	-1.42		322
T(2'-Thienyl)P	--	Cu(II)			DCM	$TBAPF_6$	Ag/AgCl		1.35	0.99		-1.19	-1.58		322
T(2'-Thienyl)P	--	Mg(II)			DCM	TBAP	SCE		0.98	0.78		-1.42			78
T(2'-Thienyl)P	--	Sn(IV)	OH^-	OH^-	DCM	TBAP	SCE					-0.56	-0.96		315
T(2'-Thienyl)P	--	Zn(II)			DCM	$TBABF_4$	Fc/Fc^+		0.63	0.43		-1.71	-2.05		130
T(2'-Thienyl)P	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		1.09	0.89		-1.23	-1.43		322
T(2',4'-OCH_3P)P	**177**	Ni(II)			DCM	TBAP	Ag/AgCl		1.13	0.91		-1.38			297
T(2',4',6'-CF_3P)P	**178**	Co(II)			*n*-BuCN	TBAP	SCE				-0.75	-1.81			266
T(2',4',6'-OCH_3P)P	**179**	Ni(II)			DCM	TBAP	Ag/AgCl		1.22	0.85		-1.49			297
T(2',4',6'-OCH_3P)P	--	Pt(II)			DMF	TBAP	Fc/Fc^+			0.67		-1.94			483
T(2',5'-OCH_3P)P	**180**	Ni(II)			DCM	TBAP	Ag/AgCl		1.20	1.00		-1.33			297
T(2',6'-$O(CH_2)_3CO_2$EtP)P	**181**	Pt(II)			DMF	TBAP	Fc/Fc^+			0.70		-1.91			483

Table 5c. *meso*-Tetraarylporphyrins. (see structures in Figure 5c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
T(2',6'-OCH_3P)P	**182**	Pt(II)			DMF	TBAP	Fc/Fc^+			0.70		-1.91			483
T(2',6'-OCH_3P)P	**183**	Ru(II)	See Fig.	See Fig.	DCM	$TBAPF_6$	SCE		0.92	0.28					206
T(3,5-OCH_2CO_2EtP)PP	**184**	Pt(II)			DMF	TBAP	Fc/Fc^+			0.86*		-1.66			483
T(3,5-OCH_3P)P	**185**	Pt(II)			DMF	TBAP	Fc/Fc^+			0.86*		-1.66			483
T(3'-ClP)P	**186**	Fe(II)	NO		THF	TBAP	SCE					-1.33	-2.15		583
T(3'-NH_2P)P	**187**	2H			DMF	TBAP	Ag/AgCl					-0.72	-1.04	-1.50	481
T(3'-NH_2P)P	--	Co(II)			DMF	TBAP	Ag/AgCl			1.09*	-0.74				115
T(3'-NH_2P)P	--	Co(II)			H_2O	$NaClO_4$	Ag/AgCl				-0.84				115
T(3'-NH_2P)P	--	Fe(II)			DMF	TBAP	Ag/AgCl				-0.24, -1.06 -1.74				481
T(3'-PP)P	**188**	2H			DCM	$TBAPF_6$	SCE			1.08		-0.80			11
T(3'-Py)P	**189**	2H			H_2O	KOH	Ag/AgCl				-1.00	-0.54	-0.71		462
T(3'-Py)P	--	Co(II)			H_2O	KOH	Ag/AgCl				0.21 -0.98	-0.53	-0.73		462
T(3'-Py)P	--	Cu(II)			H_2O	KOH	Ag/AgCl				-0.97	-0.44	-0.70		462
T(3'-Py)P	--	Mn(III)	Cl^-		DMF	TBAP	Fc/Fc^+				-0.54				2
T(3'-Py)P	--	Mn(III)	Cl^-		DMF	TBAP	SCE				-0.07				2
T(3'-Py)P	--	Zn(II)			H_2O	KOH	Ag/AgCl				-0.99	-0.41	-0.72		462

Table 5c. *meso*-Tetraarylporphyrins. (see structures in Figure 5c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
T(3'-Thienyl)P	**190**	2H			DCM	$TBAPF_6$	Ag/AgCl		1.21	0.95		-1.23	-1.53		322
T(3'-Thienyl)P	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		1.09	0.81		-1.39	-1.70		322
T(3'-Thineyl)P	--	Cu(II)			DCM	$TBAPF_6$	Ag/AgCl		1.30	0.92		-1.35	-1.75		322
T(3',4'-OCH_3P)P	**191**	Co(II)			H_2O/EtOH	NaCl (0.5M)	Ag/AgCl			0.42	0.13				468
T(3',4'-OCH_3P)P	--	Ni(II)			DCM	TBAP	Ag/AgCl		1.08	0.98		-1.30			297
T(3',4',5'-OCH_3P)P	**192**	Ni(II)			DCM	TBAP	Ag/AgCl		1.05	1.05		-1.26			297
T(3',4',5'-OCH_3P)P	--	Pt(II)			DMF	TBAP	Fc/Fc^+					-1.68			483
T(3',4',5'-OCH_3P)P	**193**	Ru(II)	See Fig.		DCM	NR	Fc/Fc^+		0.81	0.25					203
T(3',5'-CF_3P)P	**194**	2H			DCM	$TBAPF_6$	Fc/Fc^+		1.08	0.92		-1.42	-1.75		443
T(3',5'-D-tBuHP)P	**195**	2H			DCB	TBAP	Fc/Fc^+		0.43*	0.31*		-1.82	-2.19		353
T(3',5'-D-tBuP)P	**196**	2H			DCM	$P(Ph)_4BF_4$	SCE		1.07	0.95		-1.05	-1.29		121
T(3',5'-D-tBuP)P	**196**	2H			DCM	TBAP	SCE			0.95		-1.22	-1.55		38
T(3',5'-D-tBuP)P	**196**	2H			DCM	TBAP (0.5M)	$Ag/AgNO_3$					-1.46	-1.87		215 (DPV)
T(3',5'-D-tBuP)P	**196**	2H			DCM	$TBAPF_6$	SCE			0.86		-1.28			7
T(3',5'-D-tBuP)P	**196**	2H			DCM	$TBAPF_6$	Fc/Fc^+		0.78	0.48		-1.69	-2.02		26
T(3',5'-D-tBuP)P	**196**	2H			DCM	$TBAPF_6$	Fc/Fc^+			0.47		-1.76			406

Table 5c. *meso*-Tetraarylporphyrins. (see structures in Figure 5c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
T(3',5'-D-tBuP)P	**196**	2H			PhCN	TBAP	SCE		1.25	0.99			-1.19	-1.56		38
T(3',5'-D-tBuP)P	**196**	2H			Py	TBAP	SCE						-1.13	-1.50		38
T(3',5'-D-tBuP)P	--	Ag(II)			DCM	TBAP	SCE			1.58	0.58					22
T(3',5'-D-tBuP)P	--	Ag(II)			Py	TBAP	SCE				0.64	-0.94	-1.77*			22
T(3',5'-D-tBuP)P	--	Au(II)			PhCN	TBAP	SCE						-1.09	-1.81		571
T(3',5'-D-tBuP)P	--	Au(III)			CH_3CN	$TBAPF_6$	SCE				-0.63		-1.02			7
T(3',5'-D-tBuP)P	--	Au(III)			DCM	TBAP	SCE			1.59	-0.64		-1.15			231
T(3',5'-D-tBuP)P	--	Au(III)			DCM	TBAP	SCE				-0.64					571
T(3',5'-D-tBuP)P	--	Au(III)			DCM	$TBAPF_6$	SCE				-0.70		-1.23			7
T(3',5'-D-tBuP)P	--	Au(III)			DCM	$TBAPF_6$ (0.15M)	SCE				-0.68		-1.23			131
T(3',5'-D-tBuP)P	--	Au(III)			DMF	TBAP	SCE			1.06*	-0.49		-0.99	-1.74		231
T(3',5'-D-tBuP)P	--	Au(III)			DMSO	TBAP	SCE				-0.54*		-1.24*	-1.68*		231
T(3',5'-D-tBuP)P	--	Au(III)			PhCN	TBAP	SCE				-0.56		-1.09	-1.81		29
T(3',5'-D-tBuP)P	--	Au(III)			PhCN	TBAP	SCE			1.66	-0.56		-1.09	-1.81		231
T(3',5'-D-tBuP)P	--	Au(III)			Py	TBAP	SCE				-0.52		-1.08	-1.76		231
T(3',5'-D-tBuP)P	--	Au(III)			THF	TBAP (0.4M)	SCE				-0.40		-1.10	-1.77		231

Table 5c. *meso*-Tetraarylporphyrins. (see structures in Figure 5c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
T(3',5'-D-tBuP)P	--	Co(II)			PhCN	TBAP	SCE		1.35	1.13	0.64*	-0.04*	-0.87			6
T(3',5'-D-tBuP)P	--	Co(III)	Cl^-		PhCN	TBAP	SCE		1.27	0.90	0.64*	-0.26*	-0.87			6
T(3',5'-D-tBuP)P	--	Cu(II)			DCM	TBAP	SCE		1.23	0.94			-1.36	-1.88*		28
T(3',5'-D-tBuP)P	--	Cu(II)			DCM	TBAP	SCE		1.28*	0.92			-1.36	-1.92*		38
T(3',5'-D-tBuP)P	--	Cu(II)			PhCN	TBAP	SCE						-1.28	-1.75		29
T(3',5'-D-tBuP)P	--	Cu(II)			PhCN	TBAP	SCE		1.26	0.96			-1.28	-1.75		38
T(3',5'-D-tBuP)P	--	Cu(II)			Py	TBAP	SCE						-1.25	-1.69		38
T(3',5'-D-tBuP)P	**197**	In(III)	See Fig.		DCM	TBAP	$Ag/AgNO_3$			0.94*			-1.44	-2.01		234
T(3',5'-D-tBuP)P	--	Ni(II)			DCM	TBAP	SCE		0.93	0.93			-1.31			38
T(3',5'-D-tBuP)P	--	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.80	0.46			-1.85			406
T(3',5'-D-tBuP)P	--	Ni(II)			PhCN	NR	Fc/Fc^+			0.61			-1.73			517
T(3',5'-D-tBuP)P	--	Ni(II)			PhCN	TBAP	SCE		1.08	1.08			-1.26	-1.81		38
T(3',5'-D-tBuP)P	--	Ni(II)			Py	TBAP	SCE						-1.22	-1.75		38
T(3',5'-D-tBuP)P	--	Pd(II)			DCM	TBAP	SCE		1.52*	1.05			-1.32	-1.95*		38
T(3',5'-D-tBuP)P	--	Pd(II)			PhCN	TBAP	SCE		1.46	1.12			-1.25	-1.75		38
T(3',5'-D-tBuP)P	--	Pd(II)			Py	TBAP	SCE						-1.22	-1.68		38

Table 5c. *meso*-Tetraarylporphyrins. (see structures in Figure 5c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
T(3',5'-D-tBuP)P	**198**	Rh(III)	See Fig.		DCM	TBAP (0.5M)	$Ag/AgNO_3$					-2.00			215 (DPV)
T(3',5'-D-tBuP)P	--	Sn(IV)	Cl^-	Cl^-	DCM	TBAP	SCE			1.36		-0.83	-1.34*		25
T(3',5'-D-tBuP)P	--	Sn(IV)	Cl^-	Cl^-	DCM (-75°C)	TBAP	SCE			1.36		-0.75	-1.21		25
T(3',5'-D-tBuP)P	--	Sn(IV)	OH^-	OH^-	DCM	TBAP	SCE			1.36		-0.99	-1.42		25
T(3',5'-D-tBuP)P	--	Zn(II)			DCB	TBAP	$Ag/AgNO_3$		0.82	0.50					408
T(3',5'-D-tBuP)P	--	Zn(II)			DCB	$TBAPF_6$	$Ag/AgNO_3$			0.79					334
T(3',5'-D-tBuP)P	--	Zn(II)			DCB/CH_3CN	TBAP	SCE		1.23	0.84		-1.42	-1.78		76
T(3',5'-D-tBuP)P	--	Zn(II)			DCM	$P(Ph)_4BF_4$	SCE		1.04	0.71		-1.35	-1.58		121
T(3',5'-D-tBuP)P	--	Zn(II)			DCM	$TBABF_4$	Ag/Ag^+		0.83	0.45					509
T(3',5'-D-tBuP)P	--	Zn(II)			DCM	TBAP	SCE		1.06	0.72		-1.42			38
T(3',5'-D-tBuP)P	--	Zn(II)			DCM	TBAP	SCE		1.03*	0.70*		-1.40*			447
T(3',5'-D-tBuP)P	--	Zn(II)			DCM	$TBAPF_6$	SCE		1.09	0.68					7
T(3',5'-D-tBuP)P	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.62	0.30		-1.89			26
T(3',5'-D-tBuP)P	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.59	0.31		-1.87	-2.26		128
T(3',5'-D-tBuP)P	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.67	0.35		-1.85	-2.25		153
T(3',5'-D-tBuP)P	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.64	0.33		-1.91			406

Table 5c. *meso*-Tetraarylporphyrins. (see structures in Figure 5c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
T(3',5'-D-tBuP)P	--	Zn(II)			DCM	$TBAPF_6$ (0.15M)	SCE			0.74					131
T(3',5'-D-tBuP)P	--	Zn(II)			PhCN	TBAP	SCE		1.09	0.77		-1.34	-1.73		38
T(3',5'-D-tBuP)P	--	Zn(II)			Py	TBAP	SCE					-1.38	-1.66*		38
T(3',5'-D-tBuP)P	--	Zn(II)			THF	TBAP	$Ag/AgNO_3$			0.54		-1.83	-2.22		408
T(3',5'-DCBuP)P	**199**	Pt(II)			DMF	TBAP	Fc/Fc^+					-1.35			483
T(3',5'-DCEP)P	**200**	2H			DCM	$TBAPF_6$	Ag/AgCl		1.48	1.20		-1.06	-1.36		324
T(3',5'-DCEP)P	--	Cu(II)			DCM	$TBAPF_6$	Ag/AgCl		1.47	1.17		-1.20	-1.58		324
T(3',5'-DCEP)P	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		1.31	1.00		-1.21	-1.58		324
T(3',5'-DFP)P	**201**	2H			DCM	$TBAPF_6$	Ag/AgCl		1.47	1.24		-1.07	-1.39		324
T(3',5'-DFP)P	--	Cu(II)			DCM	$TBAPF_6$	Ag/AgCl		1.42	1.20		-1.19	-1.54		324
T(3',5'-DFP)P	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		1.25	1.01		-1.22	-1.63		324
T(3',5'-DMP)P	**202**	2H			DCM	$TBABF_4$	Fc/Fc^+		1.32	1.00		-0.99	-1.19		282
T(3',5'-DMP)P	**202**	2H			DCM	$TBAPF_6$	Ag/AgCl		1.32	1.01		-1.23	-1.52		324
T(3',5'-DMP)P	--	Cu(II)			DCM	$TBAPF_6$	Ag/AgCl		1.31	0.98		-1.35	-1.64		324
T(3',5'-DMP)P	--	Zn(II)			DCM	$TBABF_4$	Fc/Fc^+		1.12	0.82		-1.06	-1.31		282
T(3',5'-DMP)P	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		1.09	0.84		-1.36	-1.71		324

Table 5c. *meso*-Tetraarylporphyrins. (see structures in Figure 5c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
T(3',5'-DNP)P	**203**	2H			DCM	$TBAPF_6$	Ag/AgCl			1.44		-0.81*	-1.46*		324
T(3',5'-DNP)P	--	Cu(II)			DCM	$TBAPF_6$	Ag/AgCl		1.54	1.47		-0.82*	-1.24*		324
T(3',5'-DNP)P	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		1.38	1.21		-0.86*	-1.30*		324
T(4'-AcSPPA)P	**204**	Zn(II)			DCM/EtOH	$TBAPF_6$	Ag/Ag^+		0.71	0.49					436
T(4'-BrP)P	**205**	Ru(II)	See Fig.		CH_3CN	NR	Fc/Fc^+		0.96	0.30		-1.89*			203
T(4'-CF_3P)P	**206**	Fe(II)	NO		THF	TBAP	SCE					-1.32	-2.08		583
T(4'-CF_3PA)P	**207**	Zn(II)			THF (-40°C)	$TBAPF_6$	Ag/AgCl			1.08		-0.73	-1.12		125
T(4'-CH_3P)P	**208**	2H			DCM	TBAP	SCE		1.37	1.13		-1.03	-1.35		233
T(4'-CH_3P)P	**208**	2H			DCM	TBAP	SCE		1.30	1.03		-1.23	-1.55		306
T(4'-CH_3P)P	**208**	2H			DCM	TBAP	SCE			1.03		-1.32	-1.55		498
T(4'-CH_3P)P	--	Al(III)	OH^-		DCM	TBAP	SCE	1.62	1.30	1.07		-1.01	-1.40		233
T(4'-CH_3P)P	--	Bi(III)	$CF_3SO_3^-$		DCM	TBAP	SCE		1.49	1.10					54
T(4'-CH_3P)P	--	Bi(III)	NO_3^-		DCM	TBAP	SCE		1.51	1.05					54
T(4'-CH_3P)P	--	Bi(III)	NO_3^-		PhCN	TBAP	SCE		1.42	1.11					54
T(4'-CH_3P)P	--	Cu(II)			DCM	TBAP	SCE		1.48	1.19		-1.08	-1.50		233
T(4'-CH_3P)P	--	Fe(II)	NO		THF	TBAP	SCE					-1.44	-2.27		583

Table 5c. *meso*-Tetraarylporphyrins. (see structures in Figure 5c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
T(4'-CH_3P)P	**209**	In(III)	See Fig.		DCM	$TBAPF_6$	SCE					-1.36	-1.82*		235
T(4'-CH_3P)P	**210**	In(III)	See Fig.		DCM	$TBAPF_6$	SCE					-1.28	-1.72*		235
T(4'-CH_3P)P	--	Mn(III)	Br^-		NR	NR	Ag/AgCl				-0.23				464
T(4'-CH_3P)P	--	Mn(III)	Br^-		NR	NR	Ag/AgCl				-0.23				504
T(4'-CH_3P)P	--	Mn(III)	$CH_3CO_2^-$		NR	NR	Ag/AgCl				-0.28				464
T(4'-CH_3P)P	--	Mn(III)	$CH_3CO_2^-$		NR	NR	Ag/AgCl				-0.28				504
T(4'-CH_3P)P	--	Mn(III)	Cl^-		NR	NR	Ag/AgCl				-0.26				464
T(4'-CH_3P)P	--	Mn(III)	Cl^-		NR	NR	Ag/AgCl				-0.26				504
T(4'-CH_3P)P	--	Mn(III)	F^-		NR	NR	Ag/AgCl				-0.32				464
T(4'-CH_3P)P	--	Mn(III)	F^-		NR	NR	Ag/AgCl				-0.32				504
T(4'-CH_3P)P	--	Mn(III)	I^-		NR	NR	Ag/AgCl				0.07				464
T(4'-CH_3P)P	--	Mn(III)	I^-		NR	NR	Ag/AgCl				0.07				504
T(4'-CH_3P)P	--	Mn(III)	OH^-		NR	NR	Ag/AgCl				-0.26				464
T(4'-CH_3P)P	--	Mn(III)	OH^-		NR	NR	Ag/AgCl				-0.26				504
T(4'-CH_3P)P	--	Mn(V)	N^{3-}		DCM	TBAP	Ag/AgCl		1.31	1.09		-1.21			474
T(4'-CH_3P)P	--	Pt(IV)	Br^-	Br^-	DCM	$TBAPF_6$	Fc/Fc^+			0.85	-0.80	-1.87			229

Table 5c. *meso*-Tetraarylporphyrins. (see structures in Figure 5c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
T(4'-CH_3P)P	--	Rh(III)	Cl^-	Py	DCM	$TBAPF_6$	Ag/AgCl			0.96					217
T(4'-CH_3P)P	--	Ru(II)	CO	Py	DCM	$TBAPF_6$ (0.2M)	SCE		1.28	0.73		-1.62			197
T(4'-CH_3P)P	--	Ru(II)	NO	H_2O	DCM	$TBAPF_6$	Fc/Fc^+		1.53	1.10		-0.82*			587
T(4'-CH_3P)P	**211**	Ru(II)	NO	See Fig.	DCM	$TBAPF_6$	Fc/Fc^+			0.72	-0.88* -1.22				208
T(4'-CH_3P)P	--	Ru(II)	NS	Cl^-	DCM	$TBAPF_6$	Ag/Ag^+		1.41	0.94		-0.66			576
T(4'-CH_3P)P	**212**	Ru(II)	See Fig.	See Fig.	DCM	$TBAPF_6$	SCE		1.20*	0.51					206
T(4'-CH_3P)P	--	Ru(III)	NO	CH_3O^-	DCM	$TBAPF_6$	Fc/Fc^+		1.52	1.22		-0.89*			587
T(4'-CH_3P)P	--	Ru(III)	NO	Cl^-	DCM	$TBAPF_6$	Ag/Ag^+		1.49	1.02		-0.79			576
T(4'-CH_3P)P	--	Ru(III)	NO	Cl^-	DCM	$TBAPF_6$	Fc/Fc^+		1.49	1.02		-0.79*			587
T(4'-CH_3P)P	--	Ru(III)	NO	HCO_2^-	DCM	$TBAPF_6$	Fc/Fc^+		1.52	1.15		-0.79*			587
T(4'-CH_3P)P	--	Ru(III)	NO	NCS^-	DCM	$TBAPF_6$	Fc/Fc^+		1.52	1.05		-0.86*			587
T(4'-CH_3P)P	--	Ru(III)	NO	OH^-	DCM	$TBAPF_6$	Fc/Fc^+		1.53	1.23		-0.88*			587
T(4'-CH_3P)P	--	Ru(III)	NO	^-ONO	DCM	$TBAPF_6$	Fc/Fc^+		1.33	1.15		-0.99*			587
T(4'-CH_3P)P	--	Ru(III)	NO	$^-ONO_2$	DCM	$TBAPF_6$	Fc/Fc^+		1.53	1.09		-0.85*			587
T(4'-CH_3P)P	--	Ru(III)	NO	SH^-	DCM	$TBAPF_6$	Fc/Fc^+		1.54	1.24		-0.99*			587
T(4'-CH_3P)P	--	Ru(VI)	O^{2-}	O^{2-}	DCM	$TBAPF_6$	Fc/Fc^+			0.70	-0.94*	-0.49	-1.58		440

Table 5c. *meso*-Tetraarylporphyrins. (see structures in Figure 5c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
T(4'-CH_3P)P	--	Sn(II)			THF	TEAB(C_6F_5)$_4$	Fc/Fc$^+$					-1.64	-2.06		236
T(4'-CH_3P)P	--	Sn(IV)	OH^-	OH^-	DCM	TBAP	SCE			1.39		-0.96	-1.36		96
T(4'-CH_3P)P	--	Sn(IV)	OH^-	OH^-	DCM	TBAP	SCE			1.39*		-0.88	-1.02		56
T(4'-CH_3P)P	--	Sn(IV)	OH^-	OH^-	DCM	TBAP	SCE					-0.96	-1.36		315
T(4'-CH_3P)P	--	Sn(IV)	Py	Py	Py	TEAB(C_6F_5)$_4$	Fc/Fc$^+$					-0.76	-1.20		236
T(4'-CH_3P)P	**213**	Sn(IV)	See Fig.	See Fig.	CH_3CN	TBAP	SCE			0.92					238
T(4'-CH_3P)P	**214**	Sn(IV)	See Fig.	See Fig.	CH_3CN	TBAP	SCE			0.92					238
T(4'-CH_3P)P	**215**	Sn(IV)	See Fig.	See Fig.	CH_3CN	TBAP	SCE			1.12					238
T(4'-CH_3P)P	**216**	Sn(IV)	See Fig.	See Fig.	CH_3CN	TBAP	SCE			1.35					238
T(4'-CH_3P)P	**217**	Sn(IV)	See Fig.	See Fig.	CH_3CN	TBAP	SCE			1.33					238
T(4'-CH_3P)P	**213**	Sn(IV)	See Fig.	See Fig.	DCM	TBAP	SCE					-0.99	-1.49		238
T(4'-CH_3P)P	**214**	Sn(IV)	See Fig.	See Fig.	DCM	TBAP	SCE					-1.00	-1.33		238
T(4'-CH_3P)P	**215**	Sn(IV)	See Fig.	See Fig.	DCM	TBAP	SCE					-0.91	-1.37		238
T(4'-CH_3P)P	**216**	Sn(IV)	See Fig.	See Fig.	DCM	TBAP	SCE					-0.91	-1.04	-1.41	238
T(4'-CH_3P)P	**217**	Sn(IV)	See Fig.	See Fig.	DCM	TBAP	SCE					-0.84	-1.31	-1.40	238
T(4'-CH_3P)P	**218**	Ti(IV)	See Fig.		DCM	TBAP	SCE		1.19*	0.35*		-1.18	-1.59		58

Table 5c. *meso*-Tetraarylporphyrins. (see structures in Figure 5c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
T(4'-CH_3P)P	**219**	Ti(IV)	See Fig.		DCM	TBAP	SCE			1.04*		-1.20	-1.59		58
T(4'-CH_3P)P	--	Zn(II)			DCM	TBAP	SCE		1.21	0.90		-1.37	-1.54		233
T(4'-CH_3P)P	--	Zn(II)			DCM	TBAP	SCE		1.09	0.80		-1.25	-1.67		306
T(4'-CH_3P)P	--	Zn(II)			DCM	TBAP	SCE			0.74		-1.22			494
T(4'-CH_3P)P	--	Zn(II)			DMF	$TBAPF_6$	SCE			0.87		-1.31			298
T(4'-CH_3P)P	--	Zn(II)			PhCN	$TBAPF_6$	$Ag/AgNO_3$		0.75	0.35					445
T(4'-CH_3PA)P	**220**	Zn(II)			THF (-40°C)	$TBAPF_6$	Ag/AgCl			0.99		-0.89	-1.33		125
T(4'-ClP)P	**221**	Co(II)			$CHCl_3$	H_2SO_4 (0.5M)	Ag/AgCl					-0.19			104
T(4'-ClP)P	**222**	Fe(II)	NO		THF	TBAP	SCE					-1.35	-2.18		583
T(4'-ClP)P	--	Mn(III)	Cl^-		NR	NR	NR				-0.18				477
T(4'-ClP)P	**223**	Ru(II)	See Fig.		DCM	NR	Fc/Fc^+		0.96	0.32		-1.88*			203
T(4'-ClPA)P	**224**	Zn(II)			THF (-40°C)	$TBAPF_6$	Ag/AgCl			1.05		-0.79	-1.20		125
T(4'-CNP)P	**225**	2H			DCM	$TBAPF_6$	Fc/Fc^+		1.02	0.78		-1.51	-1.83		229
T(4'-CNP)P	--	Co(II)			DME	$TBAPF_6$	Ag/AgCl				0.63 -0.62				214
T(4'-CNP)P	--	Cu(II)			DCM	$TBAPF_6$	$CuTPP^{0/+}$			0.11					579
T(4'-CNP)P	--	Pt(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.91		-1.64	-2.04		229

Table 5c. *meso*-Tetraarylporphyrins. (see structures in Figure 5c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
T(4'-CNP)P	--	Pt(IV)	Br^-	Br^-	CH_3CN	$TBAPF_6$	Fc/Fc^+			1.14	-0.50	-2.04			229
T(4'-CNP)P	--	Sb(V)	OH^-	OH^-	CH_3CN	$TEABF_4$	SCE			1.41		-0.52	-0.95		243
T(4'-CNP)P	--	Zn(II)			DCM	$TBABF_4$	Ag/Ag^+		0.98	0.68					509
T(4'-CNP)P	--	Zn(II)			DCM	TBAP	SCE			0.89		-1.16			494
T(4'-CO_2CH_3P)P	**226**	2H			PhCN	$TBAPF_6$	$Ag/AgNO_3$		0.73	0.50		-1.46			337
T(4'-CO_2CH_3P)P	--	Co(II)			PhCN	$TBAPF_6$	$Ag/AgNO_3$			1.14	0.86 -1.23				337
T(4'-CO_2CH_3P)P	--	Cu(II)			PhCN	$TBAPF_6$	$Ag/AgNO_3$			0.66		-1.64			337
T(4'-CO_2CH_3P)P	--	Mn(III)	Cl^-		DCM	$TBABF_4$	NHE				-0.16*				173
T(4'-CO_2CH_3P)P	--	Pt(II)			DMF	TBAP	Fc/Fc^+					-1.53			483
T(4'-CO_2CH_3P)P	--	Zn(II)			PhCN	$TBAPF_6$	$Ag/AgNO_3$			0.35		-1.35	-1.85		337
T(4'-CO_2EtP)P	**227**	2H			PhCN	$TBAPF_6$	$Ag/AgNO_3$		0.73	0.52		-1.50			337
T(4'-CO_2EtP)P	--	Cu(II)			PhCN	$TBAPF_6$	$Ag/AgNO_3$			0.70		-1.60			337
T(4'-CO_2EtP)P	--	Ni(II)			PhCN	$TBAPF_6$	$Ag/AgNO_3$			0.79		-1.62			337
T(4'-CO_2EtP)P	--	Zn(II)			PhCN	$TBAPF_6$	$Ag/AgNO_3$		0.87	0.50		-1.69			337
T(4'-CO_2HP)P	**228**	2H			DCM	$TBAPF_6$	SCE			1.10		-0.74			11
T(4'-CO_2HP)P	--	Co(II)			DMF	TBAP	SCE				-0.75				384

Table 5c. *meso*-Tetraarylporphyrins. (see structures in Figure 5c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
T(4'-CO_2HP)P	--	Co(II)			DMF	TBAP	SCE				-0.75				384
T(4'-CO_2HP)P	--	Co(III)	Cl^-		DMSO	$TBAPF_6$	Fc/Fc^+				-0.56				506
T(4'-CO_2HP)P	--	Os(II)	CO	THF	DMF	$TBAPF_6$	SCE				0.66				360
T(4'-CO_2HP)P	--	Os(II)	DMSO	1-(CH_3)	DMF	$TBAPF_6$	SCE				0.30				360
T(4'-CO_2HP)P	**229**	Os(II)	See Fig.	See Fig.	DMF	$TBAPF_6$	SCE				0.36				360
T(4'-CO_2HP)P- TiO_2 film	**230**	Co(III)	Cl^-		DMSO	$TBAPF_6$	Fc/Fc^+				-0.78				506
T(4'-CPPyr)P-Film	**231**	Mn(II)			CH_3CN	TBAOH	Ag/AgCl			0.95	0.60				177
T(4'-DecyloxyP)P	**232**	Ni(II)			DCM	$TBAPF_6$	Ag/AgCl		1.27	0.95					550
T(4'-DEtPP)P	**233**	2H			$CHCl_3$	TBAP (0.2M)	SCE			1.18		-1.09			318
T(4'-DEtPP)P	**233**	2H			DCM	TBAP	SCE		1.35	1.18		-1.08	-1.38		318
T(4'-DEtPP)P	--	Zn(II)			$CDCl_3$	TBAP (0.2M)	SCE		1.15	0.86		-1.35*			318
T(4'-DEtPP)P	--	Zn(II)			DCM	TBAP	SCE		1.20	0.90		-1.23	-1.58*		318
T(4'-DEtPP)P	--	Zn(II)	Ph_3PO		$CDCl_3$	TBAP (0.2M)	SCE		1.25	0.89		-1.45			318
T(4'-DMPAP)P	**234**	Zn(II)			DCM	TBAP	Ag/AgCl	0.96, 1.35	0.87*	0.66*		-1.36	-1.81*		295
T(4'-DPAP)P	**235**	2H			DCE	$TBAPF_6$	SCE		1.28*	0.75		-1.25	-1.63*		97
T(4'-DPAP)P	--	Pd(II)			DCE	$TBAPF_6$	SCE		1.35*	1.05*		-0.97			97

Table 5c. *meso*-Tetraarylporphyrins. (see structures in Figure 5c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
T(4'-DPAP)P-Film	**236**	2H			DCE	$TBAPF_6$	SCE		0.95	0.75					97
T(4'-DPAP)P-Film	--	Pd(II)			DCE	$TBAPF_6$	SCE		0.95	0.75					97
T(4'-FP)P	**237**	Fe(II)	NO		THF	TBAP	SCE					-1.34	-2.19		583
T(4'-FP)P	**238**	Ru(II)	See Fig.		DCM	NR	Fc/Fc^+		0.94	0.26					203
T(4'-FP)P	**239**	Ru(II)	See Fig.	See Fig.	PhCN	$TBAPF_6$	Fc/Fc^+		1.56*	0.33	0.86	-2.02*			284
T(4'-FPA)P	**240**	Zn(II)			THF (-40°C)	$TBAPF_6$	Ag/AgCl			1.03		-0.82	-1.25		125
T(4'-IP)P	**241**	Co(II)			$CHCl_3$	H_2SO_4 (0.5M)	Ag/AgCl					-0.17			104
T(4'-NH_2P)P	**242**	2H			DMF	TBAP	Ag/AgCl					-1.12	-1.55		481
T(4'-NH_2P)P	--	Co(II)			DMF	H_2SO_4 (0.5M)	Ag/AgCl					0.09			104
T(4'-NH_2P)P	--	Fe(II)			DMF	TBAP	Ag/AgCl				-0.17, -1.02 -1.69				481
T(4'-OCH_2CO_2EtP)P	**243**	Pt(II)			DMF	TBAP	Fc/Fc^+			0.79		-1.68			483
T(4'-OCH_3P)P	**244**	2H			DCM	TBAP	SCE			0.94		-1.14			494
T(4'-OCH_3P)P	--	Co(II)			$CHCl_3$	H_2SO_4 (0.5M)	Ag/AgCl					0.22			104
T(4'-OCH_3P)P	--	Co(II)			DMF	TEAP	SCE					-0.79	-1.93		584
T(4'-OCH_3P)P	--	Co(III)	*n*-Bu^-		DMF	TEAP	SCE			0.85		-1.36			584
T(4'-OCH_3P)P	**245**	Co(III)	See Fig.		DMF	TEAP	SCE			0.80		-1.35			584

Table 5c. *meso*-Tetraarylporphyrins. (see structures in Figure 5c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
T(4'-OCH_3P)P	--	Cu(II)			DCM	$TBAPF_6$	$CuTPP^{0/+}$			-0.17					579
T(4'-OCH_3P)P	--	Fe(II)			DMF	TEAP	SCE					-1.07	-1.67		584
T(4'-OCH_3P)P	--	Fe(II)	NO		THF	TBAP	SCE					-1.45	-2.32		583
T(4'-OCH_3P)P	--	Fe(III)	1-(CH_3)	1-(CH_3)	DMF	TBAP	SCE				-0.14				589
T(4'-OCH_3P)P	--	Fe(III)	Cl^-		DMF	TBAP	SCE				-0.08				589
T(4'-OCH_3P)P	--	Fe(III)	*n*-Bu^-		DMF	TEAP	SCE			0.30		-0.82			584
T(4'-OCH_3P)P	**246**	Fe(III)	See Fig.		DMF	TEAP	SCE			0.20		-0.84			584
T(4'-OCH_3P)P	**247**	Fe(III)	See Fig.		DMF	TEAP	SCE					-0.85			584
T(4'-OCH_3P)P	**248**	Fe(III)	See Fig.		DMF	TEAP	SCE			0.20		-0.83			584
T(4'-OCH_3P)P	**249**	Fe(III)	See Fig.		DMF	TEAP	SCE			0.21		-0.78			584
T(4'-OCH_3P)P	--	Ni(II)			DCM	TBAP	Ag/AgCl		1.12	0.97		-1.30			297
T(4'-OCH_3P)P	--	Pt(II)			DMF	TBAP	Fc/Fc^+			0.79		-1.68			483
T(4'-OCH_3P)P	--	Pt(IV)	Br^-	Br^-	DCM	$TBAPF_6$	Fc/Fc^+			0.76	-0.81	-1.86			229
T(4'-OCH_3P)P	**250**	Ru(II)	See Fig.		CH_3CN	NR	Fc/Fc^+	1.03	0.80	0.20					203
T(4'-OCH_3P)P	--	Sb(V)	OH^-	OH^-	CH_3CN	$TEABF_4$	SCE			1.40		-0.51	-0.99		243
T(4'-OCH_3P)P	**251**	Sb(V)	OH^-	See Fig.	CH_3CN	$TEABF_4$	SCE			1.64	0.70	-0.54	-0.90		243

Table 5c. *meso*-Tetraarylporphyrins. (see structures in Figure 5c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
T(4'-OCH_3P)P	--	Zn(II)			DCM	TBAP	SCE			0.72			-1.24			494
T(4'-OCH_3P)P	**252**	Ru(II)	See Fig.	See Fig.	PhCN	$TBAPF_6$	Fc/Fc^+		1.30*	0.25	0.71		-2.01*			284
T(4'-OCH_3PA)P	**253**	Zn(II)			THF (-40°C)	$TBAPF_6$	Ag/AgCl			0.89			-0.89	-1.32		125
T(4'-OctyloxyP)P	**254**	Zn(II)			DCM	$TBABF_4$	Ag/Ag^+		0.77	0.40						509
T(4'-OHP)P	**255**	2H			CH_3CN	TBAP	Ag/AgCl	1.28	0.71	0.52						218
T(4'-OHP)P	--	Co(II)			H_2O	KOH (1M)	Ag/AgCl						0.08			104
T(4'-OHP)P-(CD-MWCNT)	**256**	2H			DMF	TBAP	Ag/AgCl			1.16			-0.55	-0.66		534
T(4'-OHP)P-CD	**257**	2H			DMF	TBAP	Ag/AgCl			1.19			-0.60	-0.69		534
T(4'-PnP)P	**258**	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		1.16	0.87			-1.42*	-1.87*		251
T(4'-PnP)P-PBI	**259**	Zn(II)	See Fig.		DCM	$TBAPF_6$	Ag/AgCl		1.24	0.76			-1.50	-1.90		251
T(4'-PP)P	**260**	2H			DCM	$TBAPF_6$	SCE			1.13			-0.76			11
T(4'-PrSRP)P	**261**	Co(II)			DCM	$TBAPF_6$	SCE			1.10	0.44	-0.70				81
T(4'-PrSRP)P	**262**	Co(II)			DCM (-60°C)	$TBAPF_6$	SCE		1.29	1.09	0.79	-0.80	-1.30			81
T(4'-PrSRP)P	**262**	Co(II)			H_2O	KNO_3	SCE			0.90	0.40	-0.79				81
T(4'-PrSRP)P	--	Co(II)	NO		DCM	$TBAPF_6$	SCE		0.94	0.86			-1.01			81
T(4'-PrSRP)P	--	Co(II)	NO		DCM (-60°C)	$TBAPF_6$	SCE		1.14	0.89			-1.14	-1.41		81

Table 5c. *meso*-Tetraarylporphyrins. (see structures in Figure 5c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
T(4'-PrSRP)P	--	Co(II)	NO		H_2O	KNO_3	SCE			0.83			-0.98			81
T(4'-Py)P	**263**	2H			H_2O	KOH	Ag/AgCl						-0.45	-0.71	-1.12	462
T(4'-Py)P	--	Au(III)	Cl^-		DCM	$TBAPF_6$	SCE				-0.41					330
T(4'-Py)P	--	Co(II)			H_2O	KOH	Ag/AgCl				0.20	-1.10	-0.49	-0.80		462
T(4'-Py)P	--	Cu(II)			H_2O	KOH	Ag/AgCl				-1.11		-0.48	-0.78		462
T(4'-Py)P	--	Mn(V)	N^{3-}		DCM	TBAP	Ag/AgCl				1.22*		-1.05	-1.40		474
T(4'-Py)P	--	Sn(IV)	OH^-	OH^-	DCM	TBAP	SCE						-0.52	-0.92		315
T(4'-Py)P	--	Zn(II)			CH_3CN	$TBABF_4$	Fc/Fc^+	1.16	0.83	0.41			-1.28	-1.92		551
T(4'-Py)P	--	Zn(II)			H_2O	KOH	Ag/AgCl						-0.43	-0.79	-1.17	462
T(4'-Py)P-Sc_3N	**264**	Zn(II)			CH_3CN	$TBABF_4$	Fc/Fc^+		0.85	0.40	-1.20	-1.69	-1.57	-1.91		551
T(4'-*t*-BuP)P	**265**	2H			DCM	TBAP	SCE	1.34, 1.60	1.18	0.94			-1.21	-1.56		520
T(4'-*t*-BuP)P	--	Co(II)			$CHCl_3$	H_2SO_4 (0.5M)	Ag/AgCl						-0.03			104
T(4'-*t*-BuP)P	--	Co(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.79	0.53	0.28	-1.35				211
T(4'-t-BuP)P	--	Co(II)			PhCN	$TBAPF_6$	Fc/Fc^+		0.95	0.67	0.00	-1.35				211
T(4'-*t*-BuP)P	--	Ru(II)	CO	Py	DCM	$TBAPF_6$	SCE			0.79			-1.76			286
T(4'-*t*-BuP)P	--	Ru(II)	CO	Py	DCM	$TBAPF_6$	Fc/Fc^+		1.25	0.67						261

Table 5c. *meso*-Tetraarylporphyrins. (see structures in Figure 5c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
T(4'-*t*-BuP)P	--	Ru(II)	Py	Py	DCM	$TBAPF_6$	Fc/Fc^+			1.12	0.08					261
T(4'-*t*-BuP)P	**266**	Ru(II)	See Fig.	See Fig.	DCM	$TBAPF_6$	Fc/Fc^+			1.13	0.33					261
T(Benzoyl)P	**267**	Mn(III)	Cl^-		DMF/H_2O	NaCl	Ag/AgCl				0.06					3
T(Benzoyl)P	**267**	Mn(III)	Cl^-		DMF/H_2O	NaCl	NHE				0.09					3
T(BTP)P	**268**	Zn(II)			CH_3CN	TBAP	SCE			0.81			-1.24			287
T(CrownP)P	**269**	2H			PhCN	TBAP	Fc/Fc^+			0.26			-1.82	-2.20		354
T(CrownP)P	--	Ag(II)			PhCN	TBAP	Fc/Fc^+				0.04	-1.45	-1.64			354
T(CrownP)P	--	Co(II)			PhCN	TBAP	Fc/Fc^+				-0.22	-1.34				354
T(CrownP)P	--	Cu(II)			PhCN	TBAP	Fc/Fc^+			0.43			-1.74			354
T(CrownP)P	--	Mg(II)			PhCN	TBAP	Fc/Fc^+			0.12			-1.92	-2.11		354
T(CrownP)P	--	Ni(II)			PhCN	TBAP	Fc/Fc^+			0.56			-1.69			354
T(CrownP)P	--	V(IV)	O^{2-}		PhCN	TBAP	Fc/Fc^+			0.56			-1.58	-1.78		354
T(CrownP)P	--	Zn(II)			PhCN	TBAP	Fc/Fc^+			0.25			-1.80			354
T(CrownP)P	--	Pd(II)			PhCN	TBAP	Fc/Fc^+			0.61			-1.68			354
T(D(4'-ClP)APA)P	**270**	Zn(II)			THF	$TBAPF_6$	Ag/AgCl		1.12	0.90			-0.90	-1.32		106
T(DAPTTP)P	**271**	Zn(II)			CH_3CN	TBAP	SCE			1.20			-1.27			287

Table 5c. *meso*-Tetraarylporphyrins. (see structures in Figure 5c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
T(DMCP)P	**272**	Co(II)			DME	$TBAPF_6$	Ag/AgCl				0.61	-0.70				214
T(DMOA)P	**273**	Ni(II)			THF	$TBAPF_6$	$Ag/AgNO_3$			0.61			-1.81			356
T(DPAPA)P	**274**	Zn(II)			THF	$TBAPF_6$	Ag/AgCl		1.09	0.87			-0.94	-1.37		106
T(EDDP)P	**275**	2H			DMF	TBAP	Ag/Ag^+						-1.17	-1.66		528
T(EHDP)P	**276**	2H			DMF	TBAP	Ag/Ag^+						-1.17	-1.68		526
T(EHDP)P	**276**	2H			DMF	TBAP	Ag/Ag^+						-1.17	-1.65		526
T(EHDP)P	**276**	2H			DMF	TBAP	Ag/Ag^+						-1.17	-1.65		528
T(EHDP)P	--	Er(III)	OH^-		DMF	TBAP	Ag/Ag^+				-2.02*		-1.41	-1.61		526
T(ENCP)P	**277**	2H			DMF	TBAP	Ag/Ag^+						-1.56	-2.07		527
T(ETDCP)P	**278**	2H			DMF	TBAP	Ag/Ag^+						-1.62	-2.05		527
T(ETDP)P	**279**	2H			DMF	TBAP	Ag/Ag^+						-1.17	-1.66		526
T(ETDP)P	**279**	2H			DMF	TBAP	Ag/Ag^+						-1.17	-1.68		528
T(ETDP)P	--	Ho(III)	OH^-		DMF	TBAP	Ag/Ag^+				-1.90		-0.93	-1.63		528
T(EUDP)P	**280**	2H			DMF	TBAP	Ag/Ag^+						-1.55	-2.04		527
T(N-HCP)P	**281**	Zn(II)			DCM	$TBAPF_6$	Ag/Ag^+		0.79	0.53						372
T(NEtC)P	**282**	2H			DCM	$TBABF_4$	SCE		1.01*	0.86*			-1.19*			327

Table 5c. *meso*-Tetraarylporphyrins. (see structures in Figure 5c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
T(NEtC)P	**282**	2H			DCM	$TBAPF_6$	SCE	1.26*	0.83*	0.67*		-1.33*			303
T(NEtC)P	--	Cu(II)			DCM	$TBABF_4$	SCE		1.25	0.88		-1.29			321
T(NEtC)P	--	Mn(III)			DCM	$TBABF_4$	SCE			1.04	-0.26				326
T(NuAP)P	**283**	2H			DCM	$TBAPF_6$	Fc/Fc^+		0.89	0.61		-1.58	-1.96		143
$T(OCH_3OHP)P$	**284**	Fe(III)	Cl^-		DMF	$TBAPF_6$	Ag/AgCl				-0.54	-1.11			105
T(OHDMA)P	**285**	Ru(VI)	O^{2-}	O^{2-}	DCM	$TBAPF_6$	Fc/Fc^+			0.62	-1.11	-0.62	-1.65		440
$T(OHOCH_3P)P$	**286**	2H			DMF	$TBAPF_6$	Ag/AgCl			0.84*		-1.12*			105
$T(OHOCH_3P)P$	--	Co(II)			DMF	$TBAPF_6$	Ag/AgCl				-0.15 -0.82				105
$T(OHOCH_3P)P$	--	Cu(II)			DMF	$TBAPF_6$	Ag/AgCl					-1.20			105
$T(OHOCH_3P)P$	--	Ni(II)			DMF	$TBAPF_6$	Ag/AgCl					-1.20			105
T(PA)P	**287**	Zn(II)			THF (-40°C)	$TBAPF_6$	Ag/AgCl			1.03		-0.84	-1.28		125
T(PCP)P	**288**	2H			DCE	TBAP	SCE	1.32	0.90	0.58					586 (DPV)
T(PCP)P	--	Co(II)			DCE	TBAP	SCE	1.21	1.10	0.94					586 (DPV)
T(PCP)P	--	Fe(II)			DCE	TBAP	SCE	1.37	1.28	1.00					586 (DPV)
T(PCP)P	--	Mn(II)			DCE	TBAP	SCE	1.32	1.01	0.90					586 (DPV)
T(PCP)P	--	Ni(II)			DCE	TBAP	SCE	1.18	0.96	0.77					586 (DPV)

Table 5c. *meso*-Tetraarylporphyrins. (see structures in Figure 5c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
T(SB)P	**289**	2H			DCM	$TBAPF_6$ (0.2M)	Fc/Fc^+	1.50	0.90	0.60						180
T(SB)P	--	Mn(III)	Cl^-		DCM	$TBAPF_6$ (0.2M)	Fc/Fc^+			1.18	0.66	1.33*				176
T(SB)P	--	Mn(III)	Cl^-		DCM	$TBAPF_6$ (0.2M)	Fc/Fc^+	1.30	1.20	0.65						180
T(TFPOP)P	**290**	Mn(III)	Cl^-		CH_3CN	TBAP	Ag/AgCl		1.20*	1.00*	-0.34			-1.46	-1.87	170
T(TFPOP)P	--	Zn(II)			CH_3CN	TBAP	Ag/AgCl		1.10*	0.98*			-1.41	-1.77		170
T(TMSiA)P	**291**	Zn(II)			THF	$TBAPF_6$	Ag/AgCl			1.24			-0.90	-1.38		106
T[D(4'-CNP)APA]P	**292**	Zn(II)			THF	$TBAPF_6$	Ag/AgCl		1.42*	1.06			-0.78	-1.23		106
T[D(4'-OCH_3P)APA]P	**293**	Zn(II)			THF	$TBAPF_6$	Ag/AgCl		0.94	0.76	1.03		-0.97	-1.35		106
T[D(4'-Tol)APA]P	**294**	Zn(II)			THF	$TBAPF_6$	Ag/AgCl		0.99	0.84	1.26		-0.92	-1.34		106

Table 6a. β-alkyl and β-aryl substituted TPP macrocycles. (see structures in Figure 6a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$(CF_3)_4TPP$	**295**	Fe(III)	Cl^-		DCM	$TBAPF_6$	SCE			1.18	-0.04		-0.92		362
$(CF_3)_4TPP$	**295**	Fe(III)	Cl^-		PhCN	$TBAPF_6$	SCE		1.63	1.15	0.05	-0.54	-0.90		362
$(CH_3)_4TPP$	**296**	2H			DCM	$TBAPF_6$	Ag/AgCl		0.96	0.83		-1.27	-1.54		23
$(CH_3)_4TPP$	--	Cu(II)			DCM	$TBAPF_6$	Ag/AgCl		1.16	0.72		-1.35	-1.75		23
$(CH_3)_4TPP$	--	Ni(II)			DCM	$TBAPF_6$	Ag/AgCl		1.15	0.82		-1.34	-1.80		23
$(CH_3)_4TPP$	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		0.85	0.72		-1.46			23
$(i\text{-}Bu)_8TPP$	**297**	2H			DCM	TBAP	SCE	1.27	0.86	0.45		-1.47	-1.99		77
$(i\text{-}Bu)_8TPP$	**298**	See Fig.			DCM	TBAP	SCE			1.66	-1.02	-1.49	-1.99		77
$(PA)_8TPP$	**299**	2H			THF	$TBAPF_6$ (0.5M)	Fc/Fc^+			0.56*		-1.11	-1.27		560
$(Ph)_4TPP$	**300**	2H			DCM	$TBAPF_6$	Ag/AgCl		0.95	0.83		-1.19			23
$(Ph)_4TPP$	--	Cu(II)			DCM	$TBAPF_6$	Ag/AgCl		1.26	0.75		-1.33	-1.57		23
$(Ph)_4TPP$	--	Ni(II)			DCM	$TBAPF_6$	Ag/AgCl		1.19	0.91		-1.32	-1.71		23
$(Ph)_4TPP$	--	V(IV)	O^{2-}		DCM	TBAP	SCE		1.07	0.92		-1.24	-1.56		476
$(Ph)_4TPP$	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		0.88	0.74		-1.39	-1.79		23
$(Ph)_8T(3'\text{-Thienyl})P$	**301**	Ni(II)			DCM	TBAP	SCE		0.81	0.81		-1.35			33
TC_6TPP	**302**	Ni(II)			DCM	TBAP	SCE		0.98	0.66		-1.56			33

Table 6b. β-pyrrole halogenated porphyrins. (see structures in Figure 6b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
Br_{16}T(3',5'-DMP)P	**303**	2H			DCM	$TBAPF_6$	Ag/AgCl			1.34*			-0.74*	-0.99		323
Br_{16}T(3',5'-DMP)P	--	Cu(II)			DCM	$TBAPF_6$	Ag/AgCl			1.21			-0.84	-1.16		323
Br_{16}T(3',5'-DMP)P	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		1.37	1.15			-0.87	-1.25		323
Br_1TPP	**304**	Co(II)			DCM	$TBAPF_6$ (0.2M)	SCE		1.31	1.12	0.91					73
Br_1TPP	**304**	Co(II)			DCM	$TBAPF_6$ (0.2M)	SCE		1.31	1.22	0.79					73
Br_1TPP	**304**	Co(II)			PhCN	TBAP	SCE				0.91	-0.79				41
Br_1TPP	--	Fe(III)	Cl^-		PhCN	TBAP	SCE			1.24	-0.26					41
Br_1TPP	--	Zn(II)			DCM	TBAP	SCE		1.10	0.82			-1.26	-1.68*		17
Br_1TPP	--	Zn(II)			PhCN	TBAP	SCE		1.18	0.88			-1.25	-1.68		17
Br_1TPP	--	Zn(II)			PhCN	TBAP	SCE			0.88			-1.25			41
Br_2TPP	**305**	Co(II)			DCM	$TBAPF_6$ (0.2M)	SCE		1.33	1.14	0.92					73
Br_2TPP	**305**	Co(II)			DCM	$TBAPF_6$ (0.2M)	SCE		1.33	1.22	0.80					73
Br_2TPP	**305**	Co(II)			PhCN	TBAP	SCE				0.92	-0.73				41
Br_2TPP	--	Fe(III)	Cl^-		PhCN	TBAP	SCE			1.28	-0.18					41
Br_2TPP	--	Mn(III)	Cl^-		PhCN	TBAP	SCE			1.26	-0.20					41
Br_2TPP	--	Zn(II)			DCM	TBAP	SCE		1.09	0.84			-1.18	-1.56*		17
Br_2TPP	--	Zn(II)			PhCN	TBAP	SCE		1.17	0.91			-1.19	-1.58		17
Br_2TPP	--	Zn(II)			PhCN	TBAP	SCE			0.91			-1.19			41
Br_3TPP	**306**	Co(II)			DCM	$TBAPF_6$ (0.2M)	SCE		1.33	1.15	0.94					73
Br_3TPP	**306**	Co(II)			DCM	$TBAPF_6$ (0.2M)	SCE		1.33	1.23	0.85					73

Table 6b. β-pyrrole halogenated porphyrins. (see structures in Figure 6b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
Br_3TPP	**306**	Co(II)			PhCN	TBAP	SCE				0.94	-0.67				41
Br_3TPP	--	Fe(III)	Cl^-		PhCN	TBAP	SCE			1.27	-0.13					41
Br_3TPP	--	Mn(III)	Cl^-		PhCN	TBAP	SCE			1.29	-0.09					41
Br_3TPP	--	Zn(II)			DCM	TBAP	SCE		1.09	0.86			-1.11	-1.47*		17
Br_3TPP	--	Zn(II)			PhCN	TBAP	SCE		1.16	0.93			-1.10	-1.42		17
Br_3TPP	--	Zn(II)			PhCN	TBAP	SCE			0.93			-1.10			41
$Br_4T(4'\text{-}CO_2HP)P$	**307**	2H			DCM	$TBAPF_6$	Ag/AgCl		1.61	1.27			-0.75			558
$Br_4T(4'\text{-}CO_2HP)P$	--	Co(II)			DCM	$TBAPF_6$	Ag/AgCl		1.47	1.29	0.97	-0.48				558
$Br_4T(4'\text{-}CO_2HP)P$	--	Cu(II)			DCM	$TBAPF_6$	Ag/AgCl		1.51	1.20			-0.88	-1.05		558
$Br_4T(4'\text{-}CO_2HP)P$	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		1.22	1.04			-1.05	-1.27		558
$Br_4T(4'\text{-}OC_{10}P)P$	**308**	2H			DCM	$TBAPF_6$	Ag/AgCl		0.99	0.84			-0.90	-1.04		89
$Br_4T(4'\text{-}OC_{10}P)P$	--	Cu(II)			DCM	$TBAPF_6$	Ag/AgCl		1.37	0.90			-1.02*	-1.29		89
$Br_4T(4'\text{-}OC_{10}P)P$	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		1.02	0.80			-1.14*	-1.33		89
$Br_4T(4'\text{-}OC_4P)P$	**309**	2H			DCM	$TBAPF_6$	Ag/AgCl		0.98	0.85			-0.91	-1.05		89
$Br_4T(4'\text{-}OC_4P)P$	--	Cu(II)			DCM	$TBAPF_6$	Ag/AgCl		1.36*	0.86			-0.99	-1.08		89
$Br_4T(4'\text{-}OC_4P)P$	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		1.02	0.80			-1.07	-1.35		89
$Br_4T(4'\text{-}OC_8P)P$	**310**	2H			DCM	$TBAPF_6$	Ag/AgCl		0.99	0.84			-0.89	-1.02		89
$Br_4T(4'\text{-}OC_8P)P$	--	Cu(II)			DCM	$TBAPF_6$	Ag/AgCl		1.05	0.83			-1.06	-1.24		89
$Br_4T(4'\text{-}OC_8P)P$	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		1.10	0.79			-1.10	-1.36		89
$Br_4T(4'\text{-}OCH_3P)P$	**311**	2H			DCM	$TBAPF_6$	Ag/AgCl		1.04	0.89			-0.85	-0.95		558

Table 6b. β-pyrrole halogenated porphyrins. (see structures in Figure 6b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$Br_4T(4'\text{-}OCH_3P)P$	--	Co(II)			DCM	$TBAPF_6$	Ag/AgCl		1.31	1.19	0.88	-0.58				558
$Br_4T(4'\text{-}OCH_3P)P$	--	Cu(II)			DCM	$TBAPF_6$	Ag/AgCl		1.42	0.87			-1.01	-1.28		558
$Br_4T(4'\text{-}OCH_3P)P$	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		1.09	0.85			-1.23	-1.41		558
$Br_4T(4'\text{-}tBuP)P$	**312**	2H			DCM	$TBAPF_6$	Ag/AgCl		1.13	0.99			-0.84	-0.94		558
$Br_4T(4'\text{-}tBuP)P$	--	Co(II)			DCM	$TBAPF_6$	Ag/AgCl		1.32	1.18	0.90	-0.56				558
$Br_4T(4'\text{-}tBuP)P$	--	Cu(II)			DCM	$TBAPF_6$	Ag/AgCl		1.44	0.94			-0.98	-1.26		558
$Br_4T(4'\text{-}tBuP)P$	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		1.12	0.87			-1.18	-1.42		558
Br_4TPP	**313**	2H			DCM	$TBAPF_6$	Ag/AgCl		1.16	1.06			-0.90			89
Br_4TPP	**313**	2H			DCM	$TBAPF_6$	Ag/AgCl		1.20	0.98			-0.86	-1.40		558
Br_4TPP	**313**	2H			THF	TBAP	SCE			1.05			-1.02			423
Br_4TPP	--	Co(II)			DCM	TBAP	SCE		1.21	1.02	0.81	-0.56	-1.61			45
Br_4TPP	--	Co(II)			DCM	$TBAPF_6$	Ag/AgCl			1.20	0.86	-0.55				558
Br_4TPP	--	Co(II)			DCM	$TBAPF_6$ (0.2M)	SCE		1.36	1.20	0.95					73
Br_4TPP	--	Co(II)			DCM	$TBAPF_6$ (0.2M)	SCE		1.36	1.24	0.86					73
Br_4TPP	--	Co(II)			PhCN	TBAP	SCE				0.95	-0.61				41
Br_4TPP	--	Co(II)			PhCN	TBAP	SCE		1.39	1.29	0.68*	-0.61	-1.66*	-1.80*		43
Br_4TPP	--	Co(II)	NO		DCM	TBAP	SCE			1.26	1.06	-1.10	-1.60			45
Br_4TPP	--	Co(II)	Py		DCM	TBAP	SCE				-0.14	-0.81	-1.57			45
Br_4TPP	--	Cu(II)			DCM	$TBAPF_6$	Ag/AgCl		1.45	1.02			-1.01	-1.24		89
Br_4TPP	--	Cu(II)			DCM	$TBAPF_6$	Ag/AgCl		1.47	1.08			-0.92	-1.16		558

Table 6b. β-pyrrole halogenated porphyrins. (see structures in Figure 6b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
Br_4TPP	--	Cu(II)			PhCN	TBAP	SCE		1.41	1.08		-0.96	-1.26		43
Br_4TPP	--	Fe(III)	Cl^-		DCM	$TBAPF_6$	SCE		1.60	1.13	-0.20				362
Br_4TPP	--	Fe(III)	Cl^-		PhCN	TBAP	SCE			1.26	-0.07				41
Br_4TPP	--	Fe(III)	Cl^-		PhCN	$TBAPF_6$	SCE		1.53	1.18	-0.13				362
Br_4TPP	--	Mn(III)	Cl^-		PhCN	TBAP	SCE			1.30	-0.06				41
Br_4TPP	--	Ni(II)			PhCN	TBAP	SCE			1.17		-0.96	-1.27		43
Br_4TPP	--	Tb(III)	$CH_3CO_2^-$		THF	TBAP	SCE	1.49	1.10	0.81		-0.93	-1.03		423
Br_4TPP	--	Zn(II)			DCM	TBAP	SCE		1.14	0.90		-1.09	-1.36*		17
Br_4TPP	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		1.10	0.93		-1.08	-1.30		89
Br_4TPP	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		1.19	0.97		-1.15	-1.35		558
Br_4TPP	--	Zn(II)			PhCN	TBAP	SCE		1.19	0.95		-1.03	-1.32		17
Br_4TPP	--	Zn(II)			PhCN	TBAP	SCE			0.95		-1.03			41
Br_4TPP	--	Zn(II)			PhCN	TBAP	SCE		1.19	0.95		-1.03	-1.32		43
Br_5TPP	**314**	Co(II)			DCM	$TBAPF_6$ (0.2M)	SCE		1.37	1.22	0.99				73
Br_5TPP	**314**	Co(II)			DCM	$TBAPF_6$ (0.2M)	SCE		1.37	1.26	0.93				73
Br_5TPP	**314**	Co(II)			PhCN	TBAP	SCE				0.99 -0.52				41
Br_5TPP	--	Fe(III)	Cl^-		PhCN	TBAP	SCE			1.26	-0.02				41
Br_5TPP	--	Zn(II)			DCM	TBAP	SCE		1.08	0.87		-1.04	-1.28*		17
Br_5TPP	--	Zn(II)			PhCN	TBAP	SCE		1.15	0.96		-0.97	-1.28		17
Br_5TPP	--	Zn(II)			PhCN	TBAP	SCE			0.96		-0.97			41

Table 6b. β-pyrrole halogenated porphyrins. (see structures in Figure 6b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$Br_6T(4'\text{-}CO_2CH_3P)P$	**315**	Mn(III)	Cl^-		DCM	$TBABF_4$	NHE				0.17					173
Br_6TPP	**316**	Co(II)			DCM	$TBAPF_6$ (0.2M)	SCE		1.40	1.27	0.99					73
Br_6TPP	**316**	Co(II)			DCM	$TBAPF_6$ (0.2M)	SCE		1.39	1.28	0.95					73
Br_6TPP	**316**	Co(II)			PhCN	TBAP	SCE				0.99	-0.46				41
Br_6TPP	--	Fe(III)	Cl^-		PhCN	TBAP	SCE			1.24	0.04					41
Br_6TPP	--	Mn(III)	Cl^-		PhCN	TBAP	SCE			1.37	0.02					41
Br_6TPP	--	Zn(II)			DCM	TBAP	SCE		1.08	0.85			-0.95	-1.24*		17
Br_6TPP	--	Zn(II)			PhCN	TBAP	SCE		1.11	0.96			-0.93	-1.20		17
Br_6TPP	--	Zn(II)			PhCN	TBAP	SCE			0.96			-0.93			41
$Br_7T(3',5'\text{-D-t-BuP})P$	**317**	In(III)	See Fig.		DCM	TBAP	$Ag/AgNO_3$			1.06*			-1.00	-1.34		234
Br_7TPP	**318**	Co(II)			DCM	$TBAPF_6$ (0.2M)	SCE		1.44	1.32	0.97					73
Br_7TPP	**318**	Co(II)			DCM	$TBAPF_6$ (0.2M)	SCE		1.44	1.32	0.97					73
Br_7TPP	**318**	Co(II)			PhCN	TBAP	SCE				0.97	-0.42				41
Br_7TPP	--	Fe(III)	Cl^-		PhCN	TBAP	SCE			1.21	0.06					41
Br_7TPP	--	Mn(III)	Cl^-		PhCN	TBAP	SCE			1.36	0.05					41
Br_7TPP	--	Zn(II)			DCM	TBAP	SCE		1.07	0.86			-0.90	-1.13*		17
Br_7TPP	--	Zn(II)			PhCN	TBAP	SCE		1.14	0.97			-0.92	-1.15		17
Br_7TPP	--	Zn(II)			PhCN	TBAP	SCE			0.97			-0.92			41
$Br_8F_{20}TPP$	**319**	Fe(II)	NO		DCM	$TBAPF_6$	Fc/Fc^+						-0.65	-1.33		412
$Br_8F_{20}TPP$	**319**	Fe(III)	NO		DCM	$TBAPF_6$	Fc/Fc^+			0.92*	-0.20*		-0.65*	-1.33*		370

Table 6b. β-pyrrole halogenated porphyrins. (see structures in Figure 6b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$Br_8F_{20}TPP$	--	Mn(III)	Cl^-		NR	NR	NR				0.27				477
$Br_8F_{20}TPP$	--	Ni(II)			DCM	TBAP	SCE		1.50	1.50		-0.42			33
$Br_8F_{20}TPP$	--	Ni(II)			DCM	$TBAPF_6$	SCE		1.66	1.66		-0.43			33
$Br_8T(2'\text{-}CH_3P)P$	**320**	2H			DCM	$TBABF_4$	Ag/AgCl		1.37	1.07		-1.02			485
$Br_8T(2'\text{-}CH_3P)P$	--	Zn(II)			DCM	$TBABF_4$	Ag/AgCl		1.11	0.88		-0.94			485
$Br_8T(2'\text{-}Py)P$	**321**	Mn(III)	Cl^-		DCM	$TBAPF_6$	SCE				0.21				2
$Br_8T(2'\text{-}Py)P$	**321**	Mn(III)	Cl^-		DCM	$TBAPF_6$	Fc/Fc^+				-0.25				511
$Br_8T(3'\text{-}CH_3P)P$	**322**	2H			DCM	$TBABF_4$	Ag/AgCl		1.36	0.99		-1.04			485
$Br_8T(3'\text{-}CH_3P)P$	--	Zn(II)			DCM	$TBABF_4$	Ag/AgCl		1.08	0.85		-1.03			485
$Br_8T(3'\text{-}Py)P$	**323**	Mn(III)	Cl^-		DMF	TBAP	Fc/Fc^+				0.12				2
$Br_8T(3'\text{-}Py)P$	**323**	Mn(III)	Cl^-		DMF	TBAP	SCE				0.59				2
$Br_8T(4'\text{-}BrP)P$	**324**	Ni(II)			DCM	TBAP	SCE			1.21		-0.80	-1.10		50
$Br_8T(4'\text{-}CF_3P)P$	**325**	Cu(II)			DCM	TBAP	SCE		1.49	1.10		-0.69	-0.96		50
$Br_8T(4'\text{-}CF_3P)P$	--	Ni(II)			DCM	TBAP	SCE			1.25	-1.60	-0.73	-1.03		50
$Br_8T(4'\text{-}CH_3P)P$	**326**	2H			DCM	$TBABF_4$	Ag/AgCl		1.35	0.97		-1.03			485
$Br_8T(4'\text{-}CH_3P)P$	--	Cu(II)			DCM	TBAP	SCE		1.45	0.94		-0.83	-1.09		50
$Br_8T(4'\text{-}CH_3P)P$	--	Ni(II)			DCM	TBAP	SCE			1.17		-0.87	-1.26		50
$Br_8T(4'\text{-}CH_3P)P$	--	Zn(II)			DCM	$TBABF_4$	Ag/AgCl		1.10	0.83		-1.04			485
$Br_8T(4'\text{-}CO_2CH_3P)P$	**327**	Mn(III)	Cl^-		DCM	$TBABF_4$	NHE				0.27				173
$Br_8T(4'\text{-}CO_2CH_3P)P$	--	Ni(II)			DCM	TBAP	SCE			1.23	-1.43	-0.75	-0.94		50

Table 6b. β-pyrrole halogenated porphyrins. (see structures in Figure 6b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$Br_8T(4'\text{-}CO_2EtP)P$	**328**	Ni(II)			DCM	TBAP	SCE			1.23	-1.43	-0.74	-0.94		50
$Br_8T(4'\text{-}CO_2HP)P$	**329**	Mn(III)	Cl^-		H_2O	NaCl	NHE				0.13				561
$Br_8T(4'\text{-}FP)P$	**330**	Cu(II)			DCM	TBAP	SCE		1.48	0.99		-0.74	-1.05		50
$Br_8T(4'\text{-}FP)P$	--	Ni(II)			DCM	TBAP	SCE			1.19		-0.80	-1.12		50
$[Br_8T(4'\text{-}NMPy)P]^{4+}$	**331**	2H			H_2O	NaCl	NHE					-0.01	-1.09*		562
$[Br_8T(4'\text{-}NMPy)P]^{4+}$	--	Co(II)			H_2O	NR	Ag/AgCl					-0.29*			352
$[Br_8T(4'\text{-}NMPy)P]^{4+}$	--	Co(II)			H_2O	NaCl	Ag/AgCl				0.53* -0.31				260
$[Br_8T(4'\text{-}NMPy)P]^{4+}$	--	Cu(II)			H_2O	NaCl	NHE					-0.13	-0.35*		562
$[Br_8T(4'\text{-}NMPy)P]^{4+}$	--	Mn(II)			H_2O	NaCl	NHE				0.48	-0.36	-1.11*		562
$Br_8T(4'\text{-}NO_2P)P$	**332**	Cu(II)			DCM	TBAP	SCE		1.55	1.18		-0.58	-0.85		50
$Br_8T(4'\text{-}NO_2P)P$	--	Ni(II)			DCM	TBAP	SCE			1.27		-0.54	-1.04		50
Br_8T(a-Naphthyl)P	**333**	2H			DCM	$TBABF_4$	Ag/AgCl		1.38	1.13		-0.98			485
Br_8T(a-Naphthyl)P	--	Zn(II)			DCM	$TBABF_4$	Ag/AgCl		1.15	0.92		-0.89			485
Br_8T(b-Naphthyl)P	**334**	2H			DCM	$TBABF_4$	Ag/AgCl		1.36	1.03		-1.05			485
Br_8T(b-Naphthyl)P	--	Zn(II)			DCM	$TBABF_4$	Ag/AgCl		1.09	0.86		-0.96			485
Br_8TMP	**335**	Ru(VI)	O^{2-}	O^{2-}	DCM	$TBAPF_6$	Fc/Fc^+			1.02	-0.76*	-0.35	-1.30		440
Br_8TPP	**336**	2H			DCM	$TBAPF_6$	Ag/AgCl		1.59*	0.95*		-0.73*	-1.11*		323
Br_8TPP	**336**	2H			DCM	$TBAPF_6$	SCE			0.96*		-0.68	-1.07		325
Br_8TPP	**336**	2H			THF	TBAP	SCE		1.17	0.93		-0.77	-1.18		423
Br_8TPP	--	Co(II)			DCM	$TBAPF_6$ (0.2M)	SCE		1.47	1.33	0.98				73

Table 6b. β-pyrrole halogenated porphyrins. (see structures in Figure 6b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
Br_8TPP	--	Co(II)			DCM	$TBAPF_6$ (0.2M)	SCE		1.47	1.34	0.97					73
Br_8TPP	--	Co(II)			PhCN	TBAP	SCE				0.98	-0.37				41
Br_8TPP	--	Co(II)			PhCN	TBAP	SCE		1.29	1.41	0.74	-0.32	-1.60*	-1.78*		43
Br_8TPP	--	Cu(II)			DCM	TBAP	SCE		1.45	0.96			-0.82	-1.07		50
Br_8TPP	--	Cu(II)			DCM	$TBAPF_6$	Ag/AgCl		1.55	0.97			-0.85	-1.09		323
Br_8TPP	--	Cu(II)			DCM	$TBAPF_6$	SCE		1.51	0.91			-0.87	-1.09		325
Br_8TPP	--	Cu(II)			PhCN	TBAP	SCE		1.52	1.01			-0.75	-1.10		43
Br_8TPP	--	Fe(III)	Cl^-		PhCN	TBAP	SCE			1.19	0.10					41
Br_8TPP	--	Mn(III)	Cl^-		PhCN	TBAP	SCE			1.38	0.09					41
Br_8TPP	--	Ni(II)			DCM	TBAP	SCE		1.20	1.20			-0.80			33
Br_8TPP	--	Ni(II)			DCM	TBAP	SCE			1.18			-0.82	-1.14		50
Br_8TPP	--	Ni(II)			DCM	$TBAPF_6$	SCE		1.25	1.25			-0.87*			33
Br_8TPP	--	Ni(II)			PhCN	TBAP	SCE		1.30	1.08			-0.96	-1.26		43
Br_8TPP	--	Tb(III)	$CH_3CO_2^-$		THF	TBAP	SCE			0.86			-0.86	-1.04		423
Br_8TPP	--	Zn(II)			DCM	TBAP	SCE		1.11	0.85			-0.85	-1.10*		17
Br_8TPP	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		1.17	0.89			-0.92	-1.12		323
Br_8TPP	--	Zn(II)			DCM	$TBAPF_6$	SCE		1.14	0.88			-0.94*	-1.09	-1.34	325
Br_8TPP	--	Zn(II)			PhCN	TBAP	SCE		1.15	0.96			-0.82	-1.15		17
Br_8TPP	--	Zn(II)			PhCN	TBAP	SCE			0.96			-0.82			41
Br_8TPP	--	Zn(II)			PhCN	TBAP	SCE		1.15	0.96			-0.82	-1.15		43

Table 6b□β-pyrrole halogenated porphyrins. (see structures in Figure 6b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$[Br_8TPPS]^{4-}$	**337**	Co(II)			H_2O	NaCl	Ag/AgCl				0.50*	-0.49				260
$Cl_{14}F_5TPP$	**338**	Mn(II)			CH_3CN	$TBAPF_6$	NHE				1.86	0.61	-0.72	-1.03		171
$Cl_{16}TPP$	**339**	Mn(III)	Cl^-		NR	NR	NR				0.11					477
$Cl_{20}TPP$	**340**	Fe(III)	Cl^-		PhCN	$TBAPF_6$	SCE		1.53	0.80	0.10		-1.31			362
Cl_4TPP	**341**	2H			THF	TBAP	SCE			1.12			-1.10			423
Cl_4TPP	**--**	Tb(III)	$CH_3CO_2^-$		THF	TBAP	SCE	1.57	1.19	0.98			-1.00	-1.22		423
$Cl_8T(4'\text{-}CF_3P)P$	**342**	Ni(II)			DCM	TBAP	SCE			1.24	-1.55		-0.69	-1.01		50
$Cl_8T(4'\text{-}CH_3P)P$	**343**	Ni(II)			DCM	TBAP	SCE			1.16	-1.56		-0.83	-1.15		50
$Cl_8T(4'\text{-}CO_2EtP)P$	**344**	Ni(II)			DCM	TBAP	SCE			1.23	-1.39		-0.73	-0.99		50
$Cl_8T(4'\text{-}FP)P$	**345**	Ni(II)			DCM	TBAP	SCE			1.18			-0.79	-1.14		50
$Cl_8T(4'\text{-}NO_2P)P$	**346**	Ni(II)			DCM	TBAP	SCE			1.26			-0.55	-1.03		50
Cl_8TPP	**347**	2H			THF	TBAP	SCE		1.26	1.04			-0.83	-1.11		423
Cl_8TPP	**--**	Co(II)			DMF	TEAP	SCE						-0.73	-1.77		584
Cl_8TPP	**--**	Fe(II)			DMF	TEAP	SCE						-0.97	-1.54		584
Cl_8TPP	**--**	Ni(II)			DCM	TBAP	SCE			1.17			-0.82	-1.17		50
Cl_8TPP	**--**	Tb(III)	$CH_3CO_2^-$		THF	TBAP	SCE	1.63	1.26	1.03			-0.87	-1.17		423
$[F_{16}TPPS]^{4-}$	**348**	Rh(III)			H_2O	$NaPF_6$ (0.5M)	NHE				-0.20*		-1.17*			465
$[F_{16}TPPS]^{4-}$	**--**	Zn(II)			H_2O	NaCl (0.5M)	Ag/AgCl			1.20			-0.89			146 (SWV)
$F_{28}TPP$	**349**	Co(II)			PhCN	$TBAPF_6$	Ag/Ag^+			1.68	0.56	-0.58	-1.49			212
$F_{28}TPP$	**--**	Pt(II)			DCM	$TBAPF_6$	$Ag/AgNO_3$						-0.75	-1.18		228

Table 6b□β-pyrrole halogenated porphyrins. (see structures in Figure 6b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$F_{28}TPP$	--	Rh(II)			C_6H_6	$THAPF_6$ (1.0M)	Fc/Fc^+				-0.16				216
$F_{28}TPP$	--	Rh(II)			DFB	TBACl	Fc/Fc^+			-0.34	-1.27				216
$F_{28}TPP$	--	Rh(II)			DFB	$TBAPF_6$	Fc/Fc^+				-0.21	-1.63			216
$F_{28}TPP$	--	Ru(II)	CO		DCM	$TBAPF_6$	Fc/Fc^+					-1.30	-1.79		440
$F_{28}TPP$	--	Ru(II)	PPh_3	PPh_3	DCM	$TBAPF_6$	Fc/Fc^+				0.59	-1.52	-1.92		440
$F_{28}TPP$	--	Ru(VI)	O^{2-}	O^{2-}	DCM	$TBAPF_6$	Fc/Fc^+				-0.31*	-1.20*			440
$F_{28}TPP$	--	Zn(II)			DCM	$TBAPF_6$	Ag/Ag^+			1.70		-0.63	-1.04		212
$F_{28}TPP$	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl			1.70		-0.63	-1.04		361
F_8TPP	**350**	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		1.36	1.26		-1.03			361
$[F_8TPPS]^{4-}$	**351**	Rh(III)			H_2O	$NaPF_6$ (0.5M)	NHE				-0.30*	-1.39*			465
$[F_8TPPS]^{4-}$	--	Zn(II)			H_2O	NaCl (0.5M)	Ag/AgCl			1.00		-1.08			146 (SWV)

Table 6c. TPP with mixed β-pyrrole substituents. (see structures in Figure 6c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$Br_4(CH_3)_4TPP$	**352**	2H			DCM	$TBAPF_6$	Ag/AgCl		1.46	0.85			-0.91	-1.20		23
$Br_4(CH_3)_4TPP$	--	Cu(II)			DCM	$TBAPF_6$	Ag/AgCl		1.34	0.72			-1.03	-1.32		23
$Br_4(CH_3)_4TPP$	--	Ni(II)			DCM	$TBAPF_6$	Ag/AgCl			1.14			-1.03	-1.40		23
$Br_4(CH_3)_4TPP$	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		0.96	0.73			-0.96	-1.31		23
$Br_4(NO_2)TPP$	**353**	Co(II)			DCM	TBAP	SCE		1.36	1.12	0.89	-0.37	-1.16			45
$Br_4(NO_2)TPP$	--	Co(II)	NO		DCM	TBAP	SCE		1.39	1.19	1.19	-0.77	-1.01			45
$Br_4(NO_2)TPP$	--	Co(II)	Py		Py	TBAP	SCE				0.00	-0.62	-1.16			45
$Br_4(Ph)_4TPP$	**354**	2H			DCM	$TBAPF_6$	Ag/AgCl		0.93	0.82			-0.88	-1.25		23
$Br_4(Ph)_4TPP$	--	Cu(II)			DCM	$TBAPF_6$	Ag/AgCl		1.29	0.77			-1.03	-1.32		23
$Br_4(Ph)_4TPP$	--	Ni(II)			DCM	$TBAPF_6$	Ag/AgCl		1.17	1.02			-1.03	-1.32		23
$Br_4(Ph)_4TPP$	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		0.90	0.72			-1.06	-1.27		23
$Br_6(NO_2)TPP$	**355**	2H			DCM	$TBAPF_6$	SCE		1.29	1.06			-0.65*	-0.96		325
$Br_6(NO_2)TPP$	--	Cu(II)			DCM	$TBAPF_6$	SCE			1.06			-0.73	-0.97		325
$Br_6(NO_2)TPP$	--	Zn(II)			DCM	$TBAPF_6$	SCE		1.22	0.96			-0.75*	-0.96	-1.22	325
$Br_7(NO_2)TPP$	**356**	2H			DCM	$TBAPF_6$	SCE		1.31	1.05			-0.58*	-0.95		325
$Br_7(NO_2)TPP$	--	Cu(II)			DCM	$TBAPF_6$	SCE		1.55	1.04			-0.72	-0.93		325
$Br_7(NO_2)TPP$	--	Zn(II)			DCM	$TBAPF_6$	SCE		1.24	0.96			-0.74*	-0.95	-1.18	325
$(CH_3)_4(Ph)_4TPP$	**357**	2H			DCM	$TBAPF_6$	Ag/AgCl		0.84	0.59			-1.20			23
$(CH_3)_4(Ph)_4TPP$	--	Cu(II)			DCM	$TBAPF_6$	Ag/AgCl		1.04	0.46			-1.36	-1.70		23
$(CH_3)_4(Ph)_4TPP$	--	Ni(II)			DCM	$TBAPF_6$	Ag/AgCl		1.03	0.72			-1.40	-1.74		23

Table 6c. TPP with mixed β-pyrrole substituents. (see structures in Figure 6c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$(CH_3)_4(Ph)_4TPP$	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		0.66	0.38		-1.50	-1.67*		23
$Cl_4(Ph)_4TPP$	**358**	2H			DCM	$TBAPF_6$	Ag/AgCl		0.98	0.86		-0.91	-1.03		23
$Cl_4(Ph)_4TPP$	--	Cu(II)			DCM	$TBAPF_6$	Ag/AgCl		1.29	0.78		-1.03	-1.38		23
$Cl_4(Ph)_4TPP$	--	Ni(II)			DCM	$TBAPF_6$	Ag/AgCl		1.17	1.05		-1.04	-1.42		23
$Cl_4(Ph)_4TPP$	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		0.88	0.74		-1.06	-1.27		23
$(CN)_4(CH_3)_4TPP$	**359**	2H			DCM	$TBAPF_6$	Ag/AgCl		1.34	1.11		-0.36	-0.61		23
$(CN)_4(CH_3)_4TPP$	--	Cu(II)			DCM	$TBAPF_6$	Ag/AgCl		1.59	1.17		-0.45	-0.85		23
$(CN)_4(CH_3)_4TPP$	--	Ni(II)			DCM	$TBAPF_6$	Ag/AgCl			1.35		-0.44	-0.85		23
$(CN)_4(CH_3)_4TPP$	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		1.31	1.00		-0.49	-0.88		23
$(CN)_4(Ph)_4TPP$	**360**	2H			DCM	$TBAPF_6$	Ag/AgCl		1.38	1.13		-0.28	-0.56		23
$(CN)_4(Ph)_4TPP$	--	Cu(II)			DCM	$TBAPF_6$	Ag/AgCl		1.38	1.16		-0.38	-0.80		23
$(CN)_4(Ph)_4TPP$	--	Ni(II)			DCM	$TBAPF_6$	Ag/AgCl			1.36		-0.42	-0.86		23
$(CN)_4(Ph)_4TPP$	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		1.35	1.02		-0.46	-0.82		23

Table 6d. Nitro substituted TPP and tetraarylporphyrin (TArP) derivatives. (see structure in Figure 6d)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
(2',12'-NO_2)$_2$TPP	**361**	2H			DCM	$TBAPF_6$	Fc/Fc^+			0.69		-1.12			316
(2',12'-NO_2)$_2$TPP	--	Cu(II)			DCM	$TBAPF_6$	Fc/Fc^+		1.07	0.71		-1.23	-1.32	-1.53	316
(2',13'-NO_2)$_2$TPP	**362**	2H			DCM	$TBAPF_6$	Fc/Fc^+		0.89	0.70		-1.15			316
(2',13'-NO_2)$_2$TPP	--	Cu(II)			DCM	$TBAPF_6$	Fc/Fc^+		1.07	0.72		-1.22	-1.31	-1.52	316
(2',7'-NO_2)$_2$TPP	**363**	2H			DCM	$TBAPF_6$	Fc/Fc^+			0.70		-1.20	-1.30	-1.82	316
(2',7'-NO_2)$_2$TPP	--	Cu(II)			DCM	$TBAPF_6$	Fc/Fc^+		1.08	0.72		-1.21	-1.36		316
(2',7',13'-NO_2)$_3$TPP	**364**	2H			DCM	$TBAPF_6$	Fc/Fc^+			0.75		-1.01	-1.13	-1.61	316
(2',7',13'-NO_2)$_3$TPP	--	Cu(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.81		-1.09	-1.33		316
(2',8'-NO_2)$_2$TPP	**365**	2H			DCM	$TBAPF_6$	Fc/Fc^+		0.87	0.69		-1.24	-1.47	-1.76	316
(2',8'-NO_2)$_2$TPP	--	Cu(II)			DCM	$TBAPF_6$	Fc/Fc^+		1.03	0.72		-1.28	-1.52		316
(3',7'-NO_2)$_2$TPP	**366**	2H			DCM	$TBAPF_6$	Fc/Fc^+			0.70		-1.16	-1.29	-1.92	316
(3',7'-NO_2)$_2$TPP	--	Cu(II)			DCM	$TBAPF_6$	Fc/Fc^+		1.11	0.72		-1.26	-1.45		316
(3',7',12'-NO_2)$_3$TPP	**367**	2H			DCM	$TBAPF_6$	Fc/Fc^+			0.77		-1.12	-1.38	-1.61	316
(3',7',12'-NO_2)$_3$TPP	--	Cu(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.80		-1.09	-1.28		316
(3',7',13'-NO_2)$_3$TPP	**368**	2H			DCM	$TBAPF_6$	Fc/Fc^+		0.91	0.73		-0.98	-1.07	-1.65	316
(3',7',13'-NO_2)$_3$TPP	--	Cu(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.80		-1.07	-1.28		316
$Cl_8(NO_2)_5$TPP	**369**	Mn(II)			DCM	$TBAPF_6$	SCE				0.75				540
$Cl_8(NO_2)_7$TPP	**370**	Mn(II)			DCM	$TBABF_4$	SCE				0.94	0.04	-0.22	-0.75	267
$Cl_8(NO_2)_8$TPP	**371**	Fe(II)			DCM	$TBAPF_6$	SCE				1.03				380
$Cl_8(NO_2)_8$TPP	--	Mn(II)			DCM	$TBAPF_6$	SCE				1.15				540

Table 6d. Nitro substituted TPP and tetraarylporphyrin (TArP) derivatives. (see structure in Figure 6d)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$(NO_2)_{12}Cl_8TPP$	**372**	Ni(II)			DCM	$TBAPF_6$	SCE					0.47	0.11	-0.42, -0.56	505
$(NO_2)_{12}Cl_8TPP$	**--**	Zn(II)			DCM	$TBAPF_6$	SCE					0.37	-0.64	-0.82	505
$(NO_2)T(4'\text{-}OC_{10}P)P$	**373**	Ni(II)			DCM	$TBAPF_6$	Ag/AgCl		1.21	1.04		-1.19			550

Table 6e. Porphiones. (see structures in Figure 6e)

Ring	Strucuture	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
(O)Cl_8TPPone	**374**	2H			DCM	$TBAPF_6$	SCE			1.37						582
(O)Cl_8TPPone	--	Fe(III)	Cl^-		DCM	$TBAPF_6$	SCE			1.37						582
(O)TMPone	**375**	2H			DCM	$TBAPF_6$	SCE			1.12						582
(O)TMPone	--	Fe(III)	Cl^-		DCM	$TBAPF_6$	SCE			1.19						582
T(3',5'-D-tBuP)P-C-tetraone	**376**	2H			DCM	TBAP	SCE			1.06	-0.28	-0.79	-1.09	-1.60		28
T(3',5'-D-tBuP)P-C-tetraone	--	Cu(II)			DCM	TBAP	SCE			1.16*	-0.33	-0.67	-1.37*			28
T(3',5'-D-tBuP)P-C-tetraone	--	Ni(II)			DCM	TBAP	SCE			1.22	-0.32	-0.69	-1.62*			28
T(3',5'-D-tBuP)P-C-tetraone	--	Pd(II)			DCM	TBAP	SCE			1.29	-0.33	-0.69	-1.46*			28
T(3',5'-D-tBuP)P-C-tetraone	--	Zn(II)			DCM	TBAP	SCE			0.96	-0.46	-0.76	-1.47*			28
T(3',5'-D-tBuP)P-dione	**377**	2H			DCM	TBAP	SCE			1.06	-0.59		-0.95	-1.86*		28
T(3',5'-D-tBuP)P-dione	--	Cu(II)			DCM	TBAP	SCE			1.10	-0.49		-1.21	-1.62		28
T(3',5'-D-tBuP)P-dione	--	Ni(II)			DCM	TBAP	SCE			1.17	-0.51		-1.24	-1.61		28
T(3',5'-D-tBuP)P-dione	--	Pd(II)			DCM	TBAP	SCE		1.44	1.19	-0.50		-1.26	-1.61		28
T(3',5'-D-tBuP)P-dione	--	Zn(II)			DCM	TBAP	SCE		1.00	0.85	-0.57		-1.25*	-1.68		28
T(3',5'-D-tBuP)P-L-tetraone	**378**	2H			DCM	TBAP	SCE			1.09	-0.47	-0.72	-1.01	-1.80		28
T(3',5'-D-tBuP)P-L-tetraone	--	Cu(II)			DCM	TBAP	SCE			1.11	-0.26	-0.70	-1.34*	-1.85		28
T(3',5'-D-tBuP)P-L-tetraone	--	Ni(II)			DCM	TBAP	SCE			1.20	-0.25	-0.68	-1.38	-1.84		28
T(3',5'-D-tBuP)P-L-tetraone	--	Pd(II)			DCM	TBAP	SCE		1.49	1.29	-0.29	-0.64	-1.34*	-1.81		28
T(3',5'-D-tBuP)P-L-tetraone	--	Zn(II)			DCM	TBAP	SCE			0.95	-0.34	-0.73	-1.36*	-1.84		28

Table 6f. Mono β-pyrrole substituted porphyrins. (see structures in Figure 6f)

Ring	Structure	Axial Ligand Metal	L1	L2	Solvent	Salt	RE	Porphyrin Ox 3	2	1	Metal / Other	Porphyrin Red 1	2	3	Ref.
(3'-CP)T(3',5'-D-tBuP)P	**379**	Zn(II)			THF (-20°C)	$TBAPF_6$	Ag/AgCl			0.95		-1.35			132
(3'-CPA)T(3',5'-D-tBuP)P	**380**	Zn(II)			THF (-20°C)	$TBAPF_6$	Ag/AgCl			0.99		-1.40*			132
(4'-CP)T(3',5'-D-tBuP)P	**381**	Zn(II)			THF (-20°C)	$TBAPF_6$	Ag/AgCl			1.04*		-1.41			132
(4'-CPA)T(3',5'-D-tBuP)P	**382**	Zn(II)			THF (-20°C)	$TBAPF_6$	Ag/AgCl			1.00		-1.36*			132
(4'-NO_2PA)TPP	**383**	2H			DCM	TBAP	SCE		1.26	1.11		-1.17*	-1.53*		74
(4'-NO_2PA)TPP	**--**	Zn(II)			DCM	TBAP	SCE		1.16*	0.86		-1.02			74
(4'-NO_2PE)TPP	**384**	2H			DCM	TBAP	SCE		1.23*	1.08		-0.96*	1.18*		74
(4'-NO_2PV)TPP	**385**	Zn(II)			DCM	TBAP	SCE		1.11	0.85		-1.10	-1.51*		74
(A)TPP	**386**	2H			DCM	TBAP	SCE		1.41	1.01		-1.12	-1.40		94
(A)TPP	**--**	Zn(II)			DCM	TBAP	SCE		1.08	0.78		-1.48	-1.65		94
(APA)TPP	**387**	Zn(II)			DMF	$TBAPF_6$	SCE			0.91		-1.18			298
(CCV)T(3',5'-D-tBuP)P	**388**	Zn(II)			THF (-20°C)	$TBAPF_6$	Ag/AgCl			0.98		-1.36*			132
(DBAPV)TPP	**389**	Zn(II)			DCM	TBAP	SCE		0.79	0.63		-1.28*	-1.68*		74
(DBAV)TPP	**390**	2H			DCM	TBAP	SCE		1.01	0.66		-1.04*	-1.55*		74
(DPEA)TPP	**391**	2H			DCB	$TBAPF_6$ (0.05M)	SCE		1.45	1.12	-1.74*	-1.10	-1.33		120
(DPEA)TPP	**--**	Zn(II)			DCB	$TBAPF_6$ (0.05M)	SCE		1.26	0.96	-1.87*	-1.31	-1.47		120
(HTA)T(3',5'-D-tBuP)P	**392**	Ni(II)			CH_3CN	$TBAPF_6$	Ag/Ag^+		0.97	0.69					249
(N_3)T(3',5'-D-tBuP)P	**393**	Ni(II)			CH_3CN	$TBAPF_6$	Ag/Ag^+		0.97	0.75					249
(NH_2)T(3',5'-D-tBuP)P	**394**	Au(III)			DCM	TBAP	SCE			1.25*	-0.69	-1.23			231
(NH_2)T(3',5'-D-tBuP)P	**394**	Au(III)			Py	TBAP	SCE				-0.60	-1.15	-1.83		231

Table 6f. Mono β-pyrrole substituted porphyrins. (see structures in Figure 6f)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
(NO_2)T(3',5'-D-tBuP)P	**395**	Au(III)			DCM	TBAP	SCE				-0.38	-0.80	-1.40		231
(NO_2)T(3',5'-D-tBuP)P	**395**	Au(III)			Py	TBAP	SCE				-0.32	-0.72	-1.40		231
(NO_2)T(3',5'-D-tBuP)P	**395**	Au(III)			THF	TBAP (0.4M)	SCE				-0.24	-0.77	-1.42		231
(PAA)TPP	**396**	2H			DCB	$TBAPF_6$ (0.05M)	SCE		1.43	1.10		-1.10	-1.34		13
(PAA)TPP	--	Zn(II)			DCB	$TBAPF_6$ (0.05M)	SCE		1.21	0.95		-1.28			13
(RHN)T(3',5'-D-tBuP)P	**397**	2H			DCM	$TBAPF_6$	Fc/Fc^+	1.10*	0.76*	0.48		-1.70	-2.03		26
(RHN)T(3',5'-D-tBuP)P	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+	0.95	0.56	0.30		-1.86	-2.16*		26
[T(PA)A]TPP	**398**	2H			DCB	$TBAPF_6$ (0.05M)	SCE		1.45	1.11	-1.60	-1.10	-1.34		120
[T(PA)A]TPP	--	Zn(II)			DCB	$TBAPF_6$ (0.05M)	SCE		1.24	0.98		-1.30	-1.59		120
(TA)TPP	**399**	2H			DCB	$TBAPF_6$ (0.05M)	SCE		1.44	1.08		-1.16	-1.44		13
(TA)TPP	--	Zn(II)			DCB	$TBAPF_6$ (0.05M)	SCE		1.17	0.93		-1.33			13

Table 7. Dodecaphenylporphyrin (DPP) and substituted DPP macrocycles. (see structures in Figure 7)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
Br_4DPP (meso)	**400**	Mn(III)	Cl^-		DCM	TBAP	SCE			0.97						60
Br_4DPP (meso)	**400**	Mn(III)	Cl^-		PhCN	TBAP	SCE				-0.25		-1.46*	-1.54*	-1.82*	60
Br_4DPP (meso)	**400**	Mn(III)	Cl^-		Py	TBAP	SCE				-0.33		-1.12	-1.50		60
$(CF_3)_4$DPP (meso)	**401**	Mn(III)	Cl^-		DCM	TBAP	SCE			1.03						60
$(CF_3)_4$DPP (meso)	**401**	Mn(III)	Cl^-		PhCN	TBAP	SCE				-0.24		-1.46*	-1.75*		60
$(CF_3)_4$DPP (meso)	**401**	Mn(III)	Cl^-		Py	TBAP	SCE				-0.28		-1.05	-1.52*		60
Cl_{12}DPP (meso)	**402**	Mn(III)	Cl^-		DCM	TBAP	SCE			1.18						60
Cl_{12}DPP (meso)	**402**	Mn(III)	Cl^-		PhCN	TBAP	SCE				-0.15		-1.37*	-1.52*	-1.74*	60
Cl_{12}DPP (meso)	**402**	Mn(III)	Cl^-		PhCN	TBAP	SCE				-0.15					68
Cl_{12}DPP (meso)	**402**	Mn(III)	Cl^-		Py	TBAP	SCE				-0.20		-1.02	-1.43		60
Cl_8DPP	**403**	Mn(III)	Cl^-		DCM	TBAP	SCE			1.10						60
Cl_8DPP	**403**	Mn(III)	Cl^-		PhCN	TBAP	SCE				-0.33		-1.30*	-1.63*	-1.72*	60
Cl_8DPP (meso)	**404**	Mn(III)	Cl^-		Py	TBAP	SCE				-0.40		-1.22			60
DDP-$Ru_3O(L_n)(4'\text{-}PyCO_2^-)$	**405**	Sn(IV)	See Fig.	See Fig.	PhCN	$TBAPF_6$	SCE				1.06	0.03	-0.91			92
DDP-$Ru_3OL_6(4'\text{-}PyCO_2^-)_3$	**406**	Sn(IV)	See Fig.	See Fig.	PhCN	$TBAPF_6$	SCE				1.06	0.11	-0.90			92
DDP-$Ru_3OL_n(3'\text{-}PyCO_2^-)$	**407**	Sn(IV)	See Fig.	See Fig.	PhCN	$TBAPF_6$	SCE				1.04	-0.11	-0.91			92
DDP-$Ru_3OL_n(4'\text{-}PyCO_2^-)$	**408**	Sn(IV)	See Fig.	See Fig.	PhCN	$TBAPF_6$	SCE				1.04	-0.13	-0.89			92
DPP	**409**	2H			DCM	$TBAPF_6$	$Ag/AgNO_3$			0.32*			-1.57*			364 (DPV)
DPP	--	4H			DCM	$TBAPF_6$	$Ag/AgNO_3$		1.40	1.11			-0.59			364
DPP	--	[Al(III)]			PhCN	$TBAPF_6$	SCE			0.55			-1.09			565 (DPV)

Table 7. Dodecaphenylporphyrin (DPP) and substituted DPP macrocycles. (see structures in Figure 7)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
DPP	--	[Al(III)]			PhCN	$TBAPF_6$	SCE		0.72	0.60					565 (DPV)
DPP	--	Cu(II)			PhCN	TBAP	SCE					-1.22	-1.61		62
DPP	--	Fe(III)	Cl^-		DCM	TBAP	SCE		1.19	0.73					62
DPP	--	Fe(III)	Cl^-		PhCN	TBAP	SCE				-0.35	-0.99	-1.76		62
DPP	--	Fe(III)	Cl^-		PhCN	TBAP	SCE					-0.99	-1.76		62
DPP	--	Fe(III)	Cl^-		Py	TBAP	SCE				-0.01	-1.58	-1.85		62
DPP	--	Mn(III)	Cl^-		DCM	TBAP	SCE			0.92					60
DPP	--	Mn(III)	Cl^-		PhCN	TBAP	SCE				-0.36	-1.55*	-1.64*	-1.89*	60
DPP	--	Mn(III)	Cl^-		PhCN	TBAP	SCE				-0.36				68
DPP	--	Mn(III)	Cl^-		PhCN	TBAP	SCE				-0.36				348
DPP	--	Mn(III)	Cl^-		Py	TBAP	SCE				-0.41	-1.24	-1.64		60
DPP	--	Mn(III)	DMSO	DMSO	PhCN	TBAP	SCE				-0.40				348
DPP	--	Mn(III)	Py	Py	PhCN	TBAP	SCE				-0.41				348
DPP	--	Ni(II)			DCM	TBAP	SCE		0.83	0.75		-1.37			33
DPP	--	Ni(II)			DCM	$TBAPF_6$	SCE		1.01	0.71		-1.42			33
DPP	--	Ni(II)			PhCN	TBAP	SCE					-1.24	-1.72		62
DPP	--	Sn(IV)	OH^-	OH^-	PhCN	$TBAPF_6$	SCE			1.06		-0.90			331
DPP	--	V(IV)	O^{2-}		DCM	TBAP	SCE			0.79		-1.33	-1.66		476
DPP	--	Zn(II)			DCM	$TBAPF_6$	$Ag/AgNO_3$		0.40	0.29		-1.65			364
DPP	--	Zn(II)			PhCN	TBAP	SCE					-1.34	-1.70*		62

Table 7. Dodecaphenylporphyrin (DPP) and substituted DPP macrocycles. (see structures in Figure 7)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
DPP	--	[Zn(II)]			PhCN	$TBAPF_6$	SCE		0.51	0.35					565 (DPV)
DPP(CO_2^-)	**410**	2H			DCM	$TBAPF_6$	$Ag/AgNO_3$			0.26*		-1.55*			364 (DPV)
DPP(CO_2^-)	--	4H			DCM	$TBAPF_6$	$Ag/AgNO_3$			1.18		-0.55			364
DPP(CO_2H)	**411**	Zn(II)			DCM	$TBAPF_6$	$Ag/AgNO_3$		0.42	0.31		-1.61*			364 (DPV)
F_{12}DPP	**412**	Fe(III)	Cl^-		DCM	TBAP	SCE		1.18	0.84					62
F_{12}DPP	**412**	Fe(III)	Cl^-		PhCN	TBAP	SCE				-0.28*	-1.24*	-1.58		62
F_{12}DPP	**412**	Fe(III)	Cl^-		Py	TBAP	SCE				0.07	-1.44	-1.74		62
F_{12}DPP	--	Ni(II)			DCM	TBAP	SCE		0.89	0.89		-1.17			33
F_{12}DPP	--	Ni(II)			DCM	$TBAPF_6$	SCE		1.08	0.88		-1.24			33
F_{16}DPP(CO_2H)	**413**	2H			PhCN	$TBAPF_6$	SCE			0.63		-0.93			331
F_{16}DPP(CO_2H)	--	$[2H]_2$			PhCN	$TBAPF_6$	SCE					-0.34			331
F_{20}DPP	**414**	Fe(III)	Cl^-		PhCN	TBAP	SCE				-0.10*	-1.14*	-1.37		62
F_{20}DPP	**414**	Fe(III)	Cl^-		Py	TBAP	SCE				0.45	-1.19	-1.53		62
F_{20}DPP	--	Mn(III)	Cl^-		DCM	TBAP	SCE		1.36*	1.11*					60
F_{20}DPP	--	Mn(III)	Cl^-		Py	TBAP	SCE				0.02	-0.88	-1.35		60
F_{20}DPP	--	Ni(II)			DCM	TBAP	SCE		1.25	1.25		-0.92			33
F_{20}DPP	--	Ni(II)			DCM	$TBAPF_6$	SCE		1.52	1.30		-0.96			33
F_{20}DPP	--	Fe(III)	Cl^-		DCM	TBAP	SCE		1.64	1.36					62
F_{20}DPP	--	Fe(III)	Cl^-		PhCN	TBAP	SCE					-1.14*	-1.37		62
F_{20}DPP	--	Fe(III)	Cl^-		Py	TBAP	SCE				0.45	-1.19	-1.53		62

Table 7. Dodecaphenylporphyrin (DPP) and substituted DPP macrocycles. (see structures in Figure 7)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
F_{20}DPP	--	Mn(III)	Cl^-		PhCN	TBAP	SCE				0.04	-1.19*	-1.31*	-1.44*	60
F_{20}DPP	--	Mn(III)	Cl^-		PhCN	TBAP	SCE				0.04				68
F_{20}DPP	--	Mn(III)	Cl^-		PhCN	TBAP	SCE				-0.04				348
F_{20}DPP	--	Ni(II)			PhCN	TBAP	SCE					-0.96	-1.45		62
F_{20}DPP	--	Ni(II)			Py	TBAP	SCE					-0.83	-1.39		62
F_{20}DPP	--	Zn(II)			PhCN	TBAP	SCE					-1.04	-1.43		62
F_{20}DPP	--	Zn(II)			Py	TBAP	SCE					-0.93	-1.38		62
F_{28}DPP	**415**	Fe(III)	Cl^-		DCM	TBAP	SCE			1.45					62
F_{28}DPP	**415**	Fe(III)	Cl^-		PhCN	TBAP	SCE				-0.04*	-1.12*	-1.28		62
F_{28}DPP	**415**	Fe(III)	Cl^-		Py	TBAP	SCE				0.53	-1.07	-1.44		62
F_{28}DPP	--	Mn(III)	Cl^-		DCM	TBAP	SCE			1.46*					60
F_{28}DPP	--	Mn(III)	Cl^-		PhCN	TBAP	SCE				0.10	-1.08*	-1.23*	-1.46*	60
F_{28}DPP	--	Mn(III)	Cl^-		Py	TBAP	SCE				0.02	-0.91	-1.35		60
F_{28}DPP	--	Ni(II)			DCM	TBAP	SCE		1.31	1.31		-0.80			33
F_{28}DPP	--	Ni(II)			DCM	$TBAPF_6$	SCE		1.57	1.38		-0.82			33
F_{36}DPP	**416**	Fe(III)	Cl^-		DCM	TBAP	SCE			1.40*					62
F_{36}DPP	**416**	Fe(III)	Cl^-		PhCN	TBAP	SCE				0.12*	-0.88*	-1.10		62
F_{36}DPP	**416**	Fe(III)	Cl^-		Py	TBAP	SCE				0.58	-0.88	-1.27		62
F_{36}DPP	--	Ni(II)			DCM	$TBAPF_6$	SCE		1.58	1.58		-0.60			33
F_4DPP	**417**	Mn(III)	Cl^-		DCM	TBAP	SCE			0.95					60

Table 7. Dodecaphenylporphyrin (DPP) and substituted DPP macrocycles. (see structures in Figure 7)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
F_4DPP	**417**	Mn(III)	Cl^-		PhCN	TBAP	SCE				-0.33	-1.50*	-1.60*	-1.90*	60
F_4DPP	--	Ni(II)			DCM	TBAP	SCE		0.86	0.86		-1.30			33
F_4DPP	--	Fe(III)	Cl^-		DCM	TBAP	SCE		1.16	0.78					62
F_4DPP	--	Fe(III)	Cl^-		PhCN	TBAP	SCE				-0.34	-1.31*	-1.66		62
F_4DPP	--	Fe(III)	Cl^-		Py	TBAP	SCE				0.06	-1.50	-1.76		62
F_4DPP	--	Mn(III)	Cl^-		Py	TBAP	SCE				-0.37	-1.18	-1.66*		60
F_4DPP	--	Ni(II)			DCM	$TBAPF_6$	SCE		1.06	0.81		-1.34			33
F_8DPP	**418**	Fe(III)	Cl^-		DCM	TBAP	SCE		1.19	0.82					62
F_8DPP	**418**	Fe(III)	Cl^-		PhCN	TBAP	SCE				-0.33*	-1.41*	-1.63		62
F_8DPP	**418**	Fe(III)	Cl^-		Py	TBAP	SCE				0.09	-1.48	-1.75		62
F_8DPP	--	Ni(II)			DCM	TBAP	SCE		0.85	0.85		-1.26			33
F_8DPP	--	Ni(II)			DCM	$TBAPF_6$	SCE		1.04	0.84		-1.30			33
F_8DPP (meso)	**419**	Fe(III)	Cl^-		DCM	TBAP	SCE		1.41	1.06					62
F_8DPP (meso)	**419**	Fe(III)	Cl^-		PhCN	TBAP	SCE				-0.27*	-1.42*	-1.67		62
F_8DPP (meso)	**419**	Fe(III)	Cl^-		Py	TBAP	SCE				0.12	-1.49	-1.76		62
F_8DPP (meso)	--	Mn(III)	Cl^-		DCM	TBAP	SCE			1.14					60
F_8DPP (meso)	--	Mn(III)	Cl^-		PhCN	TBAP	SCE				-0.27	-1.30*	-1.51*	-1.67*	60
F_8DPP (meso)	--	Mn(III)	Cl^-		Py	TBAP	SCE				-0.28	-1.16	-1.58		60
F_8DPP (meso)	--	Ni(II)			DCM	TBAP	SCE		1.16	1.02		-1.19			33
F_8DPP (meso)	--	Ni(II)			DCM	$TBAPF_6$	SCE		1.34	0.96		-1.26			33

Table 7. Dodecaphenylporphyrin (DPP) and substituted DPP macrocycles. (see structures in Figure 7)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$(NO_2)_4$DPP	**420**	Ni(II)			DCM	$TBAPF_6$	SCE		1.16	0.98						33
$(NO_2)_4$DPP	**420**	Ni(II)			DCM	TBAP	SCE		0.98	0.98			-1.13*			33
$(OCH_3)_{20}$DPP	**421**	Ni(II)			DCM	TBAP	SCE		0.87	0.75			-1.38			33
$(OCH_3)_{20}$DPP	**421**	Ni(II)			DCM	$TBAPF_6$	SCE		0.91	0.73			-1.38			33
$(OCH_3)_4$DPP (meso)	**422**	Sn(IV)	Cl^-	Cl^-	PhCN	$TBAPF_6$	SCE		1.11	0.86			-0.97	-1.24		308
$(OCH_3)_4$DPP (meso)-POM	**423**	Sn(IV)	Cl^-	Cl^-	PhCN	$TBAPF_6$	SCE		1.11	0.86	-0.50	-1.05	-0.97			308
$(OCH_3)_4$DPP (meso)-POM	--	Sn(IV)	CH_3O^-	CH_3O^-	PhCN	$TBAPF_6$	SCE			0.69	-0.48	-1.04	-1.43			308

Table 8a. Quinoxalinoporphyrins. (see structures in Figure 8a)

Ring	Structure	Axial Ligand Metal	L1	L2	Solvent	Salt	RE	Porphyrin Ox 3	2	1	Metal / Other	Porphyrin Red 1	2	3	Ref.
cis-$(Q)_2$T(3',5'-D-tBuP)P	**424**	2H			DCM	TBAP	SCE			1.00*	-1.60*, -1.78*	-0.97	-1.23		24
cis-$(Q)_2$T(3',5'-D-tBuP)P	--	Ag(II)			DCM	TBAP	SCE			1.40	0.75				22
cis-$(Q)_2$T(3',5'-D-tBuP)P	--	Ag(II)			Py	TBAP	SCE				0.80, -0.65	-1.47			22
cis-$(Q)_2$T(3',5'-D-tBuP)P	--	Co(III)	Cl^-		PhCN	TBAP	SCE		1.10	0.85	-0.36*, -0.64	-1.65	-1.88*		6
cis-$(Q)_2$T(3',5'-D-tBuP)P	--	Cu(II)			DCM	TBAP	SCE		1.03	0.92	-1.68*, -1.96*	-1.13	-1.58*		24
cis-$(Q)_2$T(3',5'-D-tBuP)P	--	Ni(II)			DCM	TBAP	SCE			0.93	-1.76*,	-1.07	-1.64*		24
cis-$(Q)_2$T(3',5'-D-tBuP)P	--	Pd(II)			DCM	TBAP	SCE		1.38	0.99	-1.66*, -1.90*	-1.14	-1.56*		24
cis-$(Q)_2$T(3',5'-D-tBuP)P	--	Zn(II)			DCM	TBAP	SCE		1.08*	0.77	-1.73*, -1.91*	-1.29	-1.58*		24
(MClip-Q)T(3',5'-D-tBuP)P	**425**	2H			DCM	$TBAPF_6$	Fc/Fc^+			0.40		-1.61	-1.79		273
(MClip-Q)T(3',5'-D-tBuP)P	**425**	2H			DCM	$TBAPF_6$	Fc/Fc^+			0.42	-1.86	-1.44	-1.67		273
(MClip-Q)T(3',5'-D-tBuP)P	--	Au(III)			DCM	$TBAPF_6$	Fc/Fc^+				-0.91				273
(MClip-Q)T(3',5'-D-tBuP)P	--	Cu(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.52	-2.02	-1.62	-2.00		273
(MClip-Q)T(3',5'-D-tBuP)P	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.30		-1.69			273
(MClip-Q)T(3',5'-D-tBuP)P	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.30		-1.78			273
(MClip-Q)T(3',5'-D-tBuP)P	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.30		-0.93			273
(MClip-Q)T(3',5'-D-tBuP)P	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.28		-2.06			273
(MClip-Q)T(3',5'-D-tBuP)P	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.56	0.29		-2.04			273
(MClip-Q)T(3',5'-D-tBuP)P	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.56		-1.77			273
(NQ)T(3',5'-D-tBuP)P	**426**	2H			DCM	TBAP	SCE			0.98*		-1.08	-1.19		447
(NQ)T(3',5'-D-tBuP)P	--	Zn(II)			DCM	TBAP	SCE		1.04*	0.72*		-1.11	-1.40*		447

Table 8a. Quinoxalinoporphyrins. (see structures in Figure 8a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
(Q(CN)(CO_2H))TMP	**427**	Zn(II)			DCM	$TBAPF_6$	NHE			1.06			-0.54			294
(Q(CO_2H))T(3',5'-D-tBuP)P(CO_2H)	**428**	Zn(II)			DCM	$TBAPF_6$	NHE			0.97			-1.14			294
(Q(CO_2H))TMP	**429**	Zn(II)			DCM	$TBAPF_6$	NHE			0.98			-1.13			294
Q(NO_2)(NH_2)T(3',5'-D-tBuP)P	**430**	2H			DCM	TBAP	SCE		1.50*	1.00*	-0.82		-1.06	-1.59*	-1.90*	27
Q(NO_2)(NH_2)T(3',5'-D-tBuP)P	--	Cu(II)			DCM	TBAP	SCE		1.08	0.93	-0.78		-1.17	-1.59*	-1.67*	27
Q(NO_2)(NH_2)T(3',5'-D-tBuP)P	--	Cu(II)			DCM	TBAP	SCE		1.21	1.04	-0.84		-1.18	-1.72*		27
Q(NO_2)(NH_2)T(3',5'-D-tBuP)P	--	Pd(II)			DCM	TBAP	SCE		1.14	1.04	-0.78		-1.18	-1.47*	-1.67*	27
Q(NO_2)(NH_2)T(3',5'-D-tBuP)P	--	Zn(II)			DCM	TBAP	SCE		0.95	0.74	-0.81		-1.20*	-1.41*	-1.71*	27
Q(NO_2)$_2$T(3',5'-D-tBuP)P	**431**	2H			DCM	TBAP	SCE		1.39*	1.09	-0.68	-1.48*	-1.03	-1.36*		27
Q(NO_2)$_2$T(3',5'-D-tBuP)P	--	Cu(II)			DCM	TBAP	SCE		1.14	1.04	-0.64	-1.58*	-1.05	-1.44*		27
Q(NO_2)$_2$T(3',5'-D-tBuP)P	--	Ni(II)			DCM	TBAP	SCE		1.08	1.08	-0.65	-1.68*	-1.07	-1.46		27
Q(NO_2)$_2$T(3',5'-D-tBuP)P	--	Pd(II)			DCM	TBAP	SCE		1.48*	1.20	-0.66	-1.70*	-1.08	-1.40		27
Q(NO_2)$_2$T(3',5'-D-tBuP)P	--	Zn(II)			DCM	TBAP	SCE		1.17*	0.86	-0.70	-1.66*	-1.13	-1.66*		27
Q(NO_2)T(3',5'-D-tBuP)P	**432**	2H			DCM	TBAP	SCE			1.06*	-0.89		-1.10	-1.50	-1.94*	27
Q(NO_2)T(3',5'-D-tBuP)P	--	Ni(II)			DCM	$TBAPF_6$	Ag/AgCl		1.23	1.07			-1.02	-1.34		550
Q(NO_2)T(3',5'-D-tBuP)P	--	Zn(II)			DCM	TBAP	SCE		1.03	0.80	-0.88		-1.20*	-1.40*		27
(Q(OCH_3)$_2$)T(3',5'-D-tBuP)P	**433**	2H			DCM	TBAP	SCE		1.36*	1.02*			-1.18	-1.42		27
(Q(OCH_3)$_2$)T(3',5'-D-tBuP)P	**433**	2H			DCM	$TBAPF_6$	Fc/Fc^+			0.32			-0.78			273
(Q(OCH_3)$_2$)T(3',5'-D-tBuP)P	--	Cu(II)			DCM	TBAP	SCE		1.14	0.94			-1.22	-1.62		27
(Q(OCH_3)$_2$)T(3',5'-D-tBuP)P	--	Zn(II)			DCM	TBAP	SCE		0.98	0.75			-1.34	-1.70		27

Table 8a. Quinoxalinoporphyrins. (see structures in Figure 8a)

Ring	Structure	Axial Ligand: Metal	L1	L2	Solvent	Salt	RE	Porphyrin Ox: 3	2	1	Metal / Other	Porphyrin Red: 1	2	3	Ref.
$(Q(OCH_3)_2)T(3',5'\text{-D-tBuP})P$	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.57	-1.75, -1.86	-1.45	-1.67		273
(Q)T(3',5'-D-tBuP)P	**434**	2H			DCM	TBAP	SCE		0.99	0.99		-1.13	-1.33		38
(Q)T(3',5'-D-tBuP)P	**434**	2H			PhCN	TBAP	SCE		1.06	1.06		-1.08	-1.31		38
(Q)T(3',5'-D-tBuP)P	**434**	2H			Py	TBAP	SCE					-1.05	-1.27		38
(Q)T(3',5'-D-tBuP)P	--	Ag(II)			DCM	TBAP	SCE			1.50	0.67				22
(Q)T(3',5'-D-tBuP)P	--	Ag(II)			Py	TBAP	SCE				0.74, -0.78	-1.59			22
(Q)T(3',5'-D-tBuP)P	--	Au(II)			DCM	TBAP	SCE					-0.97	-1.82*		571
(Q)T(3',5'-D-tBuP)P	--	Au(II)			PhCN	TBAP	SCE					-1.11	-1.83		571
(Q)T(3',5'-D-tBuP)P	--	Au(III)			DCM	TBAP	SCE			1.54	-0.47	-0.97	-1.80*		231
(Q)T(3',5'-D-tBuP)P	--	Au(III)			PhCN	TBACl (0.05M)	Ag/AgCl			1.73	-0.35				63
(Q)T(3',5'-D-tBuP)P	--	Au(III)			PhCN	TBAP	SCE			1.64	-0.39	-0.88			18
(Q)T(3',5'-D-tBuP)P	--	Au(III)			PhCN	TBAP	SCE				-0.39	-0.88	-1.81		231
(Q)T(3',5'-D-tBuP)P	--	Au(III)			PhCN	TBAP	SCE				-0.36*				571
(Q)T(3',5'-D-tBuP)P	--	Au(III)			PhCN	TBAP	SCE				-0.60				571
(Q)T(3',5'-D-tBuP)P	--	Au(III)			PhCN	$TBAPF_6$	Ag/AgCl			1.68	-0.40				63
(Q)T(3',5'-D-tBuP)P	--	Au(III)			PhCN	$TBAPF_6$	Ag/AgCl		1.81	1.68	-0.40	-0.90	-1.65		246
(Q)T(3',5'-D-tBuP)P	--	Au(III)			PhCN	$TBAPF_6$	SCE				-0.45	-0.95	-1.63		338
(Q)T(3',5'-D-tBuP)P	--	Au(III)			PhCN	$TBAPF_6$	SCE			0.22	-0.67	-1.18	-1.63		338
(Q)T(3',5'-D-tBuP)P	--	Au(III)			Py	TBAP	SCE				-0.35	-0.87	-1.69		231
(Q)T(3',5'-D-tBuP)P	--	Au(III)			THF	TBACl (0.05M)	Ag/AgCl			1.77*	-0.20, -2.22, -2.71	-0.88	-1.65		246

Table 8a. Quinoxalinoporphyrins. (see structures in Figure 8a)

Ring	Structure	Axial Ligand Metal	L1	L2	Solvent	Salt	RE	Porphyrin Ox 3	2	1	Metal / Other	Porphyrin Red 1	2	3	Ref.
(Q)T(3',5'-D-tBuP)P	--	Au(III)			THF	TBAP (0.4M)	SCE				-0.25	-0.87	-1.67		231
(Q)T(3',5'-D-tBuP)P	--	Au(III)			Tol.	THAP (0.6M)	SCE				-0.30	-0.91	-1.75		231
(Q)T(3',5'-D-tBuP)P	--	Au(III)			Tol.	$THAPF_6$ (0.6M)	Ag/AgCl			1.74*	-0.18	-0.85	-1.68		246
(Q)T(3',5'-D-tBuP)P	--	Au(III)			Tol. (40°C)	TBACl (0.05M)	Ag/AgCl			1.76	-0.18				63
(Q)T(3',5'-D-tBuP)P	--	Au(III)			Tol. (40°C)	$THAPF_6$ (0.6M)	Ag/AgCl			1.74	-0.18				63
(Q)T(3',5'-D-tBuP)P	--	Au(III)			Tol. (45°C)	THAP (0.6M)	SCE				-0.30	-0.91	-1.75		18
(Q)T(3',5'-D-tBuP)P	--	Co(II)			PhCN	TBAP	SCE		1.19	1.19	0.75*, -0.01*	-0.70	-1.82*		6
(Q)T(3',5'-D-tBuP)P	--	Cu(II)			DCM	TBAP	SCE		1.30*	0.97		-1.19	-1.72*		38
(Q)T(3',5'-D-tBuP)P	--	Cu(II)			PhCN	TBAP	SCE		1.14	0.98		-1.09	-1.55		38
(Q)T(3',5'-D-tBuP)P	--	Cu(II)			PhCN	TBAP	SCE					-1.31	-1.75		25
(Q)T(3',5'-D-tBuP)P	--	Cu(II)			Py	TBAP	SCE					-1.10	-1.51		38
(Q)T(3',5'-D-tBuP)P	--	Ni(II)			DCM	TBAP	SCE		1.34	0.95		-1.12	-1.59*		27
(Q)T(3',5'-D-tBuP)P	--	Ni(II)			DCM	TBAP	SCE		0.95	0.95		-1.12	-1.59*		38
(Q)T(3',5'-D-tBuP)P	--	Ni(II)			PhCN	TBAP	SCE		1.03	1.03		-1.08	-1.56		38
(Q)T(3',5'-D-tBuP)P	--	Ni(II)			PhCN	TBAP	SCE					-1.31	-1.81		25
(Q)T(3',5'-D-tBuP)P	--	Ni(II)			Py	TBAP	SCE					-1.02	-1.48		38
(Q)T(3',5'-D-tBuP)P	--	Pd(II)			DCM	TBAP	SCE		1.46*	1.06		-1.16	-1.62*		38
(Q)T(3',5'-D-tBuP)P	--	Pd(II)			PhCN	TBAP	SCE			1.11		-1.09	-1.56		38
(Q)T(3',5'-D-tBuP)P	--	Pd(II)			Py	TBAP	SCE					-1.07	-1.52		38
(Q)T(3',5'-D-tBuP)P	--	Sn(IV)	Cl^-	Cl^-	DCM	TBAP	SCE			1.42		-0.67	-1.15*		25

Table 8a. Quinoxalinoporphyrins. (see structures in Figure 8a)

Ring	Structure	Axial Ligand: Metal	L1	L2	Solvent	Salt	RE	Porphyrin Ox: 3	2	1	Metal / Other	Porphyrin Red: 1	2	3	Ref.
(Q)T(3',5'-D-tBuP)P	--	Sn(IV)	Cl^-	Cl^-	DCM (-75°C)	TBAP	SCE			1.39		-0.59	-1.03		25
(Q)T(3',5'-D-tBuP)P	--	Sn(IV)	OH^-	OH^-	DCM	TBAP	SCE		1.56*	1.37		-0.84	-1.27		25
(Q)T(3',5'-D-tBuP)P	--	Zn(II)			DCM	TBAP	SCE		1.10*	0.72		-1.31	-1.75*		38
(Q)T(3',5'-D-tBuP)P	--	Zn(II)			PhCN	TBACl (0.05M)	Ag/AgCl			0.65		-1.21			63
(Q)T(3',5'-D-tBuP)P	--	Zn(II)			PhCN	TBAP	SCE		1.04	0.84		-1.19	-1.55		18
(Q)T(3',5'-D-tBuP)P	--	Zn(II)			PhCN	TBAP	SCE		1.04	0.84		-1.19	-1.58*		38
(Q)T(3',5'-D-tBuP)P	--	Zn(II)			PhCN	$TBAPF_6$	Ag/AgCl			0.79		-1.23			63
(Q)T(3',5'-D-tBuP)P	--	Zn(II)			PhCN	$TBAPF_6$	Ag/AgCl		1.07	0.79		-1.23	-1.57		246
(Q)T(3',5'-D-tBuP)P	--	Zn(II)			PhCN	$TBAPF_6$	SCE		1.04	0.78					338
(Q)T(3',5'-D-tBuP)P	--	Zn(II)			PhCN	$TBAPF_6$	SCE	1.06	0.82*	0.02*		-0.24*			338
(Q)T(3',5'-D-tBuP)P	--	Zn(II)			PhCN	$TBAPF_6$	SCE		1.11	0.82*		-0.31*			338
(Q)T(3',5'-D-tBuP)P	--	Zn(II)			PhCN	$TBAPF_6$	Ag/AgCl			0.78					63
(Q)T(3',5'-D-tBuP)P	--	Zn(II)			PhCN	$TBAPF_6$	Ag/AgCl			0.72					63
(Q)T(3',5'-D-tBuP)P	--	Zn(II)			PhCN	$TBAPF_6$	SCE	1.06	0.82	0.02*		-0.24*			338
(Q)T(3',5'-D-tBuP)P	--	Zn(II)			Py	TBAP	SCE					-1.20	-1.70*		38
(Q)T(3',5'-D-tBuP)P	--	Zn(II)			THF	TBACl (0.05M)	Ag/AgCl		1.18*	1.02	-2.27, -2.95	-1.18	-1.55		246
(Q)T(3',5'-D-tBuP)P	--	Zn(II)			Tol.	$THAPF_6$ (0.6M)	Ag/AgCl			1.02		-1.16	-1.55		246
(Q)T(3',5'-D-tBuP)P	--	Zn(II)			Tol. (40°C)	TBACl (0.05M)	Ag/AgCl			0.65		-1.19			63
(Q)T(3',5'-D-tBuP)P	--	Zn(II)			Tol. (40°C)	$THAPF_6$ (0.6M)	Ag/AgCl			1.02		-1.16			63
(Q)T(3',5'-D-tBuP)P	--	Zn(II)			Tol. (45°C)	THAP (0.6M)	SCE		1.03	0.83		-1.14	-1.56		18

Table 8a. Quinoxalinoporphyrins. (see structures in Figure 8a)

Ring	Structure	Axial Ligand Metal	L1	L2	Solvent	Salt	RE	Porphyrin Ox 3	2	1	Metal / Other	Porphyrin Red 1	2	3	Ref.
(Q)T(3',5'-D-tBuP)P(NO_2)	**435**	2H			DCM	TBAP	SCE		1.39	1.08		-0.84	-0.94	-1.88*	27
(Q)T(3',5'-D-tBuP)P(NO_2)	--	Cu(II)			DCM	TBAP	SCE		1.20	1.03		-0.92	-1.19	-1.92*	27
(Q)T(3',5'-D-tBuP)P(NO_2)	--	Pd(II)			DCM	TBAP	SCE		1.56*	1.22		-0.93	-1.22	-1.90*	27
(Q)T(3',5'-D-tBuP)P(NO_2)	--	Zn(II)			DCM	TBAP	SCE		1.04	0.84		-0.98	-1.16		27
(QBr)T(3',5'-D-tBuP)P	**436**	2H			DCM	TBAP	SCE		1.38*	1.05*		-1.12	-1.30		27
(QBr)T(3',5'-D-tBuP)P	--	Cu(II)			DCM	TBAP	SCE		1.15	1.00	-1.84*	-1.14	-1.52		27
(QBr)T(3',5'-D-tBuP)P	--	Zn(II)			DCM	TBAP	SCE		0.99	0.76		-1.23	-1.66		27
(QCl_2)T(3',5'-D-tBuP)P	**437**	2H			DCM	TBAP	SCE		1.40*	1.07*		-1.10	-1.25		27
(QCl_2)T(3',5'-D-tBuP)P	--	Cu(II)			DCM	TBAP	SCE		1.15	1.02		-1.11	-1.49		27
(QCl_2)T(3',5'-D-tBuP)P	--	Ni(II)			DCM	TBAP	SCE		1.35	0.97		-1.06	-1.43		27
(QCl_2)T(3',5'-D-tBuP)P	--	Zn(II)			DCM	TBAP	SCE		1.13*	0.77		-1.20	-1.59		27
(QNH_2)T(3',5'-D-tBuP)P	**438**	2H			DCM	TBAP	SCE		1.23*	1.03*		-1.12	-1.32		27
(QNH_2)T(3',5'-D-tBuP)P	--	Cu(II)			DCM	TBAP	SCE		1.14	0.92*	-1.84*	-1.17	-1.56		27
(QNH_2)T(3',5'-D-tBuP)P	--	Zn(II)			DCM	TBAP	SCE		1.02*	0.78		-1.31	-1.61		27
(QNO_2)T(3',5'-D-tBuP)P	**439**	2H			DCM	TBAP	SCE		1.09	1.02		-1.06	-1.19	-1.66*	27
(QNO_2)T(3',5'-D-tBuP)P	--	Cu(II)			DCM	TBAP	SCE		1.16	1.02		-1.03	-1.38*	-1.74*	27
(QNO_2)T(3',5'-D-tBuP)P	--	Zn(II)			DCM	TBAP	SCE		1.01	0.79		-1.08	-1.32*	-1.62*	27
trans-($Q)_2$T(3',5'-D-tBuP)P	**440**	2H			DCM	TBAP	SCE			1.02*		-1.03	-1.32*		24
trans-($Q)_2$T(3',5'-D-tBuP)P	**440**	2H			THF	TBACl (0.05M)	Ag/AgCl			1.19*	-2.17, -2.67	-0.92	-1.24*		246
trans-($Q)_2$T(3',5'-D-tBuP)P	**440**	2H			Tol.	$THAPF_6$	Ag/AgCl			1.17*	-2.12, -2.38	-0.85	-1.15*		246

Table 8a. Quinoxalinoporphyrins. (see structures in Figure 8a)

Ring	Structure	Axial Ligand Metal	L1	L2	Solvent	Salt	RE	Porphyrin Ox 3	2	1	Metal / Other	Porphyrin Red 1	2	3	Ref.
trans-$(Q)_2$T(3',5'-D-tBuP)P	**440**	2H			Tol. (40°C)	TBACl (0.05M)	Ag/AgCl			1.19		-0.87			63
trans-$(Q)_2$T(3',5'-D-tBuP)P	**440**	2H			Tol. (40°C)	$THAPF_6$ (0.6M)	Ag/AgCl			1.17		-0.85			63
trans-$(Q)_2$T(3',5'-D-tBuP)P	--	Ag(II)			DCM	TBAP	SCE			1.40	0.77				22
trans-$(Q)_2$T(3',5'-D-tBuP)P	--	Ag(II)			Py	TBAP	SCE				0.81, -0.60	-1.54			22
trans-$(Q)_2$T(3',5'-D-tBuP)P	--	Au(II)			DCM	TBAP	SCE					-1.19			571
trans-$(Q)_2$T(3',5'-D-tBuP)P	--	Au(II)			DCM	TBAP	SCE					-0.84	-1.64		571
trans-$(Q)_2$T(3',5'-D-tBuP)P	--	Au(III)			DCM	TBAP	SCE				-0.29*				571
trans-$(Q)_2$T(3',5'-D-tBuP)P	--	Au(III)			DCM	TBAP	SCE				-0.48				571
trans-$(Q)_2$T(3',5'-D-tBuP)P	--	Au(III)			DCM	TBAP	SCE				-0.72				571
trans-$(Q)_2$T(3',5'-D-tBuP)P	--	Co(III)	Cl^-		PhCN	TBAP	SCE		1.08	0.90	-0.24*, -0.63	-1.61	-1.91*		6
trans-$(Q)_2$T(3',5'-D-tBuP)P	--	Cu(II)			DCM	TBAP	SCE		1.04	0.91		-0.99	-1.40		24
trans-$(Q)_2$T(3',5'-D-tBuP)P	--	Ni(II)			DCM	TBAP	SCE			0.92		-1.00	-1.40		24
trans-$(Q)_2$T(3',5'-D-tBuP)P	--	Pd(II)			DCM	TBAP	SCE		1.41	1.01		-1.00	-1.43		24
trans-$(Q)_2$T(3',5'-D-tBuP)P	--	Zn(II)			DCM	TBAP	SCE		0.93	0.76		-1.14	-1.42		24

Table 8b. TPP macrocycles with fused groups. (see structures in Figure 8b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
(1-(CH_3)Im)T(4'-tBuP)P	**441**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.73	0.43			-1.76	-2.22		291
AD(BEM)P	**442**	2H			PhCN	$TBAPF_6$	Fc/Fc^+			0.21			-1.89			332
AFP	**443**	Zn(II)			THF	$TBAPF_6$	Fc/Fc^+			0.02			-1.23			134
AZFP	**444**	Ni(II)			PhCN	NR	Fc/Fc^+		0.55	0.38			-1.20	-1.58		517
BEDKP-1	**445**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.83	0.40	-1.37	-1.67	-2.01	-2.23		219
BEDKP-1	**446**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.69	0.39	-1.21	-1.52	-2.00	-2.19		219
BEDKP-3	**447**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+	1.26*	0.81	0.40	-1.15	-1.49	-2.37*			219
BEDKP-4	**448**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.69	0.38	-1.16	-1.51	-2.38*			219
BEDKP-5	**449**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+	0.83	0.52	0.41	-1.31	-1.66	-2.41			219
cis-BCDP	**450**	Zn(II)			DCM	$TBABF_4$	Fc/Fc^+		0.53	0.20						137
DBP	**451**	Zn(II)			DCM	$TBABF_4$	Fc/Fc^+		0.42	0.14						137
(DFEA)TPP	**452**	2H			DCM	$TBAPF_6$	Fc/Fc^+		0.83	0.53			-1.11	-1.46		314
(DFEA)TPP	--	Cu(II)			DCM	$TBAPF_6$	Fc/Fc^+	0.81	0.61	0.38			-1.17	-1.55		314
(DFEA)TPP	--	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+	1.21*	0.58	0.42			-1.20	-1.60		314
(DFEA)TPP	--	Pd(II)			DCM	$TBAPF_6$	Fc/Fc^+	1.03*	0.68	0.44			-1.18	-1.58		314
DK-D(BEM)P	**453**	2H			PhCN	$TBAPF_6$	Fc/Fc^+			0.36			-1.59	-1.89		332
DK-D(BEM)P	--	Pd(II)			PhCN	$TBAPF_6$	Fc/Fc^+		0.35	0.20			-1.50	-2.00		332
DKP-1	**454**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+		1.12*	0.71	-0.99	-1.33	-1.84	-2.12		219
DKP-2	**455**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+	1.05	0.73	0.64	-1.00	-1.35	-1.77	-2.15		219
DKP-3	**456**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+		1.12*	0.70	-0.78	-1.17*	-1.73	-2.18		219

Table 8b. TPP macrocycles with fused groups. (see structures in Figure 8b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
DKP-4	**457**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+		1.08*	0.72	-1.01	-1.32	-1.82			219
DKP-5	**458**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+	1.04	0.75	0.64	-0.88	-1.16				219
DKP-6	**459**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.94	-0.95	-1.29	-2.11			219
DOH-D(BEM)P	**460**	2H			PhCN	$TBAPF_6$	Fc/Fc^+			0.29			-1.89			332
DOH-D(BEM)P	**--**	Pd(II)			PhCN	$TBAPF_6$	Fc/Fc^+		0.28	0.15			-1.98			332
EA-TPP	**461**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.63	0.32	1.20		-1.64	-2.04		222
EAA-TPP	**462**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.62	0.32	1.18		-1.62	-2.05*		222
EADTKP-1	**463**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+	0.97*	0.62*	0.37*	-1.17	-1.40	-1.74	-2.13*		219
EADTKP-2	**464**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+	0.81	0.66*	0.39*	-1.05	-1.33	-1.75	-2.11*		219
EADTKP-3	**465**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+	0.89	0.65*	0.42*	-0.96	-1.23	-2.00	-2.15*		219
EADTKP-4	**466**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+	1.00*	0.65*	0.36*	-0.95	-1.24	-2.04	-2.15*		219
EAK-P	**467**	2H			DCM	$TBAPF_6$	Fc/Fc^+		0.72	0.46			-1.36	-1.65		223
EAK-P	**--**	Cu(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.71	0.39			-1.51	-1.85		223
EAK-P	**--**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.79	0.45			-1.44	-1.80		223
EAK-P	**--**	Pd(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.46			-1.45			223
EAK-TPP	**468**	Cu(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.76	0.46			-1.38	-1.76		223
EAK-TPP	**--**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.78	0.37			-1.44	-1.79		222
EAK-TPP	**--**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.95	0.60			-1.26	-1.63		223
EATK-TPP	**469**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.80	0.44*			-1.26	-1.61		222
EATKP-2	**470**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+	0.87*	0.72*	0.37*	-1.07	-1.40	-1.87*	-2.25*		219

Table 8b. TPP macrocycles with fused groups. (see structures in Figure 8b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
EATKP-3	**471**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+	0.80	0.68	0.39*	-1.15	-1.38	-1.91	-2.19		219
EATKP-4	**472**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+	0.76	0.65	0.41*	-1.05	-1.35	-2.19			219
EATKP-5	**473**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+	0.84	0.69	0.39*	-1.00	-1.32	-2.23			219
ETKP-1	**474**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.68	0.38*	-1.25	-1.52	-1.92*	-2.20*		219
(Im)T(4'-tBuP)P	**475**	2H			DCM	$TBAPF_6$	Fc/Fc^+		0.69	0.47			-1.65	-2.05*		291
(Im)T(4'-tBuP)P	--	Cu(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.77	0.44			-1.74	-2.14		291
(Im)T(4'-tBuP)P	--	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.65	0.44			-1.73	-2.27		291
(Im)T(4'-tBuP)P	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.61	0.28			-1.81	-2.15		291
$[(Im)T(4'-tBuP)P]^+$	**476**	2H			DCM	$TBAPF_6$	Fc/Fc^+		0.75	0.57	0.38*	0.00*	-1.48	-1.73		291
$[(Im)T(4'-tBuP)P]^+$	--	Cu(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.90	0.54	0.35*	0.00*	-1.59	-1.99		291
$[(Im)T(4'-tBuP)P]^+$	--	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.64	0.33	-0.01	-1.54	-2.03*	-2.18	291
$[(Im)T(4'-tBuP)P]^+$	--	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.66			-1.56	-2.01		291
$[(Im)T(4'-tBuP)P]^+$	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.66	0.36	0.28*	-0.04*	-1.69	-1.93*	-2.24	291
(MPTTF)TPP	**477**	2H			THF	$TBAPF_6$	Fc/Fc^+				0.50	0.28	-1.34	-1.64		244
NF-T(3',5'-CF_3P)P	**478**	Re(I)	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.75			-0.91	-1.41		430
NF-T(3',5'-D-tBuP)P	**479**	Re(I)	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.33			-1.31	-1.73		430
NF-T(4'-CF_3P)P	**480**	Re(I)	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.61			-1.08	-1.55		430
NF-T(4'-CH_3P)P	**481**	Re(I)	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.36			-1.26	-1.70		430
NF-T(4'-ClP)P	**482**	Re(I)	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.50			-1.15	-1.60		430
NF-T(4'-CO_2CH_3P)P	**483**	Re(I)	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.56			-1.08	-1.51		430

Table 8b. TPP macrocycles with fused groups. (see structures in Figure 8b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
NF-T(4'-NO_2 P)P	**484**	Re(I)	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.65		-0.95	-1.30		430
NF-T(4'-OCH_3P)P	**485**	Re(I)	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.33		-1.21	-1.65		430
NF-T(4'-tBuP)P	**486**	Re(I)	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.35		-1.28	-1.70		430
NF-TPP	**487**	Mn(I)	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.34		-1.32	-1.76		373
NF-TPP	**--**	Re(I)	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.47		-1.21	-1.67		430
NF-TPP(Benzoyl)	**488**	Mn(I)	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.42		-1.25	-1.67		373
NF-TPP(Benzoyl)	**--**	Re(I)	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.50		-1.15	-1.59		430
NF-TPP(Benzyl)	**489**	Mn(I)	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.29		-1.38	-1.83		373
NF-TPP(Br)	**490**	Mn(I)	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.37		-1.25	-1.66		373
NF-TPP(C_3H_7)	**491**	Mn(I)	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.28		-1.36	-1.80		373
NF-TPP(CH_3)	**492**	Mn(I)	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.24		-1.40	-1.80		373
NF-TPP(CHO)	**493**	Mn(I)	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.52		-1.15	-1.54		373
NF-TPP(CHO)	**--**	Re(I)	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.60		-1.06	-1.46		430
NF-TPP(Cl)	**494**	Mn(I)	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.35		-1.27	-1.68		373
NF-TPP(CN)	**495**	Re(I)	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.69		-0.99	-1.43		430
NF-TPP(iBu)	**496**	Mn(I)	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.25		-1.41	-1.86		373
NF-TPP(iPr)	**497**	Mn(I)	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.28		-1.42	-1.85		373
NF-TPP(NO_2)	**498**	Mn(I)	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.66		-1.05	-1.43		373
NF-TPP(NO_2)	**--**	Re(I)	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.71		-0.95	-1.34		430
$(PhIm)_2$T(3',5'-D-tBuP)P	**499**	Zn(II)			DCB	$TBAPF_6$	$Ag/AgNO_3$			0.77					334

Table 8b. TPP macrocycles with fused groups. (see structures in Figure 8b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$(PhIm)_2T(3',5'\text{-}D\text{-}tBuP)P$	**499**	Zn(II)			PhCN	$TBAPF_6$	$Ag/AgNO_3$			0.76						334
(PMI-b)P	**500**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+	0.77	0.43	0.20			-1.15			311
(PMI)P	**501**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.77	0.37			-1.15			311
PQ-TPP	**502**	2H			DCM	$TBAPF_6$	Fc/Fc^+		0.47	0.17			-1.65	-1.98		559
PQ-TPP	--	Cu(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.53	0.14			-1.79	-2.15		559
PQ-TPP	--	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+	1.15	0.57	0.16			-1.78	-2.17		559
PQ-TPP	--	Pd(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.65	0.24			-1.71	-2.12		559
(TAF)P	**503**	Ni(II)			THF	$TBAPF_6$	$Ag/AgNO_3$			-0.44			-1.05			356
TAZFP	**504**	Ni(II)			PhCN	NR	Fc/Fc^+		0.13	0.33			-0.88	-1.05		517
TEAA-TPP	**505**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.64	0.35*			-1.55	-1.88		222
(TFMA)P	**506**	Zn(II)			THF	$TBAPF_6$	Fc/Fc^+			0.00			-1.19			134
trans-$(Et)_4(TTF)_2TPP$	**507**	2H			THF	$TBAPF_6$	Fc/Fc^+				0.27	0.03	-1.51	-1.77		244
trans-$(TTF)_2TPP$	**508**	2H			THF	$TBAPF_6$	Fc/Fc^+				0.36	0.15	-1.57	-1.81		244
trans-DAFP	**509**	Ni(II)			THF	$TBAPF_6$	Fc/Fc^+			0.07			-1.20			254
trans-DAZFP	**510**	Ni(II)			PhCN	NR	Fc/Fc^+		0.47	0.25			-0.98	-1.27		517
trans-MAFP	**511**	Ni(II)			THF	$TBAPF_6$	Fc/Fc^+			0.08			-1.33			254
$(TTF)_4TPP$	**512**	2H			THF	$TBAPF_6$	Fc/Fc^+				0.51	0.08	-1.32	-1.66		244

Table 9a. N-substituted tetraarylporphyrins. (see structures in Figure 9a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
HMP	**513**	Fe(II)			CH_3CN	$TBABPh_4$ (0.04M)	NHE				0.99					381
HMP	**513**	Fe(III)			CH_3CN	$TBABPh_4$ (0.04M)	NHE				0.77*	-0.57				381
HMP	**513**	Zn(II)			CH_3CN	$TBABPh_4$ (0.04M)	NHE			0.63			0.21			381
$N(CH_3)TPP$	**514**	Re(I)	CO		DCM	$TBAPF_6$	Fc/Fc^+				0.36	-1.64 , -2.06				522
OxoP	**515**	2H			DCB	TBAP	Fc/Fc^+		0.48	0.27			-1.33*			353
OxoP(Bz)	**516**	[Naphth-2-ylmethyl], 3H			DCB	TBAP	Fc/Fc^+		0.56	0.37			-1.29*	-1.44	-2.06*	353
$OxoP(Bz)_2$	**517**	2H, $[Benzyl]_2$			DCB	$TBAPF_6$	Fc/Fc^+		0.69	0.52						351
$OxoP(Bz)_2$	**517**	2H, $[Benzyl]_2$			DCB	$TBAPF_6$	Fc/Fc^+		0.16*	-0.08						351
$OxoP(Bz)_2$	**517**	2H, $[Benzyl]_2$			DCB	$TBAPF_6$	Fc/Fc^+		0.23*	-0.06						351
$OxoP(Bz)_2$	**517**	2H, $[Benzyl]_2$			DCB	$TBAPF_6$	Fc/Fc^+		0.48*	-0.05						351
$OxoP(Bz)_2$	**517**	2H, $[Benzyl]_2$			DCB	$TBAPF_6$	Fc/Fc^+		0.70	0.45						351
$OxoP(Bz)_2$	**517**	2H, $[Benzyl]_2$			DCB	$TBAPF_6$	Fc/Fc^+		0.66	0.46						351
$OxoP(Bz)_2$	**--**	$[Naphth-2-ylmethyl]_2$, 2H			DCB	TBAP	Fc/Fc^+		0.69	0.47			-1.36*	-1.46	-1.95*	353
$OxoP(NM)_3$	**518**	$[Naphth-2-ylmethyl]_3$, H			DCB	TBAP	Fc/Fc^+		0.81	0.54			-1.30*	-1.46	-1.75	353
$OxoP(NM)_4$	**519**	$[Naphth-2-ylmethyl]_4$			DCB	TBAP	Fc/Fc^+			0.71			-1.32	-1.41	-1.85*	353
OxoP(PM)	**520**	H_3, Pyren-2-ylmethyl			DCB	TBAP	Fc/Fc^+		0.56	0.35			-1.33*	-1.44*		47
$OxoP(PM)_2$	**521**	2H, $[Pyren-2-ylmethyl]_2$			DCB	TBAP	Fc/Fc^+		0.68	0.49			-1.36*	-1.46		47
$OxoP(PM)_3$	**522**	H, $[Pyren-2-ylmethyl]_3$			DCB	TBAP	Fc/Fc^+			0.54			-1.31*	-1.47		47
$OxoP(PM)_4$	**523**	$[Pyren-2-ylmethyl]_4$			DCB	TBAP	Fc/Fc^+			0.76*			-1.35	-1.46		47
$OxP-(Bz)_2$	**524**	2H, $[benzyl]_2$			DCB	TBAP	Fc/Fc^+			0.48			-1.38			71

Table 9a. N-substituted tetraarylporphyrins. (see structures in Figure 9a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$OxP\text{-}(Bz)_4$	**525**	$[benzyl]_4$			DCB	TBAP	Fc/Fc^+			0.73		-1.34			71
TCHP	**526**	Co(II)	I^-		CH_3CN	TBAP	Ag/AgCl		0.80*	0.56*	-0.72*	-0.19*	-0.73*		99
$(TCHP)^{4-}$	**527**	Co(III)			CH_3CN	TBAP	Ag/AgCl		1.19*	0.46*	-0.50				99
$(TCHP)^{4-}$	**527**	Co(III)			DCM	TBAP	Ag/AgCl			0.52*		-0.56*	-0.69*		99
$(TCHP)^{4-}$	**527**	Co(III)			DMF	TBAP	Ag/AgCl		1.26*	0.41*		-0.49			99
$(TCHP)^{4-}$	**527**	Co(III)			DMSO	$TBAPF_6$	Ag/AgCl			0.39*		-0.40			99
$(TCHP)^{4-}$	**527**	Co(III)			THF	$TBAPF_6$	Ag/AgCl			0.40*		-0.68			99

Table 9b. Heteroporphyrins. (see structures in Figure 9b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
(CH_3)NC-TPP	**528**	Cu(II)			THF	TBAP	SCE			0.34		-1.09			281
(CH_3)NC-TPP	**528**	Cu(II)	Cl^-		THF	TBAP	SCE			0.56		-1.10			281
(CH_3)NC-TPP	**528**	Cu(II)	Cl^-		THF	TBAP	SCE			0.71	-0.22	-1.09			281
F_{20}NC-TPP	**529**	Cu(III)			DCM	TBACl	Fc/Fc^+				0.03				405 (DPV)
F_{20}NC-TPP	**529**	Cu(III)			DCM	TBAP	Fc/Fc^+				0.14				405 (DPV)
F_{20}NC-TPP	**529**	Cu(III)			DCM	$TBAPF_6$	Fc/Fc^+				0.15				405 (DPV)
IPSiAPDPP	**530**	H, S			DCM	TBAP	SCE			1,04		-1.06	-1.27		502
N(CH_3)NC-TPP	**531**	Re(I)	CO		DCM	$TBAPF_6$	Fc/Fc^+				0.02	-1.46, -1.94			522
NC-TPP	**532**	2H			DMF	$TBAPF_6$	Fc/Fc^+			0.65		-1.42	-2.10		394
NC-TPP	**532**	2H			Tol.	$TBAPF_6$	Fc/Fc^+			0.60		-1.64	-2.10		394
NC-TPP	--	Cu(II)			THF	TBAP	SCE			0.39		-1.07			281
O-BBPDPP	**533**	Cu(II), O	Cl^-		DCM	TBAP	SCE				-0.24				264
O-BMDPP	**534**	Cu(II), O	Cl^-		DCM	TBAP	SCE				-0.25				264
O-DTDPP	**535**	Cu(II), O	Cl^-		DCM	TBAP	SCE				-0.24				264
O-TIPHMEPP	**536**	H, O			DCM	TBAP	SCE			1.10		-1.20			129
O-TPP	**537**	Cu(II), O	Cl^-		DCM	TBAP	SCE				-0.22				264
O-TPP	--	Ni(II), O	Cl^-		DCM	TBAP	SCE				-0.42				264
O,S-TPP	**538**	Cu(II), O, S	Cl^-	Cl^-	DCM	TBAP	SCE				-0.11				264
O,S-TTAPP	**539**	O, S			DCM	TBAP	SCE		1.42	1.07		-0.95	-1.18		113
O,S-TTBP	**540**	O, S			DCM	TBAP	SCE					-1.18*	-1.50*		305

Table 9b. Heteroporphyrins. (see structures in Figure 9b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
O,S-TTMBP	**541**	O, S			DCM	TBAP	SCE					-1.18	-1.50		94
O,S-TTP	**542**	O, S			DCM	TBAP	SCE					-0.78*	-1.31*		305
O_2-TPP	**543**	Cu(II), 2O	Cl^-	Cl^-	DCM	TBAP	SCE				-0.37				264
O_2-TPP	**--**	Ni(II), 2O	Cl^-	Cl^-	DCM	TBAP	SCE				-0.36				264
P,S-BPP	**544**	P, S, C_6H_5,			DCM	$TBAPF_6$	Fc/Fc^+			0.45		-1.36	-1.56		376
P(III)-BPP	**545**	H, P, C_6H_5			DCM	$TBAPF_6$	Fc/Fc^+			0.38		-1.51	-1.74		376
P(III)-BPP	**545**	H, P, C_6H_5			DCM	$TBAPF_6$	Fc/Fc^+			0.38		-1.51			488
P(III),S-BPP	**546**	H, P, C_6H_5, S			DCM	$TBAPF_6$	Fc/Fc^+			0.45		-1.36			488
P(III),S-BPP	**--**	Pd(II), P, C_6H_5, S			DCM	$TBAPF_6$	Fc/Fc^+			-0.26		-2.07			488
P(III),S-BPP	**--**	Pt(II), P, C_6H_5, S			DCM	$TBAPF_6$	Fc/Fc^+			-0.24		-2.07			488
P(V)-BPP	**547**	2H, P, C_6H_5, O			DCM	$TBAPF_6$	Fc/Fc^+			0.44		-1.21	-1.49		376
S-BFDTP	**548**	H, S			DCM	TBAP	SCE		1.27	0.94		-0.99	-1.34		498
S-BTDPP	**549**	H, S			THF	$TBAPF_6$	Fc/Fc^+			0.68		-1.73			358
S-BTDPP	**--**	Li, S			THF	$TBAPF_6$	Fc/Fc^+		0.70	0.37*		-1.74			358
S-FTTP	**550**	H			DCM	TBAP	SCE		1.34	1.00		-1.03	-1.38		498
S-T(2'-Furyl)P	**551**	H, S			DCM	TBAP	SCE		1.13	0.87		-0.91	-1.24		498
S-T(4'-CH_3P)P	**552**	H			DCM	TBAP	SCE			1.04		-1.06	-1.38		498
S-T(4'-CH_3P)P	**553**	Ru(IV), S	Cl^-	Cl^-	THF	$TBAPF_6$	SCE			1.08	-0.12	-1.48*			574
S-TFTP	**554**	H, S			DCM	TBAP	SCE		1.17	0.93		-0.92	-1.28		498
S-TIPHMEPP	**555**	H, S			DCM	TBAP	SCE		1.28	1.11		-1.03	-1.35		129

Table 9b. Heteroporphyrins. (see structures in Figure 9b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
S-TPP	**556**	Cu(II), S	Cl^-		DCM	TBAP	SCE				-0.05				264
S-TPP	--	H, S			DCM	$TBABF_4$ (0.2M)	Fc/Fc^+			1.02		-1.15	-1.42		382
S-TPP	--	H, S			DCM	TBAP	SCE		1.51	1.11		-1.03	-1.35		307
S-TPP	--	Ni(II), S	Cl^-		DCM	TBAP	SCE				-0.06				264
S-TTAPP	**557**	H, S			DCM	TBAP	SCE		1.43	1.06		-1.03	-1.38		113
S-TTBEPP	**558**	H, S			DCM	TBAP	SCE		1.53*	1.16*		-0.97	-1.39		305
S-TTIPP	**559**	H, S			DCM	TBAP	SCE		1.51	1.11		-1.03	-1.35		503
S-TTMBP	**560**	H, S			DCM	TBAP	SCE		1.53	1.15		-0.96	-1.39		94
S-TTMHP	**561**	H, S			DCM	TBAP	SCE		1.51	1.11		-1.03	-1.35		96
S_2-BFBTP	**562**	2S			DCM	TBAP	SCE		1.35	0.96		-0.87	-1.20		498
S_2-BIPDTP	**563**	2S			DCM	TBAP	SCE			1.18		-0.95	-1.17		502
S_2-BTAPPyP	**564**	2S			DCM	TBAP	SCE			1.18		-0.94	-1.23		503
S_2-HTriTP	**565**	2S			DCM	TBAP	SCE		1.06	0.57		-0.75	-1.38		570
S_2-T(2'-Furyl)P	**566**	2S			DCM	TBAP	SCE		1.18	0.88		-0.79	-1.14		498
S_2-T(4'-CH_3P)P	**567**	2S			DCM	TBAP	SCE			1.18		-0.94	-1.23		498
S_2-TFTP	**568**	2S			DCM	TBAP	SCE		1.24	0.92		-0.82	-1.18		498
S_2-TIPHMEPP	**569**	2S			DCM	TBAP	SCE			1.18		-0.94	-1.23		129
S_2-TPP	**570**	2S			DCM	TBAP	SCE			1.18		-0.94	-1.23	2.12	307
S_2-TPP	**570**	2S			DCM	$TBABF_4$ (0.2M)	Fc/Fc^+			1.10		-1.07	-1.37		382
S_2-TTAPP	**571**	2S			DCM	TBAP	SCE		1.53	1.14		-0.93	-1.26		113

Table 9b. Heteroporphyrins. (see structures in Figure 9b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
S_2-TTBEPP	**572**	2S			DCM	TBAP	SCE		1.56*	1.18*		-1.15	-1.27		305
S_2-TTFP	**573**	2S			DCM	TBAP	SCE		1.40	1.03		-0.91	-1.21		498
S_2-TTMBP	**574**	2S			DCM	TBAP	SCE		1.58	1.19		-1.14	-1.25		94
S_2-TTMHP	**575**	2S			DCM	TBAP	SCE			1.18		-0.94	-1.23		96
S_2-TTP	**576**	2S			DCM	TBAP	SCE		1.50*	1.36*		-0.73	-1.05		305
S_2-TTP	**--**	H, S			DCM	TBAP	SCE		1.60*	1.30*		-0.83	-1.13		305
S_2-TTPE-BDPM	**577**	2S			DCM	TBAP	SCE			1.34	-0.64	-0.90	-1.13		471
Se-TPP	**578**	H, Se			DCM	$TBABF_4$ (0.2M)	Fc/Fc^+			1.09*		-1.10	-1.42		382
Se,S-TPP	**579**	S, Se			DCM	$TBABF_4$ (0.2M)	Fc/Fc^+			1.09		-1.04	-1.33		382
Se_2-TPP	**580**	2Se			DCM	$TBABF_4$ (0.2M)	Fc/Fc^+			1.10*		-1.01	-1.28		382
Te-TPP	**581**	H, Te			DCM	$TBABF_4$ (0.2M)	Fc/Fc^+			0.81*		-1.00	-1.61		382
Te,S-TPP	**582**	S, Te			DCM	$TBABF_4$ (0.2M)	Fc/Fc^+			0.69*		-1.00	-1.26		382

Table 10. Tetrabenzoporphyrins (TBP) and tetraazaporphyrins (TArP). (see structures in Figure 10)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$(C_6H_{13}S)_6$TAP	**583**	2H			DCE	TBAP	SCE		1.36	1.15			-0.46	-0.79	-1.12	21
$(C_6H_{13}S)_6$TAP	**--**	Zn(II)			DCE	TBAP	SCE		1.26	0.94			-0.62	-0.92	-1.27	21
$(CO_2CH_3)_8$TB-T(4'-CO_2CH_3)P	**584**	Pt(II)			DMF	TBAP	Fc/Fc^+			0.60			-1.23			483
$(CO_2CH_3)_8$TBTPP	**585**	Fe(II)	Py	Py	DCM	TBAP	SCE		1.40	1.11	0.45					40
$(CO_2CH_3)_8$TBTPP	**585**	Fe(II)	Py	Py	PhCN	TBAP	SCE		1.58	1.10	0.42					40
$(CO_2CH_3)_8$TBTPP	**585**	Fe(II)	Py	Py	Py	TBAP	SCE				0.51					40
OETAP	**586**	Fe(II)	1-(CH_3)Im	1-(CH_3)Im	DCM	$TBAPF_6$	Pt Wire				-0.31					385
OHTETB-TPAP	**587**	Zn(II)			DCM	TBAP	Fc/Fc^+		0.56	0.34			-1.46			493
$(Ph)_8$TAP	**588**	Co(II)			DCB	TBAP	Fc/Fc^+			0.94	0.68	-0.81	-1.77			399
$(Ph)_8$TAP(A)	**589**	Co(II)			DCB	TBAP	Fc/Fc^+		0.75	0.28	0.50	-0.86	-1.81			399
$(Ph)_8$TAP(DA)	**590**	Co(II)			DCB	TBAP	Fc/Fc^+		0.70	0.01	0.31	-0.88	-2.01			399
$(Ph)_8$TAP(DA)	**--**	Ni(II)			DCB	TBAP	Fc/Fc^+			0.46			-1.24	-1.56		399
$(Ph)_8$TAP(DA)	**--**	Ni(II)			DCB	TBAP	Fc/Fc^+		0.57	0.20			-1.45	-1.81		399
$(Ph)_8$TAP(DB)	**591**	Co(II)			DCB	TBAP	Fc/Fc^+			0.25	0.50	-0.87	-1.97			399
$(Ph)_8$TAP(DNaph)	**592**	Co(II)			DCB	TBAP	Fc/Fc^+			0.09	-0.86		-1.96			399 (/DPV)
$(Ph)_8$TAP(MB)	**593**	Co(II)			DCB	TBAP	Fc/Fc^+			0.48	0.48	-0.85	-1.85			399
$(Ph)_8$TAP(MNaph)	**594**	Co(II)			DCB	TBAP	Fc/Fc^+			0.32	0.48	-0.86	-1.83			399
TATAP	**595**	Fe(II)	1-(CH_3)Im	1-(CH_3)Im	DCM	$TBAPF_6$	Pt Wire				-0.09					385
TB-T(3',5'-CO_2Bu)P	**596**	Pt(II)			DMF	TBAP	Fc/Fc^+			0.50			-1.55			483
TB-T(4-CO_2CH_3)P	**597**	Pt(II)			DMF	TBAP	Fc/Fc^+			0.37			-1.61			483

Table 10. Tetrabenzoporphyrins (TBP) and tetraazaporphyrins (TArP). (see structures in Figure 10)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
TB(TPA)P	**598**	Zn(II)			DCM	TBAP	Fc/Fc^+		0.40	0.08		-1.47			493
TBP	**599**	Ru(II)	CO		DCM	TBAP	SCE		0.93	0.49					577
TBP	**599**	Ru(II)	CO	Py	DCM	TBAP	SCE		1.10	0.56					577
TBP	**599**	Ru(II)	Py	Py	DCM	TBAP	SCE		0.94	0.36					577

Table 11a. Tetraarylporphyrins with charged peripheral groups. (see Figure 11a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
3'-MVPTriPP	**600**	Fe(III)	Cl^-		DG/CH_3OH	$TBAPF_6$	Ag/AgCl				-0.09, -0.81 -0.55, -1.09				188
4'-MVPTriPP	**601**	Fe(III)	Cl^-		DG/CH_3OH	$TBAPF_6$	Ag/AgCl				-0.05, -0.85 -0.37, -1.09				188
BNCDTBP	**602**	2H			CH_3OH	$TBAPF_6$	SCE			0.52*					230
BNCDTMP	**603**	2H			CH_3OH	$TBAPF_6$	SCE			0.49*					230
BNCDTMP	**603**	2H			CH_3OH	$TBAPF_6$	SCE			0.46*					230
BNCDTMP	**603**	2H			DCM	$TBAPF_6$	SCE		1.34	0.98					230
BNCDTMP	--	Cu(II)			CH_3OH	$TBAPF_6$	SCE			0.44*					230
BNCDTMP	--	Zn(II)			CH_3OH	$TBAPF_6$	SCE			0.29*					230
BNCDTMP	--	Zn(II)			DCM	$TBAPF_6$	SCE			0.74*					230
$[(C=C)TPP]^{2+}$	**604**	C=C			THF	$TBAPF_6$	Fc/Fc^+		-0.59	-0.26		-1.91	-2.17		548
cis-[D(2'-NMPy) D(2'-Py)P]$^{2+}$	**605**	Mn(III)	H_2O		H_2O	NaCl	NHE				0.05				563
$Cl_8[T(3'-SO_3^-P)P]^{4-}$	**606**	Fe(III)	H_2O		H_2O	NaCl	NHE				0.13				563
$Cl_8[T(3'-SO_3^-P)P]^{4-}$	--	Fe(III)	OH^-		H_2O	NaCl	NHE				0.09				563
$Cl_8[T(3'-SO_3^-P)P]^{4-}$	--	Mn(III)	H_2O		H_2O	NaCl	NHE				0.09				563
$F_{16}[T(4'-TMAP)P]^{4+}$	**607**	Fe(III)	H_2O		H_2O	NaCl	NHE				0.24				563

Table 11a. Tetraarylporphyrins with charged peripheral groups. (see Figure 11a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
F_{16}[T(4'-TMAP)P]$^{4+}$	--	Fe(III)	OH^-		H_2O	NaCl	NHE				0.28					563
F_{16}[T(4'-TMAP)P]$^{4+}$	--	Mn(III)	H_2O		H_2O	NaCl	NHE				0.06					563
[F_{16}TPP(TMA)$_4$]$^{4+}$	**608**	Cr(III)			H_2O	NR	Ag/AgCl				1.10	-0.68				467
[F_{16}TPP(TMA)$_4$]$^{4+}$	**608**	Cr(III)			H_2O	NR	Ag/AgCl				1.01	-0.69				467
[F_{16}TPP(TMA)$_4$]$^{4+}$	**608**	Cr(III)			H_2O	NR	Ag/AgCl				0.91	-0.69				467
[F_{16}TPP(TMA)$_4$]$^{4+}$	**608**	Cr(III)			H_2O	NR	Ag/AgCl				0.60	-0.71				467
[F_{16}TPP(TMA)$_4$]$^{4+}$	**608**	Cr(III)			H_2O	NR	Ag/AgCl				0.43	-0.76				467
[F_{16}TPP(TMA)$_4$]$^{4+}$	**608**	Cr(III)			H_2O	NR	Ag/AgCl				0.31	-0.88				467
F_8T(3'-SO_3P)P	**609**	Mn(III)	H_2O		H_2O	NaCl	NHE				0.01					563
[(NMPyDMAP)$_{20}$ TPP]$^{20+}$	**610**	2H			CH_3CN	NR	SCE			1.90			-0.26	-0.72		393
[(PPh_2)$_2$A)TPP]$^+$	**611**	Zn(II)			CH_3CN/DCE	$TEAPF_6$	SCE		1.18	0.89	-1.04	-1.22	-1.41			154 (CV/P)
[(PPh_2)$_2$A]TPP	**612**	2H			CH_3CN/DCE	$TEAPF_6$	SCE			1.11*	-0.93		-1.18			154
(SO_3^-)$_8$TMP	**613**	Fe(III)	H_2O		H_2O	NaCl	NHE				0.11					563
(SO_3^-)$_8$TMP	--	Fe(III)	OH^-		H_2O	NaCl	NHE				0.05					563
(SO_3^-)$_8$TMP	--	Mn(III)	H_2O		H_2O	NaCl	NHE				-0.10					563

Table 11a. Tetraarylporphyrins with charged peripheral groups. (see Figure 11a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$[T(2'\text{-}N(butyl)Py)P]^{5+}$	**614**	Mn(III)	Cl^-		H_2O	NaCl	NHE				0.25				460
$[T(2'\text{-}N(hexyl)Py)P]^{5+}$	**615**	Mn(III)	Cl^-		H_2O	NaCl	NHE				0.31				460
$[T(2'\text{-}N(MOE)_2Im)P]^{5+}$	**616**	Mn(III)			H_2O	NaCl	Ag/AgCl				0.37				461
$[T(2'\text{-}N(MOE)MIm)P]^{5+}$	**617**	Mn(III)			H_2O	NaCl	Ag/AgCl				0.36				461
$[T(2'\text{-}N(MOE)Py)P]^{5+}$	**618**	Mn(III)			H_2O	NaCl	Ag/AgCl				0.25				461
$[T(2'\text{-}N(octyl)Py)P]^{5+}$	**619**	Mn(III)	Cl^-		H_2O	NaCl	NHE				0.37				460
$[T(2'\text{-}N(Pr)Py)P]^{5+}$	**620**	Mn(III)	Cl^-		H_2O	NaCl	NHE				0.24				460
$[T(2'\text{-}N(TDE)Im)P]^{4+}$	**621**	Mn(III)	Cl^-		H_2O	NaCl	NHE				0.35				459
$[T(2'\text{-}N(TDTEG)Im)P]^{4+}$	**622**	Mn(III)	Cl^-		H_2O	NaCl	NHE				0.41				459
$[T(2'\text{-}N(TEG)Py)P]^{4+}$	**623**	Mn(III)	Cl^-		H_2O	NaCl	NHE				0.25				459
$[T(2'\text{-}NEtPy)P]^{4+}$	**624**	Fe(III)	1-(CH_3)Im	1-(CH_3)Im	H_2O	NaCl	NHE				0.44				563
$[T(2'\text{-}NEtPy)P]^{4+}$	**--**	Fe(III)	H_2O		H_2O	NaCl	NHE				0.38				563
$[T(2'\text{-}NEtPy)P]^{4+}$	**--**	Fe(III)	OH^-		H_2O	NaCl	NHE				0.22				563
$[T(2'\text{-}NEtPy)P]^{4+}$	**--**	Mn(III)			CH_3OH/H_2O	NaCl	Ag/AgCl				0.13				3
$[T(2'\text{-}NEtPy)P]^{4+}$	**--**	Mn(III)			CH_3OH/H_2O	NaCl	NHE				0.23				3

Table 11a. Tetraarylporphyrins with charged peripheral groups. (see Figure 11a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$[T(2'\text{-}NEtPy)P]^{4+}$	--	Mn(III)			DMF/H_2O	NaCl	NHE				0.23				3
$[T(2'\text{-}NEtPy)P]^{4+}$	--	Mn(III)	H_2O		H_2O	NaCl	NHE				0.23				563
$[T(2'\text{-}NEtPy)P]^{4+}$	--	Mn(III)			DMF/H_2O	NaCl	Ag/AgCl				0.20				3
$[T(2'\text{-}NEtPy)P]^{5+}$	--	Mn(III)			H_2O	NaCl	Ag/AgCl				0.29				461
$[T(2'\text{-}NEtPy)P]^{5+}$	--	Mn(III)	Cl^-		H_2O	NaCl	NHE				0.23				460
$[(T(2'\text{-}NMPy)P)P]^{3+}$	**625**	Mn(III)	H_2O		H_2O	NaCl	NHE				0.11				563
$[T(2'\text{-}NMPy)P]^{4+}$	**626**	Fe(III)	1-(CH_3)Im	1-(CH_3)Im	H_2O	NaCl	NHE				0.43				563
$[T(2'\text{-}NMPy)P]^{4+}$	--	Fe(III)	H_2O		H_2O	NaCl	NHE				0.36				563
$[T(2'\text{-}NMPy)P]^{4+}$	--	Fe(III)	OH^-		H_2O	NaCl	NHE				0.21				563
$[T(2'\text{-}NMPy)P]^{4+}$	--	Mn(III)			CH_3OH/H_2O	NaCl	Ag/AgCl				0.13				3
$[T(2'\text{-}NMPy)P]^{4+}$	--	Mn(III)			CH_3OH/H_2O	NaCl	NHE				0.22				3
$[T(2'\text{-}NMPy)P]^{4+}$	--	Mn(III)	Cl^-		H_2O	NaCl	NHE				0.22				460
$[T(2'\text{-}NMPy)P]^{4+}$	--	Mn(III)	H_2O		H_2O	NaCl	NHE				0.22				563
$[T(2'\text{-}NMPy)P]^{4+}$-$[SclX8]^{4-}$	**627**	2H			H_2O	PB (0.07M)	Ag/AgCl				0.94	-0.37			518
$\{[T(2'\text{-}NMPy)P]^{4+}\}$ $[SclX4]^{4-}$	**628**	2H			H_2O	PB (0.07M)	Ag/AgCl				0.84	-0.37			518

Table 11a. Tetraarylporphyrins with charged peripheral groups. (see Figure 11a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
{[T(2'-NMPy)P]$^{4+}$} [SclX6]$^{4-}$	**628**	2H			H_2O	PB (0.07M)	Ag/AgCl				0.92	-0.37			518
[T(2'-NMPy)PyP]$^{3+}$	**629**	Mn(III)	H_2O		H_2O	NaCl	NHE				0.12				563
[T(3'-CO_2P)P]	**630**	Mn(III)			H_2O	KCl (0.2M)	Ag/AgCl			0.69*	-0.44	-0.45			259
[T(3'-CO_2P)P] [T(4'-NMPyP]$^{4+}$	**630**	Mn(III)			H_2O	KCl (0.2M)	Ag/AgCl				0.25	-0.18			259
[T(3'-NMPy)P]$^{4+}$	**631**	Fe(III)	1-(CH_3)Im	1-(CH_3)Im	H_2O	NaCl	NHE				0.26				563
[T(3'-NMPy)P]$^{4+}$	--	Fe(III)	H_2O		H_2O	NaCl	NHE				0.26				563
[T(3'-NMPy)P]$^{4+}$	--	Fe(III)	OH^-		H_2O	NaCl	NHE				0.12				563
[T(3'-NMPy)P]$^{4+}$	--	Mn(III)	H_2O		H_2O	NaCl	NHE				0.05				563
{[T(3'-NMPy)P]$^{4+}$} [SclX4]$^{4-}$	**632**	2H			H_2O	PB (0.07M)	Ag/AgCl				0.84	-0.46			518
{[T(3'-NMPy)P]$^{4+}$} [SclX6]$^{4-}$	**632**	2H			H_2O	PB (0.07M)	Ag/AgCl				0.92	-0.46			518
[T(3',5'-DCP)P]$^{8-}$	**633**	Mn(III)	Cl^-		H_2O	KNO_3 (0.2M)	Ag/AgCl			~ 0.30	~ -0.50				179
T(4'-CO_2^-P)P	**634**	Fe(III)	1-(CH_3)Im	1-(CH_3)Im	H_2O	NaCl	NHE				0.03				563
T(4'-CO_2P)P	--	Mn(III)	H_2O		H_2O	NaCl	NHE				-0.19				563
[T(4'-N(Butyl)Py)P]$^{4+}$	**635**	Zn(II)			H_2O	KCl (0.2M)	Ag/AgCl			0.96					454
[T(4'-N(hexyl)Py)P]$^{4+}$	**636**	Zn(II)			H_2O	KCl (0.2M)	Ag/AgCl			0.96					454

Table 11a. Tetraarylporphyrins with charged peripheral groups. (see Figure 11a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$[T(4'\text{-}N(Pn)Py)P]^{4+}$	**637**	Zn(II)			H_2O	KCl (0.2M)	Ag/AgCl			0.96					454
$[T(4'\text{-}N(Pr)Py)P]^{4+}$	**638**	Zn(II)			H_2O	KCl (0.2M)	Ag/AgCl			0.96					454
$[T(4'\text{-}NEtPy)P]^{4+}$	**639**	Mn(III)			H_2O	NaCl	NHE				0.07				178
$[T(4'\text{-}NMPy)P)]^{4+}$ $[(Sclx4)^{4-}]_4$	**640**	Cu(II)			H_2O	NaCl	Ag/AgCl				-0.80	-0.76			533
$[(T(4'\text{-}NMPy)P)^{4+}]_2$ $[T(3',5'\text{-}DCP)P]^{8-}$	**641**	$[Mn(III)]_3$			H_2O	KNO_3 (0.2M)	Ag/AgCl				0.22, -0.20	-0.63			179
$[(T(4'\text{-}NMPy)P)^{4+}]_2$ $[T(3',5'\text{-}DCP)P]^{8-}$	--	$[2H]_2$, Mn(III)			H_2O	KNO_3 (0.2M)	Ag/AgCl				-0.59				179
$[(T(4'\text{-}NMPy)P)^{4+}]_2$ $[T(3',5'\text{-}DCP)P]^{8-}$	--	$[Mn(III)]_2$, 2H			H_2O	KNO_3 (0.2M)	Ag/AgCl				0.25, -0.20				179
$[(T(4'\text{-}NMPy)P)^{4+}]_2$ $[(Sclx4)^{4-}]_4$	**642**	Cu(II)			H_2O	NaCl	Ag/AgCl				-0.76, -0.78, -0.79	-0.74			533
$[(T(4'\text{-}NMPy)P)^{4+}]_2$ $[(Sclx4)^{4-}]_4$	--	Zn(II)			H_2O	NaCl	Ag/AgCl				-0.84, -0.85	-0.82			533
$[T(4'\text{-}NMPy)P]^{4+}$	**643**	2H			H_2O	NaCl	NHE					-0.33	-1.14*		562
$[T(4'\text{-}NMPy)P]^{4+}$	--	Au(II)			DMF	TBAP	SCE				-0.20, -0.36, -0.60 -0.70				44
$[T(4'\text{-}NMPy)P]^{4+}$	--	Cd(II)			DMF	TBAP	SCE				-0.94*, -1.05 -1.12	-0.65			44
$[T(4'\text{-}NMPy)P]^{4+}$	--	Co(II)			DMF	TBAP	SCE				0.49, -0.49, -0.89 -0.98	-0.71			44
$[T(4'\text{-}NMPy)P]^{4+}$	--	Co(II)			H_2O	PB	Ag/AgCl					-0.67			352
$[T(4'\text{-}NMPy)P]^{4+}$	--	Cu(II)			DMF	TBAP	SCE				-0.87, -0.97	-0.60			44

Table 11a. Tetraarylporphyrins with charged peripheral groups. (see Figure 11a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$[T(4'\text{-}NMPy)P]^{4+}$	--	Cu(II)			H_2O	NaCl	NHE					-0.48	-0.63*		562
$[T(4'\text{-}NMPy)P]^{4+}$	--	Cu(II)			H_2O	NaCl	Ag/AgCl				-0.65	-0.60			533
$[T(4'\text{-}NMPy)P]^{4+}$	--	Fe(II)			DMF	TBAP	SCE				0.00, -1.01	-0.74			44
$[T(4'\text{-}NMPy)P]^{4+}$	--	Fe(III)	1-(CH_3)Im	1-(CH_3)Im	H_2O	NaCl	NHE				0.27				563
$[T(4'\text{-}NMPy)P]^{4+}$	--	Fe(III)	H_2O		H_2O	NaCl	NHE				0.20				563
$[T(4'\text{-}NMPy)P]^{4+}$	--	Fe(III)	NO		H_2O	NR	Ag/AgCl				0.45*				202
$[T(4'\text{-}NMPy)P]^{4+}$	--	Fe(III)	OH^-		H_2O	NaCl	NHE				0.11				563
$[T(4'\text{-}NMPy)P]^{4+}$	--	Ga(III)	Cl^-		DMF	TBAP	SCE				-0.77	-0.83	-0.46		44
$[T(4'\text{-}NMPy)P]^{4+}$	--	In(III)	Cl^-		DMF	TBAP	SCE				-0.82	-1.01	-0.44		44
$[T(4'\text{-}NMPy)P]^{4+}$	--	Mg(II)			DMF	TBAP	SCE				-1.02, -1.31	-1.08*	-0.63		44
$[T(4'\text{-}NMPy)P]^{4+}$	--	Mn(II)			DMF	TBAP	SCE				0.08, -1.07	-0.91, -1.18	-0.71		44
$[T(4'\text{-}NMPy)P]^{4+}$	--	Mn(III)			H_2O	NaCl	NHE				0.00				561
$[T(4'\text{-}NMPy)P]^{4+}$	--	Mn(III)			H_2O	NaCl	NHE				0.06		-0.51	-1.19*	562
$[T(4'\text{-}NMPy)P]^{4+}$	--	Mn(III)	H_2O		H_2O	NaCl	NHE				0.06				563
$[T(4'\text{-}NMPy)P]^{4+}$	--	Ni(II)			DMF	TBAP	SCE				-0.78	-0.91	-0.45		44

Table 11a. Tetraarylporphyrins with charged peripheral groups. (see Figure 11a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$[T(4'\text{-}NMPy)P]^{4+}$	--	Pb(II)			DMF	TBAP	SCE				-0.92*		-0.53			44
$[T(4'\text{-}NMPy)P]^{4+}$	--	Pd(II)			DMF	TBAP	SCE				-0.83	-0.95	-0.56			44
$[T(4'\text{-}NMPy)P]^{4+}$	--	Pt(II)			DMF	TBAP	SCE				-0.92	-1.02	-0.67			44
$[T(4'\text{-}NMPy)P]^{4+}$	--	V(IV)	O^{2-}		DMF	TBAP	SCE				-0.83	-0.97	-0.48			44
$[T(4'\text{-}NMPy)P]^{4+}$	--	Zn(II)			DMF	TBAP	SCE				-1.02	-1.10*	-0.65			44
$[T(4'\text{-}NMPy)P]^{4+}$	--	Zn(II)			H_2O	Na_2SO_4 (0.5M)	SCE		1.22	0.91	-0.87					83
$[T(4'\text{-}NMPy)P]^{4+}$	--	Zn(II)			H_2O	NaCl	Ag/AgCl				-1.00	-1.10	-0.87			533
$[T(4'\text{-}NMPy)P]^{4+}$	--	Fe(III)			H_2O	NR	Ag/AgCl				-0.15					202
$[T(4'\text{-}NMPy)P]^{4+}$	--	Fe(III)	Cl^-		H_2O	NaCl (3M)	Ag/AgCl				-0.18		-0.11			191
$[T(4'\text{-}NMPy)P]^{4+}$	--	Fe(III)	NO		H_2O	NaCl (3M)	Ag/AgCl			0.33	-0.05					191
$[T(4'\text{-}NMPy)P]^{4+}$	--	Zn(II)			DMF	TBAP	Ag/AgCl			>1.00			-0.61			52
$[T(4'\text{-}NMPy)P]^{4+}$	--	Zn(II)			H_2O	Na_2SO_4 (0.5M)	SCE		1.24	0.91	-0.81					83
$T(4'\text{-}NMPy)P]^{4+}$-DNA	**644**	Fe(III)			H_2O	NR	Ag/AgCl				-0.13					516
$T(4'\text{-}NMPy)P]^{4+}$-DNA	--	Fe(III)	NO		H_2O	NR	Ag/AgCl				-0.61*					516
$[T(4'\text{-}NMPy)P]^{4+}]_3$ $[(SclX4)^{4-}]_4$	**645**	Zn(II)			H_2O	NaCl	Ag/AgCl				-0.81, -0.85	-0.84	-0.80			533

Table 11a. Tetraarylporphyrins with charged peripheral groups. (see Figure 11a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
{[T(4'-NMPy)P]$^{4+}$} [SclX4]$^{4-}$	**646**	2H			H_2O	PB (0.07M)	Ag/AgCl				0.84	-0.37			518
{[T(4'-NMPy)P]$^{4+}$} [SclX6]$^{4-}$	**647**	2H			H_2O	PB (0.07M)	Ag/AgCl				0.92	-0.37			518
{[T(4'-NMPy)P]$^{4+}$} [SclX8]$^{4-}$	**648**	2H			H_2O	PB (0.07M)	Ag/AgCl				0.94	-0.37			518
{[T(4'-NMPy)P]$^{4+}$} [SclX8]$^{4-}$	**649**	2H			H_2O	PB (0.07M)	Ag/AgCl				0.94	-0.46			518
T(4'-NMPy)P^{4+}	**650**	Mn(III)	Cl^-		H_2O	KNO_3 (0.2M)	Ag/AgCl				0.20, -0.18				179
[T(4'-NMPyP]$^{4+}$ [TPPS]$^{4-}$	**651**	Mn(III)			H_2O	KCl (0.2M)	Ag/AgCl				0.25, -0.68	-0.20			259
[T(4'-NMPyP]$^{4+}$	**652**	Co(II)			H_2O	NaCl	Ag/AgCl				0.45*	-0.68			260
[T(4'-NMPyP]$^{4+}$	--	Mn(III)			H_2O	KCl (0.2M)	Ag/AgCl				0.20, -0.18	-0.13, -0.68	-0.60*		259
[T(4'-TMAP)P]$^{4+}$	**653**	Fe(III)	1-(CH_3)Im	1-(CH_3)Im	H_2O	NaCl	NHE				0.10				563
[T(4'-TMAP)P]$^{4+}$	--	Fe(III)	H_2O		H_2O	NaCl	NHE				0.05				563
[T(4'-TMAP)P]$^{4+}$	--	Fe(III)	OH^-		H_2O	NaCl	NHE				-0.03				563
[T(4'-TMAP)P]$^{4+}$	--	Mn(III)	H_2O		H_2O	NaCl	NHE				-0.10				563
[T(D(Pr)Im)P]$^{4+}$	**654**	Mn(III)	Cl^-		H_2O	NaCl	NHE				0.32				496
[T(DEtIm)P]$^{4+}$	**655**	Mn(III)	Cl^-		H_2O	NaCl	NHE				0.35				496
[T(DMIm)P]$^{4+}$	**656**	Co(III)	Cl^-		H_2O	NaCl	NHE				0.28				496

Table 11a. Tetraarylporphyrins with charged peripheral groups. (see Figure 11a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$[T(DMIm)P]^{4+}$	--	Mn(III)	Cl^-		H_2O	NaCl	NHE				0.32					496
$[TDMPz]^{4+}$	**657**	Mn(III)	Cl^-		H_2O	NaCl	NHE				0.32					515
$[TDMPzP]^{4+}$	**658**	Mn(III)	Cl^-		H_2O	NaCl	NHE				0.00					515
$[TP4'\text{-}NBzMBP]^+$	**659**	Zn(II)			DCM	$TBABF_4$ (0.2M)	SCE	1.46*	1.25*	1.01*			-0.84*	-1.72*		156
$[TP4'\text{-}NMVP]^+$	**660**	Zn(II)			CH_3CN	$TBABF_4$ (0.2M)	SCE		1.21*	0.96*	-0.32	-0.73	-0.95	-1.78*		156
$[TP4'\text{-}NMVP]^+$	**660**	Zn(II)			DCM	$TBABF_4$ (0.2M)	SCE		1.46*	0.97*	-0.67*		-0.18	-0.88*	-1.62*	156
$[TPC_4MVP]^{2+}$	**661**	Zn(II)			NR	[BMIM] BF_4	Fc/Fc^+			0.38	-0.81					549
$[TPC_6MVP]^{2+}$	**662**	Zn(II)			NR	[BMIM] BF_4	Fc/Fc^+			0.39	-0.81					549
$[TPC_8MVP]^{2+}$	**663**	Zn(II)			NR	[BMIM] BF_4	Fc/Fc^+			0.39	-0.83					549
$[TPPS]^{4-}$	**664**	Co(II)			H_2O	NaCl	SCE				0.16					475
$[TPPS]^{4-}$	**664**	Co(II)			H_2O	NaOH	SCE				0.05					478
$[TPPS]^{4-}$	**664**	Co(II)			H_2O	NaCl	Ag/AgCl				0.35*	-0.90				260
$[TPPS]^{4-}$	--	Fe(III)	1-(CH_3)Im	1-(CH_3)Im	H_2O	NaCl	NHE				0.04					563
$[TPPS]^{4-}$	--	Fe(III)	H_2O		H_2O	NaCl	NHE				0.02					563
$[TPPS]^{4-}$	--	Mn(III)	H_2O		H_2O	NaCl	NHE				-0.16					563

Table 11a. Tetraarylporphyrins with charged peripheral groups. (see Figure 11a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$[TPPS]^{4-}$	--	Mn(III)	H_2O	OH^-	H_2O/NaOH	Na_2SO_4	Ag/AgCl				0.18				538
$[TPPS]^{4-}$	--	Os(II)	DMSO	1-(CH_3)Im	DMF	$TBAPF_6$	SCE				0.26				500
$[TPPS]^{4-}$	--	Os(II)	DMSO	DMSO	DMF	$TBAPF_6$	SCE				0.58				500
$[TPPS]^{4-}$	--	Os(III)	1-(CH_3)Im	1-(CH_3)Im	DMF	$TBAPF_6$	SCE				-0.24				500
$[TPPS]^{4-}$	**665**	Os(III)	1-(CH_3)Im	See Fig.	DMF	$TBAPF_6$	SCE				-0.07				500
$[TPPS]^{4-}$	--	Os(III)	$P(OCH_3)_3$	1-(CH_3)Im	DMF	$TBAPF_6$	SCE				0.11				500
$[TPPS]^{4-}$	--	Os(III)	$P(OCH_3)_3$	$P(OCH_3)_3$	DMF	$TBAPF_6$	SCE				0.15				500
$[TPPS]^{4-}$	--	Os(III)	Py	Py	DMF	$TBAPF_6$	SCE				0.01				500
$[TPPS]^{4-}$	**666**	Os(III)	See Fig.	See Fig.	DMF	$TBAPF_6$	SCE				0.00				500
$[TPPS]^{4-}$	**667**	Os(III)	See Fig.	See Fig.	DMF	$TBAPF_6$	SCE				0.14				500
$[TPPS]^{4-}$	--	Rh(III)			H_2O	$NaPF_6$ (0.5M)	NHE				-0.34*	-1.59*			465
$[TPPS]^{4-}$	--	Zn(II)			DMF	TBAP	Ag/AgCl			0.79		-1.24			52
$[TPPS]^{4-}$ $[T(4'\text{-NMPy})P]^{4+}$	--	$[Zn(II)]_2$			DCE	Li_2SO_4 (0.01M)	SHE					-0.60			378 (HME)
$[TPPS]^{4-}$	--	2H			H_2O	KCl (0.2M)	Ag/AgCl			1.10					454
$[TPPS]^{4-}$	--	Mn(III)			H_2O	KCl (0.2M)	Ag/AgCl				-0.39 -0.41				259

Table 11a. Tetraarylporphyrins with charged peripheral groups. (see Figure 11a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$[TPPS]^{4-}$-CD	**668**	Mn(III)	H_2O	OH^-	H_2O/NaOH	Na_2SO_4	Ag/AgCl				0.23				538
trans-[((2'-NMPyA)DP)P]$^+$	**669**	Ni(II)			DMF	TBAP	SCE					-0.72*	-0.94	-1.24	227
trans-[((3'-NMPyA)DP)P]$^+$	**670**	Ni(II)			DMF	TBAP	SCE					-0.87*	-1.11		227
trans-[((4'-NMPyA)DP)P]$^+$	**671**	Ni(II)			DMF	TBAP	SCE					-0.68	-0.89	-1.11	227
trans-[(2'-NMPyADP)P]$^+$	**672**	2H			DMF	TBAP	SCE					-0.63	-0.88		20
trans-[(2'-NMPyADP)P]$^+$	--	Mn(III)	Cl^-		DMF	TBAP	SCE				-0.09	-0.81			20
trans-[(3'-NMPyADP)P]$^+$	**673**	2H			DMF	TBAP	SCE					-0.85*	-1.05		20
trans-[(3'-NMPyADP)P]$^+$	--	Mn(III)	Cl^-		DMF	TBAP	SCE				-0.13	-1.01*	-1.27		20
trans-[(4'-NMPyADP)P]$^+$	**674**	2H			DMF	TBAP	SCE					-0.64	-0.85		20
trans-[(4'-NMPyADP)P]$^+$	--	Mn(III)	Cl^-		DMF	TBAP	SCE				-0.11	-0.82	-1.06		20
trans-[B(2'-NMPyAP)P]$^{2+}$	**675**	2H			DMF	TBAP	SCE					-0.32	-0.50		20
trans-[B(2'-NMPyAP)P]$^{2+}$	--	Mn(III)	Cl^-		DMF	TBAP	SCE				0.02	-0.52	-0.68	-1.43	20
trans-[B(3'-NMPyAP)P]$^{2+}$	**676**	2H			DMF	TBAP	SCE					-0.61*	-0.96*		20
trans-[B(3'-NMPyAP)P]$^{2+}$	--	Mn(III)	Cl^-		DMF	TBAP	SCE				-0.04	-0.81*			20
trans-[B(3'-NMPyAP)P]$^{2+}$	--	Ni(II)			DMF	TBAP	SCE					-0.82*	-0.99*	-1.14	227

Table 11a. Tetraarylporphyrins with charged peripheral groups. (see Figure 11a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
trans-[B(4'-NMPyAP)P]$^{2+}$	**677**	2H			DMF	TBAP	SCE					-0.40	-0.55		20
trans-[B(4'-NMPyAP)P]$^{2+}$	--	Mn(III)	Cl^-		DMF	TBAP	SCE				-0.02	-0.57	-0.69	-1.40	20
trans-[B(4'-NMPyAP)P]$^{2+}$	--	Ni(II)			DMF	TBAP	SCE					-0.50	-0.63	-1.23	227
trans-[B(TFTMA)P]$^{2+}$	**678**	Mn(III)	$CF_3SO_3^-$		CH_3OH/H_2O	NaCl	Ag/AgCl				-0.22				3

Table 11b. Octaethylporphyrins with charged peripheral groups. (see structures in Figure 11b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$[(bpy)_4OEP]^{4+}$	**679**	Zn(II)			CH_3CN/DCE	$TEAPF_6$	SCE		1.47*	1.27*	-0.34, -0.71	-0.48	-0.82	-1.26	-1.41	159 (CV/P)
$[(bpy)OEP]^{+}$	**680**	Zn(II)			CH_3CN/DCE	$TEAPF_6$	SCE	1.37	1.20*	0.91	-0.65		-1.31			275
EtioP Cat-4	**681**	Zn(II)			CH_3CN	$TBAPF_6$ (0.05M)	SCE	1.67*	1.06*	0.72	-0.34	-0.56	-0.85	-1.70		446
EtioP Cat-5	**682**	Zn(II)			CH_3CN	$TBAPF_6$ (0.05M)	SCE	1.87*	0.88*	0.66	-0.32	-0.39	-0.82			446
EtioP Cat-6	**683**	Zn(II)			CH_3CN	$TBAPF_6$ (0.05M)	SCE	1.59*	0.88*	0.68	-0.35	-0.45	-0.76	-0.86	-1.68	446
$[OEP(Py)_4]^{4+}$	**684**	Zn(II)			H_2O	Na_2SO_4 (0.5M)	SCE	0.95, 1.10	0.81	0.47	-0.58, -0.80	-0.67, -0.85				83
$[OEP(Py)_4]^{4+}$	**684**	Zn(II)			H_2O	Na_2SO_4 (0.5M)	SCE		1.12	0.52	-0.59,	-0.82				83
-(POM-OEP-POM)$_n$-	**685**	Zn(II)			DCE/CH_3CN	$TBAPF_6$	SCE		1.22*	0.79*	-0.90*					112
-(POM-OEP-POM)$_n$-	**686**	Zn(II)			DCE/CH_3CN	$TBAPF_6$	SCE			1.49*	-0.95*					112
$[(Py)_4OEP]^{4+}$	**687**	Fe(II)	Im	Im	CH_3CN	TBAP	Ag/AgCl				0.38					182
$[(Py)_4OEP]^{4+}$	**--**	Fe(II)	Py	Py	CH_3CN	TBAP	Ag/AgCl				0.62					182
$[(T(Et\text{-}4'\text{-}NMPy))^{4+}]_2$ $[T(3',5'\text{-}DCP)P]^{8-}$	**688**	$[Mn(III)]_2$ 2H			H_2O	KNO_3 (0.2M)	Ag/AgCl				0.20	-0.22				179
$[(T(Et\text{-}4'\text{-}NMPy))^{4+}]_2$ $[T(3',5'\text{-}DCP)P]^{8-}$	**--**	$[Mn(III)]_3$			H_2O	KNO_3 (0.2M)	Ag/AgCl				0.19	-0.23		-0.60		179
$[(T(Et\text{-}4'\text{-}NMPy))^{4+}]_2$	**689**	Mn(III)	Cl^-		H_2O	KNO_3 (0.2M)	Ag/AgCl				0.18	-0.17				179
$[(T(Et\text{-}4'\text{-}NMPy)P)^{4+}]_2$ $[T(3'\text{-}CO_2^-P)P]$	**690**	Mn(III)			H_2O	KCl (0.2M)	Ag/AgCl				0.23, -0.87*	-0.15				259

Table 11b. Octaethylporphyrins with charged peripheral groups. (see structures in Figure 11b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$[(T(Et\text{-}4'\text{-}NMPy)P)^{4+}]_2$ $[TPPS]^{4-}$	**691**	Mn(III)			H_2O	KCl (0.2M)	Ag/AgCl				0.30*, -0.35* -0.77				259
$[T(Et\text{-}4'\text{-}NMPy)P]^{4+}$	**692**	Mn(III)			H_2O	KCl (0.2M)	Ag/AgCl				0.18, -0.11, -0.17 -0.74			-0.74	259
$[T(Et\text{-}4'\text{-}NMPy)P]^{4+}{}_2$ $[T(3',5'\text{-}DCP)P]^{8-}$	**693**	$[2H]_2$, Mn(III)			H_2O	KNO_3 (0.2M)	Ag/AgCl				-0.59				179
$[T(Py)OEP]^{4+}$	**694**	Mn(II)/Mn(III)			CH_3CN	$TEAPF_6$	SCE				0.35				466
trans-$[Cl_2(bpy)OEP]^{+}$	**695**	Zn(II)			CH_3CN/DCE	$TEAPF_6$	SCE			0.97*	-0.58	-1.28*			275
trans-$[OEP(Py)_2]^{2+}$	**696**	Zn(II)			DCE/CH_3CN	$TBAPF_6$	SCE		1.50*	1.23*		-0.88*	-1.44		112

Table 12. Porphyrin dimers. (see structures in Figure 12)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red Other Red	Ref.
$[B(BCP)P]_2$	**697**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	0.80*,0.74* 1.12	0.49*	0.40*		-1.71	-1.83	-2.18, -2.37	128
$[B(BCP)P]_2$	**697**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.10, 0.78,	0.51	0.38		-1.75	-1.86	-2.20	439
$[B(BDCP)P]_2$	**698**	$[2H]_2$			DCM	$TBAPF_6$	Fc/Fc^+		0.77	0.63		-1.55	-1.66		128
$[B(BDCP)P]_2$	--	Cu(II), 2H			DCM	$TBAPF_6$	Fc/Fc^+		0.77	0.63		-1.62	-1.82		128
$[B(BDCP)P]_2$	--	$[Cu(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+		0.79	0.64		-1.64	-1.77		128
$[B(BDCP)P]_2$	--	Zn(II), 2H			DCM	$TBAPF_6$	Fc/Fc^+	1.00, 0.77	0.67	0.44		-1.62	-1.82	-2.06	128
$[B(BDCP)P]_2$	--	Zn(II), Cu (II)			DCM	$TBAPF_6$	Fc/Fc^+	0.95, 0.77, 1.21	0.66	0.46		-1.67*	-1.79*	-2.12	128
$[B(BDCP)P]_2$	--	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	0.99, 0.80, 1.16*	0.53	0.43		-1.68	-1.80	-2.09, -2.31	128
$[B(DBMP)P]_2$	**699**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.09, 0.78	0.51	0.36		-1.79	-1.89	-2.26	455
$[B(DBMP)P]_2$	**699**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.06, 0.76	0.47	0.31		-1.79	-1.91		455
$(BDTPP)_2$-PAP	**700**	Zn(II), Au(III)			DCM	$TBAPF_6$ (0.15M)	SCE		1.16	0.76	> 1.50, -1.28 -0.58	-1.05			160
$(BDTPP)_2$-PAP	**700**	Zn(II), Au(III)			DCM	$TBAPF_6$ (0.15M)	SCE		1.18	0.74	>1.40 -0.58	-1.05			160
$(BDTPP)_2$-TPAP	**701**	Au(III), Zn(II)			DCM	$TBAPF_6$ (0.15M)	SCE		1.14	0.74	-0.56 -1.50*	-1.05			160
$[BODP]_2$	**702**	$[Zn(II)]_2$			DCM	$TBABF_4$	Fc/Fc^+	0.66, 0.54	0.28	0.12					137
Br_4TPP-TriPP	**703**	$[Co(II)]_2$			PhCN	TBAP	SCE	1.40	1.29	1.21	0.70*, -0.58 0.56*, -0.85	-1.68*	-1.82*		43
Br_4TPP-TriPP	--	$[Cu(II)]_2$			PhCN	TBAP	SCE	1.44	1.35	1.06		-0.94	-1.24	-1.32, -1.85*	43

Table 12. Porphyrin dimers. (see structures in Figure 12)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red Other Red	Ref.
Br_4TPP-TriPP	--	$[Ni(II)]_2$			PhCN	TBAP	SCE			1.15		-0.95	-1.22	-1.36, -1.94*	43
Br_4TPP-TriPP	--	$[Zn(II)]_2$			PhCN	TBAP	SCE	1.21	0.95	0.81		-1.05	-1.31*	-1.45*, -1.90*	43
$[Br_4TPP]_2$-O	**704**	$[Fe(III)]_2$	O^{2-}		PhCN	TBAP	SCE	1.61	1.24	1.04		-0.78	-1.09	-1.39, -1.60	72
Br_8TPP-3'-DEG-3'-TPP	**705**	4H			DCM	$TBAPF_6$	Ag/AgCl	1.40	1.19	1.08*		-0.57	-1.01	-1.33	564
Br_8TPP-3'-DEG-3'-TPP	--	$[Cu(II)]_2$			DCM	$TBAPF_6$	Ag/AgCl	1.58	1.37	1.17		-0.67	-0.91	-1.18, -1.52	564 (DPV)
Br_8TPP-3'-DEG-3'-TPP	--	$[Zn(II)]_2$			DCM	$TBAPF_6$	Ag/AgCl		1.21	0.94		-0.92	-1.23	-1.41	564
Br_8TPP-3'-EG-3'-TPP	**706**	4H			DCM	$TBAPF_6$	Ag/AgCl	1.40*	1.18	1.05*		-0.62	-1.04	-1.40	564
Br_8TPP-3'-EG-3'-TPP	--	$[Cu(II)]_2$			DCM	$TBAPF_6$	Ag/AgCl	1.62	1.42	1.17*		-0.63	-0.88	-1.14, -1.53	564 (DPV)
Br_8TPP-3'-EG-3'-TPP	--	$[Zn(II)]_2$			DCM	$TBAPF_6$	Ag/AgCl		1.19	0.93		-0.86	-1.36		564
Br_8TPP-4'-EG-4'-TPP	**707**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Ag/AgCl		1.25	0.98		-0.91	-1.30	-1.65	564 (DPV)
Br_8TPP-4'-EG-4'-TPP1	--	$[Cu(II)]_2$			DCM	$TBAPF_6$	Ag/AgCl	1.62	1.40	1.10		-0.63	-0.90	-1.03, -1.40	564 (DPV)
Br_8TPP-TriPP	**708**	$[Co(II)]_2$			PhCN	TBAP	SCE	1.43	1.29	1.16	0.74, -0.33 / 0.55*, -0.84	-1.60*	-1.76*		43
Br_8TPP-TriPP	--	$[Cu(II)]_2$			PhCN	TBAP	SCE	1.56	1.36	1.06		-0.71	-1.06	-1.29, -1.85	43
Br_8TPP-TriPP	--	$[Ni(II)]_2$			PhCN	TBAP	SCE		1.32	1.14		-0.74	-1.11	-1.29, -1.92*	43
Br_8TPP-TriPP	--	$[Zn(II)]_2$			PhCN	TBAP	SCE	1.25	1.00	0.82		-0.83	-1.15	-1.43, -1.70	43
cis-$(TPP)_2$-$(OC_5)_2$	**709**	$[2H]_2$			DCE	TBAP	Fc/Fc^+	1.02	0.82	0.51		-1.78	-2.06		523

Table 12. Porphyrin dimers. (see structures in Figure 12)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red Other Red	Ref.
cis-$(TPP)_2$-$(OC_5)_2$	--	$[Zn(II)]_2$			DCE	TBAP	Fc/Fc^+		0.60	0.26					523
$[D(PyP)P]_2$-B(DA)	**710**	$[2H]_2$			CH_3CN	TBAP	Fc/Fc^+			0.81					329 (DPV)
$[D(PyP)P]_2$-B(DA)	--	$[Ni(II)]_2$			DCB/Py	TBAP	Fc/Fc^+			0.88					329
$[D(PyP)P]_2$-B(DA)	--	$[Ni(II)]_2$			TCE	$TBAPF_6$	Fc/Fc^+			0.86					335
$[D(PyP)P]_2$-B(DA).C_{60}	**711**	$[2H]_2$			CH_3CN	TBAP	Fc/Fc^+			0.83					329 (DPV)
$[D(PyP)P]_2$-B(DA).C_{60}	--	$[2H]_2$			DCB/Py	TBAP	Fc/Fc^+					-1.00			329
$[D(PyP)P]_2$-B(DA).C_{60}	--	$[Ni(II)]_2$			TCE	$TBAPF_6$	Fc/Fc^+			0.88		-1.10			335
$(DArP)_2$-Indanyl	**712**	$[Zn(II)]_2$			PhCN	TBAP	SCE	1.25, 1.07	0.75	0.62		-1.72			150
$[DArP]_2$-Ede	**713**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	0.82	0.45	0.25		-1.50	-2.10		255
$[DBP]_2$	**714**	$[Zn(II)]_2$			DCM	$TBABF_4$	Fc/Fc^+	0.57, 0.50	0.23	0.08					137
$(DBPP)_2$-A	**715**	Au(III), Zn(II)			DCM	NR	SCE		1.16	0.81	-0.57	-1.07			65
$(DBPP)_2$-A	--	$[Au(III)]_2$			DCM	NR	SCE				-0.38	-0.54			65
$(DBPP)_2$-A	--	$[Zn(II)]_2$			DCM	NR	SCE		0.77	0.57					65
$(DBPP)_2$-A	--	$[Zn(II)]_2$			DCM	$TBAPF_6$	Ag/AgCl	1.30	0.76	0.63		-1.12	-1.21		102
$(DBPP)_2$-A	--	$[Zn(II)]_2$			THF	$TBABF_4$	Fc/Fc^+			0.29		-1.69			357
$(DBPP)_2$-C_1	**716**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+			0.33					161

Table 12. Porphyrin dimers. (see structures in Figure 12)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red Other Red	Ref.
$(DBPP)_2$-C_1-*m*	**717**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+			0.22						161
$(DBPP)_2$-C_{10}	**718**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+			0.28						161
$(DBPP)_2$-C_{10}-*m*	**719**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+			0.33						161
$(DBPP)_2$-C_2	**720**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+			0.29						161
$(DBPP)_2$-C_2-*m*	**721**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+			0.27						161
$(DBPP)_2$-C_3	**722**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+			0.29						161
$(DBPP)_2$-C_3-*m*	**723**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+			0.28						161
$(DBPP)_2$-C_4	**724**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+			0.30						161
$(DBPP)_2$-C_4-*m*	**725**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+			0.30						161
$(DBPP)_2$-C_6	**726**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+			0.26						161
$(DBPP)_2$-C_6-*m*	**727**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+			0.31						161
$(DBPP)_2$-C_8	**728**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+			0.27						161
$(DBPP)_2$-C_8-*m*	**729**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+			0.32						161
$(DBPP)_2$-DA	**730**	$[Zn(II)]_2$			DCM (-40°C)	$TBAPF_6$ (0.5M)	Ag/AgCl		0.83	0.72			-1.13	-1.23		457
$(DBPP)_2$-DA	**730**	$[Zn(II)]_2$			THF	$TBABF_4$	Fc/Fc^+		0.56	0.40			-1.50	-1.62		433
$(DBPP)_2$-DAQT	**731**	Au(III), Zn(II)			DCM	$TBAPF_6$ (0.15M)	SCE			0.64	0.89	-0.58	-1.04			131

Table 12. Porphyrin dimers. (see structures in Figure 12)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red Other Red	Ref.
$(DBPP)_2$-PDI	**732**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+		0.34	0.19		-1.00	-1.19	-1.37	103
$(DBPP)_2$-Vn	**733**	$[Zn(II)]_2$			THF	$TBABF_4$	Fc/Fc^+			0.39		-1.53			357
$[DBPP]_2$	**734**	$[Zn(II)]_2$			DMF	$TBAPF_6$	Fc/Fc^+			0.27		-1.75			346
$[DBPP]_2$	**734**	$[Zn(II)]_2$			PhCN	$TBAPF_6$	Fc/Fc^+			0.33		-1.79			346
$[DBPP]_2$	**734**	$[Zn(II)]_2$			THF	$TBAPF_6$	Fc/Fc^+			0.38		-1.91			346
$(DBPPAP)_2$-Pt (bpy)	**735**	Zn(II)			DMF	$TBAPF_6$	SCE			0.89		-0.77			298
DBPPP-DBPP	**736**	$[2H]_2$			DCB	$TBAPF_6$ (0.04M)	Ag/Ag^+		0.90	0.66		-1.57			300
$[DEHMP]_2$-Carb	**737**	$[Zn(II)]_2$			DCM	TBACl	SCE					-1.55*	-1.70*		296
$[DEHMP]_2$-Carb	**737**	$[Zn(II)]_2$			DCM	TBACl	SCE				-0.60*	-1.41	-1.60*		296
$[DEHMP]_2$-Carb	**737**	$[Zn(II)]_2$			DCM	TBAOAc	SCE					-1.68*	-1.75*		296
$[DEHMP]_2$-Carb	**737**	$[Zn(II)]_2$			DCM	TBAOAc	SCE				-0.90	-1.45	-1.72*		296
$[DEHMP]_2$-Carb	**737**	$[Zn(II)]_2$			DCM	TBAP	SCE					-1.57			296
$[DEHMP]_2$-Carb	**737**	$[Zn(II)]_2$			DCM	TBAP	SCE				-1.00*		-1.53	-1.67*	296
$(DEHMPP)_2$-TZ	**738**	$[Zn(II)]_2$			DCM	TBAP	SCE		1.03	0.71					95
$(DEHMPP)_2$-TZ	**738**	$[Zn(II)]_2$			PhCN	TBAP	SCE		0.87	0.52					95
DMP-DPC-TriHFPP	**739**	2H			PhCN	$TBAPF_6$	SCE			1.06	0.52	-0.62	-1.18		397

Table 12. Porphyrin dimers. (see structures in Figure 12)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red Other Red	Ref.
[DTPPyP]$_2$-D (MPA)	**740**	Zn(II)			PhCN	$TBAPF_6$	$Ag/AgNO_3$		0.78	0.42		-1.17	-1.49*		445
[DTPPyP]$_2$-D (MPA)	**--**	$[Zn(II)]_2$			PhCN	$TBAPF_6$	$Ag/AgNO_3$	1.03	0.67	0.41	-0.74*	-1.10	-1.60*		445
[(EA)TPP]$_2$-Pd^{2+}	**741**	$[Ni(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	0.60	0.36	0.25	1.25	-1.39	-1.70	-1.83, -2.18*	222
[(EK)T(Ar)P]$_2$-Pd^{2+}	**742**	$[2H]_2$			DCM	$TBAPF_6$	Fc/Fc^+	0.65	0.45	0.32		-1.50			223
[(EK)T(Ar)P]$_2$-Pd^{2+}	**--**	$[Cu(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	0.72	0.42	0.26		-1.52			223
[(EK)T(Ar)P]$_2$-Pd^{2+}	**--**	$[Pd(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	0.50	0.50	0.34		-1.48	-1.90	-2.10	223
[(EK)TPP]$_2$-Cu^{2+}	**743**	$[Ni(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	0.82	0.47	0.30	-1.22	-1.74	-2.25		223
[(EK)TPP]$_2$-Ni^{2+}	**744**	$[Ni(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	0.67	0.48	0.32		-1.37	-1.80	-1.90	223
[(EK)TPP]$_2$-Pd^{2+}	**745**	$[Cu(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	0.75	0.45	0.29		-1.50			223
[(EK)TPP]$_2$-Pd^{2+}	**--**	$[Ni(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	0.82	0.48	0.32		-1.45	-1.86	-1.94	222
[(EK)TPP]$_2$-Pd^{2+}	**--**	$[Ni(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	0.82	0.48	0.32		-1.45	-1.86	-1.94	223
[(EK)TPP]$_2$-Pd^{2+}-1	**746**	$[Ni(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	0.81	0.55	0.41		-1.46	-1.82		222
(F_{15}TriPP)$_2$-Ph	**747**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Ag/Ag^+		1.20	0.99					258
[F_{15}TriPP]$_2$	**748**	$[Zn(II)]_2$			DCM	$TBABF_4$	Ag/Ag^+		0.98	0.84					509
[F_{15}TriPP]$_2$-Ph	**749**	2H, Zn(II)			DCM	$TBAPF_6$	Ag/Ag^+	1.41, 1.23*	1.18*	0.99					258
Fused [AP]$_2$-Ae	**750**	$[Zn(II)]_2$			THF	$TBAPF_6$	Fc/Fc^+			-0.24		-1.01			254

Table 12. Porphyrin dimers. (see structures in Figure 12)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red Other Red	Ref.
Fused-[B(BCP)P]$_2$	**751**	[Zn(II)]$_2$			DCM	$TBAPF_6$	Fc/Fc^+	0.89	0.38	0.01		-1.07	-1.26	-2.17	128
Fused-[B(BCP)P]$_2$	**751**	[Zn(II)]$_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.10, 0.83	0.37	0.09		-1.01	-1.26	-2.18	136
Fused-[B(BCP)P]$_2$	**751**	[Zn(II)]$_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.10, 0.78	0.51	0.38		-1.75	-1.86	-2.20	136
Fused-[B(BCP)P]$_2$	**751**	[Zn(II)]$_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.10, 0.83	0.37	0.09		-1.01	-1.26	-2.18	439
Fused-[B(BCP)P]$_2$	**751**	[Zn(II)]$_2$			THF	$TBAPF_6$	Fc/Fc^+	0.92	0.47	0.15		-1.06	-1.40	-2.29, -2.59	136
Fused-[B(BCP)P]$_2$	**751**	[Zn(II)]$_2$			THF	$TBAPF_6$	Fc/Fc^+	0.92	0.47	0.15		-1.06	-1.40	-2.29, -2.59	439
Fused-[B(BDCP)P]$_2$	**752**	[2H]$_2$			DCM	$TBAPF_6$	Fc/Fc^+		0.83	0.43		-0.76	-1.03		128
Fused-[B(BDCP)P]$_2$	--	Cu(II), 2H			DCM	$TBAPF_6$	Fc/Fc^+	1.34	0.74	0.40		-0.83	-1.08	-2.04	128
Fused-[B(BDCP)P]$_2$	--	[Cu(II)]$_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.16	0.73	0.40		-0.83	-1.08	-2.02	128
Fused-[B(BDCP)P]$_2$	--	Zn(II), 2H			DCM	$TBAPF_6$	Fc/Fc^+	0.99	0.52	0.25		-1.00	-1.24	-2.19	128
Fused-[B(BDCP)P]$_2$	--	[Zn(II)]$_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.08, 0.86	0.33	0.13		-0.97	-1.21	-2.14	128
Fused-[B(BDCP)P]$_2$	--	Zn(II), Cu(II)			DCM	$TBAPF_6$	Fc/Fc^+	0.94	0.49	0.22		-0.92	-1.21	-2.13	128
Fused-[B(BMP)P]$_2$	**753**	[Zn(II)]$_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.03, 0.77	0.29	-0.01		-1.12	-1.36		136
Fused-[DBP]$_2$	**754**	[Zn(II)]$_2$			DCM	$TBABF_4$	Fc/Fc^+	0.75, 0.58	0.10	-0.11					137
Fused-[DBPP(PyI)]$_2$	**755**	[Pb(II)]$_2$			DCM	$TBAPF_6$	Fc/Fc^+		0.15	-0.18		-0.95	-1.18		379
Fused-[DBPP(PyI)]$_2$	--	[Zn(II)]$_2$			DCM	$TBAPF_6$	Fc/Fc^+	0.89	0.35	-0.01		-1.10	-1.27		379

Table 12. Porphyrin dimers. (see structures in Figure 12)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red Other Red	Ref.
Fused-[DBPP(Pyl)]$_2$	--	[Zn(II)]$_2$			DCM	$TBAPF_6$	Fc/Fc^+		0.18	-0.13		-0.97	-1.14		379
Fused-[DBPVCP]$_2$	**756**	[Zn(II)]$_2$			DCM	$TBAPF_6$	Fc/Fc^+			0.35		-0.65			359
Fused-[DBPVCP]$_2$	**757**	[Zn(II)]$_2$			DCM	$TBAPF_6$	Fc/Fc^+			0.10*		-0.43*			359
Fused-[TDTBP]$_2$	**758**	[Zn(II)]$_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.03, 0.75	0.25	0.03		-1.07	-1.33	-2.28	128
Fused-[TriBPP]$_2$	**759**	[Zn(II)]$_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.03, 0.77	0.28	-0.03		-1.13			406
Fused-TBPP-F_{15}TriPP	**760**	[Zn(II)]$_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.20, 0.94	0.47	0.22		-0.97	-1.21		406
IPDArP-A-DArP	**761**	[Zn(II)]$_2$			PhCN	TBAP	SCE	1.26	0.79	0.57		-1.24	-1.34		150
O,S-TriTP-TZ-TriTP	**762**	Zn(II), O, S			DCM	TBAP	SCE		1.08	0.78		-0.92	-1.14	-1.58	113
O,S-TriTPP-TriTP	**763**	2H, O, S			DCM	TBAP	SCE			1.38*		-1.16*	-1.37	-1.56*	305
O,S-TriTPP-TriTP	--	Zn(II), O, S			DCM	TBAP	SCE		1.08	0.78		-1.14	-1.16	-1.55, -1.73*	305
$(OEP)_2$-$(CH_2)_2$	**764**	[Fe(III)]$_2$	Cl^-		DCM	$TBAPF_6$	Ag/AgCl	1.44	1.15	0.88		-1.34			93
[$(OEP)_2$-$(CH_2)_2$]O	**765**	[Fe(III)]$_2$	O^{2-}		DCM	$TBAPF_6$	Ag/AgCl	1.39, 1.27	0.87	0.57		-1.39			93
$(OEP)_2$-1,3-DAP	**766**	[Ni(II)]$_2$			DCM	$TBAPF_6$ (0.5M)	Ag/AgCl			0.96		-1.10			585
$(OEP)_2$-1,3-DAP	**766**	[Ni(II)]$_2$			DCM (-40°C)	$TBAPF_6$ (0.5M)	Ag/AgCl		1.01	0.89		-1.10			585
$(OEP)_2$-1,4-DAP	**767**	[Ni(II)]$_2$			DCM	$TBAPF_6$ (0.5M)	Ag/AgCl		0.96	0.91		-1.10			585
$(OEP)_2$-1,4-DAP	**767**	[Ni(II)]$_2$			DCM (-40°C)	$TBAPF_6$ (0.5M)	Ag/AgCl		1.00	0.83		-1.08			585

Table 12. Porphyrin dimers. (see structures in Figure 12)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red Other Red	Ref.
$(OEP)_2$-2,5-AT	**768**	$[Ni(II)]_2$			DCM	TBAP (0.5M)	Ag/AgCl		0.99	0.89			-1.05			585
$(OEP)_2$-DA	**769**	$[Ni(II)]_2$			DCM	TBAP (0.5M)	Ag/AgCl		1.04	0.92			-1.01			585
$(OEP)_2$-DA	**769**	$[Ni(II)]_2$			DCM (-40°C)	$TBAPF_6$ (0.5M)	Ag/AgCl		1.03	0.86			-0.93	-1.03		585
$(OEP)_2$-DAV	**770**	$[Ni(II)]_2$			DCM	$TBAPF_6$ (0.5M)	Ag/AgCl		1.00	0.93			-0.95			585
$(OEP)_2$-DAV	**770**	$[Ni(II)]_2$			DCM (-40°C)	TBAP (0.5M)	Ag/AgCl		1.01	0.87			-0.90	-0.95		585
$(OEP)_2$-DVA	**771**	$[Ni(II)]_2$			DCM	TBAP (0.5M)	Ag/AgCl		0.94*	0.79			-0.81			585
$(OEP)_2$-DVDA	**772**	$[Ni(II)]_2$			DCM	TBAP (0.5M)	Ag/AgCl		0.96*	0.91			-0.82			585
$(OEP)_2$-O	**773**	$[Fe(III)]_2$			DCM	$TBAPF_6$	Ag/AgCl	1.54, 1.30	0.93	0.65			-1.35			93
$(OEP)_2$-TA	**774**	$[Ni(II)]_2$			DCM	$TBAPF_6$ (0.5M)	Ag/AgCl		0.97	0.89			-0.92			585
$(OEP)_2$-TA	**774**	$[Ni(II)]_2$			DCM (-40°C)	$TBAPF_6$ (0.5M)	Ag/AgCl		1.05	0.84			-0.92			585
$(OEP)_2$-VA	**775**	$[Ni(II)]_2$			DCM	$TBAPF_6$ (0.5M)	Ag/AgCl		1.04*	0.87			-0.88			585
$(OEP)_2$DAT	**776**	$[Ni(II)]_2$			DCM (-40°C)	$TBAPF_6$ (0.5M)	Ag/AgCl		1.10	0.85			-1.00			585
$[OEP]_2$-DA	**777**	$[2H]_2$			DCM	$TBAPF_6$ (0.5M)	Ag/AgCl			0.96*			-0.93	-0.98		278
$[OEP]_2$-DA	**777**	$[2H]_2$			DCM (-40°C)	$TBAPF_6$ (0.5M)	Ag/AgCl		1.06	0.92			-0.89	-0.96		278
$[OEP]_2$-DA	--	Co(II), Ni(II)			DCM	$TBAPF_6$ (0.5M)	Ag/AgCl			1.13	0.99	-0.74	-1.11			278
$[OEP]_2$-DA	--	Co(II), Ni(II)			DCM (-40°C)	$TBAPF_6$ (0.5M)	Ag/AgCl			1.09	0.96	-0.75	-1.13			278

Table 12. Porphyrin dimers. (see structures in Figure 12)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red Other Red	Ref.
$[OEP]_2$-DA	--	$[Co(II)]_2$			DCM	$TBAPF_6$ (0.5M)	Ag/AgCl				0.87*	-0.77				278
$[OEP]_2$-DA	--	$[Co(II)]_2$			DCM (-40°C)	$TBAPF_6$ (0.5M)	Ag/AgCl			1.20	0.95	-0.74				278
$[OEP]_2$-DA	--	$[Cu(II)]_2$			DCM	$TBAPF_6$ (0.5M)	Ag/AgCl		1.05	0.87			-1.08	-1.08		278
$[OEP]_2$-DA	--	$[Cu(II)]_2$			DCM (-40°C)	$TBAPF_6$ (0.5M)	Ag/AgCl		1.01	0.81			-1.04	-1.07		278
$[OEP]_2$-DA	--	Ni(II), Cu(II)			DCM	$TBAPF_6$ (0.5M)	Ag/AgCl		1.02	0.90			-1.03	-1.03		278
$[OEP]_2$-DA	--	Ni(II), Cu(II)			DCM (-40°C)	$TBAPF_6$ (0.5M)	Ag/AgCl		1.03	0.85			-0.97	-1.03		278
$[OEP]_2$-DA	--	Ni(II), Zn(II)			DCM	$TBAPF_6$ (0.5M)	Ag/AgCl		1.00	0.66			-1.07	-1.32		278
$[OEP]_2$-DA	--	Ni(II), Zn(II)			DCM (-40°C)	$TBAPF_6$ (0.5M)	Ag/AgCl		0.94	0.68			-1.06	-1.33		278
$[OEP]_2$-DA	--	$[Ni(II)]_2$			DCM	NR	SCE	1.35	1.01	0.86						224
$[OEP]_2$-DA	--	$[Ni(II)]_2$			DCM	$TBAPF_6$ (0.5M)	Ag/AgCl		1.04	0.92			-1.00	-1.00		278
$[OEP]_2$-DA	--	$[Ni(II)]_2$			DCM (-40°C)	$TBAPF_6$ (0.5M)	Ag/AgCl		1.03	0.86			-0.93	-1.03		278
$[OEP]_2$-DA	--	$[Pd(II)]_2$			DCM	$TBAPF_6$ (0.5M)	Ag/AgCl		1.08	0.96			-1.01	-1.06		278
$[OEP]_2$-DA	--	$[Pd(II)]_2$			DCM (-40°C)	$TBAPF_6$ (0.5M)	Ag/AgCl		1.04	0.90			-0.98	-1.04		278
$[OEP]_2$-DA	--	$[Pt(II)]_2$			DCM	$TBAPF_6$ (0.5M)	Ag/AgCl		1.12	1.03			-0.98	-1.04		278
$[OEP]_2$-DA	--	$[Pt(II)]_2$			DCM (-40°C)	$TBAPF_6$ (0.5M)	Ag/AgCl		1.05	0.92			-1.00	-1.07		278
$[OEP]_2$-DA	--	$[Zn(II)]_2$			DCM	$TBAPF_6$ (0.5M)	Ag/AgCl			0.65*			-1.41	-1.41		278

Table 12. Porphyrin dimers. (see structures in Figure 12)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red Other Red	Ref.
$[OEP]_2$-DA	--	$[Zn(II)]_2$			DCM (-40°C)	$TBAPF_6$ (0.5M)	Ag/AgCl		0.74	0.67		-1.30	-1.30		278
$[OEP]_2$-DPE	**778**	$[2H]_2$			PhCN	$TBAPF_6$	SCE			0.58					336
$[OEP]_2$-DPE	**779**	$[2H]_2$			PhCN	$TBAPF_6$	SCE			0.71	-0.57				336
$[OEP]_2$-Vn	**780**	$[Ni(II)]_2$			DCM	NR	SCE	1.23	0.70	0.62					224
$[OEP]_2$-Vn(E)	**781**	$[2H]_2$			DCM	TBAP	SCE	1.49	0.72	0.59					274
$[OEP]_2$-Vn(E)	--	$[Ni(II)]_2$			DCM	TBAP	SCE	1.23	0.70	0.62					274
$[OEP]_2$-Vn(E)	--	$[Pd(II)]_2$			DCM	TBAP	SCE	1.41	0.90	0.72					274
$[OEP]_2$-Vn(E)	--	$[Pt(II)]_2$			DCM	TBAP	SCE	1.52	1.04	0.86					274
$[OEP]_2$-Vn(Z)	**782**	$[2H]_2$			DCM	TBAP	SCE	1.42	0.67	0.56					274
$[OEP]_2$-Vn(Z)	--	$[Ni(II)]_2$			DCM	TBAP	SCE	1.26	0.76	0.57					274
$[OEP]_2$-Vn(Z)	--	$[Pd(II)]_2$			DCM	TBAP	SCE	1.47	0.94	0.61					274
$[OEP]_2$-Vn(Z)	--	$[Pt(II)]_2$			DCM	TBAP	SCE	1.47	0.98	0.61					274
Por-Bezyl-OxoP	**783**	3H, F^-, Zn(II)			DCB	TBAP	Fc/Fc^+			0.49		-0.10			532
Por-Bezyl-OxoP	**784**	4H, Zn(II)			DCB	TBAP	Fc/Fc^+			0.59		0.35			532
S-TriTP-TZ-TriTP	**785**	3H, S			DCM	TBAP	SCE		1.45	1.07		-1.03	-1.17	-1.34	113
S-TriTP-TZ-TriTP	--	Zn(II), H, S			DCM	TBAP	SCE	1.47	1.07	0.77		-1.02	-1.35	-1.55	113

Table 12. Porphyrin dimers. (see structures in Figure 12)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red Other Red	Ref.
S-TriTPP-TriTP	**786**	3H, S			DCM	TBAP	SCE	1.38*	1.16*	0.99*			-0.88	-1.18	-1.53	305
S-TriTPP-TriTP	--	Zn(II), H, S			DCM	TBAP	SCE	1.47*	1.08	0.77			-0.98	-1.34	-1.73*	305
S_2-DTPyP-DPA-(S-TriTP)	**787**	H, 3S			DCM	TBAP	SCE		1.22	1.11			-0.89	-1.04	-1.29, -1.36	503
S_2-TriTP-TZ-TriTP	**788**	2H, 2S			DCM	TBAP	SCE	1.38	1.12	1.05			-0.82	-1.12	-1.48	113
S_2-TriTP-TZ-TriTP	--	Zn(II), 2S			DCM	TBAP	SCE	1.31	1.06	0.77			-0.83	-1.19	-1.52	113
(S_2-TriTP)-TZ-(S-TriTP)	**789**	H, 3S			DCM	TBAP	SCE	1.59	1.40	1.08			-0.89	-1.02	-1.33	113
S_2-TriTPP-S-TriTP	**790**	H, 3S			DCM	TBAP	SCE		1.48*	1.26*			-1.00*	-1.30*		305
S_2-TriTPP-TriTP	**791**	2H, 2S			DCM	TBAP	SCE	1.38*	1.16*	0.99*			-0.88	-1.18	-1.54	305
S_2-TriTPP-TriTP	--	Zn(II), 2S			DCM	TBAP	SCE	1.55*	1.08	0.78			-0.92	-1.19	-1.56, -1.75*	305
S_2-TTP-TZ-TTP	**792**	2H, 2S			DCM	TBAP	SCE	1.28	1.14	0.95			-0.92	-1.20	-1.54	415
S_2-TTP-TZ-TTP	--	Zn(II), 2S			DCM	TBAP	SCE		1.02	0.72			-0.99	-1.19	-1.70	415
$(T(Ar)P)_2$-$(Q)_2$	**793**	Co(II)			PhCN	TBAP	SCE		1.18	1.18	0.67*	0.10*	-0.69	-1.69	-1.84*	6
$(T(Ar)P)_2$-$(Q)_2$	--	Zn(II), Au(III)			PhCN	TBAP	SCE		1.02	0.81	-0.40		-0.88	-1.23,	-1.55, -1.71	18
$(T(Ar)P)_2$-$(Q)_2$	--	Zn(II), Au(III)			Tol. (45°C)	THAP (0.6M)	SCE		1.02	0.81	-0.30		-0.87	-1.17	-1.57, -1.81	18
$(T(Ar)P)_2$-DP	**794**	Co(II)			PhCN	TBAP	SCE		1.30	1.10	0.75*	-0.05*	-0.59	-0.73,	-1.42, -1.91*	6
$[T(Ar)P]_2$-1,2-PV	**795**	2H, Zn(II)			DCM	$TBABF_4$	Fc/Fc^+	1.36, 1.11	0.97	0.80			-1.01	-1.11	-1.21, -1.35	282

Table 12. Porphyrin dimers. (see structures in Figure 12)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red Other Red	Ref.
$[T(Ar)P]_2$-1,2-PV	--	$[2H]_2$			DCM	$TBABF_4$	Fc/Fc^+		1.35	0.98		-1.01	-1.20		282
$[T(Ar)P]_2$-1,2-PV	--	$[Zn(II)]_2$			DCM	$TBABF_4$	Fc/Fc^+		1.11	0.79		-1.10	-1.36		282
$[T(Ar)P]_2$-1,3-PV	**796**	2H, Zn(II)			DCM	$TBABF_4$	Fc/Fc^+	1.30, 1.11	1.03	0.83		-0.96	-1.09	-1.18, -1.35	282
$[T(Ar)P]_2$-1,3-PV	--	$[2H]_2$			DCM	$TBABF_4$	Fc/Fc^+		1.29	1.00		-1.03	-1.20		282
$[T(Ar)P]_2$-1,3-PV	--	$[Zn(II)]_2$			DCM	$TBABF_4$	Fc/Fc^+		1.09	0.81		-1.09	-1.34		282
$[T(Ar)P]_2$-1,4-PV	**797**	2H, Zn(II)			DCM	$TBABF_4$	Fc/Fc^+	1.35, 1.14	0.98	0.80		-0.95	-1.07	-1.15, -1.35	282
$[T(Ar)P]_2$-1,4-PV	--	$[2H]_2$			DCM	$TBABF_4$	Fc/Fc^+		1.29	0.98		-1.02	-1.17		282
$[T(Ar)P]_2$-1,4-PV	--	$[Zn(II)]_2$			DCM	$TBABF_4$	Fc/Fc^+		1.09	0.78		-1.04	-1.33		282
$[T(Ar)P]_2$-DMB	**798**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	0.94	0.59	0.30		-1.85			26
$[T(Ar)P]_2$-DMB	--	$[2H]_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.10*	0.86*	0.45		-1.74	-2.05		26
$[T(Ar)P]_2$-TAA	**799**	$[Mn(III)]_2$	Cl^-	Cl^-	DCM	$TBABF_4$	Fc/Fc^+				-0.27*	-0.86	-1.03	-1.30	456
$[T(Ar)P]_2$-TAN	**800**	$[2H]_2$			DCM	TBAP	SCE			0.98*		-1.09	-1.19		447
$[T(Ar)P]_2$-TAN	--	$[Zn(II)]_2$			DCM	TBAP	SCE		0.97*	0.73		-1.14	-1.30		447
$[T(Ar)P]_2$-TAN	**801**	$[Zn(II)]_2$	See Fig.		DCM	TBAP	SCE			0.74*		-0.44*	-0.93*	-1.18, -1.45*	447
$(T(EM)PP)_2$-Calix4	**802**	$[Zn(II)]_2$			DCM	TBAP (0.5M)	Fc/Fc^+		0.32	0.14		-0.46			148
$[T(EM)PP]_2$-C-Calix4	**803**	$[Zn(II)]_2$	See Fig.		DCM	$TBAPF_6$	Fc/Fc^+			0.24					444

Table 12. Porphyrin dimers. (see structures in Figure 12)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red Other Red	Ref.
$[T(EM)PP]_2$-Calix4	**804**	$[Zn(II)]_2$			DCM	TBAP (0.5M)	Ag/Ag^+	0.76	0.49	0.27						469
$[T(EM)PP]_2$-Calix4	**805**	$[Zn(II)]_2$	See Fig.		DCM	TBAP (0.5M)	Ag/Ag^+		0.74	0.30						469
$(TBPP)_2$-POM	**806**	$[2H]_2$			DCM	$P(Ph)_4BF_4$	SCE		1.08	0.95	-0.28	-0.74	-1.07	-1.30		121
$(TBPP)_2$-POM	**--**	$[Zn(II)]_2$			DCM	$P(Ph)_4BF_4$	SCE		1.01	0.72	-0.18	-0.75	-1.35	-1.55		121
$(TBPP)_2$-POM(2)	**807**	$[Zn(II)]_2$			DCM	$P(Ph)_4BF_4$	SCE		1.03	0.71	-0.30	-0.82	-1.29	-1.55		121
$(TBPP)_2$-POM(2)-1	**808**	$[Zn(II)]_2$			DCM	$P(Ph)_4BF_4$	SCE		1.00	0.70	-0.68	-1.04	-1.33	-1.60		121
$[TBPP]_2$	**809**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Ag/AgCl	1.33*	0.86	0.75			-1.39	-1.52		133
$(TDBP)_2$	**810**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.03, 0.82	0.40	0.19			-1.86	-1.96	-2.28	128
$[(TEA)TPP]_2$-Pd^{2+}	**811**	$[Ni(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	0.60	0.41	0.27			-1.42*	-1.58	-1.80, -2.02	222
$[(TEK)TPP]_2$-Pd^{2+}	**812**	$[Ni(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	0.80	0.49	0.30			-1.35	-1.45	≈ -1.85, ≈ -1.95	222
TETMP-A-TETMP	**813**	Zn(II), Mo(V)	O^{2-}	CH_3O^-, CH_3O	DCM	TBAP	Ag/AgCl	1.47	0.96	0.49	-0.20		-0.78			10
$(TETMP)_2$-DB	**814**	$[Pd(II)]_2$			DCM	TBAP	Ag/AgCl			0.91			-1.49			402
$(TETMP)_2$-Xan	**815**	$[Pd(II)]_2$			DCM	TBAP	Ag/AgCl		0.92	0.65			-1.70			402
THTMP-Phen-THTMP	**816**	$[Zn(II)]_2$			*n*-BuCN	$TBABF_4$	Fc/Fc^+			0.17						401
$(TMPP)_2$-2C-Calix4	**817**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+		0.70	0.36						444
$(TMPP)_2$-C-Calix4	**818**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+		0.70	0.36						444

Table 12. Porphyrin dimers. (see structures in Figure 12)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red Other Red	Ref.
$(TMPP)_2$-C-Calix4	**819**	$[Zn(II)]_2$	See Fig.		DCM	$TBAPF_6$	Fc/Fc^+			0.19						444
$(TMPP)_2$-C-Calix4-1	**820**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+		0.70	0.31						444
TPP-DEHMP	**821**	$[Co(II)]_2$			PhCN	TBAP	SCE	1.37	1.21	0.99	0.60*, -0.86	0.44*, -1.06				59
TPP-DEHMP	--	$[Cu(II)]_2$			PhCN	TBAP	SCE	1.32, 1.16	1.04	0.77			-1.27	-1.54	-1.74	59
TPP-DEHMP	--	$[Ni(II)]_2$			PhCN	TBAP	SCE	1.86*	1.15	0.79			-1.27	-1.44	-1.81	59
TPP-DEHMP	--	$[Zn(II)]_2$			PhCN	TBAP	SCE	1.17, 0.97	0.84	0.67			-1.32	-1.58	-1.70	66
TPP-TriPP	**822**	$[Cu(II)]_2$			PhCN	TBAP	SCE		1.32	1.04			-1.28	-1.74		59
TPP-TriPP	--	$[Ni(II)]_2$			PhCN	TBAP	SCE			1.13			-1.25	-1.76		59
$(TPP)_2$-B(DPP)A	**823**	$[2H]_2$			CH_3CN/DCE	$TEAPF_6$	SCE			1.32*	-0.73	-1.02	-1.30	-1.52		154 (CV/P)
$(TPP)_2$-B(DPP)A	--	$[Zn(II)]_2$			CH_3CN/DCE	$TEAPF_6$	SCE	1.35	1.25	1.03	-0.73	-1.12	-1.30			154 (CV/P)
$(TPP)_2$-B(DPPTM)	**824**	$[2H]_2$			CH_3CN/DCE	$TEAPF_6$	SCE			1.34*	-0.62		-1.01			154 (CV/P)
$(TPP)_2$-B(DPPTM)	--	$[Zn(II)]_2$			CH_3CN/DCE	$TEAPF_6$	SCE		1.29	1.00	-0.92	-1.10	-1.38	-1.68		154 (CV/P)
$(TPP)_2$-BDC	**825**	Zn(II), Mo(VI)	O^{2-}	O^{2-}	DMF	TEAP	Ag/Ag^+		0.74*	0.39	-0.45		-0.91*	-1.48	-1.86	126
$(TPP)_2$-BDC	--	Zn(II), 2H			DMF	TEAP	Ag/Ag^+			0.37*			-0.90*	-1.30	-1.88	126
$(TPP)_2$-BDPBuP	**826**	$[2H]_2$			CH_3CN/DCE	$TEAPF_6$	SCE			1.31*	-0.70		-1.05	-1.73		154 (CV/P)
$(TPP)_2$-BDPBuP	**827**	$[Zn(II)]_2$			CH_3CN/DCE	$TEAPF_6$	SCE		1.19	0.90	-0.94	-1.10	-1.35	-1.68		154 (CV/P)

Table 12. Porphyrin dimers. (see structures in Figure 12)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red Other Red	Ref.
$(TPP)_2$-BDPPE	**828**	$[2H]_2$			CH_3CN/DCE	$TEAPF_6$	SCE			1.28*	-0.74		-1.10	-1.55		154 (CV/P)
$(TPP)_2$-BDPPE	--	$[Zn(II)]_2$			CH_3CN/DCE	$TEAPF_6$	SCE		1.23	1.02	-0.99	-1.17	-1.38	-1.76		154 (CV/P)
$(TPP)_2$-BDPPM	**829**	$[2H]_2$			CH_3CN/DCE	$TEAPF_6$	SCE			1.22*	-0.74		-1.10	-1.55		154 (CV/P)
$(TPP)_2$-BDPPM	--	$[Cu(II)]_2$			CH_3CN/DCE	$TEAPF_6$	SCE		1.22	0.98	-0.97	-1.14	-1.72			154 (CV/P)
$(TPP)_2$-BDPPM	**830**	$[Zn(II)]_2$			CH_3CN/DCE	$TEAPF_6$	SCE		1.17	0.97	-1.04	-1.16	-1.42	-1.77		154 (CV/P)
$(TPP)_2$-BDPPrP	**831**	$[2H]_2$			CH_3CN/DCE	$TEAPF_6$	SCE			1.32*	-0.73		-1.08			154 (CV/P)
$(TPP)_2$-BDPPrP	--	$[Zn(II)]_2$			CH_3CN/DCE	$TEAPF_6$	SCE		1.40	1.10	-1.00	-1.11	-1.37	-1.75		154 (CV/P)
$(TPP)_2$-BIP	**832**	Zn(II), Mo(VI)	O^{2-}	O^{2-}	DMF	TEAP	Ag/Ag^+		0.70	0.43	-0.44		-0.89*	-1.45	-1.86	126
$(TPP)_2$-CNP	**833**	$[2H]_2$			DMF	TBAP	$Ag/AgNO_3$			0.73			-1.48	-1.94		124
$(TPP)_2$-CNP	--	Zn(II), 2H			DMF	TEAP	Ag/Ag^+		0.68	0.38			-0.71*	-1.30	-1.91	126
$(TPP)_2$-CNP	--	$[Zn(II)]_2$			DMF	TBAP	$Ag/AgNO_3$			0.40			-1.74	-2.16		124
$(TPP)_2$-DPPAsM	**834**	$[2H]_2$			CH_3CN/DCE	$TEAPF_6$	SCE			1.34*	-0.63		-0.98	-1.38		154 (CV/P)
$(TPP)_2$-PDPAsM	**835**	$[Zn(II)]_2$			CH_3CN/DCE	$TEAPF_6$	SCE		1.32	1.07	-0.97	-1.12	-1.34	-1.66	-2.08	154 (CV/P)
$(TPP)_2$-succinyl	**836**	$[2H]_2$			DMF	TBAP	Ag/Ag^+			0.75*			-1.46	-1.91		14
$(TPP)_2$-succinyl	--	$[Co(II)]_2$			DMF	TBAP	Ag/Ag^+			0.77*	0.04*	-1.22	-1.60			14
$(TPP)_2$-succinyl	--	$[Cu(II)]_2$			DMF	TBAP	Ag/Ag^+			0.66*			-1.56	-2.08		14

Table 12. Porphyrin dimers. (see structures in Figure 12)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red Other Red	Ref.
$(TPP)_2$-succinyl	--	$[Fe(III)]_2$	Cl^-		DMF	TBAP	Ag/Ag^+			0.60*	-0.57		-1.43	-2.14		14
$(TPP)_2$-succinyl	--	$[Mn(III)]_2$	Cl^-		DMF	TBAP	Ag/Ag^+			0.65*	-0.60		-1.72	-2.19		14
$(TPP)_2$-succinyl	--	$[Ni(II)]_2$			DMF	TBAP	Ag/Ag^+			0.65*			-1.56	-2.14		14
$(TPP)_2$-succinyl	--	$[Zn(II)]_2$			DMF	TBAP	Ag/Ag^+		0.51*	0.48			-1.72	-2.11		14
$[TPP]_2$-$(OC_2Se)_2$	**837**	$[2H]_2$			H_2O	PB	SCE						-0.68*	-0.97*		530
$[TPP]_2$-$(OC_2Se)_2$	**837**	$[2H]_2$			H_2O	PB	SCE						-0.72*	-0.79*	-0.90*	530
$[TPP]_2$-$(OC_2Se)_2$	**837**	$[2H]_2$			H_2O	PB	SCE						-0.72*	-0.80*	-0.94*	530
$[TPP]_2$-Anh	**838**	$[2H]_2$			DMF	TBAP	SCE			0.62			-1.38	-1.63	-2.08, -2.92, -3.20	247
$[TPP]_2$-Anh	--	$[Zn(II)]_2$			DMF	TBAP	SCE		0.57	0.37			-1.89	-2.31	-2.61*, -3.15*	247
$[TPP]_2$-Glu	**839**	$[2H]_2$			DMF	TBAP	Ag/Ag^+			0.56*			-1.58			463
$[TPP]_2$-Glu	--	$[Co(II)]_2$			DMF	TBAP	Ag/Ag^+		0.60*	0.56*	-0.45	-1.29	-1.56	-1.93		463
$[TPP]_2$-O	**840**	$[Fe(III)]_2$	O^{2-}		PhCN	TBAP	SCE	1.59, 1.48	1.11	0.90			-1.09	-1.60		72
trans-$(TPP)_2$-$(OC_5)_2$	**841**	$[2H]_2$			DCE	TBAP	Fc/Fc^+	1.07	0.85	0.49			-1.65			523
trans-$(TPP)_2$-$(OC_5)_2$	--	$[Zn(II)]_2$			DCE	TBAP	Fc/Fc^+		0.65	0.31			-2.03			523
$(Tri(Ar)P)_2$-DAA	**842**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+		0.64	0.32	0.95*	-2.10	-1.86	-2.30		153
$(Tri(Ar)P)_2$-DAA	**843**	$[Zn(II)]_2$	See Fig.		DCM	$TBAPF_6$	Fc/Fc^+	0.75	0.40	0.28	0.96	-1.95	-1.87		-2.07	153

Table 12. Porphyrin dimers. (see structures in Figure 12)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red Other Red	Ref.
TriBPP-$(Py)_2$-TriBPP	**844**	$[Ni(II)]_2$			DCM	$TBAPF_6$	$Ag/AgClO_4$			0.75			-1.52			422
TriBPP-$(Py)_2Pd^{2+}$-TriBPP	**845**	$[Ni(II)]_2$			DCM	$TBAPF_6$	$Ag/AgClO_4$			0.52			-1.40			422
TriBPP-DPC-TriBAPP	**846**	2H, Zn(II)			PhCN	$TBAPF_6$	Fc/Fc^+		0.59	0.30						403 (DPV)
TriBPP-F_{15}TriPP	**847**	2H, Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.57			-1.38			406
TriBPP-F_{15}TriPP	**--**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+		0.55	0.34			-1.57			406
$(TriBPP)_2$	**848**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+		0.43	0.32			-1.89			406
$(TriBPP)_2$-BVQT	**849**	2H, Zn(II)			DCM	$TBAPF_6$ (0.5M)	Ag/AgCl			0.70						328
$(TriBPP)_2$-BVQT	**--**	$[Zn(II)]_2$			DCM	$TBAPF_6$ (0.5M)	Ag/AgCl			0.70						328
$(TriBPP)_2$-DAQT	**850**	Zn(II), 2H			DCM	$TBAPF_6$ (0.5M)	Ag/AgCl			0.75						328
$(TriBPP)_2$-DAQT	**--**	$[Zn(II)]_2$			DCM	$TBAPF_6$ (0.5M)	Ag/AgCl			0.77						328
$[TriBPP]_2$-DAP	**851**	$[Ni(II)]_2$			DCM	$TBAPF_6$	Ag/AgCl	1.27	0.99	0.90						449
$[TriBPP]_2$-DAQ	**852**	$[Ni(II)]_2$			DCM	$TBAPF_6$	Ag/AgCl		1.27	1.08	-0.26	-0.72	-1.37			449
$[TriCNP]_2$	**853**	$[Zn(II)]_2$			DCM	$TBABF_4$	Ag/Ag^+		0.77	0.62						509
$(TriDBP)_2$-DA	**854**	$[Ni(II)]_2$			DCM	$TBAPF_6$	Ag/AgCl	1.30	1.10	0.93			-1.14*			220
$(TriDBP)_2$-DA	**--**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Ag/AgCl	1.24	0.78	0.69			-1.22			220
$(TriDBP)_2$-PtDA	**855**	$[Ni(II)]_2$			DCM	$TBAPF_6$	Ag/AgCl	1.19	0.83	0.70			-1.37*			220

Table 12. Porphyrin dimers. (see structures in Figure 12)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red Other Red	Ref.
$(TriDBP)_2$-PtDA	--	$[Zn(II)]_2$			DCM	$TBAPF_6$	Ag/AgCl	1.01	0.56	0.50		-1.47			220
$[TriDBPP]_2$	**856**	$[Zn(II)]_2$			DCM	$TBABF_4$	Ag/Ag^+		0.58	0.44					509
$(TriDP)_2$-DPA	**857**	2H, Zn(II)			DCM/THF	$TBABF_4$	Ag/Ag^+			0.34					46
$(TriDP)_2$-DPA	--	$[Zn(II)]_2$			DCM/THF	$TBABF_4$	Ag/Ag^+			0.34					46
TriMP-PE-DTTAP	**858**	$[Zn(II)]_2$			CH_3CN	$TBAPF_6$	Ag/Ag^+			0.54					39
$(TriMP)_2$-DADMP	**859**	$[Zn(II)]_2$			DCM	$TBAPF_6$	$Ag/AgNO_3$		0.59	0.50					157
$(TriMP)_2$-DAP	**860**	$[Zn(II)]_2$			DCM	$TBAPF_6$	$Ag/AgNO_3$			0.59					157
$(TriMP)_2$-MADA	**861**	$[Zn(II)]_2$			DCM	$TBAPF_6$	$Ag/AgNO_3$		0.62	0.53					157
$(TriMP)_2$-MCH	**862**	$[Zn(II)]_2$			DCM	$TBAPF_6$	$Ag/AgNO_3$		0.65	0.53					157
$(TriMP)_2$-Ph	**863**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Ag/Ag^+		0.90	0.59					258
$(TriMP)_2$-tBP	**864**	$[Zn(II)]_2$			DCM	$TBAPF_6$	$Ag/AgNO_3$			0.58					157
$[TriMP]_2$-Ph	**865**	2H, Zn(II)			DCM	$TBAPF_6$	Ag/Ag^+	1.19, 0.88*	0.72*	0.58					258
TriMPP-TriMP	**866**	$[Zn(II)]_2$			DCM	$TBAPF_6$	$Ag/AgNO_3$			0.59					157
$(TriMPP)_2$-DAP	**867**	$[Zn(II)]_2$			DCM	$TBAPF_6$	$Ag/AgNO_3$			0.59					157
$[TriOPP]_2$	**868**	$[Zn(II)]_2$			DCM	$TBABF_4$	Ag/Ag^+		0.55	0.43					509
$(TriPCP)_2$-$(Rh^{2+}L_n)_2$	**869**	$[2H]_2$			DCE	$TBAPF_6$ (0.05M)	SCE			1.17*	1.38 0.37	-1.19*			442

Table 12. Porphyrin dimers. (see structures in Figure 12)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red Other Red	Ref.
$[TriPCP]_2$-(Ru_3O)	**870**	$[Zn(II)]_2$			DMF	$TBAPF_6$	$Ag/AgPF_6$		0.73	0.51	-1.16	-1.70	-2.08			507
$(TriPP)_2$-Calix4	**871**	$[2H]_2$			DCM	$THPPF_6$	Ag/AgCl		1.33	1.20			-1.06	-1.45		317
$(TriPP)_2$-Calix4	--	$[Cu(II)]_2$			DCM	$THPPF_6$	Ag/AgCl		1.62	1.27			-0.97	-1.50		317
$(TriPP)_2$-Calix4	--	$[Zn(II)]_2$			DCM	$THPPF_6$	Ag/AgCl		1.32	0.81			-1.43	-1.51		317
$(TriPP)_2$-DPA	**872**	2H, Zn(II)			DCM/THF	$TBABF_4$	Ag/Ag^+			0.37						46
$(TriPP)_2$-DPA	--	$[Zn(II)]_2$			DCM/THF	$TBABF_4$	Ag/Ag^+			0.36						46
TriTP-DPA-DTTAP	**873**	2H, Zn(II)			DCM	TBAP	SCE	1.30	1.02	0.74			-1.18	-1.34	-1.55, -1.74	502
$(TtBPP)_2$-POM(2)	**874**	$[2H]_2$			DCM	$P(Ph)_4BF_4$	SCE		1.08	0.93	-0.67	-1.00	-1.04	-1.30		121
TTP-A-(O,S-TriTP)	**875**	2H, O, S			DCM	TBAP	SCE		1.40	1.09			-1.11	-1.42	-1.48	94
TTP-A-(O,S-TriTP)	--	Zn(II), O, S			DCM	TBAP	SCE		1.10	0.80			-1.17	-1.49	-1.63	94
TTP-A-(S-TriTP)	**876**	2H, H, S			DCM	TBAP	SCE		1.42	1.10			-1.00	-1.11	-1.40	94
TTP-A-(S-TriTP)	--	Zn(II), H, S			DCM	TBAP	SCE	1.52	1.11	0.80			-1.03	-1.37	-1.55, -1.68	94
TTP-A-$(S_2$-TriTP)	**877**	2H, 2S			DCM	TBAP	SCE		1.43	1.01			-1.10	-1.32	-1.44	94
TTP-A-$(S_2$-TriTP)	--	Zn(II), 2S			DCM	TBAP	SCE	1.55	1.11	0.80			-1.22	-1.50	-1.62	94
TTP-Al-O-TriTP	**878**	2H, Al(III)			DCM	TBAP	SCE	1.49, 1.31	1.10	1.01			-1.06	-1.42		233
TTP-BDP-$(S_2$-TTP)	**879**	2H, 2S			DCM	TBAP	SCE		1.44	1.19	-0.79		-0.98	-1.16	-1.32, -1.51	570

Table 12. Porphyrin dimers. (see structures in Figure 12)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red Other Red	Ref.
TTP-BDP-S-TTP	**880**	3H, S			DCM	TBAP	SCE		1.46	0.94	-0.92	-0.92	-1.38	-1.53	570
TTPAl^{3+}-TriTP	**881**	Cu(II), Al(III)			DCM	TBAP	SCE	1.58	1.37	1.08		-1.19	-1.41		233
TTPAl^{3+}-TriTP	**--**	Zn(II), Al(III)			DCM	TBAP	SCE	1.46, 1.32	1.07	0.88		-1.22	-1.43	-1.61	233

Table 13. Porphyrin trimers. (see structure in Figure 13)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
D(BPBP)P-$Cu^{+}L_n$(THMP)$_2$	**882**	Au(III), [Zn(II)]$_2$			*n*-BuCN	$TBABF_4$	Fc/Fc^{+}			0.18	0.43	-1.04				401
DArP-Indanyl-(DArP)$_2$	**883**	Zn(II)			PhCN	TBAP	SCE	1.27	0.77	0.56			-1.42			150
(DArP)$_2$-OxP	**884**	2H, [Zn(II)]$_2$			DCB	TBAP	Fc/Fc^{+}			0.29			-1.35			71
(DArP1)$_2$-OxP	**885**	2H, [Zn(II)]$_2$			DCB	TBAP	Fc/Fc^{+}			0.28			-1.37			71
(DBPCPP)$_3$	**886**	[Zn(II)]$_3$			PhCN	$TBAPF_6$	Fc/Fc^{+}			0.32			-1.83			341
(DBPCPP)$_3$	**886**	[Zn(II)]$_3$			THF	$TBAPF_6$	Fc/Fc^{+}			0.33			-1.96			341
(DBPP)$_3$	**887**	[Zn(II)]$_3$			DCM	$TBAPF_6$	Fc/Fc^{+}	0.79, 1.10	0.55	0.38			-1.78	-1.93	-2.27	455
(DCPDBPP)$_3$	**888**	[Zn(II)]$_3$			DMF	$TBAPF_6$	Fc/Fc^{+}			0.33			-1.94			341
(F_{16}DPP)$_2$-DPP	**889**	Sn(IV), [2H]$_2$			PhCN	$TBAPF_6$	SCE			0.63			-0.97			331
(F_{16}DPP)$_2$-DPP	**890**	Sn(IV), [4H]$_2$			PhCN	$TBAPF_6$	SCE			1.03			-0.27			331
Fused-[TBPP]$_2$-F_{10}DBPP	**891**	2H, [Ni(II)]$_2$			DCM	$TBAPF_6$	Fc/Fc^{+}		0.39	0.19			-0.71	-0.92	-1.66	406
Fused-[TBPP]$_2$-F_{10}DBPP	--	[Ni(II)]$_2$, Zn(II)			DCM	$TBAPF_6$	Fc/Fc^{+}	0.76, 0.95	0.39	0.14			-0.81	-0.99	-1.66, -1.99	406
Fused-[TBPP]$_2$-F_{10}DBPP	--	[Zn(II)]$_3$			DCM	$TBAPF_6$	Fc/Fc^{+}	0.53, 0.77	0.17	0.00			-0.81	-1.00	-1.66, -1.99	406
Fused-[TBPP]$_3$	**892**	[Zn(II)]$_3$			DCM	$TBAPF_6$	Fc/Fc^{+}	0.46, 0.70	0.05	-0.13			-1.11			406
[OEP]$_3$-(Vn)$_2$	**893**	[2H]$_3$			DCM	TBAP	SCE	1.19	0.56	0.36						274
[OEP]$_3$-(Vn)$_2$	--	[Ni(II)]$_3$			DCM	TBAP	SCE	1.25	1.05	0.49						274

Table 13. Porphyrin trimers. (see structure in Figure 13)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$[OEP]_3$-$(Vn)_2$	--	$[Pd(II)]_3$			DCM	TBAP	SCE	1.48	1.14	0.65					274
$[OEP]_3$-$(Vn)_2$	--	$[Pt(II)]_3$			DCM	TBAP	SCE	1.56	1.17	0.75					274
Pc-T(4-OCH_3P)P-Pc	**894**	Ru(IV)			DCM (-42°C)	$TBAPF_6$	Ag/AgCl	1.06, 1.32	0.76	0.40					205
Rotaxane-P	**895**	Au(III), $[Zn(II)]_2$			PhCN	$TBABF_4$	Fc/Fc^+			0.17	-1.05				401
$(S\text{-}TriTP)_2$-TTP	**896**	Sn(IV), 2H			DCM	TBAP	SCE		1.28	0.93		-1.11	-1.40		96
$(S_2\text{-}TriTP)_2$-TTP	**897**	Sn(IV)			DCM	TBAP	SCE		1.53	1.00		-0.97	-1.29	-1.38	96
$(TBPP)_2$-$(Pd^{2+})_2$-TPyDBPP	**898**	$[Ni(II)]_3$			DCM	$TBAPF_6$	$Ag/AgClO_4$			0.38		-1.35			422 (DPV)
$(TBPP)_2$-A_2-DSiP	**899**	$[Zn(II)]_3$			DCM	$TBAPF_6$	Ag/AgCl	1.03, 1.26,	0.77	0.68		-0.90	-1.08	-1.31, -1.45	102
$(TBPP)_2$-DBPP	**900**	$[Zn(II)]_3$			DCM	$TBAPF_6$	Fc/Fc^+	0.72	0.50	0.35		-1.88			406
$(TBPP)_2$-F_{10}DBPP	**901**	2H, $[Ni(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+			0.58		-1.46			406
$(TBPP)_2$-F_{10}DBPP	--	$[Ni(II)]_2$, Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.55		-1.60	-1.89		406
$(TBPP)_2$-F_{10}DBPP	--	$[Zn(II)]_3$			DCM	$TBAPF_6$	Fc/Fc^+		0.65	0.36		-1.61	-1.92		406
$(TBPP)_2$-TPyDBPP	**902**	$[Ni(II)]_3$			DCM	$TBAPF_6$	$Ag/AgClO_4$			0.72		-1.48			422
$(TPP\text{-})_2$-$(EG)_2$-TPP	**903**	Zn(II), Cu(II), Ag(II)			DCM	$TBAPF_6$	SCE	1.10, 1.27	0.89	0.80	0.54				262
$(TPP\text{-}EG)_2$-TPP	**904**	2H, Cu(II), Ag(II)			DCM	$TBAPF_6$	SCE				-1.11	-1.29	-1.41	-1.64, -1.78	262
$(TPP\text{-}EG)_2$-TPP	--	2H, Cu(II), Co(II)			DCM	$TBAPF_6$	SCE				-0.95	-1.32	-1.41	-1.63, -1.85	262

Table 13. Porphyrin trimers. (see structure in Figure 13)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
Trefoil DEHMP	**905**	$[Zn(II)]_3$			DCM	$TBAPF_6$	SCE		1.11	0.66	1.02				554
Tripod-TPP	**906**	$[2H]_3$			CH_3CN/DCE	$TEAPF_6$	SCE			1.27*	-0.67	-0.94			154 (CV/P)
Tripod-TPP	--	$[Zn(II)]_3$			CH_3CN/DCE	$TEAPF_6$	SCE		1.37*	1.02	-0.93	-1.27	-1.65		154 (CV/P)
TripodP	**907**	$[Zn(II)]_3$			DCM	$TBAPF_6$	SCE			0.58					330
TripodP	**907**	$[Zn(II)]_3$			DCM	TBAP	SCE		1.08	0.58 -0.73		-0.73			95
TripodP	**907**	$[Zn(II)]_3$			PhCN	TBAP	SCE		0.90	0.49					95
TripodP.Pyr-C_{60}	**908**	$[Zn(II)]_3$			DCM/DCB	$TBAPF_6$	SCE			0.63	-0.61				95
TripodP.T(4'-Py)P	**909**	$[Zn(II)]_3$, Au(III)			DCM	$TBAPF_6$	SCE			0.61	-0.39				330
TriTP-BPP-(S-DPSiAP)	**910**	2H, Zn(II), H			DCM	TBAP	SCE		0.99	0.72		-1.11	-1.44	-1.60	502
TriTP-BPP-(S_2-TriTP)	**911**	Zn(II), 2H			DCM	TBAP	SCE		1.02	0.72		-1.01	-1.20	-1.48, -1.73	502
$(TriTP)_2$-TTP	**912**	Ge(IV), $[2H]_2$			DCM	TBAP	SCE	1.33	1.19*	0.86		-1.17	-1.35	-1.60	1
$(TriTP)_2$-TTP	--	Ge(IV), $[Zn(II)]_2$			DCM	TBAP	SCE	1.14, 1.35	1.02*	0.76		-1.12	-1.41*		1
$(TriTP)_2$-TTP	--	P(V), $[2H]_2$			DCM	TBAP	SCE		1.07	1.03		-0.46	-0.98	-1.22, -1.60	1
$(TriTP)_2$-TTP	--	P(V), $[Zn(II)]_2$			DCM	TBAP	SCE	1.28*	1.01	0.74		-0.45	-1.03	-1.43	1
$(TriTP)_2$-TTP	--	Sn(IV), $[2H]_2$			DCM	TBAP	SCE		1.24*	0.93		-1.00	-1.32	-1.49, -1.64	1
$(TriTP)_2$-TTP	--	Sn(IV), $[2H]_2$			DCM	TBAP	SCE		1.24*	0.93		-1.00	-1.32	-1.49*, -1.64	56

Table 13. Porphyrin trimers. (see structure in Figure 13)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$(TriTP)_2$-TTP	--	Sn(IV), $[Zn(II)]_2$			DCM	TBAP	SCE	1.33	0.94	0.65		-1.04	-1.48		1
$(TTP)_2$-D(TP)P	**913**	$[Al(III)]_2$, 2H			DCM	TBAP	SCE	1.29, 1.65	1.06	0.90		-1.13	-1.40		233
$(TTP)_2$-D(TP)P	--	$[Al(III)]_2$, Cu(II)			DCM	TBAP	SCE	1.57	1.41	1.16		-1.23	-1.52		233
$(TTP)_2$-D(TP)P	--	$[Al(III)]_2$, Zn(II)			DCM	TBAP	SCE	1.31, 1.45	1.03	0.81		-0.96	-1.21	-1.50	233
$(TTP)_2$-OxP	**914**	2H, $[Zn(II)]_2$			DCB	TBAP	Fc/Fc^+	0.64	0.50	0.28		-1.33	-1.48	-1.94, -2.29	91

Table 14. Porphyrin-corrole dyads. (see structures in Figure 14)

Ring	Structure	Metal	Axial Ligand L1	L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	2	1	Metal / Other	Porphyrin Red 1	2	Other Red	Ref.
DEHMP-Ae-Corr	**915**	2H			DCM	TBAP	SCE	1.22*, 0.74	0.41	0.26	-0.20	-1.42	-1.74		36
DEHMP-Ae-Corr	**915**	2H			PhCN	TBAP	SCE	1.22*, 0.72,	0.42	0.32	-0.26	-1.41	-1.67	-1.77	36
DEHMP-Ae-Corr	**915**	2H	Cl^-		Py	TBAP	SCE			0.26	-0.70	-1.36	-1.64	-1.72, -1.90	35
DEHMP-Ae-Corr	**--**	Co(III)			PhCN	TBAP	SCE			0.28		-0.56	-0.90	-1.05, -1.66	48
DEHMP-Ae-Corr	**--**	Fe(III)	Cl^-		H_2O	$HClO_4$ (1 M)	SCE				0.39, -0.04				9 (RDV)
DEHMP-Ae-Corr	**--**	Fe(III)	Cl^-		PhCN	TBAP	SCE				0.43, 0.14, -0.24, -0.57				185
DEHMP-Ae-Corr	**--**	Fe(III)	Cl^-		Py	TBAP	SCE			0.31	-0.03, -0.72	-1.64			35
DEHMP-Ae-Corr	**--**	Mn(III)	Cl^-		PhCN	TBAP	SCE				0.44, 0.22, -0.22, -0.34 -0.65				185
DEHMP-Ae-Corr	**--**	Mn(III)	Cl^-		Py	TBAP	SCE			0.33	-0.42, -0.72	-1.64			35
DEHMP-Ae-MesCorr	**916**	Mn(III)	Cl^-		PhCN	TBAOAc	SCE				0.25,-0.44* -1.44	-1.70			304
DEHMP-BP-Corr	**917**	2H			DCM	TBAP	SCE	1.10, 0.87	0.71	0.39	-0.38	-1.41	-1.74*		36
DEHMP-BP-Corr	**917**	2H			PhCN	TBAP	SCE	1.09, 0.83	0.69	0.40	-0.37	-1.41	-1.59,	-1.88*	36
DEHMP-BP-Corr	**917**	2H	Cl^-		Py	TBAP	SCE			0.31	-0.59	-1.36	-1.53	-1.76, -1.89	35
DEHMP-BP-Corr	**--**	Fe(III)	Cl^-		H_2O	$HClO_4$ (1 M)	SCE				0.30, -0.06				9 (RDV)
DEHMP-BP-Corr	**--**	Fe(III)	Cl^-		PhCN	TBAP	SCE				0.44, 0.07 -0.35, -0.44				185
DEHMP-BP-Corr	**--**	Fe(III)	Cl^-		Py	TBAP	SCE			0.37	-0.02, -0.54* -0.71	-1.67			35

Table 14. Porphyrin-corrole dyads. (see structures in Figure 14)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red Other Red	Ref.
DEHMP-BP-Corr	--	Mn(III)	Cl^-		H_2O	$HClO_4$ (1 M)	SCE				0.32, -0.14				9 (RDV)
DEHMP-BP-Corr	--	Mn(III)	Cl^-		PhCN	TBAP	SCE				0.10, 0.46 -0.29,-0.43				185
DEHMP-BP-Corr	--	Mn(III)	Cl^-		Py	TBAP	SCE			0.49*	-0.44, -0.62	-1.62			35
DEHMP-DB-Corr	**918**	2H	Cl^-		Py	TBAP	SCE			0.28	-0.72	-1.32	-1.59	-1.83	35
DEHMP-DB-Corr	--	Co(II)			PhCN	TBAP	SCE	1.25	0.91	0.43		-0.19	-1.02	-1.64	31
DEHMP-DB-Corr	--	Fe(III)	Cl^-		H_2O	$HClO_4$ (1 M)	SCE				0.35, -0.03				9 (RDV)
DEHMP-DB-Corr	--	Fe(III)	Cl^-		PhCN	TBAP	SCE				0.15, 0.49 -0.17, -0.42				185
DEHMP-DB-Corr	--	Fe(III)	Cl^-		Py	TBAP	SCE			0.35	-0.02, -0.68	-1.60			35
DEHMP-DB-Corr	--	Mn(III)	Cl^-		H_2O	$HClO_4$ (1 M)	SCE				0.36, -0.02				9 (RDV)
DEHMP-DB-Corr	--	Mn(III)	Cl^-		Py	TBAP	SCE			0.35	-0.42, -0.70	-1.59			35
DEHMP-DB-MesCorr	**919**	Co(II)			PhCN	TBAP	SCE	1.25, 0.98, 1.61	0.57	0.41		-0.16	-1.06	-1.75	15
DEHMP-DB-MesCorr	--	Mn(III)	Cl^-		Py	TBAOAc	SCE				0.23,-0.68* -1.50	-0.82*	-1.72		304
DEHMP-DMX-Corr	**920**	2H			DCM	TBAP	SCE	0.87, 0.68	0.41	0.24	-0.39	-1.44*	-1.62	-1.80*	36
DEHMP-DMX-Corr	**920**	2H			PhCN	TBAP	SCE	0.85, 0.65	0.41	0.31	-0.38	-1.41	-1.55	-1.73	36
DEHMP-DMX-Corr	**920**	2H	Cl^-		Py	TBAP	SCE			0.23	-0.64	-1.36	-1.48	-1.68, -1.80	35
DEHMP-DMX-Corr	--	Co(II)			PhCN	TBAP	SCE	1.30	0.98	0.38		-0.39	-1.09		15

Table 14. Porphyrin-corrole dyads. (see structures in Figure 14)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red Other Red	Ref.
DEHMP-DMX-Corr	--	Fe(III)	Cl^-		H_2O	$HClO_4$ (1 M)	SCE				0.33, -0.08				9 (RDV)
DEHMP-DMX-Corr	--	Fe(III)	Cl^-		Py	TBAP	SCE			0.30	0.04,-0.54* -0.73	-1.69			35
DEHMP-DMX-Corr	--	Mn(III)	Cl^-		H_2O	$HClO_4$ (1 M)	SCE				0.33, -0.16				9 (RDV)
DEHMP-DMX-Corr	--	Mn(III)	Cl^-		PhCN	TBAP	SCE				0.46, 0.18 -0.17				185
DEHMP-DMX-Corr	--	Mn(III)	Cl^-		PhCN	TBAP	SCE				0.11, 0.43 -0.30				185
DEHMP-DMX-Corr	--	Mn(III)	Cl^-		Py	TBAP	SCE			0.32	-0.42, -0.72	-1.68			35
DEHMP-DMX-MesCorr	**921**	Co(II)			PhCN	TBAP	SCE	1.25, 0.95	0.55	0.44		-0.26	-1.19	-1.90	15
DEHMP-DMX-MesCorr	--	Mn(III)	Cl^-		PhCN	TBAOAc	SCE				0.19,-0.60* -1.52		-1.80		304
DEHMP-DPE-Corr	**922**	Co(II)			PhCN	TBAP	SCE	1.04, 0.83, 1.16, 1.35	0.52	0.45		-0.29	-1.15	-1.75	15
DEHMP-DPE-MesCorr	**923**	Co(II)			PhCN	TBAP	SCE	1.01, 0.89, 1.24, 1.66	0.53	0.38		-0.21	-1.13	-1.79	15
DEHMP-DPE-MesCorr	--	Mn(III)	Cl^-		PhCN	TBAOAc	SCE				0.27,-0.60* -1.41	-0.74*	-1.72		304
DEHMP-DPE-MesCorr	--	Mn(III)	Cl^-		PhCN	TBAOAc	SCE				0.24,-0.68* -1.49	-0.76*	-1.72		304
DEHMP-DPE-MesCorr	--	Mn(III)	Cl^-		Py	TBAOAc	SCE				0.21,-0.69* -1.44	-0.92*	-1.63		304

Table 15. Porphyrin dendrimers, and oligimeric or polymeric porphyrins. (see structures in Figure 15)

Ring	Structure	Axial Ligand: Metal	L1	L2	Solvent	Salt	RE	Porphyrin Ox: Other Ox	2	1	Metal / Other		Porphyrin Red: 1	2	Other Red	Ref.
Axially bonded $(Por)_6$	**924**	$[Sn(IV)]_2$, $[2H]_4$			DCM	TBAP	SCE		1.43*	0.90			-0.93	-1.25	-1.46*, -1.66	56
Axially bonded $(Por)_9$	**925**	$[Sn(IV)]_3$, $[2H]_6$			DCM	TBAP	SCE		1.37*	0.83			-0.96	-1.28	-1.47*, -1.68	56
Bis(por dimer)-SWNT	**926**	$[2H]_4$			DCB	$TBAPF_6$ (0.04M)	Ag/Ag^+			0.32			-0.49			300
$Bpy-(OEP)_5$	**927**	$[Zn(II)]_5$			CH_3CN/ DCE	$TEAPF_6$	SCE	1.35*	1.19*	0.97	-0.04	-0.57	-0.83	-1.10	-1.61, -1.80	159 (CV/P)
$CP-(Por)_6$	**928**	$[Sn(IV)]_6$			DCM	TBAP	SCE						-0.61	-1.01		319
$CP-(Por)_6$	**--**	$[Co(II)]_6$			DCM	TBAP	SCE		1.26	1.10	0.83	-0.86	-1.28*			319
$CP-(Por)_6$	**--**	$[Cu(II)]_6$			DCM	TBAP	SCE		1.23	0.97			-1.31	-1.58		319
$CP-(Por)_6$	**--**	$[Ni(II)]_6$			DCM	TBAP	SCE			1.11			-1.15	-1.63*		319
$CP-(Por)_6$	**--**	$[Zn(II)]_6$			DCM	TBAP	SCE		1.06	0.79			-1.35	-1.64		319
$Cyclic-(Por)_6$	**929**	$[Zn(II)]_3$, $[2H]_3$			DCM	$TBAPF_6$	Ag/Ag^+	1.10*	0.87*	0.58*						431
$Cyclic-(Por)_6$	**929**	$[Zn(II)]_3$, $[2H]_3$			DCM	$TBAPF_6$	Ag/Ag^+	1.27	1.10	0.68						431
Cyclic-Por-6	**930**	$[Zn(II)]_6$			THF	$TBAPF_6$	Fc/Fc^+		0.68	0.33			-1.29	-1.65		573 (SWV)
Cyclic-Por-6.T6	**931**	$[Zn(II)]_6$			THF	$TBAPF_6$	Fc/Fc^+		0.64	0.25			-1.30	-1.80		573 (SWV)
$DPA-(DtBuPP)_4$	**932**	$[Zn(II)]_4$			THF	$TBABF_4$	Fc/Fc^+	0.61	0.47	0.37			-1.43	-1.50	-1.66	433
$DPA-(Por)_4$	**933**	2H, $[Zn(II)]_3$			DCM	TBAP	SCE	1.28	0.98	0.73			-1.18	-1.55	-1.75	129
Indanyl-$[(Por)_2]_2$	**934**	Zn(II)			PhCN	TBAP	SCE	1.28	0.77	0.54			-1.43			150

Table 15. Porphyrin dendrimers, and oligimeric or polymeric porphyrins. (see structures in Figure 15)

Ring	Structure	Axial Ligand: Metal	L1	L2	Solvent	Salt	RE	Porphyrin Ox: Other Ox	2	1	Metal / Other	Porphyrin Red: 1	2	Other Red	Ref.
m-*m*-(Por)$_4$	**935**	[Zn(II)]$_4$			DCM	$TBAPF_6$	Ag/AgCl	1.30, 1.11	1.02	0.76		-1.34	-1.45		133
m-*m*-(Por)$_4$	**935**	[Zn(II)]$_4$			DCM	$TBAPF_6$	Fc/Fc^+	1.12, 0.80	0.58	0.34		-1.82	-1.99		455
m-*m*-(Por)$_5$	**936**	[Zn(II)]$_5$			DCM	$TBAPF_6$	Ag/AgCl	1.41	1.09	0.76		-1.34	-1.45		133
m-*m*-A-(Por)$_5$	**937**	[Zn(II)]$_5$			DCM	$TBAPF_6$	Ag/AgCl	1.01, 0.86, 1.20, 1.43,	0.66	0.56		-0.90	-1.08	-1.26, -1.34, -1.48	102
Nucleoside-(Por)$_5$	**938**	2H, [Zn(II)]$_4$			DCM	$TBAPF_6$	Fc/Fc^+		0.64	0.30		-1.88	-2.24		143
O-TPP-DPA-(Por)$_3$	**939**	H, O, [Zn(II)]$_3$			DCM	TBAP	SCE	1.23	0.92	0.72		-1.16	-1.54	-1.75	129
OxP-Bz-(Por)$_4$	**940**	2H, [Zn(II)]$_4$			DCB	TBAP	Fc/Fc^+			0.29		-1.37			71
OxP-Bz-(Por)$_4$	**941**	2H, [Zn(II)]$_4$			DCB	TBAP	Fc/Fc^+			0.29		-1.35			71
Pc-(Por)$_4$	**942**	Co(II)			DMSO	TBAP	Ag/AgCl	1.10	0.72	0.40		-0.30	-0.52	-0.73, -1.13, -1.36, -1.70	210
(PEG1)P	**943**	Zn(II)			DCM	TBAP	Ag/AgCl		1.08	0.81					270
(PEG1)P	**943**	Zn(II)			DMF	TBAP	Ag/AgCl					-1.22	-1.68		270
(PEG2)P	**944**	Zn(II)			DCM	TBAP	Ag/AgCl		1.08	0.82					270
(PEG2)P	**944**	Zn(II)			DMF	TBAP	Ag/AgCl					-1.37			270
(PEG3)P	**945**	Zn(II)			DCM	TBAP	Ag/AgCl			1.12*					270
(PEG3)P	**945**	Zn(II)			DMF	TBAP	Ag/AgCl					-1.55*			270
(PEG4)P	**946**	Zn(II)			DMF	TBAP	Ag/AgCl					-1.61*			270

Table 15. Porphyrin dendrimers, and oligimeric or polymeric porphyrins. (see structures in Figure 15)

Ring	Structure	Axial Ligand: Metal	L1	L2	Solvent	Salt	RE	Porphyrin Ox: Other Ox	2	1	Metal / Other	Porphyrin Red: 1	2	Other Red	Ref.
$(Por)_{12}$-gold nanocluster	**947**	$[2H]_{12}$			PhCN	$TBAPF_6$	SCE			0.94		-1.22			342
$(Por)_2$-DPA-$(Het\text{-}Por)_2$	**948**	Zn(II), 2H, H			DCM	TBAP	SCE	1.28, 1.02	0.97	0.72		-0.96	-1.10	-1.24, -1.41, -1.60	502
$(Por)_3$-DPA-$(Het\text{-}Por)_2$-1	**949**	H, O, 2S, $[Zn(II)]_3$			DCM	TBAP	SCE	1.24	0.91	0.72		-0.90	-1.29	-1.51, -1.74	129
$(Por)_3$-DPA-$(Het\text{-}Por)_2$-2	**950**	H, 3S, $[Zn(II)]_3$			DCM	TBAP	SCE	1.29	1.02	0.70		-0.92	-1.10	-1.22, -1.40, -1.64	129
$(Por)_4$-DPA-(Het-Por)	**951**	2H, 2S, $[Zn(II)]_3$			DCM	TBAP	SCE	1.31	1.03	0.72		-0.93	-1.18	-1.53, -1.75	129
$(Por)_4$-DPA-(Het-Por)	--	4S, $[Zn(II)]_3$			DCM	TBAP	SCE	1.25	0.98	0.72		-0.80	-1.03	-1.27, -1.56, -1.73	129
PPID-(Por)-4-mer	**952**	$[Zn(II)]_4$			DCM	$TBAPF_6$	Fc/Fc^+	1.00	0.70	0.30		-1.84			26
PPID-(Por)-12-mer	**953**	$[Zn(II)]_{16}$			DCM	$TBAPF_6$	Fc/Fc^+	0.90	0.63	0.29		-1.80	-2.18*		26
PPID-(Por)-12-mer	--	$[2H]_{16}$			DCM	$TBAPF_6$	Fc/Fc^+		0.76*	0.44		-1.79	-2.19		26
PPID-(Por)-32-mer	**954**	$[2H]_{32}$			DCM	$TBAPF_6$	Fc/Fc^+			0.41		-1.80	-2.13		26
PPID-(Por)-32-mer	--	$[Zn(II)]_{32}$			DCM	$TBAPF_6$	Fc/Fc^+	0.91	0.64	0.31		-1.79			26
PPID-(Por)-4-mer	**955**	$[2H]_4$			DCM	$TBAPF_6$	Fc/Fc^+	1.10*	0.72*	0.41		-1.78	-2.10		26
PPID-(Por)-64-mer	**956**	$[2H]_{64}$			DCM	$TBAPF_6$	Fc/Fc^+			0.43		-1.78	-2.11		26
PPID-(Por)-64-mer	--	$[Zn(II)]_{64}$			DCM	$TBAPF_6$	Fc/Fc^+	1.09*	0.76	0.30		-1.80			26
PPID-(Por)-8-mer	**957**	$[2H]_8$			DCM	$TBAPF_6$	Fc/Fc^+		0.76*	0.44		-1.77	-2.13		26
PPID-(Por)-8-mer	--	$[Zn(II)]_8$			DCM	$TBAPF_6$	Fc/Fc^+	0.90	0.63	0.30		-1.80			26

Table 15. Porphyrin dendrimers, and oligimeric or polymeric porphyrins. (see structures in Figure 15)

Ring	Structure	Axial Ligand: Metal	L1	L2	Solvent	Salt	RE	Porphyrin Ox: Other Ox	2	1	Metal / Other	Porphyrin Red: 1	2	Other Red	Ref.
S-TPP-DPA-$(Por)_3$	**958**	H, S, [Zn (II)]$_3$			DCM	TBAP	SCE	1.39	1.02	0.72		-1.02	-1.46	-1.69	129
S_2-TPP-DPA-$(Por)_3$	**959**	2S, [Zn (II)]$_3$			DCM	TBAP	SCE	1.38	1.01	0.71		-0.98	-1.22	-1.72	129
T(4-MPAP)P	**960**	Zn(II)			DCM	TBAP	Ag/AgCl	1.43, 1.00	0.73*	0.42*		-1.36	-1.84*		295
T(4'-DPAM)P-G1	**961**	Zn(II)			$CHCl_3$/ CH_3CN	TBAP	Fc/Fc^+			0.34					135
T(4'-DPAM)P-G1	**961**	Zn(II)			THF	TBAP	Fc/Fc^+					-1.19			135
T(4'-DPAM)P-G2	**962**	Zn(II)			$CHCl_3$/ CH_3CN	TBAP	Fc/Fc^+			0.33					135
T(4'-DPAM)P-G2	**962**	Zn(II)			THF	TBAP	Fc/Fc^+			0.39					135
T(4'-DPAM)P-G3	**963**	Zn(II)			$CHCl_3$/ CH_3CN	TBAP	Fc/Fc^+			0.32					135
T(4'-DPAM)P-G3	**963**	Zn(II)			THF	TBAP	Fc/Fc^+			0.37					135
T(4'-DPAM)P-G4	**964**	Zn(II)			$CHCl_3$/ CH_3CN	TBAP	Fc/Fc^+			0.26					135
T(4'-DPAM)P-G4	**964**	Zn(II)			THF	TBAP	Fc/Fc^+			0.34					135
T(DEG)P	**965**	Fe(III)			CH_3CN	$TBAPF_6$	SCE				-0.24				190
T(DEG)P	**965**	Fe(III)			DCM	$TBAPF_6$	SCE				-0.21				190
T(DEG)P	**965**	Fe(III)			H_2O	$TBAPF_6$	SCE				-0.29				190
T(TEG)P	**966**	Fe(III)			CH_3CN	$TBAPF_6$	SCE				-0.01				190
T(TEG)P	**966**	Fe(III)			DCM	$TBAPF_6$	SCE				0.08				190

Table 15. Porphyrin dendrimers, and oligimeric or polymeric porphyrins. (see structures in Figure 15)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red Other Red	Ref.
T(TEG)P	**966**	Fe(III)			H_2O	$TBAPF_6$	SCE			-0.25				190
T(TTEG)P	**967**	Fe(III)			CH_3CN	$TBAPF_6$	SCE			0.09				190
T(TTEG)P	**967**	Fe(III)			DCM	$TBAPF_6$	SCE			0.10				190
T(TTEG)P	**967**	Fe(III)			H_2O	$TBAPF_6$	SCE			0.09				190
$(TPP)_4$-graphene oxide	**968**	$[2H]_4$			DMF	$TBAPF_6$	SCE		0.68		-0.19*			473
Triphyne-$(Por)_6$	**969**	$[2H]_6$			THF	$TBAPF_6$	Fc/Fc^+		0.62*		-1.52	-1.74		546 (DPV)
Triphyne-$(Por)_6$-1	**970**	$[2H]_6$			THF	$TBAPF_6$	Fc/Fc^+		0.64*		-1.49	-1.70		546 (DPV)
Vn-DA-$(OEP)_4$	**971**	$[Ni(II)]_4$			DCM	NR	SCE	1.30	0.74 0.58					224

Table 16. Porphyrin metal sandwich complexes. (see structures in Figure 16)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red Other Red	Ref.
ATETMP-M-OEP	**972**	Ce(IV)			DCM	TBAP	SCE	1.90	0.91	0.35		-0.51	-0.87	-1.72	241 (CV/DPV)
[ATETMP]$_2$-(M)$_2$-Pc	**973**	[Eu(III)]$_2$			DCM	TBAP	SCE	1.31, 1.07, 0.87	0.65	0.50		-0.81	-0.91	-1.11, -1.28, -1.61	241 (CV/DPV)
(BTP)$_3$-(M)$_2$	**974**	[Ce(III)]$_2$			DCM	$TBAPF_6$	Ag/Ag^+	1.20	0.89*	0.39					529
[D($OC_{14}P$)P]$_2$-M	**975**	Ce(IV)			DCB	TBAP	Ag/AgCl		0.96	0.64		-0.29	-1.71		242
[D($OC_{14}P$)P]$_3$-(M)$_2$	**976**	[Ce(III)]$_2$			DCB	TBAP	Ag/AgCl		0.99	0.63		-1.26	-1.60	-1.94	242
[D(TMP)P]$_2$-M	**977**	Ce(IV)			DCM	$TBAPF_6$	Fc/Fc^+		0.61*	0.22*		-0.74*			541
[DTP]$_2$-M	**978**	Ce(IV)			DCM	$TBAPF_6$	Fc/Fc^+		0.53	0.14					541
[DTP]$_2$-M	**--**	Zr(IV)			DCM	$TBAPF_6$	Fc/Fc^+		0.43	0.00					541
[F_{10}D(PMP)P]$_2$-M	**979**	Ce(IV)			DCM	$TBAPF_6$	Fc/Fc^+		0.85*	0.49*		-0.44*			541
Nc-M-OEP	**980**	Ce(III)			DCM	TBAP	SCE	1.83, 1.55	0.71	0.20		-0.19	-1.45	-1.88	240 (CV/DPV)
Nc-M-TtBPP	**981**	Ce(IV)			DCM	TBAP	SCE	1.69, 1.46	0.84	0.30		-0.07	-1.38	-1.80, -1.93	240 (CV/DPV)
(NF-TPP)$_2$-M	**982**	Fe(II)			DCM	$TBAPF_6$	Fc/Fc^+			-0.24		-1.47			553
(OC_5P)P-(M)$_2$-[Pc(15C5)$_4$]$_2$	**983**	[Eu(III)]$_2$			DCM	TBAP	SCE	1.31, 1.11	0.66	0.22		-0.89	-1.27		245
OEP-M-OETAP	**984**	Zr(IV)			DCM	$TBAPF_6$	Ag/AgCl			0.24					375
[OEP]$_2$-(M)$_2$-Pc(CH_3)$_8$	**985**	[Eu(III)]$_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.12, 0.84	0.24	-0.19					239
[OEP]$_2$-M	**986**	Zr(IV)			DCM	$TBAPF_6$	Ag/AgCl			~0.00*					375

Table 16. Porphyrin metal sandwich complexes. (see structures in Figure 16)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red Other Red	Ref.
$(OETAP)_2$-M	**987**	Gd(III)			DCM	$TBAPF_6$	Ag/AgCl			0.65		0.11			375
$(OETAP)_2$-M	--	Lu(III)			DCM	$TBAPF_6$	Ag/AgCl			0.59		-0.04			375
Pc-M-T(ClP)P	**988**	Dy(III)			DCM	TBAP	SCE	1.71	1.41	0.68		0.18	-1.28	-1.70	492
Pc-M-T(ClP)P	--	Er(III)			DCM	TBAP	SCE	1.72	1.41	0.65		0.13	-1.32	-1.72	492
Pc-M-T(ClP)P	--	Eu(III)			DCM	TBAP	SCE	1.69	1.39	0.72		0.21	-1.28	-1.66	492 (CV/DPV)
Pc-M-T(ClP)P	--	Gd(III)			DCM	TBAP	SCE	1.71	1.42	0.73		0.22	-1.26	-1.66	492 (CV/DPV)
Pc-M-T(ClP)P	--	Ho(III)			DCM	TBAP	SCE	1.73	1.42	0.69		0.18	-1.28	-1.71	492 (CV/DPV)
Pc-M-T(ClP)P	--	La(III)			DCM	TBAP	SCE		1.37	0.80		0.30	-1.26	-1.74	492 (CV/DPV)
Pc-M-T(ClP)P	--	Lu(III)			DCM	TBAP	SCE	1.74	1.41	0.63		0.12	-1.32	-1.69	492 (CV/DPV)
Pc-M-T(ClP)P	--	Nd(III)			DCM	TBAP	SCE	1.61	1.41	0.77		0.29	-1.25	-1.66	492
Pc-M-T(ClP)P	--	Pr(III)			DCM	TBAP	SCE	1.59	1.36	0.80		0.27	-1.26	-1.72	492 (CV/DPV)
Pc-M-T(ClP)P	--	Sm(III)			DCM	TBAP	SCE	1.61	1.36	0.70		0.20	-1.35		492
Pc-M-T(ClP)P	--	Tb(III)			DCM	TBAP	SCE	1.71	1.42	0.72		0.21	-1.26	-1.71	492 (CV/DPV)
Pc-M-T(ClP)P	--	Tm(III)			DCM	TBAP	SCE	1.75	1.43	0.66		0.15	-1.30	-1.68	492 (CV/DPV)
Pc-M-T(ClP)P	--	Y(III)			DCM	TBAP	SCE	1.74	1.41	0.69		0.18	-1.28	-1.69	492 (CV/DPV)
Pc-M-T(ClP)P	--	Yb(III)			DCM	TBAP	SCE	1.77	1.43	0.66		0.17	-1.28	-1.69	492 (CV/DPV)

Table 16. Porphyrin metal sandwich complexes. (see structures in Figure 16)

Ring	Structure	Axial Ligand: Metal	L1	L2	Solvent	Salt	RE	Porphyrin Ox: Other Ox	2	1	Metal / Other	Porphyrin Red: 1	2	Other Red	Ref.
Pc-M-TPyP	**989**	Ce(IV)			DCM	TBAP	SCE	1.72	1.26	0.73		0.10	-1.24	-1.56, -1.85	240 (CV/DPV)
$[Pc(C_7)_8]_2$-$(M)_2$-OEP	**990**	$[Eu(III)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.15, 0.89	0.31	0.06					239
$[Pc(CH_3)_8]_2$-$(M)_2$-$T(C_5)P$	**991**	$[Eu(III)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.13, 0.82	0.35	-0.05					239
$[Pc(CH_3)_8]_2$-$(M)_2$-TC_5P	**992**	$[Eu(III)]_2$			*n*-BuCN	$TBAPF_6$	Fc/Fc^+	1.14, 0.79	0.33	-0.02					239
$[Pc(CH_3)_8]_2$-$(M)_2$-TPP	**993**	$[Eu(III)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.17, 0.89	0.43	-0.01					239
$[Pc(OC_8)_8]_2$-$(M)_2$-TTP	**994**	$[Eu(III)]_2$			*n*-BuCN	$TBAPF_6$	Fc/Fc^+		0.35	0.06		-1.17	-1.55		239
$[(Pc(tBu)_4)_4$-$(M)_4$-Por1]	**995**	$[Eu(III)]_4$			DCM	$TBAPF_6$	Ag/Ag^+	0.94, 0.55, 0.48, 1.05, ~1.28	0.07*	0.07*					495
$[Pc(tBu)_4]_2$-$(M)_2$-$T(C_5)P$	**996**	$[Eu(III)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.28, 0.94	0.47	0.04					239
$[Pc(tBu)_4]_2$-$(M)_2$-$T(C_5)P$	**997**	$[Eu(III)]_2$			*n*-BuCN	$TBAPF_6$	Ag/Ag^+	1.26, 0.89	0.45	0.09					495
$[Pc(tBu)_4]_2$-$(M)_2$-TTP	**998**	$[Eu(III)]_2$			*n*-BuCN	$TBAPF_6$	Fc/Fc^+	1.17, 0.93	0.46	0.27		-1.12	-1.44	-1.81	239
$[Pc(tBu)_4]_2$-$(M)_2$-TTP	**--**	$[Eu(III)]_2$			*n*-BuCN	$TBAPF_6$	Ag/Ag^+	1.01	0.56	0.13					495
$[Pc(tBu)_4]_2$-MM_1-TTP	**999**	Eu(III), Ce(III)			DCM	$TBAPF_6$	Ag/Ag^+	1.60, 1.25, 1.01	0.57	0.06					495
$[Pc(tBu)_4]_3$-$(M)_3$-TTP-M_1-Por2]	**1000**	$[Eu(III)]_3$, Ce(III)			DCM	$TBAPF_6$	Ag/Ag^+	~0.94, 0.61, 0.44, ~1.25, ~1.25	0.23	0.01					495
$[Pc(tBu)_4]_3$-$(M)_3M_1$-Por2]	**1001**	$[Eu(III)]_3$, Ce(III)			DCM	$TBAPF_6$	Ag/Ag^+	~0.58, ~0.58, ~0.99, ~0.99,	0.24	0.07					495
$[Pc(tBu)_4]_3$-$(M)_3M_1$-Por3]	**1002**	$[Eu(III)]_3$, Ce(III)			DCM	$TBAPF_6$	Ag/Ag^+	~0.58, ~0.58, ~0.99, ~0.99,	0.24	0.06					495
$[Pc(tBu)_4]_3$-$(M)_3M_1$-Por4]	**1003**	$[Eu(III)]_3$, Ce(III)			DCM	$TBAPF_6$	Ag/Ag^+	~0.60, ~0.60, ~1.01, ~1.01,	0.25	0.07					495

Table 16. Porphyrin metal sandwich complexes. (see structures in Figure 16)

Ring	Structure	Axial Ligand Metal	L1	L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	2	1	Metal / Other	Porphyrin Red 1	2	Other Red	Ref.
$(Pc)_2$-$(M)_2$-TtBPP	**1004**	$[Eu(III)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.29, 0.94	0.47	0.25		-1.14			239
$(Pc)_3$-M_1-$(M)_2$-T(ClP)P	**1005**	$[Y(III)]_2$, Cd(II)			DCM	TBAP	SCE	1.39*, 1.13*	0.68*	0.31*		-0.64*	-0.98*	-1.34*	552
$[Pc]_2$-$(M)_2$-DTPP	**1006**	$[Eu(III)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.31, 1.01	0.61	0.16					239
$[Pc]_2$-$(M)_2$-M_1-Pc-T(ClP)P	**1007**	$[Eu(III)]_2$, Cd(II)			DCM	TBAP	SCE	1.36*, 1.18*	0.70*	0.36*		-0.66*	-1.02*	-1.33*	552
$[Pc]_2$-$(M)_2$-T(ClP)P	**1008**	$[Eu(III)]_2$			DCM	$TBAPF_6$	SCE	1.56, 1.28	0.82	0.34		-0.78	-1.22	-1.65	268
$[Pc]_2$-$(M)_2$-T(OCH_3P)P	**1009**	$[Eu(III)]_2$			DCM	$TBAPF_6$	SCE	1.29, 1.03	0.72	0.30		-0.84	-1.23	-1.64	268
$[Pc]_2$-$(M)_2$-T(P_n)$_3$HMSAc	**1010**	$[Eu(III)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.32, 0.93	0.46	0.09					239
$[Pc]_2$-$(M)_2$-T(tBu)P	**1011**	$[Eu(III)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.29, 0.97	0.59	0.16					239
$[Pc]_2$-$(M)_2$-TC_5P	**1012**	$[Eu(III)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.31, 0.92	0.45	0.05		-1.02			239
$[Pc]_2$-$(M)_2$-TPP	**1013**	$[Eu(III)]_2$			DCM	$TBAPF_6$	SCE	1.51, 1.19	0.75	0.30		-0.83	-1.25	-1.68	268
$[Pc]_2$-$(M)_2$-TtBPP	**1014**	$[Eu(III)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.27, 0.95	0.58	0.13		-1.02			239
$[Pc]_2$-$(M)_2$-TtBPP	**1014**	$[Eu(III)]_2$			DCM	$TBAPF_6$	SCE	1.45, 1.13	0.74	0.31		-0.86	-1.27	-1.65	268
(Peryl)TBP-M-$Pc(OC_5)_4$	**1015**	Eu(III)			DCM	TBAP	SCE	1.98, 1.51	0.88	0.34	-0.59, -0.98	-1.34			480 (DPV)
$[T(C_{10})P]$-$(M)_2$-$[Pc(15C5)_4]_2$	**1016**	$[Eu(III)]_2$			DCM	TBAP	SCE	1.37, 1.04	0.60	0.20		-0.84	-1.23		245
$[T(C_5)P]_2$-$(M)_2$-Nc	**1017**	$[Eu(III)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.07, 0.78	0.35	-0.12					239
$[T(ClP)P]_2$-$(M)_2$-Pc	**1018**	$[Eu(III)]_2$			DCM	$TBAPF_6$	SCE	1.52, 1.26	0.94	0.57		-0.88	-1.37		268

Table 16. Porphyrin metal sandwich complexes. (see structures in Figure 16)

Ring	Structure	Axial Ligand: Metal	L1	L2	Solvent	Salt	RE	Porphyrin Ox: Other Ox	2	1	Metal / Other	Porphyrin Red: 1	2	Other Red	Ref.
$[T(OCH_3P)P]_2$-$(M)_2$-Pc	**1019**	$[Eu(III)]_2$			DCM	$TBAPF_6$	SCE	1.24 ,1.03	0.71	0.41		-0.98	-1.36		268
T(Pyrenyl)P-$(M)_2$-$(Pc)_2$	**1020**	$[Eu(III)]_2$			DCM	TBAP	SCE		0.97	0.51		-0.62	-1.01		116
T(Pyrenyl)P-M-Pc	**1021**	Eu(III)			DCM	TBAP	SCE			0.71		0.19	-0.85	-1.29	116
$(TBPP)_2$Pc-M-Pc	**1022**	$[Zn(II)]_2$, Eu(III)			DCM	TBAP	SCE	1.04, 0.77	0.59	0.16		-0.80	-1.06	-1.42	127 (DPV)
(TBPP)Pc-M-P-m	**1023**	Zn(II), Eu(III)			DCM	TBAP	SCE	1.30, 1.03, 0.73	0.54	0.13		-0.88	-1.10	-1.40, -1.57, -1.74	127
(TBPP)Pc-M-Pc-p	**1024**	Eu(III), Zn(II)			DCM	TBAP	SCE	1.31, 1.03, 0.74	0.55	0.12		-0.89	-1.13	-1.45, -1.59, -1.74	127
TC_5P-$(M)_2$-$[Pc(tBu)_4]_2$	**1025**	$[Eu(III)]_2$			*n*-BuCN	$TBAPF_6$	Fc/Fc^+	1.26, 0.89	0.45	0.09		-1.09	-1.51		239
$[TC_5P]_2$-$(M)_2$-Pc	**1026**	$[Eu(III)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.25, 0.85	0.44	0.02		-1.26			239
$[TC_5P]_2$-$(M)_2$-$Pc(CH_3)_8$	**1027**	$[Eu(III)]_2$			*n*-BuCN	$TBAPF_6$	Fc/Fc^+	1.16, 0.80	0.40	-0.03					239
$[TC_5P]_2$-$(M)_2$-$Pc(tBu)_4$	**1028**	$[Eu(III)]_2$			*n*-BuCN	$TBAPF_6$	Fc/Fc^+	1.21, 0.85	0.44	0.03		-1.29	-1.77		239
TPP-$(M)_2$-$[Pc(15C5)_4]_2$	**1029**	$[Eu(III)]_2$			DCM	$TBAPF_6$	SCE	1.25, 0.96	0.39	-0.05		-1.19			458 (CV/DPV)
TPP-M-$Pc(15C5)_4$	**1030**	Eu(IV)			DCM	$TBAPF_6$	SCE	1.16	0.84	0.27		-0.21	-1.47		458 (CV/DPV)
$(TPP)_2$-$(M)_2$-Pc	**1031**	$[Eu(III)]_2$			DCM	$TBAPF_6$	SCE	1.49, 1.20	0.85	0.47		-0.95	-1.40		268
$(TPP)_2$-$(M)_2$-$Pc(15C5)_4$	**1032**	$[Eu(III)]_2$			DCM	$TBAPF_6$	SCE	1.16, 0.88	0.54	0.20		-1.27	-1.52		458 (CV/DPV)
$(TPP)_2$-$(M)_2$-$Pc(CH_3)_8$	**1033**	$[Eu(III)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.20, 0.97	0.61	0.15					239
(TriTP-C_{10}-TriTP)-M	**1034**	Ce(IV)			DCM	$TBAPF_6$	SCE		1.02	0.63	-0.31				265

Table 16. Porphyrin metal sandwich complexes. (see structures in Figure 16)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red Other Red	Ref.
(TriTP-C_{11}-TriTP)-M	**1035**	Ce(IV)			DCM	$TBAPF_6$	SCE		1.02	0.63					265
$(TriTP)_2$-C_8)-M	**1036**	Ce(IV)			DCM	$TBAPF_6$	SCE		1.00	0.61	-0.30				265
$(TriTP)_2$-C_9)-M	**1037**	Ce(IV)			DCM	$TBAPF_6$	SCE		1.02	0.63	-0.30				265
$[TtBPP]_2$-$(M)_2$-Pc	**1038**	$[Eu(III)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.20, 0.93	0.62	0.22		-1.21			239
$[TtBPP]_2$-$(M)_2$-Pc	**1038**	$[Eu(III)]_2$			DCM	$TBAPF_6$	SCE	1.40, 1.12	0.79	0.40		-1.03	-1.47		268
TtBuAPP-M-$Pc(OC_5)_4$	**1039**	Eu(III)			DCM	TBAP	SCE	1.99, 1.67	0.98	0.43		-0.89	-1.70		480 (DPV)
TTP-$(M)_2$-$(Pc)_2$	**1040**	$[Eu(III)]_2$			*n*-BuCN	$TBAPF_6$	Fc/Fc^+	1.29, 1.01	0.62	0.23		-0.91	-1.37	-1.85	239
TTP-M-$Pc(tBu)_4$-M_1-B(TEPS)P	**1041**	Eu(III), Ce(III)			DCM	$TBAPF_6$	Ag/Ag^+	1.48, 1.24, 1.00, 1.68	0.64	0.24					495
$(TTP)_2$-$(M)_2$-Pc	**1042**	$[Eu(III)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.18, 0.93	0.61	0.19					239
$(TTP)_2$-$(M)_2$-$Pc(OC_8)_8$	**1043**	$[Eu(III)]_2$			*n*-BuCN	$TBAPF_6$	Fc/Fc^+	1.12, 0.91	0.53	0.19		-1.21	-1.68		239
$(TTP)_2$-M	**1044**	Ce(IV)			DCM	$TBAPF_6$	SCE		1.00	0.62	-0.29				265
α-$(TTP)_2$-$(M)_2$-$Pc(tBu)_4$	**1045**	$[Eu(III)]_2$			*n*-BuCN	$TBAPF_6$	Fc/Fc^+	1.27, 0.98	0.62	0.26		-1.16	-1.65		239
α-TTP-$(M)_2$-$[Pc(tBu)_4]_2$	**1046**	$[Eu(III)]_2$			*n*-BuCN	$TBAPF_6$	Fc/Fc^+	1.01	0.56	0.13		-1.03	-1.51		239
β-$(TTP)_2$-$(M)_2$-$Pc(tBu)_4$	**1047**	$[Ce(III)]_2$			DCM	$TBAPF_6$	Ag/Ag^+	1.42, 1.17, 0.93, 1.70	0.67	0.26					495
β-$(TTP)_2$-$(M)_2$-$Pc(tBu)_4$	--	$[Eu(III)]_2$			*n*-BuCN	$TBAPF_6$	Ag/Ag^+	1.27, 0.98	0.62	0.26					495

Table 17a. A_3B *meso*-substituted porphyrins. (see structures in Figure 17a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
(15C5P)BDBTriTP	**1048**	Zn(II)			PhCN	TBAP	Fc/Fc^+		0.58	0.25	0.78	-1.64	-1.90		545
2'-OQTriPP	**1049**	2H			DCM	TBAP	SCE		1.36	1.18	-0.22				453
2'-PerynylPATriMP	**1050**	Zn(II)			*n*-BuCN	$TBAPF_6$	Ag/Ag^+		0.96*	0.51*		-1.20	-1.76*		388
3'-FTZ3'-PTBPP	**1051**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.67	0.30		-1.84	-2.15		365
3'-ImPTriTP	**1052**	2H			DCB	TBAP	Fc/Fc^+			0.56		-1.72			109
3'-OQTriPP	**1053**	2H			DCM	TBAP	SCE		1.35	1.17	-0.36				453
3'-PATBPP	**1054**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.68	0.32		-1.87	-2.22		365
3'-PerynylPATriMP	**1055**	Zn(II)			*n*-BuCN	$TBAPF_6$	Ag/Ag^+		0.96*	0.52*		-1.19	-1.73*		388
3'-PyTriBPP	**1056**	2H			DCM	$TBAPF_6$	Fc/Fc^+		1.14	0.83		-1.35	-1.69		261
4'-FTZ-3'-PTBPP	**1057**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.65	0.30		-1.86	-2.10		365
4'-FTZ-4'-PTBPP	**1058**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.67	0.31		-1.85	-2.09	-2.24	365
4'-FTZ-4'-PTBPP	**1058**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.66	0.33		-1.81	-2.18		365
4'-PATBPP	**1059**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.69	0.29		-1.87	-2.22		365
4'-PerynylPATriMP-3	**1060**	Zn(II)			*n*-BuCN	$TBAPF_6$	Ag/Ag^+		0.96*	0.52*		-1.13	-1.57		388
4'-PyTriBPP	**1061**	2H			DCM	$TBAPF_6$	Fc/Fc^+		1.31*	0.90		-1.65	-1.29		261
AcPTBPP	**1062**	2H			PhCN	$TBAPF_6$	SCE			0.94		-1.22			342

Table 17a. A_3B *meso*-substituted porphyrins. (see structures in Figure 17a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
ADPTriTP	**1063**	2H			DCM	$TBAPF_6$	Fc/Fc^+		0.83	0.55		-1.65	-2.00*		19
AmPTBPP	**1064**	2H			THF	TBAP	Ag/Ag^+		1.23	0.98		-1.57	-1.91		537
AmPTBPP	--	Zn(II)			THF	TBAP	Ag/Ag^+		0.93	0.70		-1.80	-2.18		537
APrTriTP	**1065**	2H			DCM	TBAP	SCE		1.32	0.96		-1.19	-1.53		415
APTriCMPP	**1066**	2H			DCM	TBAP	$Ag/AgNO_3$			0.85		-1.50	-1.81		524
APTriMP	**1067**	2H			DCM	$TBAPF_6$	Fc/Fc^+			0.71		-1.61			427
APTriMP	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.59		-1.76			427
APTriPP	**1068**	2H			DMF	TEAP	Ag/Ag^+		0.70	0.43		-1.49	-2.00		126
APTriPP	--	Mo(VI)	O^{2-}	O^{2-}	DMF	TEAP	Ag/Ag^+			0.51	-0.43	-1.16	-1.46	-1.86	126
APTriPP	--	Zn(II)			DMF	TEAP	Ag/Ag^+		0.48	0.26		-1.45	-1.81		126
APTriTP	--	2H			DCM	TBAP	SCE		1.40	1.00		-1.18	-1.54		113
APTriTP	--	Zn(II)			DCM	TBAP	SCE		1.08	0.78		-1.26	-1.56		113
APTriTP	--	2H			DCM	$TBAPF_6$	SCE			0.91		-1.19			377
APTriTP	--	Zn(II)			DCM	TBAP	SCE		1.08	0.77		-1.35	-1.71		129
APTriTP	--	Zn(II)			DCM	TBAP	SCE		1.11	0.77		-1.35	-1.73		502
AZTBPP	**1069**	Ni(II)			PhCN	NR	Fc/Fc^+			0.65		-1.62			517

Table 17a. A_3B *meso*-substituted porphyrins. (see structures in Figure 17a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
BDFTAtriPP	**1070**	2H			DCM	$TBAPF_6$	Fc/Fc^+		0.76	0.52	0.76, -1.70	-1.70	-2.09		566
BDFTAtriPP	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.71	0.35	0.71, -1.65	-1.80			566
BDP-TTP	**1071**	2H			DCM	TBAP	SCE		1.44	1.01	-0.86	-1.15	-1.57		570
(Benzoyl)TriTP	**1072**	Mn(III)	Cl^-		CH_3OH/H_2O	NaCl	Ag/AgCl				-0.33				3
(Benzoyl)TriTP	**1072**	Mn(III)	Cl^-		CH_3OH/H_2O	NaCl	NHE				-0.23				3
BODPITriTP	**1073**	2H			DCM	TBAP	SCE		1.57	1.11	-0.59	-1.09	-1.43		471
BODPITriTP	--	Zn(II)			DCM	TBAP	SCE		1.21	0.91	-0.52	-1.18	-1.57		471
BQADCPTBPP	**1074**	Zn(II)			PhCN	$TBAPF_6$	SCE			0.79	-0.37				339
BQAHCPTBPP	**1075**	Zn(II)			PhCN	$TBAPF_6$	SCE			0.79	-0.38				339
BQAPrCPTBPP	**1076**	Zn(II)			PhCN	$TBAPF_6$	SCE			0.79	-0.40				339
BQCAPTBPP	**1077**	Zn(II)			PhCN	$TBAPF_6$	SCE			0.77	-0.17				339
BQCPTBPP	**1078**	Zn(II)			PhCN	$TBAPF_6$	SCE			0.78	-0.36				339
BQMACPTBPP	**1079**	Zn(II)			PhCN	$TBAPF_6$	SCE			0.77	-0.46				339
BQTDPAPP	**1080**	Zn(II)			PhCN	TBAP	Ag/AgCl		0.49	0.29	0.72, -0.81 -0.93	-1.80	-2.01		350 (DPV)
BQTriPP	**1081**	Zn(II)			PhCN	TBAP	Fc/Fc^+					-0.85			350 (DPV)
BQTriPP.DHQ	**1082**	2H			PhCN	TBAP	SCE			1.01	-0.51, -0.93	-1.41	-1.83*		355

Table 17a. A_3B *meso*-substituted porphyrins. (see structures in Figure 17a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
BQTriPP.HQ	**1083**	2H			PhCN	TBAP	Fc/Fc^+		0.83	0.63	-0.89, -1.44	-1.71	-2.05		472
BQTriPP.HQ	--	Zn(II)			PhCN	TBAP	Fc/Fc^+		0.70	0.38	-0.85, -1.45	-2.10			472
(BTC_5)TriTP	**1084**	2H			DCM	$TBAPF_6$	Fc/Fc^+	1.10	0.85	0.44		-1.71	-2.03		497
(BTC_5)TriTP	--	Co(II)			DCM	$TBAPF_6$	Fc/Fc^+	1.34	0.75	0.51	0.34, -1.44	-1.95			497
(BTC_5)TriTP	--	Fe(III)	Cl^-		DCM	$TBAPF_6$	Fc/Fc^+	1.24	0.98	0.55	-0.87	-1.60			497
(BTC_5)TriTP	--	Mn(III)	Cl^-		DCM	$TBAPF_6$	Fc/Fc^+	1.28	1.06	0.63	-0.81, 0.90	-2.14			497
(BTC_5)TriTP	--	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+	1.29	0.84	0.50		-1.81			497
(BTC_5)TriTP	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+	0.76, 1.31	0.50	0.23	0.96	-1.92			497
(BTPn)TriTP	**1085**	2H			DCM	$TBAPF_6$	Fc/Fc^+	1.10	0.85	0.44		-1.71	-2.03		110
(BTPn)TriTP	--	Co(II)			DCM	$TBAPF_6$	Fc/Fc^+	1.34	0.75	0.51	0.34, -1.44	-1.95			110
(BTPn)TriTP	--	Fe(III)	Cl^-		DCM	$TBAPF_6$	Fc/Fc^+	1.24	0.98	0.55	-0.86	-1.60			110
(BTPn)TriTP	--	Mn(III)	Cl^-		DCM	$TBAPF_6$	Fc/Fc^+	1.28	1.06	0.63	-0.81	-2.14			110
(BTPn)TriTP	--	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+	1.29	0.84	0.50		-1.81			110
(BTPn)TriTP	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+	0.76	0.50	0.23		-1.92			110
CACTriTP	**1086**	Zn(II)			*n*-BuCN	$TBAPF_6$	Fc/Fc^+			0.65		-1.21			424
CAHTPTriPP	**1087**	Ga(III)	SCN		DMF	TBAP	NHE			0.99		-1.36			521

Table 17a. A_3B *meso*-substituted porphyrins. (see structures in Figure 17a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
CAHTPTriPP	--	Mn(III)	NCS^-		DMF	TBAP	NHE			0.93		-1.26			521
CATBPP	**1088**	Zn(II)			THF (-20°C)	$TBAPF_6$	Ag/AgCl			1.03		-1.21*			132
CMEPTriTP	**1089**	Zn(II)			DCM	$TBAPF_6$	SCE			0.79		-1.27			377
CPATBPP	**1090**	Zn(II)			THF	TBAP	SCE					-1.15			285
CPATBPP	**1090**	Zn(II)			THF	TBAP	SCE				-1.51*	-1.13	-1.36		285
CPATBPP	**1090**	Zn(II)			THF	$TBAPF_6$	NHE		1.48*	1.04		-1.36*			299
CPATBPP	**1090**	Zn(II)			THF (-20°C)	$TBAPF_6$	Ag/AgCl			1.00		-1.19			132
CPPTBPP	**1090**	Zn(II)			THF	TBAP	SCE					-1.16			285
CPPTBPP	**1090**	Zn(II)			THF	TBAP	SCE				-0.92, -1.33	-0.85	-1.10		285
CPTBPP	**1091**	Zn(II)			THF (-20°C)	$TBAPF_6$	Ag/AgCl			0.96		-1.36			132
CPTNPP	**1092**	2H			DCM	$TBABF_4$	Ag/AgCl					-1.11	-1.44		192
CPTNPP	--	Fe(III)			DCM	$TBABF_4$	Ag/AgCl				-0.26, -0.83	-1.04	-1.47		192
CPTriMP	**1093**	Zn(II)			DCM	$TBAPF_6$	NHE			1.00		-1.33			87
CPTriPP	**1094**	Co(II)			DMF	$TBAPF_6$	SCE				-0.73				384
CPTriPP	**1094**	Co(II)			DMF	$TBAPF_6$	Ag/AgCl				-0.68				384
CPTriPP	--	Zn(II)			DMF	$TBAPF_6$	$Ag/AgPF_6$		0.70	0.52		-1.69	-2.25		507

Table 17a. A_3B *meso*-substituted porphyrins. (see structures in Figure 17a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
CPTriPP	--	2H			DMF	TBAP	SCE			0.71*		-1.50	-1.94		247
CPTriPP	--	Zn(II)			DMF	TBAP	SCE		0.68	0.47		-1.76	-2.18		247
CPTriTP	--	2H			DCM	$TBAPF_6$	SCE			0.97		-1.18			377
CPTriTP	--	Zn(II)			DCM	$TBAPF_6$	SCE			0.82					377
CPTTBPP	**1095**	Zn(II)			THF	TBAP	SCE				-1.13	-0.99	-1.15		285
CTriBPP	**1096**	2H			DCM	$TBAPF_6$	SCE			1.06		-0.79			11
DAPTBPP	**1097**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.65	0.35		-1.86	-2.25*		139
DBOQTriPP	**1098**	2H			DCM	TBAP	SCE			1.16	-0.52	-1.27			453
DBOQTriPP	--	Zn(II)			DCM	TBAP	SCE			0.82	-0.58				453
DCNPPTriPP	**1099**	Co(II)			H_2O	TBAP	Ag/AgCl				-0.07				187
DCPATBPP	**1100**	Zn(II)			THF (-20°C)	$TBAPF_6$	Ag/AgCl			1.05*		-1.24			132
DCPATriTP	**1101**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.57					424
DCPATriTP	**1102**	Zn(II)			*n*-BuCN	$TBAPF_6$	Fc/Fc^+					-1.62			424
DCPPTriPP	**1103**	2H			DMSO	TBAP	Ag/AgCl					-0.74	-1.15	-1.29	210
DCPPTriPP	--	Co(II)			DMSO	TBAP	Ag/AgCl			1.06	0.44, -0.55	-1.30	-1.62		210
DCPPTriPP	--	Fe(III)	Cl^-		DMSO	TBAP	Ag/AgCl			0.20	-0.85, -1.35				187

Table 17a. A_3B *meso*-substituted porphyrins. (see structures in Figure 17a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
DCPPTriPP	--	Fe(III)	Cl^-		H_2O	TBAP	Ag/AgCl				-0.34				187
DCPTMPP	**1104**	Fe(III)	1-(CH_3)	1-(CH_3)	DMF	TBAP	SCE				-0.10				589
DCPTMPP	**1104**	Fe(III)	Cl^-		DMF	TBAP	SCE				-0.07				589
DCTAtriPP	**1105**	2H			DCM	$TBAPF_6$	Fc/Fc^+			0.51	0.79	-1.71	-2.07		566
DCTAtriPP	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.68	0.37		-1.82			566
DDPTriPP	**1106**	2H			DMF	TBAP	Ag/Ag^+					-1.59	-2.10		528
DDTTriPP	**1106**	2H			DCB	$TBAPF_6$	Fc/Fc^+			0.48	0.22, -1.56	-1.62			410 (SWV)
DHPTriPP	**1107**	Zn(II)			PhCN	TBAP	SCE		1.21	0.89					4
DHPTriPP.BQ	**1108**	2H			PhCN	TBAP	Fc/Fc^+		0.85	0.66	0.48*	-1.64	-2.00		472
DHPTriPP.BQ	--	Zn(II)			PhCN	TBAP	Fc/Fc^+		0.72	0.40	0.34	-1.81	-2.09		472
DMCPATriTP	**1109**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.50					424
DMCPATriTP	**1109**	Zn(II)			*n*-BuCN	$TBAPF_6$	Fc/Fc^+					-1.62			424
DMOQTriPP	**1110**	2H			DCM	TBAP	SCE		1.31	1.13	-0.27	-1.25			453
$DMXBrF_{15}TriPP$	**1111**	Co(II)			CH_3CN	$TBAPF_6$	Fc/Fc^+				-1.10	-2.14			371
$DMXBrF_{15}TriPP$	--	Zn(II)			CH_3CN	$TBAPF_6$	Fc/Fc^+					-1.52	-1.92		371
$DMXCF_{15}TriPP$	**1112**	Co(II)			CH_3CN	$TBAPF_6$	Fc/Fc^+				-1.08	-1.94*			371

Table 17a. A_3B *meso*-substituted porphyrins. (see structures in Figure 17a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
DPANTriPP	**1113**	2H			THF	TBAP	Fc/Fc^+			0.38		-1.73			499
DPAPTPnP	**1114**	Zn(II)			DCM	TBAP	SCE			0.69					86
DPSAcTriPP	**1115**	Zn(II)			DCM/EtOH	$TBAPF_6$	Ag/Ag^+		0.69	0.47					436
EtBrPTriTP	**1116**	2H			DCM	TBAP	SCE		1.17	0.95					30
EtBrPTriTP	**1116**	2H			DMF	TBAP	SCE					-1.02	-1.47		30
EtBrPTriTP	--	Zn(II)			DCM	TBAP	SCE		1.06	0.75					30
EtBrPTriTP	--	Zn(II)			DMF	TBAP	SCE					-1.30	-1.70		30
F_{15}APTriPP	**1117**	2H			H_2O/DCE	$TBAPF_6$	NHE		1.57	1.30		-0.76			536
F_{15}PyTriPP	**1118**	2H			DMF	TBAP	SHE					-0.60			510
F_{15}TMCXTriPP	**1119**	Co(II)			CH_3CN	$TBAPF_6$	Fc/Fc^+				0.48*, -1.20				547
F_5PTriPyP	**1120**	2H			CH_3CN	$TBAPF_6$	Ag/AgCl			>1.0		-0.89			248
F_5PTriPyP	**1120**	2H			CH_3CN	$TBAPF_6$	Ag/AgCl			1.40*		-0.78			366
F_5PTriPyP	**1120**	2H			DMF	TBAP	SHE					-0.78	-1.24		510
F_5PTriPyP	**1120**	2H			DMF	$TBAPF_6$	Ag/AgCl					-0.79			111
F_5PTriPyP	--	Cu(II)			DMF	$TBAPF_6$	Ag/AgCl			0.52		-0.91			111
F_6TPP-tmpa	**1121**	Fe(III)	Cl^-		CH_3CN	$TBAPF_6$	Fc/Fc^+				-0.56				183

Table 17a. A_3B *meso*-substituted porphyrins. (see structures in Figure 17a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
F_6TPP-tmpa	**1121**	Fe(II)			CH_3CN	$TBAPF_6$	Fc/Fc^+				-0.17				183
FPTAPTriPP	**1122**	Zn(II)			DCB	TBAP	Fc/Fc^+			0.24		-1.92			288
FPTriMP	**1123**	Zn(II)			DCM	$TBAPF_6$	Ag/Ag^+		0.91	0.60					12
FTMPP	**1124**	Fe(III)	1-(CH_3)	1-(CH_3)	DMF	TBAP	SCE				-0.11				589
FTMPP	**1124**	Fe(III)	Cl^-		DMF	TBAP	SCE				-0.07				589
FTriTP	**1125**	2H			DCM	TBAP	SCE		1.33	0.95		-1.16	-1.52		498
HDPTriPP	**1126**	2H			DMF	TBAP	Ag/Ag^+					-1.58	-2.07		528
HPTBPP	**1127**	Zn(II)			DCM	TBAP	SCE	1.27, 1.55	1.02	0.72		-0.89	-1.66	-1.88	127
HPTriPP	**1128**	2H			DMF	TBAP	Ag/Ag^+			0.65*		-1.50	-1.95		14
HPTriPP	--	Co(II)			DMF	TBAP	Ag/Ag^+			0.64*	0.03*,-1.23	-1.64			14
HPTriPP	--	Cu(II)			DMF	TBAP	Ag/Ag^+			0.57*		-1.59	-2.11		14
HPTriPP	--	Fe(III)	Cl^-		DMF	TBAP	Ag/Ag^+			0.49*	-0.58	-1.48	-1.85		14
HPTriPP	--	Mn(III)	Cl^-		DMF	TBAP	Ag/Ag^+			0.75*	-0.62	-1.73	-2.04		14
HPTriPP	--	Ni(II)			DMF	TBAP	Ag/Ag^+			0.60*		-1.60	-2.17		14
HPTriPP	--	Zn(II)			DMF	TBAP	Ag/Ag^+			0.44*		-1.77	-2.18		14
HPTTP	**1129**	2H			DCM	TBAP	SCE		1.30	0.94		-1.24	-1.64*		56

Table 17a. A_3B *meso*-substituted porphyrins. (see structures in Figure 17a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
(ImP)TriPP	**1130**	2H			DCB	TBAP	Fc/Fc^+			0.55		-1.67	-2.02		109
(ImP)TriTP	**1130**	2H			DCB	TBAP	Fc/Fc^+			0.51		-1.72			109
MCPTriPP	**1131**	2H			DMF	TBAP	SCE			0.72		-1.47	-1.92		82
MCPTriPP	**--**	Zn(II)			DMF	TBAP	SCE			0.43		-1.78	-2.23		82
MEPTriPP	**1132**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.64	0.31		-1.88	-2.29*		158
MMEPTriPP	**1133**	Co(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.85	0.60	0.35, -1.34	-1.80*			211
MMEPTriPP	**1133**	Co(II)			PhCN	$TBAPF_6$	Fc/Fc^+	0.99	0.71	-0.21*	0.09*, -1.34				211
MOQTriPP	**1134**	2H			DCM	TBAP	SCE			1.13	-0.23				453
MOQTriPP	**--**	Zn(II)			DCM	TBAP	SCE		1.18	0.88	-0.42				453
(NH_2P)TriPP	**1135**	2H			DMF	TBAP	SCE			0.70		-1.49	-2.00		82
(NicBu)TPP	**1136**	2H			DCM	TBAP	Ag/Ag^+		0.95*	0.71		-1.55	-1.86		98
(Nicdecyl)TPP	**1137**	2H			DCM	TBAP	Ag/Ag^+		1.19	0.71		-1.55	-1.90		98
(NicDecyl)TriCPP	**1138**	2H			DCM	TBAP	Ag/Ag^+		1.14*	0.77		-1.38	-1.76		119
(NicDecyl)TriMPP	**1139**	2H			DCM	TBAP	Ag/Ag^+		0.81	0.65		-1.56	-1.88		119
(NicDecyl)TriPP	**1140**	2H			DCM	TBAP	Ag/Ag^+		1.19*	0.71		-1.54	-1.90		119
(NicEt)TPP	**1141**	2H			DCM	TBAP	Ag/Ag^+		0.97*	0.72		-1.53	-1.88		98

Table 17a. A_3B *meso*-substituted porphyrins. (see structures in Figure 17a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
(NicH)TPP	**1142**	2H			DCM	TBAP	Ag/Ag^+		0.94*	0.70		-1.54	-1.87		98
(NicHex)TriPP	**1143**	2H			DCM	TBAP	Ag/Ag^+		0.94	0.71		-1.54	-1.87		557
(NicHex)TriPP	--	Cu(II)			DCM	TBAP	Ag/Ag^+		0.92	0.67		-1.64			557
(NicHex)TriPP	--	Fe(III)	Cl^-		DCM	TBAP	Ag/Ag^+		1.08	0.75	-0.51	-1.38			557
(NicHex)TriPP	--	Mn(III)	Cl^-		DCM	TBAP	Ag/Ag^+		1.17	0.83	-0.76	-1.48			557
(NicHex)TriPP	--	Ni(II)			DCM	TBAP	Ag/Ag^+		0.87	0.72		-1.60			557
(NicHex)TriPP	--	Zn(II)			DCM	TBAP	Ag/Ag^+		0.81	0.46		-1.42			557
(NicPn)TPP	**1144**	2H			DCM	TBAP	Ag/Ag^+		0.94*	0.71		-1.54	-1.90		98
(NicPr)TPP	**1145**	2H			DCM	TBAP	Ag/Ag^+		1.03*	0.78		-1.51	-1.86		98
(NicPr)TPP	**1145**	2H			DMF	TBAP	Ag/Ag^+			0.71		-1.50	-1.83		98
(NicPr)TPP	--	Mn(III)	Cl^-		DMF	TBAP	Ag/Ag^+				-0.64	-1.73	-2.41*		98
(NicPr)TPP	--	Zn(II)			DMF	TBAP	Ag/Ag^+			0.43		-1.74	-2.14		98
NPTriPP	**1146**	2H			DMF	TBAP	Ag/Ag^+					-1.70	-2.27		527
(O-Samag)-DPATriTP	**1147**	Zn(II)			DCM	TBAP	SCE		1.09	0.78	0.37, 0.78, -0.83, -1.16 -1.49	-1.16	-1.67		306
(O-Sapp)-DPATriTP	**1148**	2H			DCM	TBAP	SCE		1.43	1.00	0.58, 0.33 -1.16, -1.67	-1.16	-1.49		306
OPDPyTriPP	**1149**	2H			THF	TBAP	Fc/Fc^+				-0.14	-1.68			293 (DPV)

Table 17a. A_3B *meso*-substituted porphyrins. (see structures in Figure 17a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
OPDPyTriPP	--	Zn(II)			THF	TBAP	Fc/Fc^+				-0.14	-1.93			293
OPDTPyTriPP	**1150**	2H			THF	TBAP	Fc/Fc^+				-0.14	-1.68			293
OPDTPyTriPP	--	Zn(II)			THF	TBAP	Fc/Fc^+				-0.15	-1.90			293
OPTriPP	**1151**	2H			DMF	TBAP	$Ag/AgNO_3$			0.63		-1.46			501
OPTriPP	--	Co(II)			DMF	TBAP	$Ag/AgNO_3$			0.73	-0.12, -1.21				501
OPTriPP	--	Cu(II)			DMF	TBAP	$Ag/AgNO_3$		0.79	0.37		-1.58			501
OPTriPP	--	Mn(III)	Cl^-		DMF	TBAP	$Ag/AgNO_3$				-0.59	-1.73			501
OPTriPP	--	Ni(II)			DMF	TBAP	$Ag/AgNO_3$		0.56	0.39		-1.58			501
OPTriPP	--	Zn(II)			DMF	TBAP	$Ag/AgNO_3$			0.67					501
OTTriPP	**1152**	2H			DCB	$TBAPF_6$	Fc/Fc^+			0.55	0.32, -1.58	-1.60			410 (SWV)
PATriPP	**1153**	Zn(II)			CH_3CN	$TBAPF_6$	Ag/Ag^+			0.55		-1.45			39
PBETriTP	**1154**	2H			DCM	TBAP	SCE		1.05	0.75		-1.33*	-1.61*		305
PBETriTP	--	Zn(II)			DCM	TBAP	SCE		1.34*	1.20		-1.19	-1.40		305
PDAPTriMPP	**1155**	Mn(II)			CH_3CN	$TBAPF_6$	Ag/AgCl			1.20*					172
PerynylDPATMP	**1156**	Zn(II)			*n*-BuCN	$TBAPF_6$	Ag/Ag^+		0.90	0.52	1.40, -0.77 -1.06	-1.71	-2.12		413 (SWV)
PerynylPATriMP	**1157**	Zn(II)			*n*-BuCN	$TBAPF_6$	Ag/Ag^+		0.88	0.50		-1.14	-1.60		388

Table 17a. A_3B *meso*-substituted porphyrins. (see structures in Figure 17a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
PerynylPATriMP-1	**1158**	Zn(II)			*n*-BuCN	$TBAPF_6$	Ag/Ag^+		1.08	0.52		-1.19	-1.81*		388
PerynylPATriMP-2	**1159**	Zn(II)			*n*-BuCN	$TBAPF_6$	Ag/Ag^+		0.96*	0.52*		-1.19	-1.73*		388
PerynylPATriMP-4	**1160**	Zn(II)			*n*-BuCN	$TBAPF_6$	Ag/Ag^+	1.19	0.92*	0.52*		-1.30	-1.76*		388
PerynylPTBPP	**1161**	2H			DCM	TBAP	SCE	1.58	1.31	0.96	-0.72, -0.88	-1.20	-1.56		480 (DPV)
Phen4QTriPP	**1162**	2H			DCM	TBAP	SCE		1.32	1.12	-0.55				519
Phen4QTriPP	--	Zn(II)			DCM	TBAP	SCE		1.36	0.86	-0.55	-1.25			519
Phen4QTriPP	--	Zn(II)			DMF	TBAP	SCE			0.92	-0.59				519
Phen4QTriPP	--	Zn(II)			DMF	TBAP	SCE			0.92	-0.52				519
Phen4QTriPP	--	Zn(II)			DMF	TBAP	SCE			0.92	-0.49				519
Phen4QTriPP	--	Zn(II)			DMF	TBAP	SCE		1.14	0.92	-0.31				519
PhenQTriPP	**1163**	2H			DCM	TBAP	SCE			1.04	-0.58				519
PhenQTriPP	**1163**	2H			DMF	TBAP	SCE			1.02	-0.57				519
PhenQTriPP	**1163**	2H			DMF	TBAP	SCE			1.07	-0.52				519
PhenQTriPP	**1163**	2H			DMF	TBAP	SCE			1.03	-0.46				519
PhenQTriPP	--	Zn(II)			DCM	TBAP	SCE		1.13	0.82	-0.60				519
PrCEPTBPP	**1164**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.60	0.35		-1.76	-2.18		143

Table 17a. A_3B *meso*-substituted porphyrins. (see structures in Figure 17a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
PyTriPP	**1165**	2H			DCM	$TBABF_4$ (0.2M)	SCE			1.16*		-1.05	-1.40		156
PyTriPP	--	Zn(II)			DCM	$TBABF_4$ (0.2M)	SCE	1.52*	1.24*	0.94*		-1.26	-1.55*		156
QTriPP	**1166**	Zn(II)			PhCN	TBAP	SCE					-0.51			4
QTTriPP	**1167**	2H			DCB	$TBAPF_6$	Fc/Fc^+			0.66	-0.45, -1.59	-1.56			410 (SWV)
(S_3-Sapp)-DPATriTP	**1168**	2H			DCM	TBAP	SCE		1.35	1.00	1.43, 1.00 , 0.78, -0.84 -1.09, -1.51	-1.18	-1.51		306
(S_4-Rubn)-BDP-TTP	**1169**	2H			DCM	TBAP	SCE			1.45	-0.95, -1.34 -1.50	-0.95	-1.05	-1.50	570
SAcPTriMP	**1170**	Zn(II)			DCM	$TBAPF_6$	Ag/Ag^+		1.05	0.73		0.13			186
Subpc-TPAP	**1171**	Zn(II)			DCM	TBAP	SCE			0.67	-1.11				86
T(TSiA)PP	**1172**	Zn(II)			DCM	$TBABF_4$	Fc/Fc^+		0.66	0.44		-1.72*	-2.02*		130
TAPTBPP	**1173**	2H			DCM	$TBAPF_6$ (0.2M)	Ag/AgCl			1.02					276 (DPV)
TAPTBPP	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.68	0.35		-1.89	-2.27*		139
TAPTBPP	--	Zn(II)			DCM	$TBAPF_6$ (0.2M)	Ag/AgCl			0.88					276 (DPV)
TBPAAPP	**1174**	2H			PhCN	$TBAPF_6$	Fc/Fc^+			0.49					403 (DPV)
TBPAAPP	--	Zn(II)			PhCN	$TBAPF_6$	Fc/Fc^+			0.29					403 (DPV)
TBPAzDPAP	**1175**	2H			DCM	$TBAPF_6$ (0.2M)	Fc/Fc^+			0.53*					411
TCDTAPP	**1176**	Zn(II)			DCM	$TBABF_4$	Fc/Fc^+		0.68	0.42		-1.82	-1.81*	-2.20*	130

Table 17a. A_3B *meso*-substituted porphyrins. (see structures in Figure 17a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
[TCPCO$_2^-$PP]	**1177**	Os(II)	1-(CH_3)Im	1-(CH_3)Im	DMF	$TBAPF_6$	SCE				-0.14				360
[TCPCO$_2^-$PP]	--	Os(II)	P(OCH_3)	1-(CH_3)Im	DMF	$TBAPF_6$	SCE				0.25				360
[TCPCO$_2^-$PP]	--	Os(II)	P(OCH_3)	P(OCH_3)	DMF	$TBAPF_6$	SCE				0.27				360
[TCPCO$_2^-$PP]	**1178**	Os(II)	See Fig.	1-(CH_3)Im	DMF	$TBAPF_6$	SCE				0.06				360
[TCPCO$_2^-$PP]	**1179**	Os(II)	See Fig.	See Fig.	DMF	$TBAPF_6$	SCE				0.11				360
[TCPCO$_2$PP]	--	Os(II)	Py	Py	DMF	$TBAPF_6$	SCE				0.14				360
TDPTriPP	**1180**	2H			DMF	TBAP	Ag/Ag^+					-1.58	-2.08		528
TF_7PrCMPP	**1181**	2H			PhCN	$TBAPF_6$	SCE			1.59		-0.63			397
TFMTMPP	**1182**	Fe(III)	1-(CH_3)Im	1-(CH_3)Im	DMF	TBAP	SCE				-0.11				589
TFMTMPP	--	Fe(III)	Cl^-		DMF	TBAP	SCE				-0.07				589
TIPHMAPP	**1183**	2H			DCM	TBAP	SCE		1.30	1.03		-1.11	-1.52		129
TMCXTriBPP	**1184**	Co(II)			CH_3CN	$TBAPF_6$	Fc/Fc^+				0.28*, -1.31				547
TMCXTriMP	**1185**	Co(II)			CH_3CN	$TBAPF_6$	Fc/Fc^+				0.11* -1.32				547
TMCXTriMPP	**1186**	Co(II)			CH_3CN	$TBAPF_6$	Fc/Fc^+				0.07*, -1.28				547
TMCXTriPnP	**1187**	Co(II)			CH_3CN	$TBAPF_6$	Fc/Fc^+				0.12*, -1.23				547
TMTPAPP	**1188**	Zn(II)			DCM	TBAP	Ag/AgCl	1.13	0.81		0.58				114

Table 17a. A_3B *meso*-substituted porphyrins. (see structures in Figure 17a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
TPAPTriMP	**1189**	Zn(II)	Im		DCM	TBAP	Ag/AgCl	1.17	0.70		0.51				114
trans-APTBPP	**1190**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.65	0.35		-1.91	-2.34*		139
trans-T(DPSAc)PP	**1191**	Zn(II)			DCM/EtOH	$TBAPF_6$	Ag/Ag^+		0.70	0.49					436
trans-TSiAPTBPP	**1192**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.63	0.35		-1.81	-2.06*		139
trans-TSiDAPTBPP	**1193**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.66	0.36		-1.79			139
trans-TTDSAPP	**1194**	Zn(II)			DCM/THF	$TBABF_4$	Ag/Ag^+			0.33					46
TriAPCMPP	**1195**	2H			DCM	TBAP	$Ag/AgNO_3$			0.37		-1.59	-1.92		524
TriDBTMSiP	**1196**	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		1.18	0.80		-1.29			102
TriFTP	**1197**	2H			DCM	TBAP	SCE		1.15	0.89		-1.04	-1.44		498
TSiATBPP	**1198**	Ni(II)			DCM	$TBAPF_6$	Ag/AgCl		1.21	0.97		-1.26			220
TSiATBPP	**--**	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		1.16	0.78		-1.31			220
TSiATTriPP	**1199**	Zn(II)			DCM	$TBABF_4$	Fc/Fc^+		0.67	0.42		-1.86*	-2.04*		130
TSiTAPTBPP	**1200**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.63	0.35		-1.78	-2.13*		139
TTP-BDP-(O-Samag)	**1201**	2H			DCM	TBAP	SCE		1.44	1.05	1.05, 0.62 -0.92	-1.06	-1.56		570
(TTPn)TriTP	**1202**	2H			DCM	$TBAPF_6$	Fc/Fc^+	1.10	0.87	0.46		-1.70	-2.05		110
(TTPn)TriTP	**1202**	2H			DCM	$TBAPF_6$	Fc/Fc^+	1.10	0.87	0.46		-1.70	-2.05		497

Table 17a. A_3B *meso*-substituted porphyrins. (see structures in Figure 17a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
(TTPn)TriTP	--	Co(II)			DCM	$TBAPF_6$	Fc/Fc^+	1.36	0.78	0.51	0.34, -1.44	-1.95			110
(TTPn)TriTP	--	Co(II)			DCM	$TBAPF_6$	Fc/Fc^+	1.36	0.78	0.51	0.34, -1.41	-1.95			497
(TTPn)TriTP	--	Fe(III)	Cl^-		DCM	$TBAPF_6$	Fc/Fc^+	1.26	0.99	0.55	-0.84	-1.57			110
(TTPn)TriTP	--	Fe(III)	Cl^-		DCM	$TBAPF_6$	Fc/Fc^+	1.26	0.99	0.55	-0.84	-1.57			497
(TTPn)TriTP	--	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+	1.29	0.86	0.50		-1.80			110
(TTPn)TriTP	--	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+	1.29	0.86	0.50		-1.80			497
UPTriPP	**1203**	2H			DMF	TBAP	Ag/Ag^+					-1.72	-2.19		527

Table 17b. *cis* and *trans*-A_2B_2 *meso*-substituted porphyrins. (see structures in Figure 17b)

Ring	Structure	Axial Ligand Metal	L1	L2	Solvent	Salt	RE	Porphyrin Ox 3	2	1	Metal / Other		Porphyrin Red 1	2	3	Ref.
BTSiATDPP	**1204**	Zn(II)			DCM	$TBABF_4$	Fc/Fc^+		0.67	0.44			-1.74*	-2.06*		130
cis-B(DPSAc)DPP	**1205**	Zn(II)			DCM/EtOH	$TBAPF_6$	Ag/Ag^+		0.74	0.48						436
cis-B(TACP)P	**1206**	Zn(II)			DCM	$TBAPF_6$	NHE			0.77			-1.13			87
cis-BAPDCMPP	**1207**	2H			DCM	TBAP	Ag/AgNO			0.74			-1.48	-1.82		524
cis-DBPDP(phen)P	**1208**	Au(III)			*n*-BuCN	$TBABF_4$	Fc/Fc^+				-1.03					401
cis-DCPDNPP	**1209**	2H			DCM	$TBABF_4$	Ag/AgCl						-1.17*	-1.27*		192
cis-DCPDNPP	**--**	Fe(III)			DCM	$TBABF_4$	Ag/AgCl				-0.29	-0.88*	-1.18*	-1.33*		192
cis-F_{10}DPyDPP	**1210**	2H			DMF	TBAP	SHE						-0.74	-1.22		510
T(Tri-iPSi)P	**1211**	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		1.46*	1.05*			-0.98	-1.31		102
trans-B(2'-MP)DMP	**1212**	2H			DCM	$TBAPF_6$	SCE		1.36	0.94			-1.34	-1.71		479
trans-B(3'-MP)DMP	**1213**	2H			DCM	$TBAPF_6$	SCE		1.40	0.96			-1.34	-1.68		479
trans-B(4'-MP)DMP	**1214**	2H			DCM	$TBAPF_6$	SCE		1.37	0.92			-1.33	-1.66		479
trans-B(DClPAPA)DMP	**1215**	Zn(II)			THF	TBAP	Fc/Fc^+						-1.05			140
trans-B(DMPAPA)DMP	**1216**	Zn(II)			THF	TBAP	Fc/Fc^+						-1.06			140
trans-B(DPSAc)DPP	**1217**	Zn(II)			DCM/EtOH	$TBAPF_6$	Ag/Ag^+		0.73	0.48						436
trans-BADBPP	**1218**	Zn(II)			THF	$TBAPF_6$	SCE		1.31	0.96			-1.39	-1.80	-2.19	272
trans-BAPDCMPP	**1219**	2H			DCM	TBAP	Ag/AgNO			0.75			-1.56	-1.92		524
trans-BAPDMP	**1220**	Zn(II)			DCM	$TBABF_4$	SCE		1.19	0.91			-1.31	-1.71		310 (SWV)
trans-BBPDBPP	**1221**	Zn(II)			THF	$TBABF_4$	Fc/Fc^+			0.44			-1.64			433
trans-BClPAPADMP	**1222**	Zn(II)			PhCN	TBAP	Fc/Fc^+		1.03	0.77	1.50*	1.28*				140

Table 17b. *cis* and *trans*-A_2B_2 *meso*-substituted porphyrins. (see structures in Figure 17b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
trans-BCNPDBPP	**1223**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.74	0.44		-1.71	-2.09		439
trans-BDPAPADMP	**1224**	Zn(II)			THF	TBAP	Fc/Fc^+					-1.07			140
trans-BDPODPP	**1225**	2H			DCM	$TBAPF_6$	Ag/Ag^+			1.33		-0.73			387
trans-BDSiMHDEDPP	**1226**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.75	0.36		-1.50	-1.96		255
trans-BFDTP	**1227**	2H			DCM	TBAP	SCE		1.26	0.94		-1.08	-1.49		498
trans-BMCPDMPP	**1228**	2H			DCM	$TBAPF_6$	SCE		1.32	1.03		-1.18	-1.50		452
trans-BMPDPP	**1229**	2H			DCM	$TBAPF_6$	Fc/Fc^+		0.87	0.55		-1.67	-1.97		256
trans-BMPDPP	**--**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.67	0.37		-1.83			256
trans-BPADPP	**1230**	Zn(II)			CH_3CN	$TBAPF_6$	Ag/Ag^+			0.56		-1.23			39
trans-BPrADBPP	**1231**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.26		-1.91			390
trans-BTSiADBPP	**1232**	Zn(II)			THF	$TBABF_4$	Fc/Fc^+			0.53		-1.61			433
trans-D(Benzoyl)DTFMP	**1233**	Mn(III)	Cl^-		CH_3OH/H_2O	NaCl	Ag/AgCl				-0.05				3
trans-D(Benzoyl)DTFMP	**1233**	Mn(III)	Cl^-		CH_3OH/H_2O	NaCl	NHE				0.04				3
trans-D(Benzoyl)DTFMP	**1233**	Mn(III)	Cl^-		DMF/H_2O	NaCl	Ag/AgCl				-0.05				3
trans-D(PTFM)P	**1234**	Mn(III)	Cl^-		CH_3OH/H_2O	NaCl	NHE				-0.09				3
trans-D(TFMP)P	**1235**	Mn(III)	Cl^-		CH_3OH/H_2O	NaCl	Ag/AgCl				-0.19				3
trans-DAPDMP	**1236**	Zn(II)			DCM	$TBAPF_6$	Ag/Ag^+			0.68					163
trans-DCNPDBPP	**1237**	2H			DCM	$TBAPF_6$	Fc/Fc^+		0.90	0.69		-1.47	-1.81		128
trans-DCNPDBPP	**--**	Cu(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.95	0.68		-1.62	-2.00		128
trans-DCNPDBPP	**--**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.75	0.47		-1.65	-1.98	-2.34	128

Table 17b. *cis* and *trans*-A_2B_2 *meso*-substituted porphyrins. (see structures in Figure 17b)

Ring	Structure	Axial Ligand Metal	L1	L2	Solvent	Salt	RE	Porphyrin Ox 3	2	1	Metal / Other	Porphyrin Red 1	2	3	Ref.
trans-DCNPDBPP	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.74	0.44		-1.71	-2.09		136
trans-DCNPDTBP	**1238**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.69	0.41		-1.66	-2.03	-2.24	128
trans-DEPDEPP	**1239**	Zn(II)	Ph_3PO		$CDCl_3$	TBAP (0.2M)	SCE		1.26	1.07		-1.01			318
trans-DEPDEPPP	**1240**	2H			$CHCl_3$	TBAP (0.2M)	SCE			1.36		-0.74	-1.23*		318
trans-DEPDEPPP	--	Zn(II)			$CDCl_3$	TBAP (0.2M)	SCE		1.22	1.07		-0.92	-1.40*		318
trans-DEPDEPPP	**1240**	2H			DCM	TBAP	SCE			1.31		-0.74	-1.21	-1.59	318
trans-DEPDEPPP	--	Zn(II)			DCM	TBAP	SCE		1.21	1.10		-0.96	-1.33*	-1.76	318
trans-DEPDPP	**1241**	Zn(II)			$CDCl_3$	TBAP (0.2M)	SCE		1.18	1.00		-0.99			318
trans-DEPDPP	**1241**	Zn(II)	Ph_3PO		$CDCl_3$	TBAP (0.2M)	SCE		1.24	0.99		-1.10	-1.50		318
trans-DEPDPP	--	2H			$CHCl_3$	TBAP (0.2M)	SCE			1.27		-1.06	-1.34*		318
trans-DEPDPP	--	2H			DCM	TBAP	SCE			1.26		-0.81	-1.29	-1.75	318
trans-DEPDPP	--	Zn(II)			DCM	TBAP	SCE			1.02		-1.02	-1.44*		318
trans-DEPDTP	**1242**	Zn(II)			$CDCl_3$	TBAP (0.2M)	SCE		1.16	0.97		-1.03	-1.51*		318
trans-DEPDTP	**1242**	Zn(II)	Ph_3PO		$CDCl_3$	TBAP (0.2M)	SCE		1.23	0.98		-1.10	-1.50*		318
trans-DEPDTP	**1242**	Zn(II)			DCM	TBAP	SCE		1.14	0.96		-1.02	-1.37*	-1.70*	318
trans-DHPDPP	**1243**	2H			DCM	NR	Fc/Fc^+		0.80	0.49		-1.72			169
trans-DMAADBPP	**1244**	Zn(II)			THF	$TBAPF_6$	SCE			0.95		-1.39	-1.80	-2.19	272
trans-DMBTFMP	**1245**	Zn(II)			DCM	$TBAPF_6$	Ag/Ag^+			0.87					163
trans-DMCPDMPP	**1246**	2H			DCM	$TBAPF_6$	SCE			1.04*		-1.25*			409
trans-DMCPDMPP	**1246**	2H			THF	$TBAPF_6$	SCE			1.31*		-1.23	-1.56		419

Table 17b. *cis* and *trans*-A_2B_2 *meso*-substituted porphyrins. (see structures in Figure 17b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
trans-DMDCMP	**1247**	2H			DCM	$TBAPF_6$/TMAOH	SCE			1.05*			-1.25*			409
trans-DMPAPADMP	**1248**	Zn(II)			PhCN	TBAP	Fc/Fc^+		0.83	0.67	1.32*	0.99*				140
trans-DMPDPP	**1249**	Zn(II)			DCM	$TBAPF_6$	Ag/Ag^+			0.53						163
trans-DND(Pn)P	**1250**	Mn(III)	Cl^-		CH_3OH/H_2O	NaCl	Ag/AgCl				-0.04					3
trans-DND(Pn)P	**1250**	Mn(III)	Cl^-		CH_3OH/H_2O	NaCl	NHE				0.06					3
trans-DPADMP	**1251**	Zn(II)			PhCN	TBAP	Fc/Fc^+		1.26	0.87						140
trans-DPADMP	**1251**	Zn(II)			THF	TBAP	Fc/Fc^+						-1.01			140
trans-DPAPADMP	**1252**	Zn(II)			PhCN	TBAP	Fc/Fc^+		0.98	0.74	1.50*	1.23*				140
trans-DPBTDP	**1253**	Zn(II)			DCM/THF	$TBABF_4$	Ag/Ag^+			0.38						46
trans-DPDPP	**1254**	2H			DCM	$TBAPF_6$	SCE			1.04			-0.83			11
trans-DPyDPP	**1255**	2H			DCM	NR	Fc/Fc^+		0.85	0.39			-1.75			169
trans-DTPDTP	**1256**	2H			DCM	$TBAPF_6$	SCE		1.30	1.00						395
trans-DTPDTP	**--**	Zn(II)			DCM	$TBAPF_6$	SCE		1.16	0.88						395
trans-F_{10}DPADPP	**1257**	Zn(II)			CH_3CN	$TBAPF_6$	Ag/Ag^+			0.77			-1.20			39
trans-F_{10}DPDPyP	**1258**	2H			DMF	$TBAPF_6$	Ag/AgCl						-0.74	-1.21		508
trans-F_{10}DPyDPP	**1259**	2H			DMF	TBAP	SHE						-0.74	-1.22		510
trans-F_{10}TPP	**1260**	Mg(II)			DCM	$TBAPF_6$	Ag/Ag^+			0.66						163
trans-TMADBPP	**1261**	Ni(II)			THF	$TBAPF_6$	Fc/Fc^+			0.63			-1.47			254

Table 17c. *cis* and *trans*-A_2B *meso*-substituted porphyrins. (see structures in Figure 17c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
DNTFMP	**1262**	Mn(III)	Cl^-		CH_3OH/H_2O	NaCl	Ag/AgCl				0.11				3
DNTFMP	**1262**	Mn(III)	Cl^-		CH_3OH/H_2O	NaCl	NHE				0.21				3
trans-APADBPP	**1263**	Mg(II)			DMF	$TBAPF_6$	SCE			0.71		-1.24			165
trans-APADBPP	**--**	Zn(II)			DMF	$TBAPF_6$	SCE			0.84		-1.19			165
trans-APDBPP	**1264**	Zn(II)			DMF	$TBAPF_6$	SCE			0.89		-1.33			298
trans-BDSiMHDEDPP	**1265**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.70	0.35		-1.66	-2.10		255
trans-BrDPP	**1266**	Zn(II)			PhCN	TBAP	$Ag/AgNO_3$			0.56					269
trans-CAPDBPP	**1267**	2H			THF	$TBAPF_6$	Fc/Fc^+			0.63*		-1.51	-1.73		546 (DPV)
trans-ClPHDBPP	**1268**	Zn(II)			DMF	NR	Fc/Fc^+			0.44	-1.64				389 (DPV)
trans-CPDPADPP	**1269**	Zn(II)			THF	TBAP	SCE			1.07*		-1.19			118
trans-CPEDPP	**1270**	Zn(II)			THF	TBAP	SCE			1.07*		-1.23			118
trans-CPPEDPP	**1271**	Zn(II)			THF	TBAP	SCE			1.07*		-1.18			118
trans-CPTPADPP	**1272**	Zn(II)			THF	TBAP	SCE			1.07*		-1.20			118
trans-D(iPr)TFMP	**1273**	Mn(III)	Cl^-		CH_3OH/H_2O	NaCl	Ag/AgCl				-0.39				3
trans-D(iPr)TFMP	**1273**	Mn(III)	Cl^-		CH_3OH/H_2O	NaCl	NHE				-0.30				3
trans-DCPHDBPP	**1274**	Zn(II)			DMF	NR	Fc/Fc^+			0.48	-1.56				389 (DPV)
trans-DMADBPP	**1275**	Zn(II)			THF	$TBAPF_6$	Fc/Fc^+			0.44		-1.56			254
trans-DPODPP	**1276**	2H			DCM	$TBAPF_6$	Ag/Ag^+			1.24		-0.96			387
trans-IPDBMPP	**1277**	Zn(II)			PhCN	TBAP	SCE		1.01	0.71		-1.50			150
trans-MPHDBPP	**1278**	Zn(II)			DMF	NR	Fc/Fc^+			0.46	-1.69				389 (DPV)

Table 17c. *cis* and *trans*-A_2B *meso*-substituted porphyrins. (see structures in Figure 17c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
trans-ND(Pn)P	**1279**	Mn(III)	Cl^-		CH_3OH/H_2O	NaCl	Ag/AgCl				-0.25				3
trans-ND(Pn)P	**1279**	Mn(III)	Cl^-		CH_3OH/H_2O	NaCl	NHE				-0.15				3
trans-NIDBPP	**1280**	Zn(II)			DMF	NR	Fc/Fc^+			0.43	-0.89				389 (DPV)
trans-NPHDBPP	**1281**	Zn(II)			DMF	NR	Fc/Fc^+			0.48	-1.08				389 (DPV)
trans-PHDBPP	**1282**	Zn(II)			DMF	NR	Fc/Fc^+			0.45	-1.69				389 (DPV)
trans-PIDBPP	**1283**	Zn(II)			DMF	NR	Fc/Fc^+			0.45	-1.14				389 (DPV)
trans-PIDPP	**1284**	Zn(II)			DCM	TBAP	SCE			0.88	-0.86				535
trans-PyrenylDBPP	**1285**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+	1.26	0.81	0.52		-1.78	-2.18		379
trans-TClPHDBPP	**1286**	Zn(II)			DMF	NR	Fc/Fc^+			0.49	-1.35				389 (DPV)

Table 17d. *trans*-A_2BC *meso*-substituted porphyrins. (see structures in Figure 17d)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
trans-(15C5)PPDTP	**1287**	Zn(II)			PhCN	TBAP	Fc/Fc^+		0.29	0.11		-1.85			69
trans-APCMPDMP	**1288**	2H			PhCN	$TBAPF_6$	SCE		1.32	1.03		-1.19			397
trans-APCMPDMP	**--**	Zn(II)			PhCN	$TBAPF_6$	SCE			0.76		-1.34			397
trans-APNMIPP	**1289**	2H			DCM	$TBAPF_6$	Ag/AgCl		1.20	1.00		-1.20	-1.59		90
trans-APNMIPP	**--**	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		0.83	0.63		-1.55	-1.70		90
trans-APNMIPP	**--**	Zn(II)	1-(CH_3)Im		DCM	$TBAPF_6$	Ag/AgCl		1.10	0.60		-1.54			90
trans-BDP-18C6-CPDTP	**1290**	Zn(II)			PhCN	TBAP	Fc/Fc^+		0.36	0.17	-1.61	-1.71			69
trans-BIBPMCPDMP	**1291**	2H			DCM	$TBAPF_6$	SCE			1.07*		-1.29*			409
trans-BOPPerynylDBPP	**1292**	Zn(II)			THF	$TBAPF_6$	NHE		1.29*	0.92		-0.72	-0.93	-1.47	363
trans-BOPTSiADBPP	**1293**	Zn(II)			THF	$TBAPF_6$	NHE		1.32*	0.92		-1.11			363
trans-BPDBACPAP	**1294**	Zn(II)			THF (-20°C)	$TBAPF_6$	Ag/AgCl			0.87*		-1.11*			132
trans-BuDBPTMSiAP	**1295**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.25		-1.73			103
trans-CEPPzDTP	**1296**	Zn(II)			DCM	$TBABF_4$	Ag/Ag^+		0.74	0.38*					151
trans-CMBBPP	**1297**	Zn(II)			DCM	$TBAPF_6$	Ag/Ag^+		0.96	0.75					12 (SWV)
trans-CPABOPBMBP	**1298**	Zn(II)			THF	$TBAPF_6$	NHE		1.27*	0.91		-1.08			299
trans-CPADHPADBPP	**1299**	Zn(II)			THF	$TBAPF_6$	Ag/AgCl		1.29*	0.89*		-1.10			391
trans-CPAMDBPP	**1300**	Zn(II)			DCM	$TBAPF_6$	Ag/Ag^+		0.87	0.55	1.26, 1.00				12 (SWV)
trans-CPBBPADMP	**1301**	Zn(II)			DCM	$TBAPF_6$	NHE			0.83		-1.04			367
trans-CPBHABPP	**1302**	Zn(II)			THF	$TBAPF_6$	NHE		1.04	0.86		-1.06			299
trans-CPBHABPP	**1302**	Zn(II)			THF	$TBAPF_6$	NHE	1.15	0.98	0.81		-0.96			299

Table 17d. *trans*-A_2BC *meso*-substituted porphyrins. (see structures in Figure 17d)

Ring	Structure	Axial Ligand Metal	L1	L2	Solvent	Salt	RE	Porphyrin Ox 3	2	1	Metal / Other	Porphyrin Red 1	2	3	Ref.
trans-CPDBPADBPP	**1303**	Zn(II)			DCM (-20°C)	$TBAPF_6$	Ag/AgCl	1.73	1.05	0.79		-1.02			132
trans-CPDMDTAP	**1304**	Zn(II)			DCM	$TBAPF_6$	NHE			0.83		-1.25			87
trans-CPDMPDBPP	**1305**	Zn(II)			THF (-20°C)	$TBAPF_6$	Ag/AgCl		1.02	0.86		-1.08			132
trans-CPDPADBPP	**1306**	Zn(II)			THF	$TBAPF_6$	NHE		1.29*	0.89		-1.09			299
trans-CPMDBPDBPP	**1307**	Zn(II)			THF (-20°C)	$TBAPF_6$	Ag/AgCl			0.98		-1.06			132
trans-CPMDTAP	**1308**	Zn(II)			DCM	$TBAPF_6$	NHE			0.78		-1.18			87
trans-CPPBOPBBPAP	**1309**	Zn(II)			THF	$TBAPF_6$	NHE		1.11	0.85		-1.08			299
Trans-DBPAPCPP	**1310**	Zn(II)			THF	TBAP	SCE		0.98	0.84		-1.14			84
trans-DBPBICPDMP	**1311**	2H			DCM	$TBAPF_6$/TMAOH	SCE		0.98*	0.26*		-1.30*			409
Trans-DBPCPCPP	**1312**	Zn(II)			THF	TBAP	SCE			1.06		-1.01			84
Trans-DBPMPCPP	**1313**	Zn(II)			THF	TBAP	SCE			0.98		-1.11			84
Trans-DBPNPCPP	**1314**	Zn(II)			THF	TBAP	SCE			1.04		-0.96	-1.05		84
trans-DHPACPADOPP	**1315**	Zn(II)			THF	$TBAPF_6$	Ag/AgCl		1.37*	0.82		-1.29			391
trans-DIMDTP	**1316**	2H			PhCN	$TBAPF_6$	SCE			0.98					428
trans-DOAPDBPP	**1317**	Zn(II)			THF	$TBAPF_6$	Fc/Fc^+			0.39		-1.21			134
trans-F_{10}APTriPP	**1318**	Zn(II)			CH_3CN	$TBAPF_6$	Ag/Ag^+			0.78		-1.34			39
trans-F_{10}TriPCEPP	**1319**	Mg(II)			DCM	$TBAPF_6$	Ag/Ag^+			0.60					163
trans-F_4CPBBPADMP	**1320**	Zn(II)			DCM	$TBAPF_6$	NHE			1.00		-0.86			367
trans-F_5DPDTP	**1321**	Mg(II)			DCM	$TBAPF_6$	Ag/Ag^+			0.50					163
trans-IPTSiAPDTP	**1322**	2H			DCM	TBAP	SCE		1.32	0.96		-1.19	-1.53		502

Table 17d. *trans*-A_2BC *meso*-substituted porphyrins. (see structures in Figure 17d)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
trans-MD(iPr)TFMP	**1323**	Mn(III)	Cl^-		CH_3OH/H_2O	NaCl	Ag/AgCl				-0.44				3
trans-MD(iPr)TFMP	**1323**	Mn(III)	Cl^-		CH_3OH/H_2O	NaCl	NHE				-0.35				3
trans-MFHPBPP	**1324**	Zn(II)			DCM	$TBAPF_6$	Ag/Ag^+		0.91	0.60					12 (SWV)
trans-NABOPADBPP	**1325**	Zn(II)			THF	$TBAPF_6$	NHE		1.32*	0.94		-0.81	-1.00		363
trans-ND(iPr)TFMP	**1326**	Mn(III)	Cl^-		CH_3OH/H_2O	NaCl	Ag/AgCl				-0.19				3
trans-ND(iPr)TFMP	**1326**	Mn(III)	Cl^-		CH_3OH/H_2O	NaCl	NHE				-0.10				3
trans-QTAPDBPP	**1327**	Au(III)			DCM	$TBAPF_6$ (0.15M)	SCE				-0.96	-1.04			131
trans-QTAPDBPP	--	Zn(II)			DCM	$TBAPF_6$ (0.15M)	SCE			0.64	0.86				131
trans-TDPDTP	**1328**	Zn(II)			DCM/THF	$TBABF_4$	Ag/Ag^+			0.42					46
trans-TPAPDBP	**1329**	Zn(II)			DCM	$TBAPF_6$ (0.15M)	SCE		1.18	0.76	1.32, <-1.30				160
trans-TPAPDBPP	**1330**	Au(III)			DCM	$TBAPF_6$ (0.15M)	SCE				>1.50, <-1.40	-1.05			160
trans-TPAPDBPP	**1330**	Au(III)			DCM	$TBAPF_6$ (0.15M)	SCE				1.35, <-1.40	-1.08			160
trans-TPAPDBPP	**1330**	Au(III)			DCM	$TBAPF_6$ (0.15M)	SCE			1.28	< -1.50		-1.06		160
trans-TPAPDBPP	--	Zn(II)			DCM	$TBAPF_6$ (0.15M)	SCE		1.20	0.77	< -1.30				160
trans-TPAPDBPP	--	Zn(II)			DCM	$TBAPF_6$ (0.15M)	SCE		1.14	0.73	1.27, < -1.50				160

Table 17e. A_2 *meso*-substituted porphyrins. (see structures in Figure 17e)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
APNMIPP	**1331**	Zn(II)	1-(CH_3)Im		DCM	$TBAPF_6$	Ag/AgCl			0.56		-1.52			117
cis-PADMPMP	**1332**	Zn(II)			DCM	$TBAPF_6$	Ag/Ag^+			0.54					163
DMPP	**1333**	Co(II)			H_2O/EtOH	NaCl (0.5M)	Ag/AgCl			0.45	0.16				468
IPMPMMSiAPP	**1334**	Zn(II)			DCM	$TBAPF_6$	Ag/Ag^+			0.57					163
M(SB)P	**1335**	2H			DCM	$TBAPF_6$ (0.2M)	Fc/Fc^+	1.45	1.05	0.60					180
M(SB)P	**--**	Mn(III)	Cl^-		DCM	$TBAPF_6$ (0.2M)	Fc/Fc^+		1.40	0.80					180
TDMPP	**1336**	Co(II)			H_2O/EtOH	NaCl (0.5M)	Ag/AgCl			0.43	0.14				468
trans-B(SB)P	**1337**	Mn(III)	Cl^-		DCM	$TBAPF_6$ (0.2M)	Fc/Fc^+		1.30	0.70					180
trans-BBPP	**1338**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.76	0.37		-1.83	-2.25		455
trans-BDENaphP	**1339**	2H			THF	TBAP	Fc/Fc^+			0.61		-1.70			253
trans-BDENaphP	**--**	Zn(II)			THF	TBAP	Fc/Fc^+			0.35		-1.97			253
trans-BDMPP	**1340**	Co(II)			H_2O/EtOH	NaCl (0.5M)	Ag/AgCl			0.44	0.15				468
trans-BDPP	**1341**	2H			DCB	TBAP	Ag/AgCl		1.32*	1.01		-1.28	-1.62		242
trans-BOAPyNaphP	**1342**	2H			THF	TBAP	Fc/Fc^+				-0.14		-1.68		253
trans-BOAPyNaphP	**--**	Zn(II)			THF	TBAP	Fc/Fc^+				-0.14		-1.90		253
trans-BOATPyNaphP	**1343**	2H			THF	TBAP	Fc/Fc^+				-0.16		-1.66		253
trans-BOATPyNaphP	**--**	Zn(II)			THF	TBAP	Fc/Fc^+				-0.16		-1.91		253
trans-BPP	**1344**	2H			DMF	TBAP	SCE					-1.12			20
trans-BPP	**--**	Mn(III)	Cl^-		DMF	TBAP	SCE				-0.23		-1.37	-1.86	20
trans-BPP	**--**	Ni(II)			DMF	TBAP	SCE					-1.16			227

Table 17e. A_2 *meso*-substituted porphyrins. (see structures in Figure 17e)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
trans-BPP	--	Zn(II)			THF	TBAP	SCE			0.99		-1.40			118
trans-D(Pn)P	**1345**	Mn(III)	Cl^-		CH_3OH/H_2O	NaCl	Ag/AgCl				-0.45				3
trans-D(Pn)P	**1345**	Mn(III)	Cl^-		CH_3OH/H_2O	NaCl	NHE				-0.35				3
trans-DBPP	**1346**	Zn(II)			DCM	$TBABF_4$	Fc/Fc^+			0.39		-1.87			357
trans-DBPP	**1346**	Zn(II)			PhCN	TBAP	$Ag/AgNO_3$			0.54					269
trans-DCEPP	**1347**	Zn(II)			PhCN	TBAP	$Ag/AgNO_3$			0.68					269
trans-DEDPP	**1348**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.71	0.37		-1.85	-2.27		255
trans-F_{10}DPP	**1349**	Zn(II)			PhCN	TBAP	$Ag/AgNO_3$			0.77					269

Table 17f. β-pyrrole substitued porphyrins with less than four *meso*-substituents. (see structures in Figure 17f)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
APTETMP	**1350**	Co(II)			DCE	$TBAPF_6$	SHE				0.69	-0.85				425
BPATBPP	**1351**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.32			-1.65			390
BPDATBPP	**1352**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.34			-1.58			390
BPrATBPP	**1353**	2H			DCM	$TBAPF_6$	Fc/Fc^+						-1.52			390
BPrATBPP	**--**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.33			-1.66			390
BrPTETMP	**1354**	Pd(II)			DCM	TBAP	Ag/AgCl			0.93			-1.51			402
BUQDEHMP	**1355**	2H			DCM	TBAP	NR			0.87			-0.52			416 (DPV)
DBFDEHMP	**1356**	Zn(II)			PhCN	TBAP	Fc/Fc^+		0.48	0.17			-2.08			64
DBPAPBBP	**1357**	Zn(II)			DCM	$TBAPF_6$	NHE			0.84			-1.22			567
DBPAPDBAP	**1358**	Zn(II)			DCM	$TBAPF_6$	NHE			0.86			-1.17			567
DBPAPPP	**1359**	Zn(II)			DCM	$TBAPF_6$	NHE			0.84			-1.30			567
DBrTUCQDEHMP	**1360**	2H			DCM	TBAP	NR			0.88			-0.49			416 (DPV)
DCITCUQDEHMP	**1361**	2H			DCM	TBAP	NR			0.88			-0.51			416 (DPV)
DEDETMP	**1362**	2H			PhCN	$TBAPF_6$ (0.2M)	Fc/Fc^+		0.92	0.44			-1.78	-2.14		349
DEHMPASP	**1363**	Zn(II)			DCM	TBAP	SCE		1.05	0.71						95
DEHMPASP	**1363**	Zn(II)			PhCN	TBAP	SCE		0.88	0.52						95
DEHMPP	**1364**	2H			DCM	TBAP	SCE		1.08*	0.90*			-1.39	-1.84*		36
DEHMPP	**1364**	2H			PhCN	TBAP	SCE		1.06*	0.92*			-1.42	-1.79		36
DEHMPP	**1364**	2H			Py	TBAP	SCE						-1.36	-1.73		35
DEHMPP	**--**	Co(II)			H_2O	$HClO_4$ (1M)	SCE				0.43					9 (RDV)

Table 17f. β-pyrrole substitued porphyrins with less than four *meso*-substituents. (see structures in Figure 17f)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
DEHMPP	--	Co(II)			PhCN	TBAP	SCE		1.25	1.01	0.36		-1.08			31
DEHMPP	--	Co(II)			PhCN	TBAP	SCE		1.25	1.01	0.36	-1.08				48
DEHMPP	--	Fe(III)	Cl^-		H_2O	$HClO_4$ (1M)	SCE				0.01					9 (RDV)
DEHMPP	--	Fe(III)	Cl^-		PhCN	TBAP	SCE				-0.44					185
DEHMPP	--	Fe(III)	Cl^-		Py	TBAP	SCE				-0.04		-1.81*			35
DEHMPP	--	Mn(III)	Cl^-		PhCN	TBAP	SCE				-0.34	-0.49				185
DEHMPP	--	Mn(III)	Cl^-		Py	TBAP	SCE				-0.43			-1.57		35
DEHMPP	--	Zn(II)			DCM	$TBAPF_6$	SCE		0.99	0.69						554
DMXDEHMP	**1365**	Zn(II)			PhCN	TBAP	Fc/Fc^+		0.45	0.16			-2.11			64
DPAPDEHMP	**1366**	Zn(II)			DCM	$TBAPF_6$	SCE		1.16	0.68	0.88					554
DPEDEHMP	**1367**	Zn(II)			PhCN	TBAP	Fc/Fc^+		0.47	0.17			-2.09			64
DPEP	**1368**	V(IV)	O^{2-}		DCM	$TBAPF_6$	SCE		1.38	0.92			-1.36			167
DPyTBPP	**1369**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.59*			-1.64			252
DPyTBPP	**1369**	Ni(II)			NR	NR	Fc/Fc^+			0.59						572
PATBPP	**1370**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.30			-1.75			390
PyTBPP	**1371**	2H			DCM	$TBAPF_6$	Fc/Fc^+			0.44						435
TEHMPP	**1372**	Mn(III)	Cl^-		PhCN	TBAOAc	SCE				-0.36		-1.75			304
TEHMPP	**1372**	Mn(III)	Cl^-		Py	TBAOAc	SCE				-0.38		-1.59			304
TETMPP	**1373**	Zn(II)			DCM	TBAP	Ag/AgCl			0.67						10
TMTMP	**1374**	Fe(III)	ClO_4^-		DCM (-60°C)	TBAP	SCE			1.07						374 (DPV)

Table 17f. β-pyrrole substitued porphyrins with less than four *meso*-substituents. (see structures in Figure 17f)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
TMTMP	--	Fe(III)	NO_3^-		DCM (-60°C)	TBAP	SCE			1.09					374 (DPV)
TMTMP	--	Fe(IV)	Im	O^{2-}	DCM (-60°C)	TBAP	SCE		0.99	0.84					374 (DPV)
TMTMP	--	Fe(IV)	O^{2-}	ClO_4^-	DCM (-60°C)	TBAP	SCE		1.22	0.90					374 (DPV)
TMTMP	--	Fe(IV)	O^{2-}	NO_3^-	DCM (-60°C)	TBAP	SCE		1.30	0.95					374 (DPV)
trans-TPrATBPP	**1375**	2H			DCM	$TBAPF_6$	Fc/Fc^+					-1.34			390
trans-TPrATBPP	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.44		-1.51			390
TSiAPDEHMP	**1376**	Zn(II)			DCM	$TBAPF_6$	SCE			0.71					330

Table 18. Porphyrin-ferrocene conjugates. (see structures in Figure 18)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
cis-DFcDPP	**1377**	2H			DCM	TFAB (0.05M)	Fc/Fc^+			1.00	0.24	0.04	-1.82	-2.20		79
cis-α^2,β^2-$(NHCOFc)_4TPP$	**1378**	2H			DCM/CH_3CN	$TBABF_4$ (0.2M)	Ag/Ag^+			0.84	0.43		-1.21	-1.67		575
cis-α^2,β^2-$(NHCOFc)_4TPP$	--	Zn(II)			DCM/CH_3CN	$TBABF_4$ (0.2M)	Ag/Ag^+			0.67	0.43		-1.37	-1.78		575
$F_{20}TPP$	**1379**	Zn(II)	See Fig.		C_6H_6	THAP	SCE			0.68						142
$F_{20}TPP$	**1380**	Zn(II)	See Fig.		C_6H_6	THAP	SCE			0.67						142
$F_{20}TPP$	**1379**	Zn(II)	See Fig.		CH_3CN	TBAP	SCE			0.63						142
$F_{20}TPP$	**1380**	Zn(II)	See Fig.		CH_3CN	TBAP	SCE			0.61						142
$F_{20}TPP$	**1379**	Zn(II)	See Fig.		DCM	TBAP	SCE			0.74						142
$F_{20}TPP$	**1380**	Zn(II)	See Fig.		DCM	TBAP	SCE			0.73						142
FcA-(S_2-TriTP)	**1381**				DCM	TBAP	SCE		1.49	1.22	0.65		-0.86	-1.23		307
FcAP-(S-TriTP)	**1382**	H			DCM	TBAP	SCE			1.07	0.61		-1.07	-1.40		307
FcAP-(S-TriTP)	--	H			DCM	TBAP	SCE		1.56	1.15	0.65		-0.96	-1.36		307
FcAP-(S_2-TriTP)	**1383**				DCM	TBAP	SCE		1.37	1.14	0.61		-0.95	-1.27		307
FcCBPTBPP	**1384**	Zn(II)			DCM	TBAP	Ag/AgCl				0.40		-1.52			490
FcPAP-PADMP-Pc	**1385**	Zn(II)			DCM	$TBAPF_6$	Ag/Ag^+		0.90	0.56	1.17	0.19				162
FcPAPTMP	**1386**	2H			DCM	$TBAPF_6$	Ag/Ag^+		1.16	0.68	0.23					162

Table 18. Porphyrin-ferrocene conjugates. (see structures in Figure 18)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
FcPAPTMP	--	Zn(II)			DCM	$TBAPF_6$	Ag/Ag^+		0.88	0.59	0.23					162
FcPCPTBPP	**1387**	2H			DCM	$TBAPF_6$ (0.2M)	Ag/AgCl			1.02	0.55					276 (DPV)
FcPCPTBPP	--	Zn(II)			DCM	$TBAPF_6$ (0.2M)	Ag/AgCl			0.88	0.53					276 (DPV)
FcPCPTriPP	**1388**	Zn(II)			DCB	TBAP	Fc/Fc^+		0.66	0.31	0.00		-1.89	-2.21		141
FcTPP	**1389**	Zn(II)			DCB	TBAP	Fc/Fc^+		0.61	0.27	0.00		-1.93	-2.25		141
FcTriPP	**1390**	2H			DCM	TFAB (0.05M)	Fc/Fc^+		1.19	0.72	0.06		-1.79	-2.22		79
FcTZP(O,S-TriTP)	**1391**				DCM	TBAP	SCE			1.13	0.57		-0.93	-1.18		113
FcTZP(S-TriTP)	**1392**	2H			DCM	TBAP	SCE		1.47	1.03	0.57		-1.17	-1.49		113
FcTZP(S-TriTP)	--	H			DCM	TBAP	SCE			1.08	0.53		-1.04	-1.36		113
FcTZP(S-TriTP)	--	Zn(II)			DCM	TBAP	SCE		1.10	0.79	0.57		-1.50	-1.70		113
FcTZP(S_2-TriTP)	**1393**				DCM	TBAP	SCE				0.56		-0.89	-1.20		113
OEP	**1394**	Fe(III)	See Fig.		DCM	TBAP (0.2M)	Ag/Ag^+				0.07	-0.77				184
OEP	**1395**	Fe(III)	See Fig.		DCM	TBAP (0.2M)	Ag/Ag^+				0.06	-0.89				184
OEP	**1396**	Ga(III)	See Fig.		DCM	TBAP (0.2M)	Ag/Ag^+				0.07					184
OEP	**1397**	Ga(III)	See Fig.		DCM	TBAP (0.2M)	Ag/Ag^+				0.04					184
OEP	**1398**	Sn(IV)	See Fig.		DCM	$TBAPF_6$	SCE				0.48		-1.36			404

Table 18. Porphyrin-ferrocene conjugates. (see structures in Figure 18)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
T(Fc)P	**1399**	2H			(BMIM)Tf_2N	(BMIM)Tf_2N	Fc/Fc^+			0.91	0.08, -0.04	0.06 -0.16	-1.31	-1.60		568
T(Fc)P	**1399**	2H			CH_3CN	TBAP	Fc/Fc^+				0.28					568
T(Fc)P	**1399**	2H			DCB	TBAP	Fc/Fc^+			0.63	0.03	-0.10	-1.86	-2.10		568
T(Fc)P	**1399**	2H			DCB	TFAB (0.05M)	Fc/Fc^+			1.30	0.40, 0.13	0.22, -0.14	-1.91	-2.18		568
T(Fc)P	**1399**	2H			DCM	TBAP	Fc/Fc^+			1.03	0.25, 0.08	0.14, -0.01	-1.71	-2.00		568
T(Fc)P	**1399**	2H			DCM	TFAB (0.05M)	Fc/Fc^+			1.42	0.34, 0.15	0.24, 0.07	-1.78	-2.06		79
T(Fc)P	**1399**	2H			DCM	TFAB (0.05M)	Fc/Fc^+			1.25	0.34, 0.15	0.24, 0.07	-1.78	-2.06		368
T(Fc)P	**1399**	2H			DCM	TFAB (0.05M)	Fc/Fc^+			1.25	0.34, 0.15	0.24, -0.07	-1.78	-2.06		568
T(Fc)P	**1399**	2H			DMF	TBAP	Fc/Fc^+				0.32					568
T(Fc)P	**1399**	2H			THF	TBAP	Fc/Fc^+				0.34					568
T(Fc)P	--	Co(II)			DCM	TFAB (0.05M)	Fc/Fc^+				0.29, 0.12	0.17, -0.09	-1.59	-2.01		368
T(Fc)P	--	Cu(II)			DCM	TFAB (0.05M)	Fc/Fc^+			1.21	0.33, 0.14	0.20, -0.10	-1.89			368
T(Fc)P	--	Ni(II)			DCM	TFAB (0.05M)	Fc/Fc^+		1.22	0.78	0.26, 0.09	0.18, -0.05	-1.94			368
T(Fc)P	--	Zn(II)			DCM	TFAB (0.05M)	Fc/Fc^+			1.09	0.25, 0.09	0.17, -0.14	-2.03			368
T(Fc)PP	--	Cu(II)			DCM	$TBAPF_6$	SCE		1.42	1.25	0.58	0.44	-1.46			555
TFcPP	**1400**	2H			DCM	$TBAPF_6$	SCE		1.43	1.23	0.63	0.45	-1.35	-1.60		555

Table 18. Porphyrin-ferrocene conjugates. (see structures in Figure 18)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
TFcPP	--	Zn(II)			DCM	$TBAPF_6$	SCE			1.31	0.63	0.47	-1.39	-1.70		555
TPP	**1401**	Sn(IV)	See Fig.		THF	$TBAPF_6$ (0.2M)	Fc/Fc^+				0.11		-1.47	-1.89		237
trans-$(Fc)_2$TPP	**1402**	Zn(II)			DCB	TBAP	Fc/Fc^+		0.61	0.28	0.00		-1.93	-2.25		141
trans-BAPFcEPMImP	**1403**	2H			DCM	$TBAPF_6$	Ag/AgCl		1.20	0.91	0.45		-1.20	-1.57		90
trans-BAPFcEPMImP	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		0.83	0.63	0.45		-1.50	-1.67		90
trans-BAPFcEPMImP	--	Zn(II)	1-(CH_3)Im		DCM	$TBAPF_6$	Ag/AgCl			0.61	0.43		-1.50			90
trans-BAPFcMImP	**1404**	2H			DCM	$TBAPF_6$	Ag/AgCl			1.10	0.55		-1.21	-1.62		90
trans-BAPFcMImP	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		1.10	0.87	0.46		-1.50	-1.68		90
trans-BAPFcMImP	--	Zn(II)	1-(CH_3)Im		DCM	$TBAPF_6$	Ag/AgCl			0.77	0.44		-1.50			90
trans-BAPFcPMImP	**1405**	2H			DCM	$TBAPF_6$	Ag/AgCl		1.21	0.90	0.39		-1.21	-1.63		90
trans-BAPFcPMImP	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		0.82	0.62	0.45		-1.55	-1.72		90
trans-BAPFcPMImP	--	Zn(II)	1-(CH_3)Im		DCM	$TBAPF_6$	Ag/AgCl		1.10	0.60	0.40		-1.54			90
trans-BAPOMFcEPMImP	**1406**	2H			DCM	$TBAPF_6$	Ag/AgCl		1.18	0.97	0.08		-1.23			90
trans-BAPOMFcEPMImP	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		0.84	0.65	0.08		-1.52	-1.69		90
trans-BAPOMFcMImP	**1407**	2H			DCM	$TBAPF_6$	Ag/AgCl			1.10	0.12		-1.28	-1.64		90
trans-BAPOMFcMImP	--	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		0.97	0.80	0.05		-1.57	-1.77		90

Table 18. Porphyrin-ferrocene conjugates. (see structures in Figure 18)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
trans-BAPOMFcMImP	--	Zn(II)	1-(CH_3)Im		DCM	$TBAPF_6$	Ag/AgCl			0.73	0.02		-1.53			90
trans-BAPOMFcPEMImP	**1408**	Zn(II)	1-(CH_3)Im		DCM	$TBAPF_6$	Ag/AgCl			0.61	0.04		-1.49			90
trans-BDFcCPDBPP	**1409**	Zn(II)			DCM	TBAP	Ag/AgCl				0.40		-1.52			490
trans-DFcADPP	**1410**	Ni(II)			DCM	TBAP	Ag/AgNO		0.92	0.84	0.31		-1.42			225
trans-DFcCDPDBPP	**1411**	Zn(II)			DCM	TBAP	Ag/AgCl				0.40		-1.52			490
trans-DFcDPP	**1412**	2H			DCM	TFAB (0.05M)	Fc/Fc^+			0.84	0.15	0.00	-1.78	-2.10	-2.30	79
trans-DFcTETMP	**1413**	Mn(III)	Cl^-		DCM	TBAP	Ag/AgCl			0.98*	0.47	0.30				279
trans-DFcTETMP	--	Ni(II)			DCM	TBAP	Ag/AgCl		1.11*	1.00*	0.50	0.11				279
trans-DFcTETMP	--	2H			DCM	TBAP	Ag/AgCl			1.00*	0.27	0.06				279
trans-FcPTETMP	**1414**	2H			DCM	TBAP	Ag/AgCl		1.05	0.61	0.29					280
trans-FcPTETMP	--	Mn(III)	Cl^-		DCM	TBAP	Ag/AgCl			0.97	0.37					280
trans-FcPTETMP	--	Zn(II)			DCM	TBAP	Ag/AgCl		0.83	0.45	0.29					280
trans-α^2,β^2-$(NHCOFc)_4TPP$	**1415**	2H			DCM/CH_3CN	$TBABF_4$ (0.2M)	Ag/Ag^+			0.90	0.44		-1.22	-1.58		575
trans-α^2,β^2-$(NHCOFc)_4TPP$	--	Zn(II)			DCM/CH_3CN	$TBABF_4$ (0.2M)	Ag/Ag^+			0.71	0.44		-1.18	-1.79		575
TriFcPP	**1416**	2H			DCM	TFAB (0.05M)	Fc/Fc^+			0.97	0.43, -0.02	0.17	-1.81	-2.13		79
α^3,β-$(NHCOFc)_4TPP$	**1417**	2H			DCM/CH_3CN	$TBABF_4$ (0.2M)	Ag/Ag^+			0.93	0.50	0.45	-1.08	-1.49		575

Table 18. Porphyrin-ferrocene conjugates. (see structures in Figure 18)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
α^3,β-$(NHCOFc)_4TPP$	--	Zn(II)			DCM/CH_3CN	$TBABF_4$ (0.2M)	Ag/Ag^+			0.69	0.48	0.43	-1.08	-1.49		575
α^4-$(NHCOFc)_4TPP$	**1418**	2H			DCM/CH_3CN	$TBABF_4$ (0.2M)	Ag/Ag^+			0.78	0.53		-1.26	-1.68		575
α^4-$(NHCOFc)_4TPP$	--	Zn(II)			DCM/CH_3CN	$TBABF_4$ (0.2M)	Ag/Ag^+			0.71	0.43		-1.26	-1.68		575

Table 19. Porphyrin-fullerene conjugates and porphyrin-fullerene complexes. (see structure in Figure 19)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
ADEDBDMP-C_{60}	**1419**	Zn(II)			PhCN	TBAP (0.05M)	$Ag/AgNO_3$			0.35			-0.76			333
ADEDBDMP-C_{60}	**1419**	Zn(II)			Tol.	THAP (1.2M)	$Ag/AgNO_3$			0.41			-0.99			333
BDP-DCPDTPC18C6.C_{60}	**1420**	Zn(II)			PhCN	TBAP	Fc/Fc^+		0.28	0.20	-1.00	-1.44, -1.62				69
BMC_{60}-DMP-BMC_{60}	**1421**	Zn(II)			DCM	$TBABF_4$	SCE	1.76	1.26	0.88	-0.56, -1.33	-0.86, -1.15 -1.56				310 (SWV)
C_{60}M-TPP-MC_{60}	**1422**	2H			DCM	$TBAPF_6$	Fc/Fc^+			0.58	-1.05	-1.39	-1.62			256
C_{60}M-TPP-MC_{60}	**--**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.72	0.37	-1.09	-1.45				256
$DBFDEHMPC_{60}$	**1423**	Zn(II)			PhCN	TBAP	Fc/Fc^+		0.47	0.17	-1.20	-1.58, -2.11	-2.11			64
DBPP-(3'-P)MEC_{60}	**1424**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.74	0.36	-1.06	-1.41	-1.84			439
DBPP-(3'-P)MEC_{60}	**1424**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.74	0.36	-1.06	-1.41	-1.84			455
DBPP-(3'-P)MEC_{60}	**1424**	Zn(II)			PhCN	$TBAPF_6$	Fc/Fc^+		0.74	0.36	-0.97	-1.37				455
DBPP-(3'-P)MEC_{60}	**1425**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	0.73, 0.84	0.50	0.37	-0.98	-1.06, -1.41	-1.84			439
DEDBDMAP-C_{60}	**1426**	2H			PhCN	TBAP (0.05M)	$Ag/AgNO_3$			0.56			-0.78			333
DEDBDMAP-C_{60}	**1426**	2H			Tol.	THAP (1.2M)	$Ag/AgNO_3$			0.63			-0.97			333
DEHMSiAPP.(4-Py)C_{60}	**1427**	Zn(II)	See Fig.		DCM/ DCB	$TBAPF_6$	SCE			0.73	-0.61					95
$DMXDEHMPC_{60}$	**1428**	Zn(II)			PhCN	TBAP	Fc/Fc^+		0.50	0.18	-1.23	-1.68, -2.21	-2.21			64
DNP-TTF-Por-C_{60}	**1429**	2H			THF	$TBAPF_6$	SCE			1.35*	1.23, -0.50	0.75, 0.46* -1.05*	-1.71*			419

Table 19. Porphyrin-fullerene conjugates and porphyrin-fullerene complexes. (see structure in Figure 19)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
DNP-TTF(rot)-Por-C_{60}	**1430**	2H			DMF	$TBAPF_6$	SCE			1.11*	1.37* -0.39	0.91*, -0.28 -0.51,-0.73	-1.39*	-1.48		419
$DPEDEHMPC_{60}$	**1431**	Zn(II)			PhCN	TBAP	Fc/Fc^+		0.46	0.15	-1.23	-1.60, -2.15	-2.15			64
DS-TTF-Por-C_{60}	**1432**	2H			DCM	$TBAPF_6$	SCE			1.03	-0.40, -1.56	-0.67, -1.03	-1.20			452
(ImUP)T(3',5'-D-TBuP)P. $PUPC_{60}$	**1433**	2H			THF	$TBAPF_6$	Fc/Fc^+			0.34*	-1.12					591
(ImUP)T(3',5'-D-TBuP)P. $PUPC_{60}$	--	Zn(II)			THF	$TBAPF_6$	Fc/Fc^+			0.22	-1.12					591
OEP-BAB(2-Hex)TC_{60}	**1434**	Ni(II)			$CHCl_3$	TBAP	SCE			1.10						221
OEP-BAB(2-HexT)C_{60}	**1434**	Ni(II)			$CHCl_3$ (40°C)	TBAP	SCE			1.20						221
OEP-BAB(3-HexT)C_{60}	**1435**	Ni(II)			$CHCl_3$	TBAP	SCE			0.94						221
OEP-BAB(3-HexT)C_{60}	**1435**	Ni(II)			$CHCl_3$ (40°C)	TBAP	SCE			1.00						221
Por-C_{60}	**1436**	2H			PhCN	TBAP	SCE			1.15	-0.57					49
Por-C_{60}	**1436**	2H			PhCN	TBAP	SCE			1.15	-0.57					345
Por-C_{60}	--	Zn(II)			PhCN	TBAP	SCE			0.93	-0.58					49
Por-C_{60}	--	Zn(II)			PhCN	TBAP	SCE			0.93	-0.58					345
$(Por)_2$-(3'-P)MEC_{60}	**1437**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	0.73, 0.84	0.50	0.37	-0.98	-1.06, -1.41	-1.84			455
Strap-OEP-MC_{60}	**1438**	2H			DCM (-35°C)	$TBAPF_6$	Fc/Fc^+		0.56	0.30	-1.09, -2.25*	-1.45, -1.90*	-2.00*			42
Strap-OEP-MC_{60}	--	Zn(II)			DCM (-35°C)	$TBAPF_6$	Fc/Fc^+		0.39	0.13	-1.09, -2.28	-1.45, -1.91	-2.41			42 (SWV)

Table 19. Porphyrin-fullerene conjugates and porphyrin-fullerene complexes. (see structure in Figure 19)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
Strap-TPP-DMC_{60}	**1439**	Co(II)			PhCN	$TBAPF_6$	Fc/Fc^+	1.27	1.03	0.78	0.28, -1.90*	-0.93, -1.50	-1.77*			211
Strap-TPP-DMC_{60}	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.69	0.34	-1.10	-1.51, -1.90*	-2.05*			211
Strap-TPP-DMC_{60}	--	Zn(II)			PhCN	$TBAPF_6$	Fc/Fc^+	1.26	0.77	0.37	-1.02, -2.03	-1.40, -1.82				211
Strap-TPP-MC_{60}	**1440**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.71	0.38	-1.13	-1.54				256
Strap-TPP-MMC_{60}	**1441**	2H			DCM	$TBAPF_6$	Fc/Fc^+		0.94	0.57	-1.11	-1.54				256
Strap-TPPBMC_{60}	**1442**	Co(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.96	0.82	0.40	-1.01, -1.57	-1.78*			211
SubpcPor.C_{60}	**1443**	Zn(II)	See Fig.		DCM	TBAP	SCE			0.58	-0.69	-1.08	-0.69			86
TBDP-TPP-C_{60}	**1444**	Zn(II)			PhCN	TBAP	SCE		1.20	0.72			-0.58	-0.98	-1.45	309
TBP(2'-P)C_{60}P	**1445**	2H			PhCN	$TBAPF_6$	SCE			0.86	-0.71					429
TBP(2'-P)C_{60}P	--	Zn(II)			PhCN	$TBAPF_6$	SCE			0.69	-0.73					429
TBP(3'-P)C_{60}P	**1446**	2H			PhCN	$TBAPF_6$	SCE			0.89	-0.70					429
TBP(3'-P)C_{60}P	--	Zn(II)			PhCN	$TBAPF_6$	SCE			0.69	-0.71					429
TBPAmPP.CPC_{60}	**1447**	2H			THF	TBAP	Ag/Ag^+		1.22	0.99	-0.91	-1.48, -2.15	-1.54	-1.92		537
TBPAmPP.CPC_{60}	--	Zn(II)			THF	TBAP	Ag/Ag^+		0.92	0.71	-0.91	-1.48, -2.14	-1.81	-2.21		537
TBPC_{60}P	**1448**	2H			PhCN	$TBAPF_6$	SCE			0.85	-0.71					429
TBPC_{60}P	--	Zn(II)			PhCN	$TBAPF_6$	SCE			0.68	-0.70					429

Table 19. Porphyrin-fullerene conjugates and porphyrin-fullerene complexes. (see structure in Figure 19)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
TBPP-3'-PTZPC$_{60}$	**1449**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.67	0.23	-1.16	-1.54	-1.93	-2.08		365
TBPP-3'-PTZPC$_{60}$	**1449**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.69	0.29	-1.12	-1.49	-1.90	-2.02		365
TBPP-4-DPVCPPV-C_{60}	**1450**	Zn(II)			THF	TBAP	$Ag/AgNO_3$			0.53	-0.85	-1.43, -2.05	-1.79			408
TBPP-4-DPVCPPVP-C_{60}	**1451**	Zn(II)			THF	TBAP	$Ag/AgNO_3$			0.53	-0.84	-1.42, -2.04	-1.80			408
TBPP-4-PVCP-C_{60}	**1452**	Zn(II)			THF	TBAP	$Ag/AgNO_3$			0.53	-0.84	-1.43, -2.05	-1.80			408
TBPP-4'-PTzPC$_{60}$	**1453**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.68	0.30	-1.12	-1.49	-1.67	-1.90	-2.04	365
TBPP-4'-PTzPC$_{60}$-1	**1454**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.70	0.31	-1.13	-1.54	-1.02	-1.67	-1.87, -2.07	365
TBPP-BTPMC$_{60}$	**1455**	Zn(II)			DCB	TBAP	Fc/Fc^+			0.18	0.18, -1.96	-1.12, -1.48, -2.30	-1.92			288
TBPP-BzPI-PC$_{60}$	**1456**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.32	-1.14	-1.26				347
TBPP-CPDBPP-PC$_{60}$	**1457**	2H, Zn(II)			PhCN	$TBAPF_6$	Fc/Fc^+		0.59	0.30	-1.04					403 (DPV)
TBPP-DAPC$_{60}$	**1458**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.69	0.36	-1.08	-1.43, -1.98*	-1.88			139
TBPP-Dendron-C_{60}	**1459**	Zn(II)			DCE	TBAP	Fc/Fc^+		0.59	0.25			-1.06	-1.44		400
TBPP-DPVCPPV-C_{60}	**1460**	Zn(II)			DCB	TBAP	$Ag/AgNO_3$	0.93, 1.12	0.77	0.49						408
TBPP-DPVCPPVP-C_{60}	**1461**	Zn(II)			DCB	TBAP	$Ag/AgNO_3$	0.93, 1.12	0.77	0.49						408
TBPP-PC$_{60}$	**1462**	2H			DCM	$TBAPF_6$ (0.2M)	Ag/AgCl			1.04						340
TBPP-PC$_{60}$	--	Zn(II)			DCM	$TBAPF_6$ (0.2M)	Ag/AgCl			0.87						340

Table 19. Porphyrin-fullerene conjugates and porphyrin-fullerene complexes. (see structure in Figure 19)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
TBPP-PCPC$_{60}$	**1463**	2H			THF	$TBAPF_6$	SCE			1.34*	-0.53	-1.07, -1.78	-1.26	-1.56		419
TBPP-PPI-BzC$_{60}$	**1464**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.31	-1.13	-1.26				347
TBPP-PPI-PC$_{60}$	**1465**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.31	-1.13	-1.21				347
TBPP-PVCP-C$_{60}$	**1466**	Zn(II)			DCB	TBAP	$Ag/AgNO_3$	1.20	0.80	0.48						408
TBPP-TAPC$_{60}$	**1467**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.66	0.35	2.00*	-1.04, -1.44	-1.90*	-2.20*		139
TBPP-TAPC$_{60}$-1	**1468**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+				-1.00	-1.35, -2.12*	-1.56*	-1.87*		139
TBPP-TPV-C$_{60}$	**1469**	Zn(II)			DCB/ CH_3CN	TBAP	SCE	1.24*, 1.39*	1.05*	0.83*	-0.61*, -2.05	-1.02*, -1.62	-1.28	-1.79		441
TBPP-TPV-C$_{60}$	**1469**	Zn(II)			DCB/ CH_3CN	TBAP	SCE	1.22*, 1.43*	0.94*	0.82*	-0.62*, -2.10	-1.02*, -1.65,	-1.26	-1.90		441
TBPP-TPVCPPVP-C$_{60}$	**1470**	Zn(II)			DCB	TBAP	$Ag/AgNO_3$	0.93, 1.13	0.78	0.49						408
TBPP-TPVCPPVP-C$_{60}$	**1470**	Zn(II)			THF	TBAP	$Ag/AgNO_3$			0.53	-0.85	-1.42, -2.04	-1.79			408
TBPPEBiNap-C$_{60}$	**1471**	Zn(II)			DCB/ CH_3CN	TBAP	SCE		1.25	0.89	1.45, -1.60	-0.65, -1.05, -2.07	-1.60	-1.79		76
TBPPP-CPC$_{60}$	**1472**	2H			DCM	$TBAPF_6$ (0.2M)	Ag/AgCl			1.04	-0.58					276 (DPV)
TBPPP-CPC$_{60}$	**1472**	2H			PhCN	$TBAPF_6$	Fc/Fc^+			0.55	-1.04					403 (DPV)
TBPPP-CPC$_{60}$	--	Zn(II)			DCM	$TBAPF_6$ (0.2M)	Ag/AgCl			0.86	-0.58					276 (DPV)
TBPPP-CPC$_{60}$	--	Zn(II)			PhCN	$TBAPF_6$	Fc/Fc^+			0.34	-1.04					403 (DPV)
TDAPPP.ImPC$_{60}$	**1473**	Zn(II)	See Fig.		DCB	TBAP	Fc/Fc^+						-0.70*	-1.30*		426

Table 19. Porphyrin-fullerene conjugates and porphyrin-fullerene complexes. (see structure in Figure 19)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
TDPAPP-CPC_{60}	**1474**	2H			DCM	$TBAPF_6$	Fc/Fc^+			0.58	-1.06	-1.44	-1.65	-1.99*		19
TDPAPP-CPC_{60}	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.66	0.35	-1.07	-1.44	-1.78	-1.99*		19
TDPAPP-CPC_{60}	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.69	0.34	-1.07	-1.45	-1.82	-1.99*		19
TDPAPPCPC_{60}	**1475**	2H			DCB	TBAP	Fc/Fc^+			0.37	-1.16					16
TDPAPPCPC_{60}	**1475**	2H			PhCN	TBAP	Fc/Fc^+			0.39	-1.01					16
TDPAPPCPC_{60}	**1476**	Zn(II)			DCB	TBAP	Fc/Fc^+			0.15*	-1.15					16
TDPAPPCPC_{60}	**1476**	Zn(II)			PhCN	TBAP	Fc/Fc^+			0.18*	-1.02					16
TPP	**1477**	Zn(II)	See Fig.		DCM	$TBAPF_6$	Fc/Fc^+		0.24	0.52			-1.89	-2.23		392
TPP-(3-Py)MC_{60}	**1478**	Zn(II)	See Fig.		DCB/ DMF	$TBABF_4$	$Ag/AgNO_3$			0.58						313
TPP-dendron-C_{60}	**1479**	Zn(II)			DCE	TBAP	Fc/Fc^+						-1.12	-1.49		400
TPP-$DPAC_{60}$	**1480**	2H			DCB	$TBAPF_6$ (0.05M)	SCE		1.46	1.10	-0.63	-1.09	-1.39	-1.63		120
TPP-$DPAC_{60}$	--	Zn(II)			DCB	$TBAPF_6$ (0.05M)	SCE		1.23	0.96	-0.63	-1.02	-1.30	-1.59		120
TPP-ECPP($La_2@C_{80}$)	**1481**	Zn(II)			DCB	$TBAPF_6$ (0.05M)	Fc/Fc^+	0.65, 0.88	0.52	0.33	-0.39	-1.79, -2.15				320
TPP-ECPP$Sc_3N@C_{80}$	**1482**	Zn(II)			DCB	$TBAPF_6$ (0.05M)	Fc/Fc^+		0.64	0.37	1.10	0.55*, -1.34	-1.92	-2.26		320
TPP-EMC_{60}	**1483**	Co(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.85	0.61	0.37	-0.99, -1.42				211
TPP-MC_{60}	**1484**	Co(II)			PhCN	$TBAPF_6$	Fc/Fc^+	1.22	0.98	0.72	0.06, -1.92*	-0.92, -1.41, -2.12				211

Table 19. Porphyrin-fullerene conjugates and porphyrin-fullerene complexes. (see structure in Figure 19)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
TPP-PAC$_{60}$	**1485**	2H			DCB	TBAPF$_6$ (0.05M)	SCE		1.43	1.08	-0.66	-1.11, -1.67	-1.44			13
TPP-PAC$_{60}$	--	Zn(II)			DCB	TBAPF$_6$ (0.05M)	SCE		1.19	0.94	-0.66	-1.05	-1.32	-1.57		13
TPP-TPAC$_{60}$	**1486**	2H			DCB	TBAPF$_6$ (0.05M)	SCE		1.52	1.20	-0.65	-1.08	-1.34	-1.59		120
TPP-TPAC$_{60}$	--	Zn(II)			DCB	TBAPF$_6$ (0.05M)	SCE		1.24	0.98	-0.64	-1.02	-1.31	-1.58		120
TPP.(3-Py)$_2$C$_{60}$	**1487**	Zn(II)	See Fig.		DCB/ DMF	TBABF$_4$	Ag/AgNO$_3$			0.62*						313
TPP.(3'-Py)C$_{60}$	**1488**	Zn(II)	See Fig.		DCB	TBAP	Fc/Fc$^+$		0.62	0.28						277
TPP.(3'-PyC$_{60}$)	**1489**	Zn(II)	See Fig.		DCB	TBAP	Fc/Fc$^+$		0.64	0.29	-1.10	-1.50, -1.96	-1.91	-2.20		149
TPP.(4-Py)C$_{60}$	**1490**	Ru(II)	CO		THF	TBAPF$_6$	SCE		1.33	0.98	-0.49, -2.09	-1.07, -1.67, -2.90	-1.54	-2.08	-2.44	283
TPP.(4'-Py)C$_{60}$	**1491**	Zn(II)	See Fig.		DCM	TBAPF$_6$	Fc/Fc$^+$				-1.07	-1.45	-1.98			365
TPP.(4'-Py)IC$_{60}$	**1492**	Zn(II)	See Fig.		DCM	TBAPF$_6$	Fc/Fc$^+$		0.32	0.72	-1.07	-1.46	-1.90			392
TPP.(4'-PyC$_{60}$)	**1493**	Zn(II)	See Fig.		DCB	TBAP	Fc/Fc$^+$		0.65	0.28	-1.11	-1.50, -1.97	-1.90	-2.20		149
TPP.(C$_{60}$PIm)$_2$/TPP. C$_{60}$PIm	**1494**	Mg(II)	See Fig.		DCB	TBAP	Fc/Fc$^+$		0.46	0.17	-1.21					164
TPP.(Im-C$_{60}$)	**1495**	Zn(II)	See Fig.		DCB	TBAP	Fc/Fc$^+$		0.67	0.29	-1.10	-1.49, -2.02	-1.91	-2.19		149
TPP.ImPC$_{60}$	**1496**	Zn(II)	See Fig.		DCB	TBAP	Fc/Fc$^+$		0.67	0.29	-1.10	-1.49, -2.02	-1.91	-2.19		141
(TPP)$_2$-(4'-Py)$_2$C$_{60}$	**1497**	[Zn(II)]$_2$	See Fig.		DCB	TBAP	Fc/Fc$^+$		0.67	0.29	-1.10	-1.49, -2.02	-1.91	-2.19		144
[TPP]$_2$-DAAP.Ur-C$_{60}$	**1498**	[Zn(II)]$_2$			DCB	TBAP	Fc/Fc$^+$			0.21			-1.19			383

Table 19. Porphyrin-fullerene conjugates and porphyrin-fullerene complexes. (see structure in Figure 19)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
trans-APMP-PC_{60}	**1499**	2H			DCM	$TBAPF_6$	SCE		0.66*	0.46*	-0.99	-1.20	-0.61			292
trans-BCPPADBPP-$PAPC_{60}$	**1500**	2H			DCM	$TBAPF_6$	SCE		1.31	1.02	-0.67	-1.02, -1.55	-1.19			452
trans-C_{60}-$(Por)_2$-C_{60}	**1501**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	0.82, 1.09	0.34	0.03			-0.99 -1.09	-1.40	-1.87, -2.29	136
trans-C_{60}-$(Por)_2$-C_{60}	**1501**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	0.82, 1.09	0.34	0.03	-0.99	-1.09, -1.40	-1.87	-2.29		439
trans-C_{60}-$(Por)_2$-C_{60}	**1501**	$[Zn(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	0.85	0.49	0.35	-0.99	-1.07, -1.40	-1.85			455
trans-C_{60}-$(Por)_2$-C_{60}	**1501**	$[Zn(II)]_2$			PhCN	$TBAPF_6$	Fc/Fc^+	0.85	0.49	0.32	-0.95	-1.36				455
trans-C_{60}-$(Por)_3$-C_{60}	**1502**	$[Zn(II)]_3$			DCM	$TBAPF_6$	Fc/Fc^+	0.57, 0.83	0.44	0.35	-1.06	-1.42	-1.85			455
trans-C_{60}-$(Por)_4$-C_{60}	**1503**	$[Zn(II)]_4$			DCM	$TBAPF_6$	Fc/Fc^+	0.61, 0.84	0.47	0.33	-1.04	-1.40	-1.85			455
trans-DBCAPEtP/C_{60}	**1504**	2H			Tol.	NR	Fc/Fc^+						0.30	-1.10		491
trans-DBCAPEtP/C_{70}	**1505**	2H			Tol.	NR	Fc/Fc^+						0.31	-1.05		491
TriP-QT-C_{60}	**1506**	2H			DCB	$TBAPF_6$	Fc/Fc^+			0.68	0.43	-1.20, -1.58	-1.58			410 (SWV)
TriPP-C_{60}(4'-Py).TPP	**1507**	Zn(II), 2H	See Fig.		DCB	TBAP	Fc/Fc^+	0.64, 0.81*	0.57	0.30	-1.10, -2.47*	-1.44, -2.00	-1.65	-1.90	-2.20	57
TriPP-DDT-C_{60}	**1508**	2H			DCB	$TBAPF_6$	Fc/Fc^+			0.49	0.21	-1.19, -1.56	-1.62			410 (SWV)
TriPP-ECPP(La@C_{82})	**1509**	2H			DCB	$TBAPF_6$ (0.05M)	Fc/Fc^+	0.89, 1.13	0.58	-0.03	-0.48	-1.41, -1.74	-2.07			369
TriPP-ECPP(La@C_{82})	**1509**	2H			DCB	$TBAPF_6$ (0.05M)	Fc/Fc^+	0.89, 1.06	0.57	-0.04	-0.48	-1.41, -1.75	-2.06			369
TriPP-ECPP(La@C_{82})	**1509**	2H			DCB	$TBAPF_6$ (0.05M)	Fc/Fc^+	0.89, 1.08	0.61	-0.02	-0.45	-1.36, -1.71	-2.07			369

Table 19. Porphyrin-fullerene conjugates and porphyrin-fullerene complexes. (see structure in Figure 19)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
TriPP-EMC$_{60}$	**1510**	Zn(II)			DCM (-50°C)	$TBAPF_6$	Fc/Fc^+		0.66	0.33	-1.06	-1.44, -1.89	-2.05*			158
TriPP-OT-C$_{60}$	**1511**	2H			DCB	$TBAPF_6$	Fc/Fc^+			0.56	0.29	-1.20, -1.58	-1.60			410 (SWV)
TriPP-PEMC$_{60}$	**1512**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.65	0.32	-1.69*		-2.13*	-2.32*		158
TriPP-PEMC$_{60}$6G1	**1513**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.66	0.32	-1.87		-2.15	-2.33		158
TriPP-PEMC$_{60}$6G2	**1514**	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+				-1.94*		-2.34*			158
TriPP(2'-EPC$_{60}$)	**1515**	2H			DCB	TBAP	Fc/Fc^+		0.81	0.50	-1.18	-1.56, -2.10	-1.73			147
TriPP(2'-EPC$_{60}$)	--	Mg(II)			DCB	TBAP	Fc/Fc^+		0.43	0.06	-1.20					166
TriPP(2'-EPC$_{60}$)	--	Mg(II)			PhCN	TBAP	Fc/Fc^+		0.51	0.20	-1.04					166
TriPP(2'-EPC$_{60}$)	--	Mg(II)			Py/DCB	TBAP	Fc/Fc^+			0.18	-1.19					166
TriPP(2'-EPC$_{60}$)	--	Zn(II)			DCB	TBAP	Fc/Fc^+		0.63	0.29	-1.17	-1.55, -2.07	-1.90	-2.29		147
TriPP(2'-EPC$_{60}$)	--	Zn(II)			DCB	TBAP	Fc/Fc^+		0.63	0.29	-1.17					166
TriPP(2'-EPC$_{60}$)	--	Zn(II)			PhCN	TBAP	Fc/Fc^+		0.67	0.29	-1.04					166
TriPP(2'-EPC$_{60}$)	--	Zn(II)			Py/DCB	TBAP	Fc/Fc^+			0.23	-1.17					166
TriPP(2'-EPC$_{60}$)	--	Zn(II)	Py		DCB	TBAP	Fc/Fc^+		0.61	0.26	-1.18	-1.56, -2.07	-1.91	-2.29		147
TriPP(4'-EPC$_{60}$)	**1516**	2H			DCB	TBAP	Fc/Fc^+		0.80	0.51	-1.19	-1.55, -2.08	-1.74			147
TriPP(4'-EPC$_{60}$)	--	Zn(II)			DCB	TBAP	Fc/Fc^+		0.61	0.27	-1.18	-1.55, -2.06	-1.91	-2.25		147

Table 19. Porphyrin-fullerene conjugates and porphyrin-fullerene complexes. (see structure in Figure 19)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
TriPP(4'-EPC$_{60}$)	--	Zn(II)	Py		DCB	TBAP	Fc/Fc$^+$		0.60	0.26	-1.18	-1.56, -2.07	-1.92	-2.26		147
TriPPC$_{60}$(3'-Py)	**1517**	2H			DCB	TBAP	Fc/Fc$^+$		0.82*	0.56	-1.14, -2.46*	-1.52, -2.05	-1.68,			57
TriPPC$_{60}$(3'-Py).TPP	**1518**	Zn(II)	See Fig.		DCB	TBAP	Fc/Fc$^+$		0.61	0.26	-1.20	-1.55, -2.07	-2.01	-2.40		152
TriPPC$_{60}$(3'-Py).TPP	**1519**	Zn(II), 2H	See Fig.		DCB	TBAP	Fc/Fc$^+$	0.65, 0.83*	0.58	0.29	-1.11, -2.47*	-1.45, -2.01	-1.67	-1.93		57
TriPPC$_{60}$(4'-Py)	**1520**	2H			DCB	TBAP	Fc/Fc$^+$		0.80*	0.55	-1.14, -2.45*	-1.51, -2.04	-1.68			57
TriPPC$_{60}$(4'-Py).TPP	**1521**	Zn(II)	See Fig.		DCB	TBAP	Fc/Fc$^+$		0.61	0.26	-1.20	-1.55, -2.07	-1.97	-2.36		152
TriPyP-PC$_{60}$	**1522**	2H			DCB	TBAPF$_6$ (0.05M)	Fc/Fc$^+$						-1.33	-1.77		312
TriPyP-PC$_{60}$---TPP	**1523**	2H, Zn(II)			DCB	TBAPF$_6$ (0.05M)	Fc/Fc$^+$			0.28	-1.23	-1.63				312
TriPyP-PC$_{70}$	**1524**	2H			DCB	TBAPF$_6$ (0.05M)	Fc/Fc$^+$						-1.27	-1.68		312
TriPyP-PC$_{70}$---TPP	**1525**	Zn(II)			DCB	TBAPF$_6$ (0.05M)	Fc/Fc$^+$			0.27	-1.08	-1.47				312
TriTP-AzPC$_{60}$	**1526**	2H			DCM	TBAPF$_6$	Fc/Fc$^+$		0.83	0.52	-1.09	-1.46	-1.64		-2.06*	19
TriTPP-BDP(18C6).C$_{60}$	**1527**	Zn(II)			PhCN	TBAP	Fc/Fc$^+$		0.58	0.25	0.78	-1.03, -1.45	-1.64	-1.90		545
TTF-Por-C$_{60}$	**1528**	2H			THF	TBAPF$_6$	SCE				0.80*, -1.07	0.53*, -0.51, -1.55	-1.23	-1.56		419

Table 20. Porphyrin-C_{60}-ferrocene triads. (see structures in Figure 20)

Ring	Structure	Axial Ligand: Metal	Axial Ligand: L1	Axial Ligand: L2	Solvent	Salt	RE	Porphyrin Ox: 3	Porphyrin Ox: 2	Porphyrin Ox: 1	Metal / Other	Porphyrin Red: 1	Porphyrin Red: 2	Porphyrin Red: 3	Ref.
Fc-$(Por)_2$-C_{60}	**1529**	$[Zn(II)]_2$			PhCN	$TBAPF_6$	Fc/Fc^+			0.34	0.00 -1.05	-1.81			346
Fc-PImT(Ar)PImP-C_{60}	**1530**	Zn(II)			DCB	$TBAPF_6$	$Ag/AgNO_3$			0.77	0.66 -0.59				334
Fc-PImT(Ar)PImP-C_{60}	**1530**	Zn(II)			PhCN	$TBAPF_6$	$Ag/AgNO_3$			0.80	0.60 -0.53				334
FcP(USH)CP-(Por)-$PCPC_{60}$	**1531**	2H			DCM	$TBAPF_6$ (0.2M)	Ag/AgCl			1.15	0.51 -0.62				276
FcP(USH)CP-(Por)-$PCPC_{60}$	**--**	Zn(II)			DCM	$TBAPF_6$ (0.2M)	Ag/AgCl			0.91	0.50 -0.62				276
FcPA-$(Por)_2$-APC_{60}	**1532**	$[Zn(II)]_2$			THF	$TBABF_4$	Fc/Fc^+		0.58	0.43	0.04 -1.00	-1.50	-1.63		433
FcPA-$(Por)_4$-APC_{60}	**1533**	$[Zn(II)]_4$			THF	$TBABF_4$	Fc/Fc^+				0.04 -1.00	-1.44	-1.59	-1.77	433
FcPA-Por-APC_{60}	**1534**	Zn(II)			THF	$TBABF_4$	Fc/Fc^+			0.45	0.04 -1.00	-1.60			433
FcPCP-(Por)-$PCPC_{60}$	**1535**	2H			DCM	$TBAPF_6$ (0.2M)	Ag/AgCl			1.02	0.56 -0.57				276 (DPV)
FcPCP-(Por)-$PCPC_{60}$	**--**	Zn(II)			DCM	$TBAPF_6$ (0.2M)	Ag/AgCl			0.86	0.52 -0.56				276 (DPV)
FcPCPTriPP.ImPC_{60}	**1536**	Zn(II)	See Fig.		DCB	TBAP	Fc/Fc^+		0.65	0.27	-0.01 -1.13, -1.52, -2.04	-1.91	-2.23		141
FcPCPTriPP.PyC_{60}	**1537**	Zn(II)	See Fig.		DCB	TBAP	Fc/Fc^+		0.64	0.28	-0.01 -1.14, -1.55, -2.06	-1.91	-2.22		141
FcPTriPP.ImC_{60}	**1538**	Zn(II)	See Fig.		DCB	TBAP	Fc/Fc^+		0.62	0.21	-0.03 -1.17, -1.56, -2.10	-1.93	-2.27		141
trans-DFcPDPP.ImC_{60}	**1539**	Zn(II)	See Fig.		DCB	TBAP	Fc/Fc^+		0.61	0.23	-0.12 -1.20, -1.57, -2.10	-1.94	-2.28		141

Table 21. Supramolecular porphyrin assemblies. (see structures in Figure 21)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$[(2'\text{-Py})TBP]_2$	**1540**	$[Ru(II)]_2$	CO		DCM	$TBAPF_6$	Fc/Fc^+	1.48, 1.32	0.94	0.66						261
$[(2'\text{-Py})TBPP]_2$. $[(4'\text{-Py})TriTP]_2$	**1541**	$[2H]_2$, $[Ru(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.48*	1.21	0.96	0.37	0.05	-1.23	-1.58		261
$[(2'\text{-Py})TriBP]_2$	**1542**	Rh(III)	Cl^-		DCM	$TBAPF_6$	Ag/AgCl		1.26	1.00						217
$[(2'\text{-Py})TriBP]_2$	**1543**	$[Ru(II)]_2$	See Fig.		DCM	$TBAPF_6$	Fc/Fc^+		1.35*	1.23*	0.38	0.12				261
$[(2'\text{-Py})TriTP]_2$	**1544**	$[Ru(II)]_2$	CO		DCM	$TBAPF_6$	Fc/Fc^+	1.46, 1.29	0.92	0.66						261
$[(2'\text{-Py})TriTP]_2$	--	$[Ru(II)]_2$	Py		DCM	$TBAPF_6$	Fc/Fc^+		1.49*	1.28*	0.32	0.02				261
$[(3'\text{-Py})TBP]_4$	**1545**	Ru(II)	CO	Py	DCM	$TBAPF_6$	Fc/Fc+	0.57, 0.53, 1.02	0.47	0.38						198
$[(3'\text{-Py})TBP]_4$	--	Ru(II)	Py		DCM	$TBAPF_6$	Fc/Fc+			0.99	-0.02, -0.17	-0.06, -0.28				198
$[(3'\text{-Py})TBPP]_2$. $[(3'\text{-Py})TriTP]_2$	**1546**	$[2H]_2$, $[Ru(II)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.61*	1.28	0.99	0.34*	0.01	-1.36			261
$[(3'\text{-Py})TriHP]_4$	**1547**	Ru(II)	CO	Py	DCM	$TBAPF_6$	Fc/Fc+	0.54, 0.53, 0.98	0.45	0.37						198
$[(3'\text{-Py})TriTP]_4$	--	Ru(II)	CO		DCM	$TBAPF_6$	Fc/Fc^+	0.57, 0.53, 1.02	0.46	0.38						198
$[(4'\text{-Py})TriTP]_4$	**1548**	Rh(III)	Cl^-		DCM	$TBAPF_6$	Ag/AgCl	1.19, 1.14	1.08	1.01						217
$(BAPMImPP)_2$	**1549**	Zn(II)	Im		DCM	$TBAPF_6$	Ag/AgCl			0.63			-1.52			117
[cis-D(4'-Py)DPP. $(RhL_n)^{2+}]_4$	**1550**	$[2H]_4$			DCE	$TBAPF_6$ (0.05M)	SCE			1.24*	1.60*	0.53	-1.10*			442
$(D(PPy)P)_2.(RuL_n)^{2+}{}_2$	**1551**	$[2H]_2$			DCM	$TBAPF_6$	SCE			1.04			-1.10			414
$(D(PyP)P)_2.(RuL_n)^{2+}{}_2$	**1551**	$[2H]_2$			DCM	$TBAPF_6$	SCE			1.02			-1.07			414

Table 21. Supramolecular porphyrin assemblies. (see structures in Figure 21)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$(EtCPPzDTP)_3$	**1552**	Zn(II)	See Fig.		DCM	$TBABF_4$	Ag/Ag^+		0.53	0.39						151
$((HP)TriPP)_2$	**1553**	$[2H]_2$			DMF	TBAP	$Ag/AgNO_3$			0.63			-1.53	-1.97		124
$[(ImUP)T(3',5'\text{-}D\text{-}TBuP)P]_2$	**1554**	$[2H]_2$			THF	$TBAPF_6$	Fc/Fc^+			0.34*						591
$[(ImUP)T(3',5'\text{-}D\text{-}TBuP)P]_2$	--	$[Zn(II)]_2$			THF	$TBAPF_6$	Fc/Fc^+			0.22						591
$(OEP)_2.(bpy)$	**1555**	$[Os(II)]_2$	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.83	0.08					209 (DPV)
$(OEP)_2.(DABCO)$	**1556**	$[Os(II)]_2$	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.83	0.15*					209 (DPV)
$(OEP)_2.(DABCO)$	--	$[Ru(II)]_2$	CO		DCM	TBAP	Fc/Fc^+			0.21	0.66					209
$(OEP)_2.(DABCO)$	--	$[Ru(II)]_2$	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.27	0.81					209 (DPV)
$(OEP)_2.(Pz)$	**1557**	$[Os(II)]_2$	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.83	0.26	0.18				209 (DPV)
$(OEP)_2.(Pz)$	--	$[Ru(II)]_2$	CO		DCM	TBAP	Fc/Fc^+			0.27	0.70					209
$(OEP)_2.(Pz)$	--	$[Ru(II)]_2$	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.28	0.75					209 (DPV)
$(OEP)_6.M((Py)_2\text{-}bpy)_3$	**1558**	Ru(II)	CO		DCM	$TBAPF_6$ (0.2M)	SCE		1.12	0.59			-0.97	-1.10	-1.30	197
$[PyTriPP]_2.(RuL_n)^{2+}$	**1559**	$[2H]_2$			DCM	$TBAPF_6$	SCE			1.04			-1.17			414
$ri[(2'\text{-}Py)TBP]_2$	**1560**	$[Ru(II)]_2$	Py		DCM	$TBAPF_6$	Fc/Fc^+		1.46*	1.26*	0.31	0.02				261
$(S_2\text{-}PyP)\text{-}(S\text{-}TP).TPP$	**1561**	H, Ru(II)	CO		DCM	TBAP	SCE	1.58, 1.35	1.16	0.89			-1.23	-1.39	-1.69	503
$[T(15C5P)P]_2.4K^+$	**1562**	$[2H]_2$			PhCN	TBAP	Fc/Fc^+			0.15			-1.87	-2.13		354

Table 21. Supramolecular porphyrin assemblies. (see structures in Figure 21)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$[T(15C5P)P]_2.4K^+$	--	$[Ag(II)]_2$			PhCN	TBAP	Fc/Fc^+			0.15	0.01	-1.48	-1.74			354
$[T(15C5P)P]_2.4K^+$	--	$[Co(II)]_2$			PhCN	TBAP	Fc/Fc^+				-0.02	-1.38	-1.78			354
$[T(15C5P)P]_2.4K^+$	--	$[Cu(II)]_2$			PhCN	TBAP	Fc/Fc^+		0.59	0.34			-1.79	-2.04		354
$[T(15C5P)P]_2.4K^+$	--	$[Mg(II)]_2$			PhCN	TBAP	Fc/Fc^+		0.67	0.14			-1.89	-2.07		354
$[T(15C5P)P]_2.4K^+$	--	$[Ni(II)]_2$			PhCN	TBAP	Fc/Fc^+		0.40	0.27			-1.80	-2.04		354
$[T(15C5P)P]_2.4K^+$	--	$[Pd(II)]_2$			PhCN	TBAP	Fc/Fc^+			0.42			-1.79	-2.08		354
$[T(15C5P)P]_2.4K^+$	--	$[V(IV)]_2$	O^{2-}		PhCN	TBAP	Fc/Fc^+			0.39			-1.54	-1.73		354
$[T(15C5P)P]_2.4K^+$	--	$[Zn(II)]_2$			PhCN	TBAP	Fc/Fc^+		0.29	0.18			-1.85	-2.07		354
$T(4'\text{-}Py)P.(TBPP)_4$	**1563**	Sn(IV), $[Ru(II)]_4$	CO		DCM	$TBAPF_6$	SCE			0.83			-0.62			286
$TPP.(TBPP)_2$	**1564**	Sn(IV), $[Ru(II)]_2$	CO	See Fig.	DCM	$TBAPF_6$	SCE			0.80			-0.90			286
$[TPP]_2.(APy)_2POM$	**1565**	$[Ru(II)]_2$	CO		DCE/ CH_3CN	$TBAPF_6$	SCE	1.61*	1.29	0.87	-0.68		-1.33*	-1.43		438
$[TPP]_2.(APy)_2POM$	**1565**	$[Ru(II)]_2$	CO		DCE/ CH_3CN	$TBAPF_6$	SCE	1.57*	1.29*	0.86	-0.69		-1.46			438
$[TPP]_2.(APy)_2POM$	**1565**	$[Ru(II)]_2$	CO		DCE/ CH_3CN	$TBAPF_6$	SCE		1.61*	0.92	-0.30		-1.44			438
$[TPP]_2.(CPy)_2POM$	**1566**	$[Ru(II)]_2$	CO		DCE/ CH_3CN	$TBAPF_6$	SCE			1.03*	-0.59		-1.37	-1.85	-1.99	438
$[TriPPyP]_2.(Rh^{2+})_2$	**1567**	$[2H]_2$			DCE	$TBAPF_6$ (0.05M)	SCE			1.17	1.54*	0.59	-1.11			442
$(TTP)_2.(bpy)$	**1568**	$[Os(II)]_2$	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.90	0.25					209 (DPV)

Table 21. Supramolecular porphyrin assemblies. (see structures in Figure 21)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$(TTP)_2$.(bpy)	--	$[Ru(II)]_2$	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.30	0.80					209 (DPV)
$(TTP)_2$.(DABCO)	**1569**	$[Os(II)]_2$	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.93	0.39	0.28				209 (DPV)
$(TTP)_2$.(DABCO)	--	$[Ru(II)]_2$	CO		DCM	$TBAPF_6$	Fc/Fc^+		0.42	0.35	0.84					209 (DPV)
$(TTP)_2$.(Pz)	**1570**	$[Os(II)]_2$	CO		DCM	$TBAPF_6$	Fc/Fc^+			0.92	0.44	0.36				209 (DPV)
$(TTP)_2$.(Pz)	--	$[Ru(II)]_2$	CO		DCM	$TBAPF_6$	Fc/Fc^+		0.45	0.39	0.83					209 (DPV)
$(TTP)_2$.M(Py-terpy)$_2$	**1571**	Ru(II)	CO		DCM	$TBAPF_6$ (0.2M)	SCE		1.23	0.71			-1.00	-1.21	-1.65	197
$(TTP)_2$.M(Py-terpy)$_2$	**1572**	Ru(II)	CO		DCM	$TBAPF_6$ (0.2M)	SCE	1.37	1.21	0.69			-1.07	-1.33	-1.68	197
$(TTP)_2$.M(Py-terpy)$_2$	**1573**	Ru(II)	CO		DCM	$TBAPF_6$ (0.2M)	SCE	1.23	1.05	0.72			-1.02	-1.36	-1.69	197
$(TTP)_4$.M((Py)$_2$-bpy)$_2$	**1574**	Ru(II)	CO		DCM	$TBAPF_6$ (0.2M)	SCE			1.26	0.74		-1.27	-1.55		197
$(TTP)_6$.M((Py)$_2$-bpy)$_3$	**1575**	Ru(II)	CO		DCM	$TBAPF_6$ (0.2M)	SCE		1.25	0.74			-0.97	-1.08	-1.30, -1.62	197
$(TTP)_6$.M((Py)$_2$-bpy)$_3$	**1576**	Ru(II)	CO		DCM	$TBAPF_6$ (0.2M)	SCE		1.24	0.75			-0.94	-1.05	-1.32, -1.66	197

Table 22a. Porphyrins with covalently bonded peripheral metal complexes. (see structures in Figure 22a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$(2'\text{-Py})_2$TBPP-$[PtL_n]^{2+}$	**1577**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.38			-1.63			252
$(2'\text{-Py})_2$TBPP-$[PtL_n]^{2+}$	**1577**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+			0.32*			-1.69			252
$(2'\text{-Py})_2$TBPP-$[PtL_n]^{4+}$	**1578**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.87	0.61			-1.27*	-1.66		252
D(tterpy)DMP$[(RuL_n)^{2+}]_2$	**1579**	2H			CH_3CN	$TBAPF_6$	SCE		1.07	0.92	0.53	-1.55*	-1.20			5
D(tterpy)DMP$[(RuL_n)^{2+}]_2$	**--**	Zn(II)			CH_3CN	$TBAPF_6$	SCE		1.16	0.82	0.52		-1.38			5
DBPDAP-$[Pt^+(bpy)]$	**1580**	Zn(II)			DMF	$TBAPF_6$	SCE			0.83			-0.80	-1.20		298
DBPP-PA-$[APt(DEPterpy)]^+$	**1581**	Mg(II)			DMF	$TBAPF_6$	SCE			0.70	-0.58		-1.14			165
DBPP-PA-$[APt(Hterpy)]^+$	**1582**	Mg(II)			DMF	$TBAPF_6$	SCE			0.70	-0.93		-1.28			165
DBPP-PA-$[APt(Hterpy)]^+$	**--**	Zn(II)			DMF	$TBAPF_6$	SCE			0.78	-0.94		-1.21			165
DBPP-PA-$[APt(terpy)]^+$	**1583**	Zn(II)			DMF	$TBAPF_6$	SCE			0.83	-0.80		-1.20			165
DBPP-PA-$[APt(terpy)]^+$	**--**	Mg(II)			DMF	$TBAPF_6$	SCE			0.70	-0.79		-1.29			165
DBPP-PA-$[APt(terpy)]^+$	**1584**	Zn(II)			DMF	$TBAPF_6$	SCE			0.79	-0.59		-1.17			165
DPyTBPP-Ir(cod)	**1585**	Ni(II)			NR	NR	Fc/Fc^+			-0.01						572
DPyTBPP-$IrCl_2(OH_2)$	**1586**	Ni(II)			NR	NR	Fc/Fc^+			0.22						572
MEAK-TPP	**1587**	Ni(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.78	0.40			-1.48	-1.85		222
SQTriPP-$[Ru(bpy)_2]^+$	**1588**	2H			CH_3CN	$TBAPF_6$	Fc/Fc^+				1.07	0.23, -0.68				486
SQTriPP-$[Ru(bpy)_2]^+$	**--**	Zn(II)			CH_3CN	$TBAPF_6$	Fc/Fc^+				1.05	0.14, -0.66				486
TBPPA-$(Pt(Et_3P)_2$TSiA)	**1589**	Ni(II)			DCM	$TBAPF_6$	Ag/AgCl		1.19	0.70			-1.44*			220
TBPPA-$(Pt(Et_3P)_2$TSiA)	**--**	Zn(II)			DCM	$TBAPF_6$	Ag/AgCl		0.95	0.48			-1.53*			220
TPPDP-Pt^+(bpy)	**1590**	Zn(II)			DMF	$TBAPF_6$	SCE			0.88			-0.76			298

Table 22a. Porphyrins with covalently bonded peripheral metal complexes. (see structures in Figure 22a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
trans-$(OP)_2$DPP-Mo(trisPHB)$^{2+}]_2$	**1591**	2H			DCM	$TBAPF_6$	Fc/Fc^+		0.82	0.48	-0.76		-1.71			169
trans-B(PSQ)DPP-$[(Ru(bpy)_2)^+]_2$	**1592**	2H			CH_3CN	$TBAPF_6$	Fc/Fc^+				1.02	0.14, -0.66				486
trans-D(PSQ)P-$[(Ru(bpy)_2)^+]_2$	**1593**	Zn(II)			CH_3CN	$TBAPF_6$	Fc/Fc^+				1.06	0.30, -0.66				486

Table 22b. Porphyrins with non-covalently bonded peripheral metal complexes. (see structures in Figure 22b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
(2'-Py)TBPP-[$(RuL_n)^{2+}$]	**1594**	2H			DCM	$TBAPF_6$	Fc/Fc^+		0.73	0.38					435
(2'-Py)TBPP-[$(RuL_n)^{2+}$]	**1594**	2H			DCM	$TBAPF_6$	Fc/Fc^+		0.72	0.32					435
(2'-Py)TBPP-[$(RuL_n)^{2+}$]	**1594**	2H			DCM	$TBAPF_6$	Fc/Fc^+		0.73	0.35					435
(2'-Py)TBPP-[$(RuL_n)^{2+}$]	**1594**	2H			DCM	$TBAPF_6$	Fc/Fc^+		0.77	0.40					435
(2'-Py)TBPP-[$(RuL_n)^{2+}$]	**1594**	2H			DCM	$TBAPF_6$	Fc/Fc^+		0.48	-0.08					435
(2'-Py)TBPP-[$(RuL_n)^{2+}$]	--	Cu(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.71	0.35					435
(2'-Py)TBPP-[$(RuL_n)^{2+}$]	--	Zn(II)			DCM	$TBAPF_6$	Fc/Fc^+		0.46	0.21					435
(3'-Py)TriPP-[$(ReL_n)^+$]	**1595**	Zn(II)			DCM	$TBAPF_6$	SCE			0.83		-1.17			386
(4'-Py)TriHMPP-[$PtL_n]^{2+}$	**1596**	Co(II)			H_2O	$HClO_4$ (1.0M)	Ag/AgCl	0.76*	0.59*	0.53					250
(4'-Py)TriPP-$(RuL_n)^+$	**1597**	2H			DCM	$TBAPF_6$	SCE			1.05		-1.22			414
(4'-Py)TriPP-[$(ReL_n)^+$]	**1598**	Zn(II)			DCM	$TBAPF_6$	SCE			0.83		-1.16			386
(4'-Py)TriPP-[$(RuL_n)^{2+}$]	**1599**	2H			CH_3CN	TBAP	SCE				0.92	-1.10			487
(4'-Py)TriPP-[$(RuL_n)^{2+}$]	**1600**	2H			DMF	TEAP	SHE			1.26*	0.85	-0.90	-1.22	-1.56*	482
C_{60}Py.[*cis*-DMP(phen)$_2$-$(CuL_n)^+_2$]	**1601**	Zn(II)			DCE	$TBAPF_6$	Fc/Fc^+		0.83	0.42	0.36, 0.21, -1.04, -1.44	-1.88			123 (DPV)
C_{60}Py.[TMP(phen))$_4$-$(CuL_n)^+_4$]	**1602**	Zn(II)			DCE	$TBAPF_6$	Fc/Fc^+		0.81	0.40	0.28, 0.19, -1.04 -1.44	-1.85			123 (DPV)
C_{60}Py.[TMPP(phen)-$(CuL_n)^+$]	**1603**	Zn(II)			DCE	$TBAPF_6$	Fc/Fc^+		0.85	0.37	0.30, 0.20, -1.06 -1.47	-1.98			123 (DPV)

Table 22b. Porphyrins with non-covalently bonded peripheral metal complexes. (see structures in Figure 22b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
C_{60}Py.[trans-DMP(phen)$_2$-(CuL$_n$)$^+_2$]	**1604**	Zn(II)			DCE	$TBAPF_6$	Fc/Fc$^+$		0.77	0.39	0.33, -1.08	0.20, -1.50	-1.88			123 (DPV)
cis-D(4'-Py)DPP-[(RuL$_n$)$^{2+}$]$_2$	**1605**	2H			DMF	TEAP	SHE			1.43*	0.86		-0.86	-1.19	-1.39	482
cis-DBPAP(bpy)-[ReL$_n$]$^+$	**1606**	Zn(II)			DCM	$TBABF_4$ (0.2M)	SCE		1.22	0.81	1.53		-1.06			100
cis-DBPAP(bpy)-[RuL$_n$]$^{2+}$	**1607**	Zn(II)			DCM	$TBABF_4$ (0.2M)	SCE		1.17	0.78	1.68		-0.79	-1.07	-1.43	100
cis-DMP(phen)$_2$-[(CuL$_n$)$^+_2$]	**1608**	Zn(II)			DCE	$TBAPF_6$	Fc/Fc$^+$		0.77	0.41	0.41	0.20	-1.86			123 (DPV)
cis-F_5PTPyP-[(RuL$_n$)$^{2+}$]$_2$	**1609**	2H			CH_3CN	$TBAPF_6$	Ag/AgCl				0.84		-0.79			366
cis-F_5PTPyP-[(RuL$_n$)$^{2+}$]$_2$	--	Cu(II)			CH_3CN	$TBAPF_6$	Ag/AgCl				0.82		-0.94			366
cis-F_5PTPyP-[(RuL$_n$)$^{2+}$]$_2$	**1610**	Cu(II)			CH_3CN	$TBAPF_6$	Ag/AgCl				0.82		-0.94			366
cis-F_5PTriPyP-[(RuL$_n$)$^+$]$_2$	**1611**	2H			CH_3CN	$TBAPF_6$	Ag/AgCl		0.79		0.37		-0.84			248
D(BPBP)P(phen)-Cu$^+$L$_n$)	**1612**	Au(III)			*n*-BuCN	$TBABF_4$	Fc/Fc$^+$				0.37	-1.02				401
(DBIP)TriPP-[CoL]$^+$	**1613**	Co(II)			DMF	TBAP	SCE			0.33	-0.02					512
(DBIP)TriPP-[CuL]$^+$	**1614**	Co(II)			DMF	TBAP	SCE				0.17	-0.07				512
DTAPTBPP(Phen)$_2$-M-Cat1	**1615**	Zn(II)			DCB	TBAP	Fc/Fc$^+$			0.20	0.20	-2.30	-1.92			288
F_{10}D(4'-Py)DPP-[(RuL$_n$)$^{2+}$]$_2$	**1616**	2H			DMF	$TBAPF_6$	Ag/AgCl				0.88	-1.42	-0.68	-1.11		508
F_5PTriPyP[(RuL$_n$)$^{2+}$]$_3$	**1617**	Cu(II)			DMF	$TBAPF_6$	Ag/AgCl				0.88		-0.86			111
[F_6(tmpa)TPP-Cu$^+$]	**1618**	Fe(II)	See Fig.		CH_3CN	$TBAPF_6$	Fc/Fc$^+$				-0.65					183

Table 22b. Porphyrins with non-covalently bonded peripheral metal complexes. (see structures in Figure 22b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$[F_6(tmpa)TPP\text{-}Cu^+]$	**1619**	Fe(II)	See Fig.	See Fig.	CH_3CN	$TBAPF_6$	Fc/Fc^+				-0.49					183
$[F_6(tmpa)TPP\text{-}Cu^+]$	--	Fe(III)	Cl^-		CH_3CN	$TBAPF_6$	Fc/Fc^+				-0.53					183
$[(phen)TriMP\text{-}(CuL_n)^+]_2$	**1620**	$[Zn(II)]_2$			DCM	$TBAPF_6$	SCE				0.63					122
$[(phen)TriMP\text{-}Cu^+(L_n)]$	**1621**	Zn(II)			DCM/Py	$TBAPF_6$	SCE				0.64					122
$[RuL_n]^{2+}\text{-}DAPDBP\text{-}[ReL_n]^+$	**1622**	2H			DCM	$TBABF_4$ (0.2M)	SCE				1.72	1.47	-0.77	-1.14		100
$[RuL_n]^{2+}\text{-}DAPDBP\text{-}[ReL_n]^+$	--	Zn(II)			DCM	$TBAPF_6$ (0.2M)	SCE		1.22	0.83	1.71	1.51	-0.76	-1.03		100
$T(3'\text{-}Py)P\text{-}[(FeL_n)^{2+}]_4$	**1623**	2H			H_2O	KCl (1.0M)	Ag/AgCl		0.70	0.50						531
$T(3'\text{-}Py)P\text{-}[Ru_3L_n]_4$	**1624**	2H			CH_3CN	TEAP	SHE			1.55	1.19 -1.15	0.17, -2.21	-0.73	-1.03		484
$T(4'\text{-}CNP)P\text{-}[(RuL_n)^{2+}]_4$	**1625**	Co(II)			DME	$TBAPF_6$	Ag/AgCl				0.88, -0.61	0.48				214
$[T(4'\text{-}Py)P\text{-}((RuL_n)^+)_4]_2O$	**1626**	Fe(III)	O^{2-}		DMF	TBAP	SHE				-1.34		-0.76*			195
$T(4'\text{-}Py)P\text{-}[(ReL_n)^+]_4$	**1627**	Zn(II)			DCM	$TBAPF_6$	SCE			1.10			-1.15			386
$T(4'\text{-}Py)P\text{-}[(RhL_n)^{2+}]_4$	**1628**	2H			DCE	$TBAPF_6$ (0.05M)	SCE				1.50*	0.60	-1.02*			442
$T(4'\text{-}Py)P\text{-}[(RuL_n)^+]_4$	**1629**	Fe(III)			DMF	TBAP	SHE				0.91, -1.34*	0.16, -1.45*	-0.76*	-0.80*	-1.20*	195
$T(4'\text{-}Py)P\text{-}[(RuL_n)^+]_4$	--	Mn(III)			DMF	$TEAPF_6$	SHE				0.94 -1.35*	-0.04	-0.90	-1.16*		175
$T(4'\text{-}Py)P\text{-}[(RuL_n)^+]_4$	**1630**	Mn(III)			DMF	$TEAPF_6$	SHE			1.22	1.40, -1.32	0.00, -1.50	-1.03	-1.12		175
$T(4'\text{-}Py)P\text{-}[(RuL_n)^{2+}]_4$	**1631**	2H			DMF	TEAP	SHE				0.92		-0.68	-0.93	-1.42*	482

Table 22b. Porphyrins with non-covalently bonded peripheral metal complexes. (see structures in Figure 22b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
T(4'-Py)P-$[(RuL_n)^{2+}]_4$	**1631**	2H			CH_3CN	TEAP	SHE			1.60						482
T(4'-Py)P-$[(RuL_n)^{2+}]_4$	**1632**	2H			DCM	$TBAPF_6$	SCE			1.04			-0.91			414
T(4'-Py)P-$[(RuL_n)^{2+}]_4$	--	Fe(III)	Im	Im	DMF	TBAP	SHE				0.16		-0.76*	-1.15		195
T(4'-Py)P-$[Ru_3L_n]_4$	**1633**	2H			CH_3CN	TEAP	SHE			1.68	2.30, 0.16	1.23, -1.14	-0.72	-1.05		257
T(4'-Py)P-$[Ru_3L_n]_4$	**1633**	2H			CH_3CN	TEAP	SHE		2.30	1.68	1.23, -1.14	0.16, -2.30	-0.72	-1.05		484
T(4'-Py)P-$[Ru_3L_n]_4$	--	Co(II)			CH_3CN	$TBAPF_6$	SHE				2.33, 0.19	1.25, -1.05				213
T(4'-Py)P-$[Ru_3L_n]_4$	--	Co(II)	Cl^-		CH_3CN	$TBAPF_6$	Ag/AgCl				0.85	0.37	-0.44	-1.10		290
T(4'-Py)P-$[Ru_3L_n]_4$	--	Zn(II)			CH_3CN	TEAP	SHE		2.18*	1.19	0.15		-1.13			155
T(4'-Py)PP-$[(RuL_n)^{2+}]_3$	**1634**	2H			DMF	TEAP	SHE			1.40*	0.86		-0.76*	-1.02*	-1.39	482
T(DMCP)P-$[(RuL_n)^{2+}]_4$	**1635**	Co(II)			DME	$TBAPF_6$	Ag/AgCl				0.87, -0.69	0.46				214
TBPP-$[(IrL_n)^{3+}]$	**1636**	2H			CH_3CN	$TBAPF_6$	SCE			0.96	-0.78	-0.94	-1.17			7
TBPP-$[(IrL_n)^{3+}]$	**1636**	2H			DCM	$TBAPF_6$	SCE			0.88	-0.72	-0.88	-1.24			7
TBPP-$[(IrL_n)^{3+}]$	--	Au(III)			CH_3CN	$TBAPF_6$	SCE				-0.59, -0.91	-0.75	-1.11			7
TBPP-$[(IrL_n)^{3+}]$	--	Zn(II)			CH_3CN	$TBAPF_6$	SCE		0.95	0.62*	-0.79	-0.95				7
TBPP-$[(IrL_n)^{3+}]$	--	Zn(II)			DCM	$TBAPF_6$	SCE		1.08	0.68	-0.71	-0.87				7
TBPP-$[IrL_n]^{3+}$	**1637**	Au(III)			DCM	$TBAPF_6$	SCE				-0.66, -0.87	-0.72				7

Table 22b. Porphyrins with non-covalently bonded peripheral metal complexes. (see structures in Figure 22b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
TBPP-$[RuL_n]^{2+}$	**1638**	2H			DCM	$TBAPF_6$ (0.05M)	SCE		1.18		1.47		-1.04	-1.56	-1.87	37
TBPP-$[RuL_n]^{2+}$	--	Zn(II)			DCM	$TBAPF_6$ (0.05M)	SCE		1.17	0.78	1.68		-0.79	-1.07	-1.43	37
$(terpy)_2DMP[(RuL_n)^{2+}]_2$	**1639**	2H			CH_3CN	$TBAPF_6$	SCE			1.18	1.31	-1.28	-0.92			5
$(terpy)_2DMP[(RuL_n)^{2+}]_2$	--	Zn(II)			CH_3CN	$TBAPF_6$	SCE		1.19	0.93	1.33	-1.25	-1.14			5
$[TMP(phen)-(CuL_n)^{+}]$	**1640**	Zn(II)			DCE	$TBAPF_6$	Fc/Fc^{+}		0.74	0.41	0.41	0.21	-1.91			123 (DPV)
$[TMP(phen)-(CuL_n)^{+}]$	**1640**	Zn(II)			DCE	$TBAPF_6$	Fc/Fc^{+}		0.74	0.41	0.21					123 (DPV)
$[TMP(phen)_4-[(CuL_n)^{+}]_4$	**1641**	Zn(II)			DCE	$TBAPF_6$	Fc/Fc^{+}		0.77	0.41	0.41	0.20	-1.84			123 (DPV)
trans-$(4'-Py)_2DPP-[Mo(L_n)^{2+}]_2$	**1642**	2H			DCM	$TBAPF_6$	Fc/Fc^{+}		0.86	0.41	0.19	-1.88	-1.74			169
trans-$D(4'-Py)DPP-[(RuL_n)^{2+}]_2$	**1643**	2H			DMF	TEAP	SHE		1.42*	1.42*	0.85		-0.84	-1.14	-1.43	482
trans-$DMP(phen)_2-[CuL_n]^{+}{}_2$	**1644**	Zn(II)			DCE	$TBAPF_6$	Fc/Fc^{+}		0.74	0.41	0.41	0.21	-1.86			123 (DPV)
$[TriMPA(phen)-(CuL_n)^{+}]_2$	**1645**	$[Zn(II)]_2$			DCM	$TBAPF_6$	SCE			1.47*	0.64		-1.11			122
TriMPAP-$[CuL_n]^{+}$	**1646**	Zn(II)			DCM	$TBAPF_6$	SCE		1.21*	1.14	0.70		-1.15			122
TriMPP-$[RuL_n]^{2+}$	**1647**	Zn(II)			*n*-BuCN	$TBAPF_6$	Ag/Ag^{+}		0.90	0.56	1.19		-1.12	-1.31		162
TriPP-$[ReL_n]^{+}$	**1648**	Pd(II)			DCM	$TBAPF_6$	Fc/Fc^{+}			0.63			-1.48			544
TriTP-$[RuL_n]^{2+}$	**1649**	2H			DCM	TBAP	SCE		1.23	0.97	1.23					30
TriTP-$[RuL_n]^{2+}$	**1649**	2H			DMF	TBAP	SCE				-1.17	-1.47	-1.00	-1.47		30

Table 22b. Porphyrins with non-covalently bonded peripheral metal complexes. (see structures in Figure 22b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
TriTP-$[RuL_n]^{2+}$	--	Zn(II)			DCM	TBAP	SCE		1.05	0.76	1.22					30
TriTP-$[RuL_n]^{2+}$	--	Zn(II)			DMF	TBAP	SCE			-1.47	-1.16	-1.31	-1.47			30
$[TriTP]_2$-$[RuL_n]^{2+}$	**1650**	$[2H]_2$			DCM	TBAP	SCE	1.28	1.14	0.93	1.28					30
$[TriTP]_2$-$[RuL_n]^{2+}$	**1650**	$[2H]_2$			DMF	TBAP	SCE				-1.02, -1.49	-1.13	-1.02	-1.37	-1.49	30
$[TriTP]_2$-$[RuL_n]^{2+}$	--	Zn(II), 2H			DCM	TBAP	SCE	1.15	0.91	0.67	1.26					30
$[TriTP]_2$-$[RuL_n]^{2+}$	--	Zn(II), 2H			DMF	TBAP	SCE				-1.16	-1.50	-1.04	-1.38	-1.73	30
$[TriTP]_2$-$[RuL_n]^{2+}$	--	$[Zn(II)]_2$			DCM	TBAP	SCE		0.98	0.64	1.26					30
$[TriTP]_2$-$[RuL_n]^{2+}$	--	$[Zn(II)]_2$			DMF	TBAP	SCE				-1.16		-1.32	-1.72		30

Table 23a. Heme and related macrocycles. (see structures in Figure 23a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
DAH-III	**1651**	Fe(II)			CH_3OH	$NaClO_4$	Ag/AgCl					-0.17			107
DAH-III	--	Fe(II)	Im		CH_3OH	$NaClO_4$	Ag/AgCl					-0.46			107
DAH-III	--	Fe(II)	Im		CH_3OH	$NaClO_4$	Ag/AgCl					-0.19			107
DP-IXDME	**1652**	Fe(III)	Cl^-		*N*-MP	TEAP	SCE				-0.30				451
Etio-I	**1653**	Pd(II)			DCM	TBAP	Ag/AgCl			0.95		-1.51			402
Etio-I	--	Fe(III)	Cl^-		*N*-MP	TEAP	SCE				-0.34				451
HP-IX	**1654**	Mn(III)	H_2O		H_2O	NaCl	NHE				-0.23				563
MAH-XIII	**1655**	Fe(II)			CH_3OH	$NaClO_4$	Ag/AgCl					-0.24			107
MAH-XIII	--	Fe(II)	Im		CH_3OH	$NaClO_4$	Ag/AgCl					-0.31			107
MH-III	**1656**	Fe(II)			CH_3OH	$NaClO_4$	Ag/AgCl					-0.31			107
MH-XIII	**1657**	Fe(II)			CH_3OH	$NaClO_4$	Ag/AgCl					-0.33			107
MH-XIII	--	Fe(II)	Im		CH_3OH	$NaClO_4$	Ag/AgCl					-0.46			107
MOMH-XIII	**1658**	Fe(III)	Im	Im	H_2O	HCl	SHE				-0.05				417
MP-IX	**1659**	Fe(III)	Im	Im	H_2O	HCl	SHE				-0.29				417
PP-IX	**1660**	Fe(II)			H_2O	Na_3PO_4 (0.03M)	Ag/AgCl					-0.05*	-0.35*		539
PP-IX	--	Fe(III)	Cl^-		DMSO	$TBAPF_6$	Fc/Fc^+				-0.73				506
PP-IX	--	Fe(III)	Cl^-		H_2O	KCl	NHE				0.00				542
PP-IX	--	Fe(III)	Im	Im	H_2O	HCl	SHE				-0.24				417
PP-IX - TiO_2-Film	**1661**	Fe(III)	Cl^-		DMSO	$TBAPF_6$	Fc/Fc^+				-1.06				506
PP-IXDME	**1662**	Fe(III)			H_2O	KCl	NHE				0.01				542

Table 23a. Heme and related macrocycles. (see structures in Figure 23a)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
PP-IXDME	--	Fe(III)	Cl^-		*N*-MP	TEAP	SCE				-0.26				451

Table 23b. *meso*-Substituted etioporphyrin II macrocycles. (see structures in Figure 23b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
D(TADAP)TETMP	**1663**	Zn(II)			DCM	TBAP	SCE		1.13*	0.75			-1.52	-1.90*		53
trans-(AAP)TETMP	**1664**	Co(II)			DCM	$TBAPF_6$	SCE			1.17*	0.49					53
trans-(AAP)TETMP	**1664**	Co(II)			DCM	$TBAPF_6$	SCE			1.11*	0.55	-1.01				53
trans-(AAP)TETMP	**--**	Zn(II)			DCM	TBAP	SCE		1.10*	0.72			-1.62			53
trans-(APrAP)TETMP	**1665**	Co(II)			DCM	$TBAPF_6$	SCE			1.21*	0.66					53
trans-(APrAP)TETMP	**1665**	Co(II)			DCM	$TBAPF_6$	SCE			1.05*	0.71	-1.01				53
trans-(APrAP)TETMP	**--**	Zn(II)			DCM	TBAP	SCE		0.98*	0.70			-1.52			53
trans-(ClAP)TETMP	**1666**	Co(II)			DCM	$TBAPF_6$	SCE		1.12	0.99	0.58					53
trans-(ClAP)TETMP	**1666**	Co(II)			DCM	$TBAPF_6$	SCE		1.13	0.92	0.71	-1.05*				53
trans-(ClPrAP)TETMP	**1667**	Co(II)			DCM	$TBAPF_6$	SCE		1.11	1.01	0.60					53
trans-B(3'-PP)TETMP	**1668**	2H			DCM	$TBAPF_6$	SCE			0.86			-0.90			11
trans-B(4'-PP)TETMP	**1669**	2H			DCM	$TBAPF_6$	SCE			0.87			-1.09			11
trans-B(DBP)TETMP	**1670**	Au(III)	BF_4^-		DCM	TBAP	Ag/Ag^+				-1.05					432
trans-B(DBP)TETMP	**--**	Fe(III)	BF_4^-		DCM	TBAP	Ag/Ag^+			0.64	-0.72					432
trans-B(DBP)TETMP	**--**	Ru(II)	CO	CH_3OH	DCM	$TBAPF_6$ (0.2M)	SCE		1.00	0.61			-1.80*			204
trans-B(DBP)TETMP	**1671**	Ru(II)	CO	See Fig.	DCM	$TBAPF_6$ (0.2M)	SCE		0.98	0.48						204
trans-B(DBP)TETMP	**1672**	Ru(II)	CO	See Fig.	DCM	$TBAPF_6$ (0.2M)	SCE		1.02	0.49			-2.00*			204
trans-B(DBP)TETMP	**1673**	Ru(II)	CO	See Fig.	DCM	$TBAPF_6$ (0.2M)	SCE		1.05	0.51			-1.90*			204
trans-B(DBP)TETMP	**1674**	Ru(II)	CO	See Fig.	DCM	$TBAPF_6$ (0.2M)	SCE		0.97	0.42			-1.80*	-2.00*		204
trans-B(DBP)TETMP	**1675**	Ru(II)	See Fig.	See Fig.	DCM	$TBAPF_6$ (0.2M)	SCE		1.21	0.93*						204

Table 23b. *meso*-Substituted etioporphyrin II macrocycles. (see structures in Figure 23b)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
trans-B(DBP)TETMP	**1676**	Ru(II)	See Fig.	See Fig.	DCM	$TBAPF_6$ (0.2M)	SCE		0.95	0.06						204
trans-B(DBP)TETMP	**1677**	Ru(II)	See Fig.	See Fig.	DCM	$TBAPF_6$ (0.2M)	SCE		0.94	0.25						204
trans-B(DBP)TETMP	**1678**	Ru(II)	See Fig.	See Fig.	DCM	$TBAPF_6$ (0.2M)	SCE		0.82	0.11						204
trans-B(DBP)TETMP	--	Zn(II)			DCM	TBAP	Ag/Ag^+			0.38						432
trans-B(DBP)TETMP	--	Zn(II)			DCM	TBAP (0.5M)	Ag/Ag^+		0.53	0.28						469
trans-B(DBP)TETMP	--	Zn(II)			THF	TBAP	Ag/Ag^+			0.42						432
trans-B(DBP)TETMP	**1679**	Zn(II)	See Fig.		DCM	TBAP (0.5M)	Ag/Ag^+		0.52	0.29						469
trans-D(ClAP)TETMP	**1680**	Zn(II)			DCM	TBAP	SCE		0.91	0.70			-1.51*	-1.84*		53
trans-D(ClPrAP)TETMP	**1681**	Co(II)			DCM	$TBAPF_6$	SCE		1.12	0.91	0.72	-0.87				53
trans-D(ClPrAP)TETMP	--	Zn(II)			DCM	TBAP	SCE		0.86	0.64			-1.48	-1.84*		53
trans-DPTETMP	**1682**	Fe(III)	Cl^-		DCM	$TBABF_4$	Ag/Ag^+			0.64	-0.72*					470
trans-DPTETMP	--	Zn(II)			DCM	$TBABF_4$	Ag/Ag^+			0.38						470
trans-DPTETMP	--	Zn(II)	Py		DCM	$TBABF_4$	Ag/Ag^+			0.29*						470

Table 23c. β-alkyl and *meso*-substituted porphyrins. (see structures in Figure 23c)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox 3	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other		Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
BHPrTMP	**1683**	Co(II)			PC	TBAP	SCE		0.98	0.38*	0.16*	-0.03*	-1.01			289
D(AEtS)TMP	**1684**	Ru(II)			CH_3CN	Na_2SO_4 (1.0M)	Ag/AgCl		0.68	0.40						489
trans-APDBPTHTMP	**1685**	Zn(II)			DMF	NR	Fc/Fc^+			0.23						543
trans-BEPDBPTHTMP	**1686**	Zn(II)			DMF	NR	Fc/Fc^+			0.22						543
trans-BEPDBPTHTMP/F^-	**1687**	Zn(II)			DMF	NR	Fc/Fc^+			0.22						543
trans-BNIPDBPTHTMP	**1688**	Zn(II)			DMF	NR	Fc/Fc^+			0.22	-0.98					543
trans-BPIPDBPTHTMP	**1689**	Zn(II)			DMF	NR	Fc/Fc^+			0.22	-1.24					543
trans-NIAPDBPTHTMP	**1690**	Zn(II)			DMF	NR	Fc/Fc^+			0.23	-0.94					543
trans-NIBPDBPTHTMP/F^-	**1691**	Zn(II)			DMF	NR	Fc/Fc^+			0.22	-0.94					543
trans-NIMEPDBPTHTMP	**1692**	Zn(II)			DMF	NR	Fc/Fc^+			0.22	-0.94					543
trans-NIMEPDBPTHTMP/F^-	**1693**	Zn(II)			DMF	NR	Fc/Fc^+			0.22	-0.95					543
trans-PIAPDBPTHTMP	**1694**	Zn(II)			DMF	NR	Fc/Fc^+			0.23	-1.18					543
trans-PIAPDBPTHTMP	**1695**	Zn(II)			DMF	NR	Fc/Fc^+			0.22	-1.18					543
trans-PIBPDBPTHTMP/F^-	**1696**	Zn(II)			DMF	NR	Fc/Fc^+			0.22	-1.24					543
trans-PIMEPDBPTHTMP/F^-	**1697**	Zn(II)			DMF	NR	Fc/Fc^+			0.22	-1.19					543
trans-TMPDBPTHTMP	**1698**	Zn(II)			DMF	NR	Fc/Fc^+			0.22						543
trans-TMPDBPTHTMP/F^-	**1699**	Zn(II)			DMF	NR	Fc/Fc^+			0.22						543

Table 24. Porphyrins and porphyin-C_{60} conjugates adsorbed on electrode surfaces. (see structures in Figure 24)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
B(DTP)TMP	**1700**	Co(II)			PC	TBAP	SCE		1.06*	0.33*		-0.97*			289
B(DTP)TMP	**1700**	Co(II)			PC	TBAP	SCE					-1.10			289
cis-B(SAPAP)DPP	**1701**	Zn(II)			DCM/EtOH	$TBAPF_6$	Ag/Ag^+		0.84	0.52					436
$Cl_8[T(3'\text{-}SO_3^-P)P]^{4-}$	**1702**	Fe(III)			H_2O	PB (1.0 M)	SCE			1.30	1.00				569
$D(AC_{10}S)PP\text{-}IX$	**1703**	Fe(II)			H_2O	Na_3PO_4 (0.03M)	Ag/AgCl					-0.35*			539
$D(AC_2S)PP\text{-}IX$	**1704**	Fe(II)			H_2O	Na_3PO_4 (0.03M)	Ag/AgCl					-0.35*			539
D(AEtS)TMP	**1705**	Co(II)			PC	TBAP	SCE					-0.89			289
D(AEtS)TMP	--	Ru(II)	CO		H_2O	Na_2SO_4 (1.0M)	Ag/AgCl			0.32					489
Furyl-$(Por)_n$	**1706**	Zn(II)			CH_3CN	$TBAPF_6$	$Ag/AgNO_3$			0.40		-1.20			407
ITO/$(O^-)_3$SiPr-C_{60}-CPTBPP	**1707**	2H			DCM	$TBAPF_6$ (0.2M)	Ag/AgCl			1.08					340
ITO/$(O^-)_3$SiPr-C_{60}-CPTBPP	--	Zn(II)			DCM	$TBAPF_6$ (0.2M)	Ag/AgCl			0.91					340
ITO/$(O^-)_3$SiPr-C_{60}-Por-Fc	**1708**	2H			DCM	$TBAPF_6$ (0.2M)	Ag/AgCl			1.08	0.57				340
ITO/$(O^-)_3$SiPr-C_{60}-Por-Fc	--	Zn(II)			DCM	$TBAPF_6$ (0.2M)	Ag/AgCl			0.88	0.56				340
ITO/$(O^-)_3$SiPr-C_{60}-PTBPP	**1709**	2H			DCM	$TBAPF_6$ (0.2M)	Ag/AgCl			1.06					340
ITO/$(O^-)_3$SiPr-C_{60}-PTBPP	--	Zn(II)			DCM	$TBAPF_6$ (0.2M)	Ag/AgCl			0.91					340
ITO/$(O^-)_3$SiPrAP-(Por)	**1710**	2H			DCM	$TBAPF_6$ (0.2M)	Ag/AgCl			0.95		-1.16			343

Table 24. Porphyrins and porphyin-C_{60} conjugates adsorbed on electrode surfaces. (see structures in Figure 24)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox: Other Ox	Porphyrin Ox: 2	Porphyrin Ox: 1	Metal / Other	Porphyrin Red: 1	Porphyrin Red: 2	Porphyrin Red: 3	Ref.
ITO/$(O^-)_3$SiPrAP-$(Por)_2$	**1711**	$[2H]_2$			DCM	$TBAPF_6$ (0.2M)	Ag/AgCl			1.04		-1.11			343
ITO/$(O^-)_3$SiPrAP-$(Por)_4$	**1712**	$[2H]_8$			DCM	$TBAPF_6$ (0.2M)	Ag/AgCl			1.08		-1.03			343
ITO/$(O^-)_3$SiPrAP-CPTBPP	**1713**	2H			DCM	$TBAPF_6$ (0.2M)	Ag/AgCl			1.05					340
ITO/$(O^-)_3$SiPrAP-CPTBPP	**--**	Zn(II)			DCM	$TBAPF_6$ (0.2M)	Ag/AgCl			0.81					340
PA-$(Por)_n$	**1714**	$[2H]_n$			DCM	$TBAPF_6$	SCE			0.85		-0.63	-0.97		292
$[Pc(CH_3)_8]_2$-$(M)_2$-TPnP	**1715**	$[Eu(III)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.34, 0.99	0.52	0.12					239
$[(Pc(tBu)_4)_2$-$(M)_2$-Por2$)]_3$	**1716**	$[Eu((III)]_6$			DCM	$TBAPF_6$ (1.0M)	Ag/Ag^+	1.48, 1.23	0.76	0.31					418
$[(Pc(tBu)_4)_3$-$(M)_3$-M_1-(Bis-por3$)]_2$	**1717**	$[Eu(III)]_3$, Ce(III)			DCM	$TBAPF_6$	Ag/Ag^+	~1.14, ~0.78, ~0.78, ~1.14, ~1.40, ~1.40	0.46	0.26					495
$[(Pc(tBu)_4)_3$-$(M)_3$-M_1-TTP-(Bis-por4]	**1718**	$[Eu(III)]_3$, Ce(III)			DCM	$TBAPF_6$	Ag/Ag^+	~0.91, ~0.53, ~0.53, ~0.91, ~1.16, ~1.16	0.20	0.05					495
$[(Pc(tBu)_4)_4$-$(M)_4$-(Bis-por)]	**1719**	$[Eu(III)]_4$			DCM	$TBAPF_6$	Ag/Ag^+	0.98, 0.61, 0.52, 1.05, 1.08, ~1.31,	~0.15*	~0.15*					495
$[Pc(tBu)_4]_2$-$(M)_2$-DTDPA	**1720**	$[Eu((III)]_2$			DCM	$TBAPF_6$ (1.0M)	Ag/Ag^+	1.34, 1.13	0.68	0.24					418
$[Pc(tBu)_4]_2$-$(M)_2$-M-TPnPS	**1721**	$[Eu(III)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.43, 1.03	0.52	0.11					239
$[(Pc)_2$-$(M)_2$-$(Por1)]_2$	**1722**	$[Eu((III)]_4$			DCM	$TBAPF_6$ (1.0M)	Ag/Ag^+	1.44, 1.23	0.77	0.30					418
$(Pc)_2$-$(M)_2$-DTPP	**1723**	$[Eu(III)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.44, 1.15	0.76	0.34					239
$[(Pc)_2$-$(M)_2$-Por3]	**1724**	$[Eu((III)]_2$			DCM	$TBAPF_6$ (1.0M)	Ag/Ag^+	1.39, 1.18	0.72	0.27					418
$(Pc)_2$-$(M)_2$-TriPnPS	**1725**	$[Eu(III)]_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.57, 1.16	0.74	0.40					239

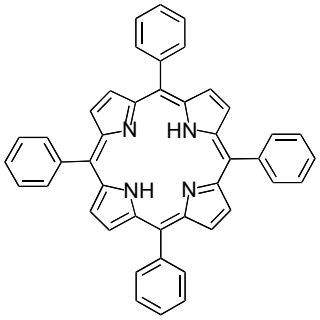
Table 24. Porphyrins and porphyin-C_{60} conjugates adsorbed on electrode surfaces. (see structures in Figure 24)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
$(Pc)_2$-$(M)_2$-TtBPP	**1726**	[Eu(III)]$_2$			DCM	$TBAPF_6$	Fc/Fc^+	1.58, 1.25	0.85	0.42					239
$[(Pc)_2$-M-Por4$]_n$	**1727**	[Eu((III)]$_2$			DCM	$TBAPF_6$ (1.0M)	Ag/Ag^+	1.68, 1.46	0.99	0.52					418
$[(Pc)_3$-$(M)_3$-M_1-TTP-(Bis-por2)$]_2$	**1728**	[Eu(III)]$_3$, Ce(III)			DCM	$TBAPF_6$	Ag/Ag^+	~1.05, 0.72, 0.57, ~1.05, ~1.35, ~1.35	0.38	0.20					495
$[(Pc)_3$-$(M)_3$-M_1-TTP-(Bis-por2]	**1729**	[Eu(III)]$_3$, Ce(III)			DCM	$TBAPF_6$	Ag/Ag^+	~1.04, ~0.67, ~0.67, ~1.04, ~1.29, ~1.29	0.35	0.16					495
Poly-M(SB)P-film	**1730**	2H			DCM	$TBAPF_6$ (0.2M)	Fc/Fc^+		1.40	0.80					180
Poly-M(SB)P-film	**--**	Mn(III)	Cl^-		DCM	$TBAPF_6$ (0.2M)	Fc/Fc^+		1.20	0.70					180
Poly-T(SB)P-Film	**1731**	2H			DCM	$TBAPF_6$ (0.2M)	Fc/Fc^+		1.40	1.15					180
Polyyne-$(Por)_n$	**1732**	Zn(II)			CH_3CN	$TBAPF_6$	Ag/AgCl			0.86		-1.08			437
Polyyne-thienyl-$(Por)_n$	**1733**	Zn(II)			CH_3CN	$TBAPF_6$	Ag/AgCl			0.81		-1.01			437
Polyyne-thienyl-$(Por)_n$	**1734**	Zn(II)			CH_3CN	$TBAPF_6$	Ag/AgCl			0.90		-0.99			437
PP-IXDME	**1735**	Os(VI)	O^{2-}		H_2O	KCl (1.0 M)	Ag/AgCl				0.18				514
PP-IXDME	**--**	Os(VI)	O^{2-}		H_2O	KCl (1.0M)	Ag/AgCl				0.10				514
SAPAPTriPP	**1736**	Zn(II)			DCM/EtOH	$TBAPF_6$	Ag/Ag^+		0.82	0.54					436
$[T(4\text{-}Py)P][PdCl_2]_4$ - LB film	**1737**	Mn(III)	$CH_3CO_2^-$		H_2O	Na_3PO_4 (0.05M)	Ag/AgCl				0.28				513
$[T(4\text{-}Py)P][PtCl_2]_4$-LB film	**1738**	Mn(III)	$CH_3CO_2^-$		H_2O	Na_3PO_4 (0.05M)	Ag/AgCl				0.62				513
T(SAMPAP)P	**1739**	Zn(II)			DCM/EtOH	$TBAPF_6$	Ag/Ag^+		0.96	0.62					436

Table 24. Porphyrins and porphyin-C_{60} conjugates adsorbed on electrode surfaces. (see structures in Figure 24)

Ring	Structure	Metal	Axial Ligand L1	Axial Ligand L2	Solvent	Salt	RE	Porphyrin Ox Other Ox	Porphyrin Ox 2	Porphyrin Ox 1	Metal / Other	Porphyrin Red 1	Porphyrin Red 2	Porphyrin Red 3	Ref.
T(SB)P-Film	**1740**	Mn(III)	Cl^-		DCM	$TBAPF_6$ (0.2M)	Fc/Fc^+		1.20	0.90					176
T(SB)P-Film	**1740**	Mn(III)	Cl^-		DCM	$TBAPF_6$ (0.2M)	Fc/Fc^+	1.20	0.90	0.60					180
Thienyl-$(Por)_n$	**1741**	Zn(II)			CH_3CN	$TBAPF_6$	$Ag/AgNO_3$			0.50		-1.20			407
trans-$[D(SB)P]_n$	**1742**	Mn(III)	Cl^-		DCM	$TBAPF_6$ (0.2M)	Fc/Fc^+		1.30	0.70					180
trans-B(SAPAP)DPP	**1743**	Zn(II)			DCM/EtOH	$TBAPF_6$	Ag/Ag^+		0.89	0.53					436
Tri(SAPAP)PP	**1744**	Zn(II)			DCM/EtOH	$TBAPF_6$	Ag/Ag^+		0.97	0.62					436
$[TTC_4VPP]^+$	**1745**	Zn(II)			H_2O	$NaClO_4$	Ag/AgCl			0.76					271
$[TTC_6VPP]^+$	**1746**	Zn(II)			H_2O	$NaClO_4$	Ag/AgCl			0.78					271
$[TTC_8VPP]^+$	**1747**	Zn(II)			H_2O	$NaClO_4$	Ag/AgCl			0.78					271

Figure 1. Structures of tetraphenylporphyrin (TPP) macrocycles in Table 1



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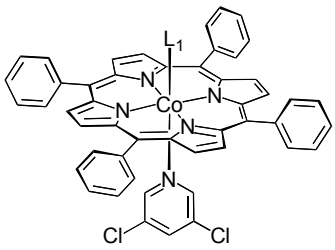

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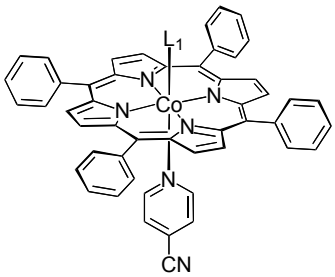

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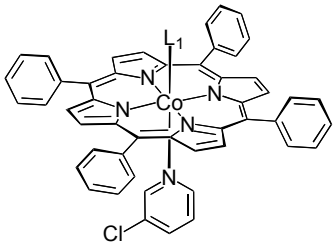

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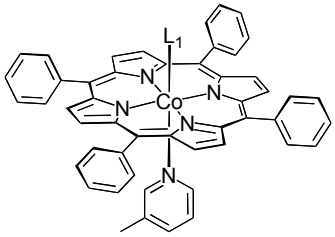

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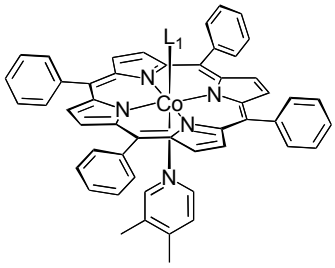

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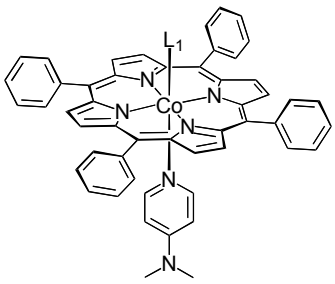
Figure 1. Structures of tetraphenylporphyrin (TPP) macrocycles in Table 1



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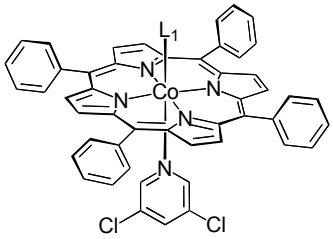

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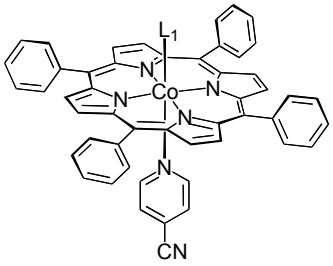

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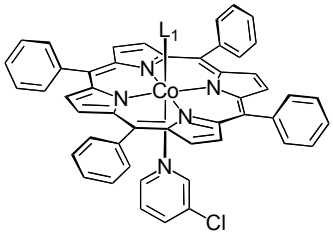

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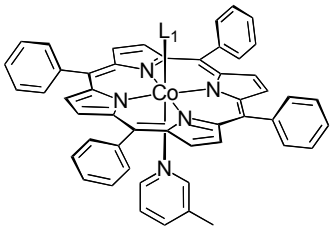

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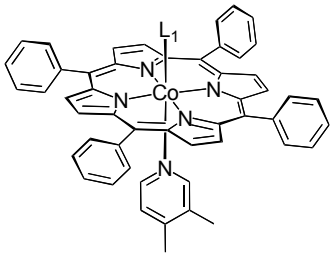

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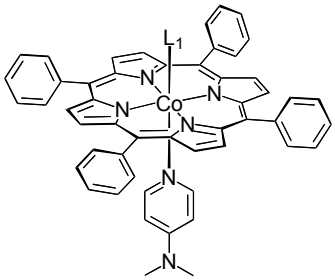
Figure 1. Structures of tetraphenylporphyrin (TPP) macrocycles in Table 1



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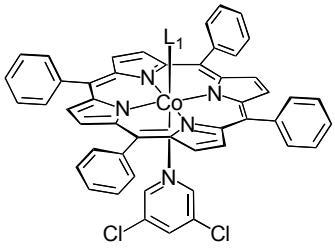

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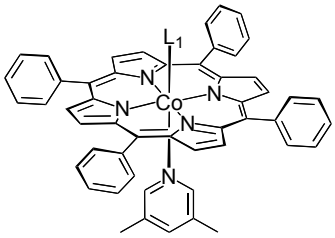

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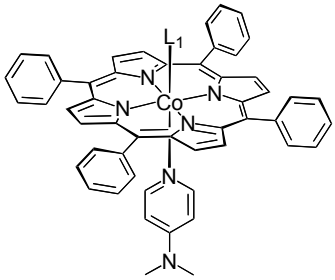

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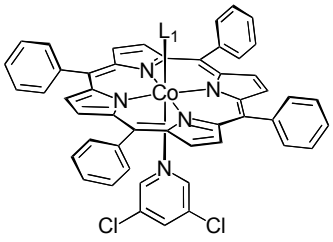

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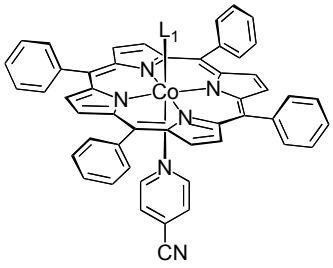

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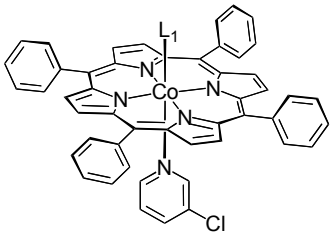
Figure 1. Structures of tetraphenylporphyrin (TPP) macrocycles in Table 1



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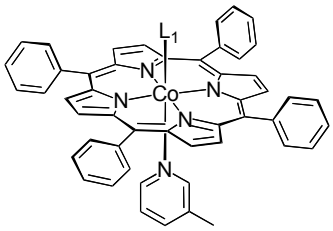

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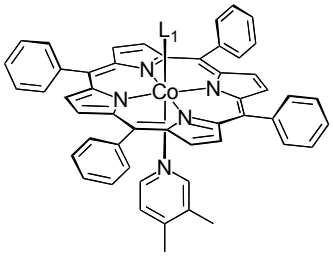

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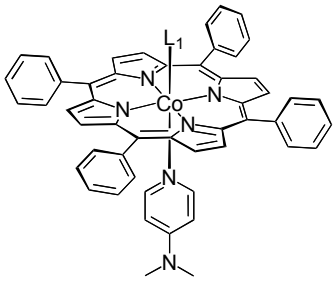

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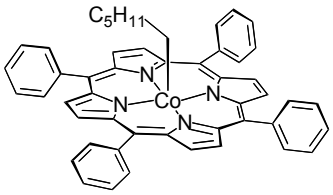

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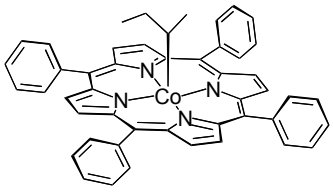

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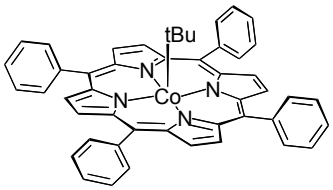
Figure 1. Structures of tetraphenylporphyrin (TPP) macrocycles in Table 1



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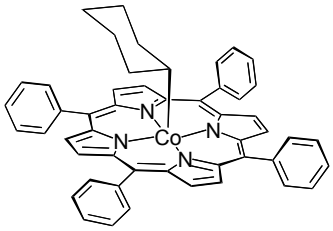

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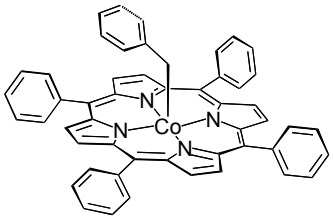

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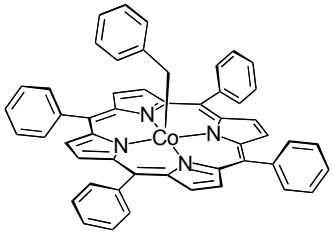

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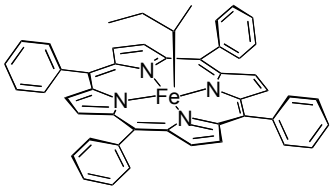

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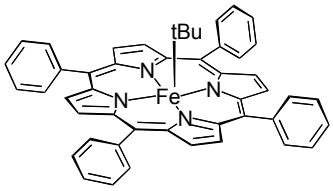

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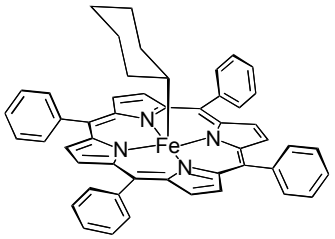
Figure 1. Structures of tetraphenylporphyrin (TPP) macrocycles in Table 1



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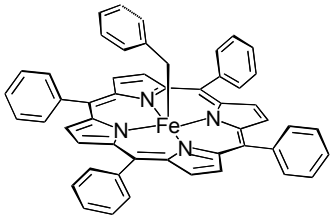

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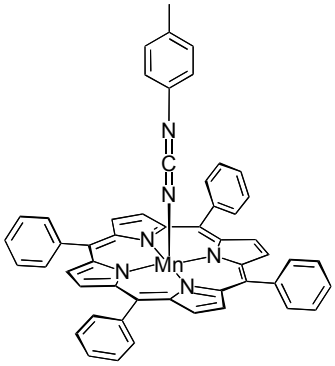

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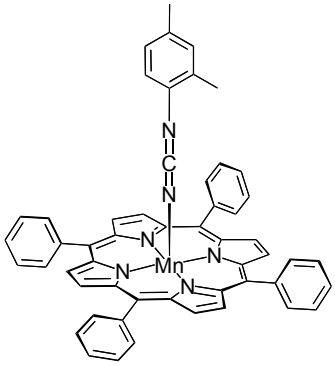

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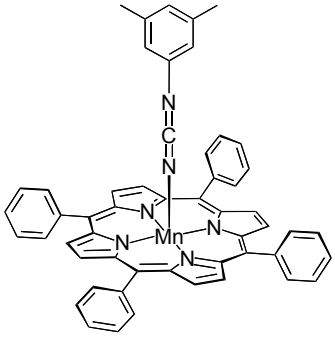

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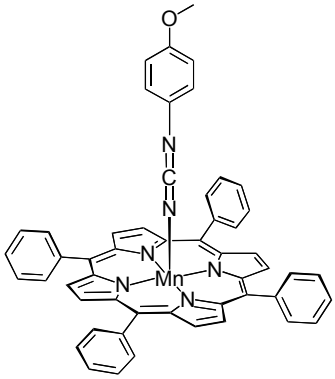

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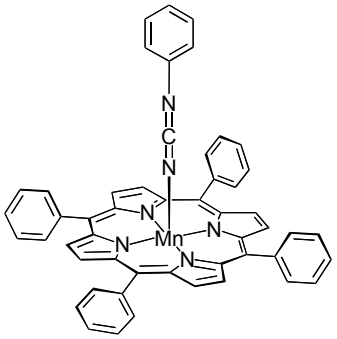
Figure 1. Structures of tetraphenylporphyrin (TPP) macrocycles in Table 1



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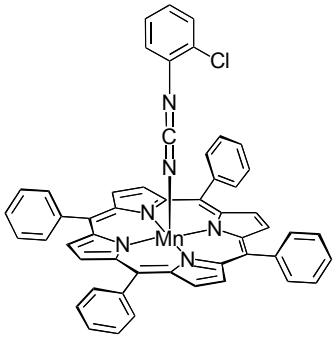

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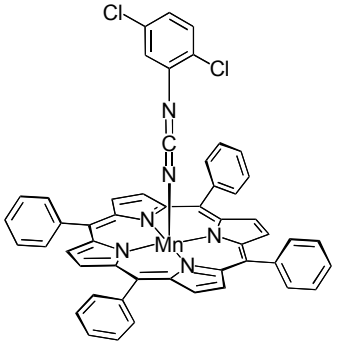

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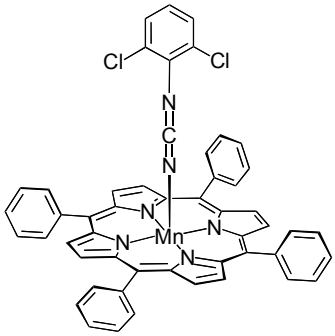

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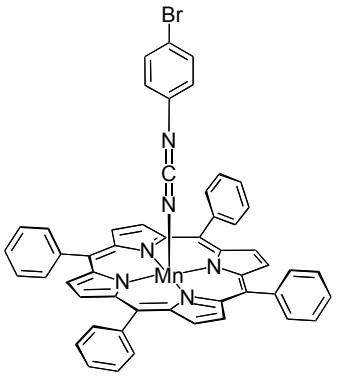

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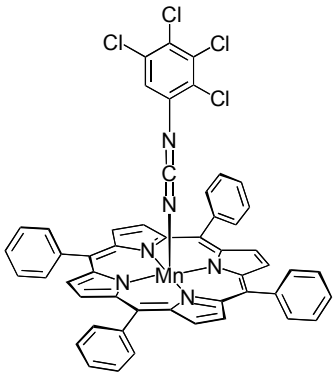

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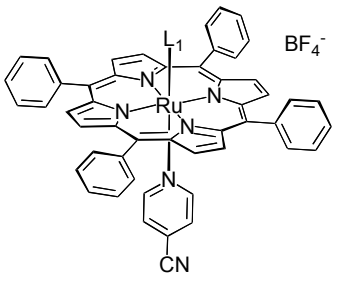
Figure 1. Structures of tetraphenylporphyrin (TPP) macrocycles in Table 1



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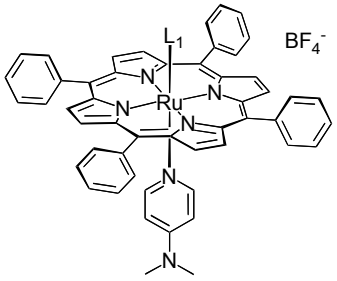

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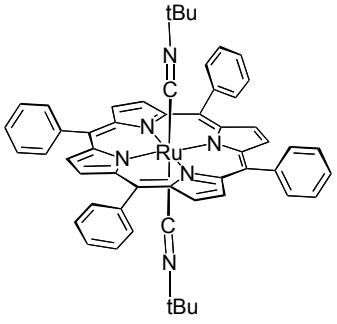

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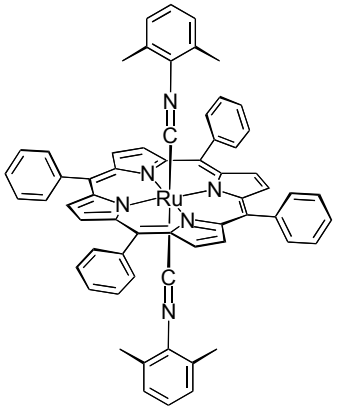

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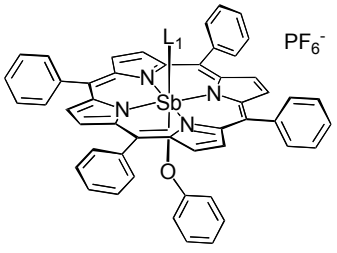

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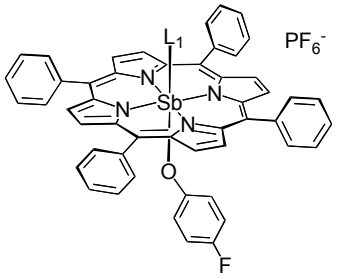

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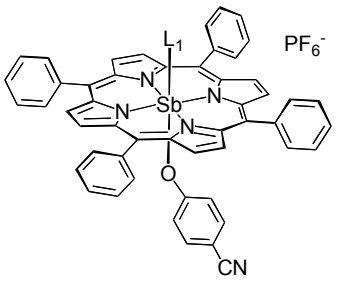
Figure 1. Structures of tetraphenylporphyrin (TPP) macrocycles in Table 1



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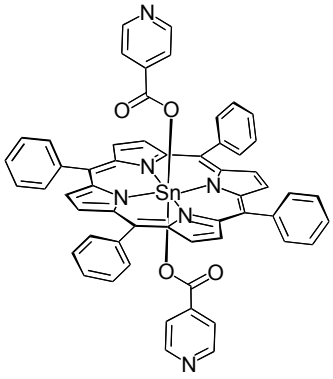

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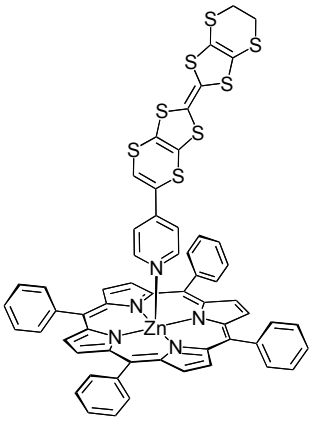

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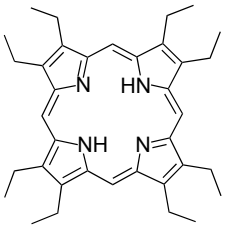
Figure 2. Structures of octaethylporphyrin (OEP) macrocycles in Table 2



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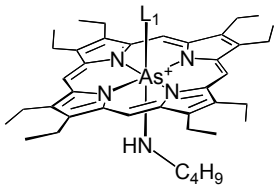

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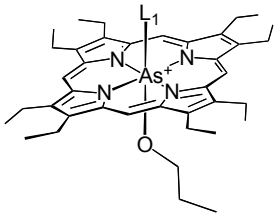

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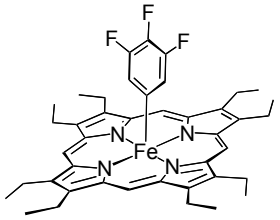

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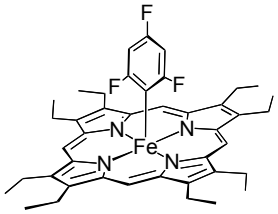

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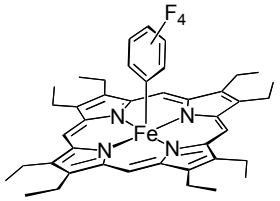

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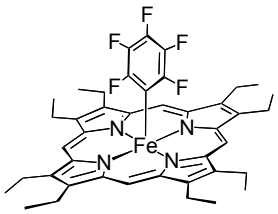
Figure 2. Structures of octaethylporphyrin (OEP) macrocycles in Table 2



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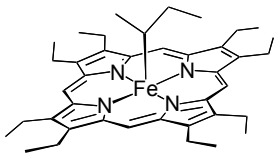

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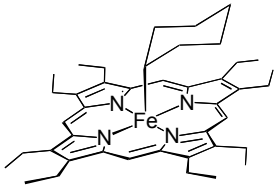

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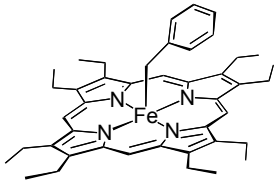

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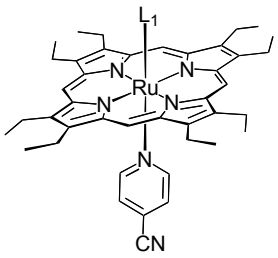

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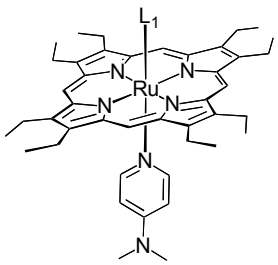

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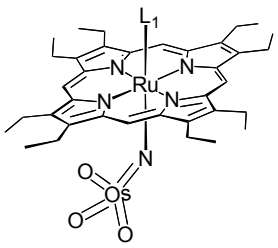
Figure 2. Structures of octaethylporphyrin (OEP) macrocycles in Table 2



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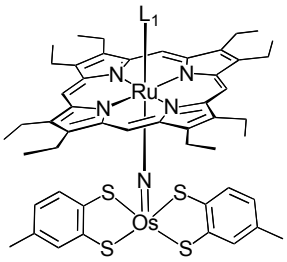

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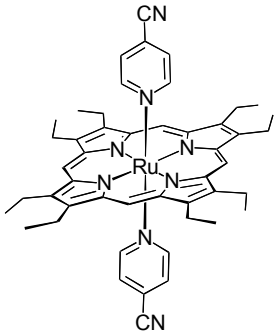

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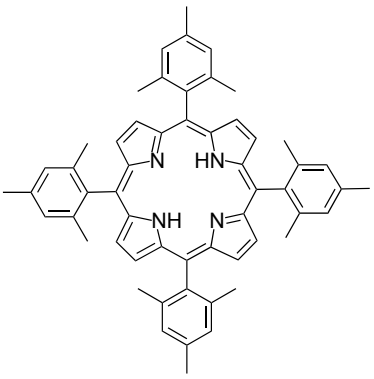
Figure 3. Structures of tetramesitylporphyrin (TMP) and substituted TMP macrocycles in Table 3



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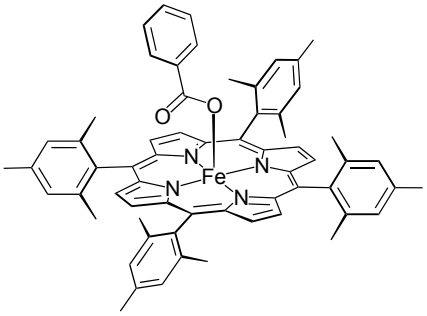

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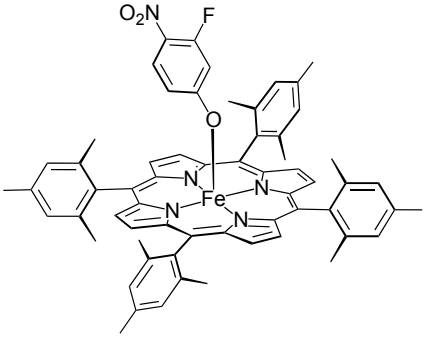

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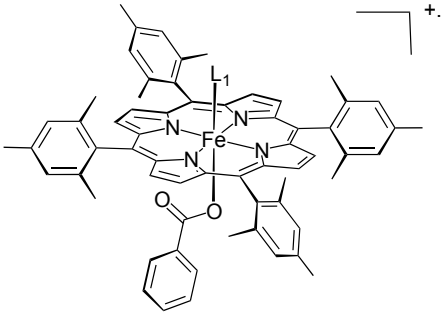

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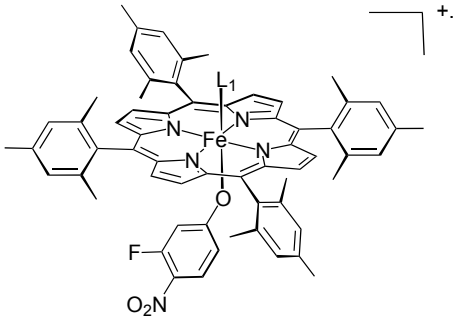

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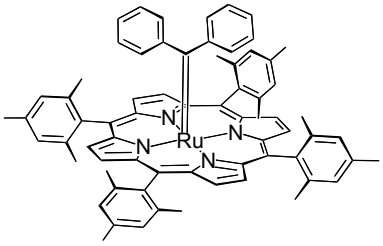

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Figure 3. Structures of tetramesitylporphyrin (TMP) and substituted TMP macrocycles in Table 3

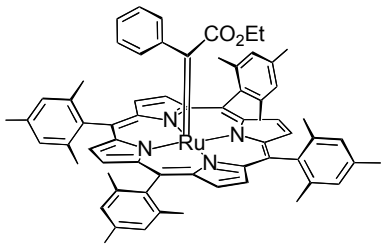

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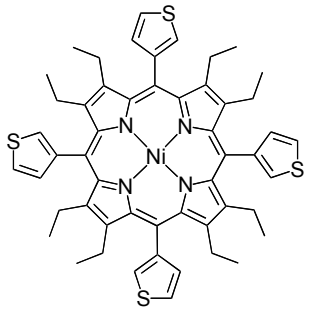
Figure 4. Structures of *meso*-Substituted OEP and porphinone macrocycles in Table 4



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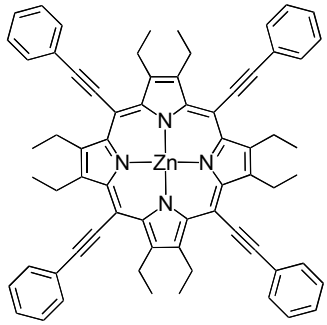

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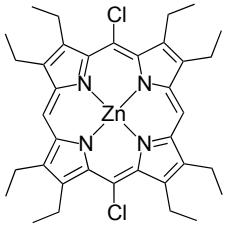

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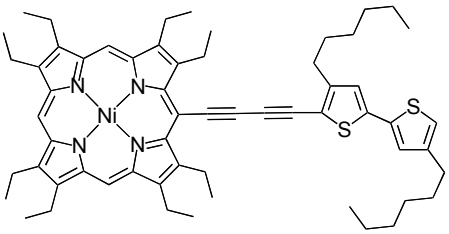

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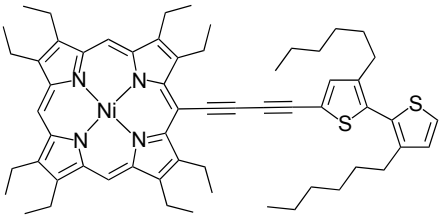

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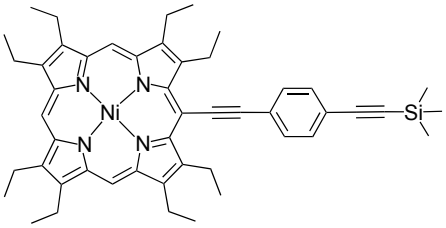

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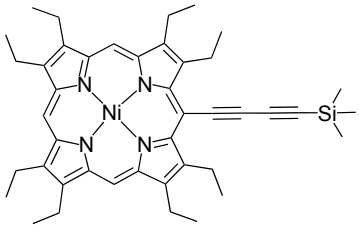
Figure 4. Structures of *meso*-Substituted OEP and porphinone macrocycles in Table 4



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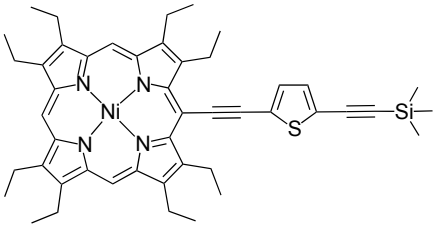

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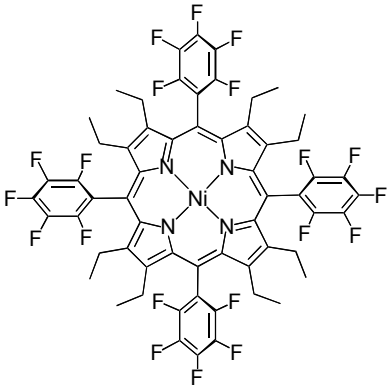

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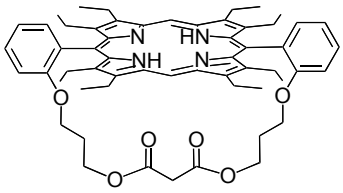

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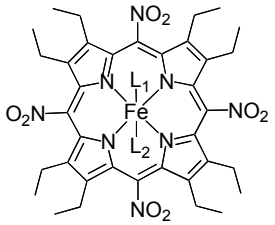

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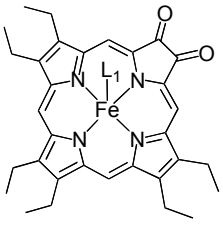

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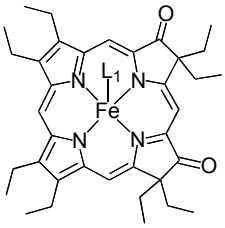
Figure 4. Structures of *meso*-Substituted OEP and porphinone macrocycles in Table 4



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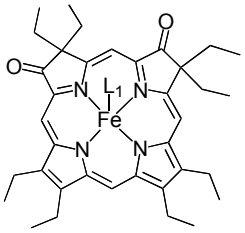

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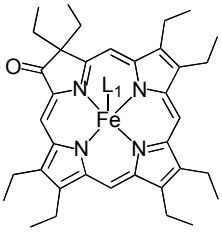

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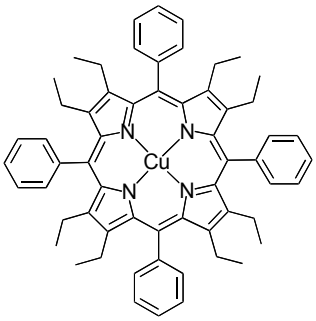

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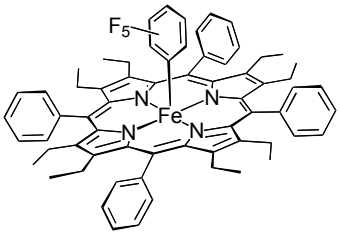

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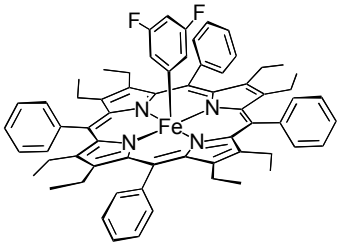

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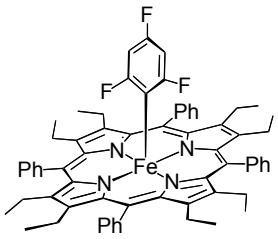
Figure 4. Structures of *meso*-Substituted OEP and porphinone macrocycles in Table 4



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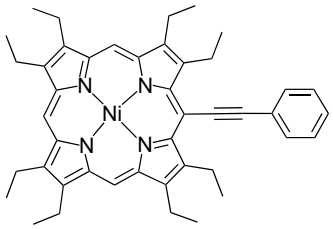

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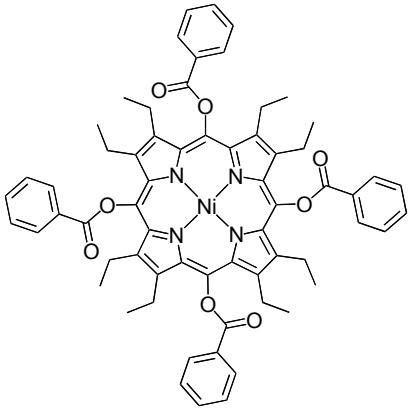

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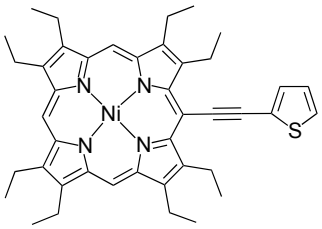

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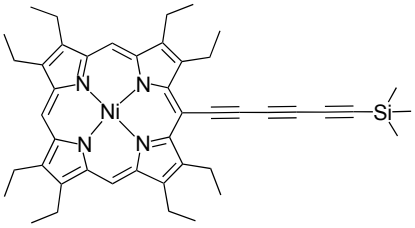

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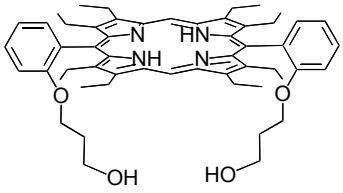

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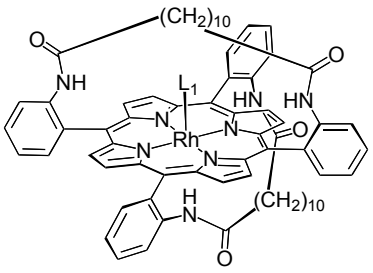
Figure 5a. Structures of Picket-Fence porphyrins and related derivatives in Table 5a



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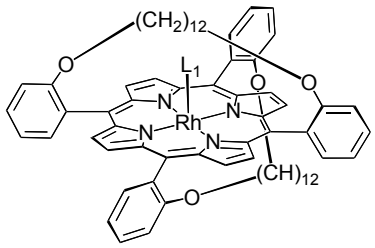

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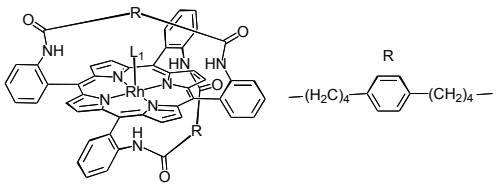

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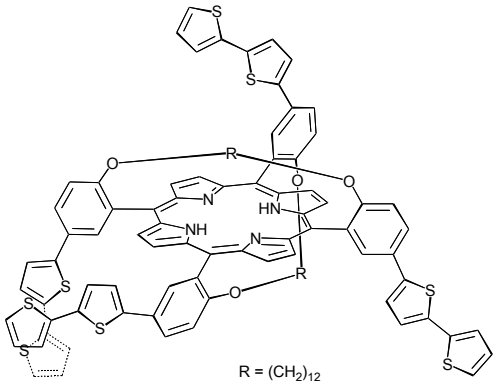

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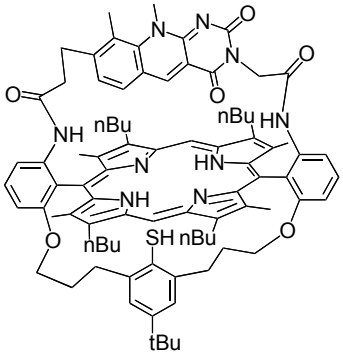

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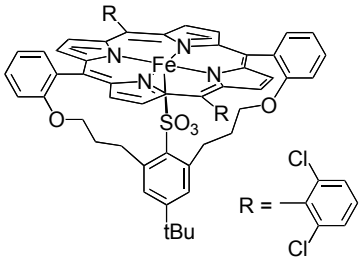

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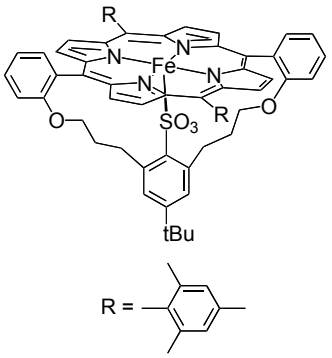
Figure 5a. Structures of Picket-Fence porphyrins and related derivatives in Table 5a



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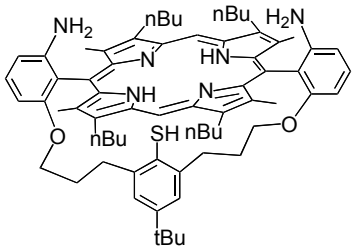

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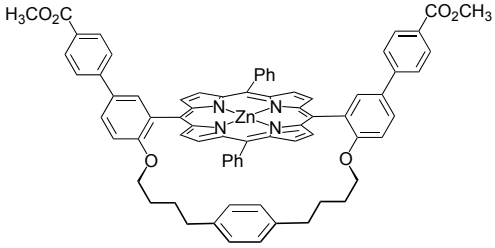

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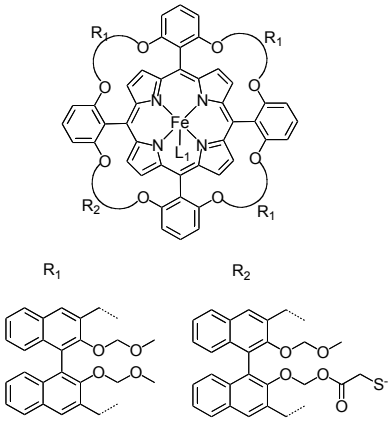

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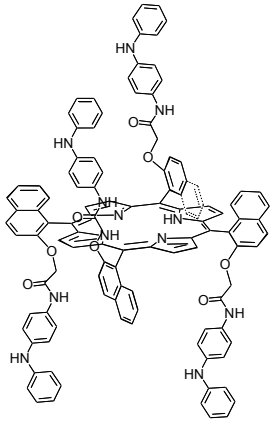

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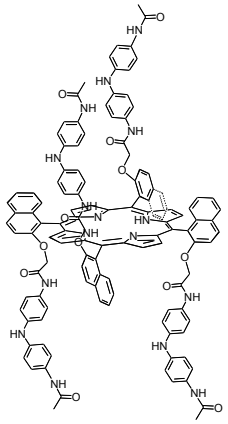

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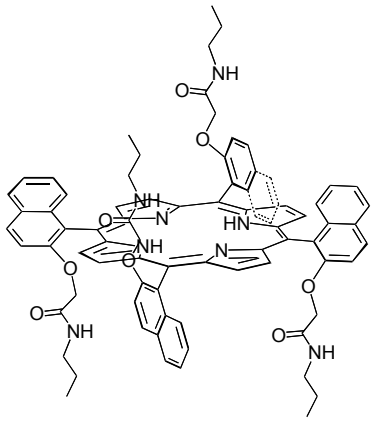
Figure 5a. Structures of Picket-Fence porphyrins and related derivatives in Table 5a



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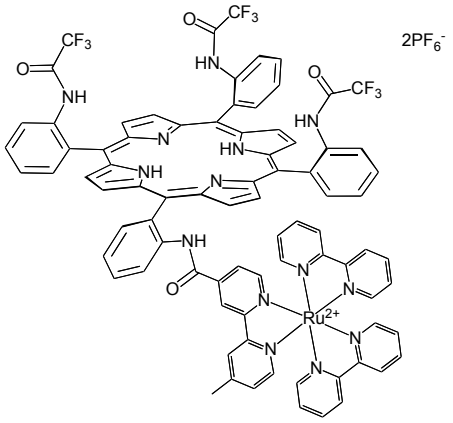

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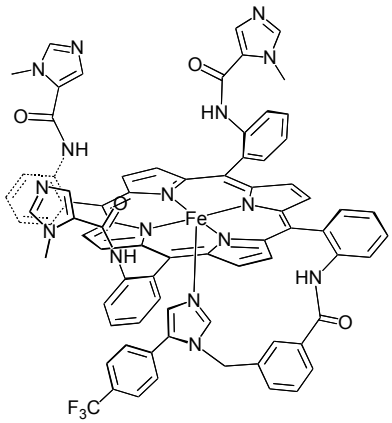

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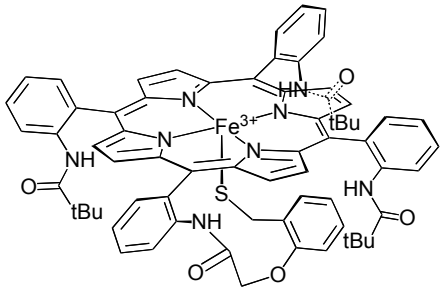

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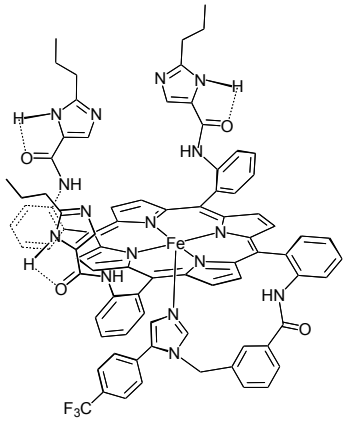

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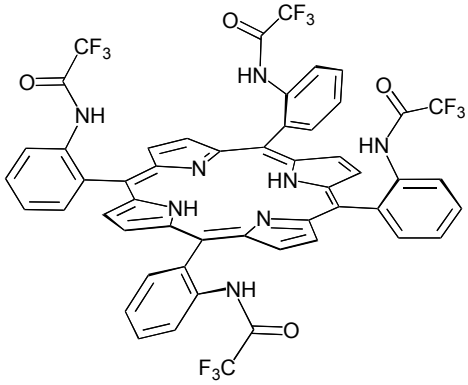

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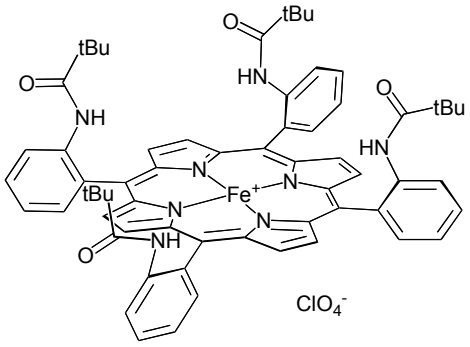
Figure 5a. Structures of Picket-Fence porphyrins and related derivatives in Table 5a



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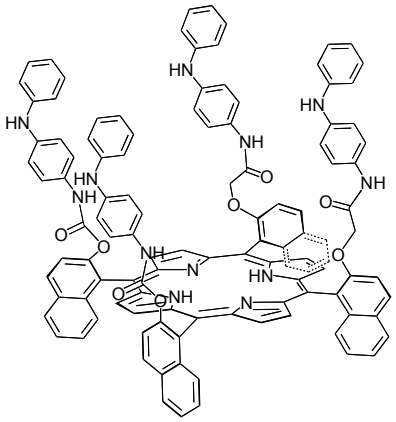

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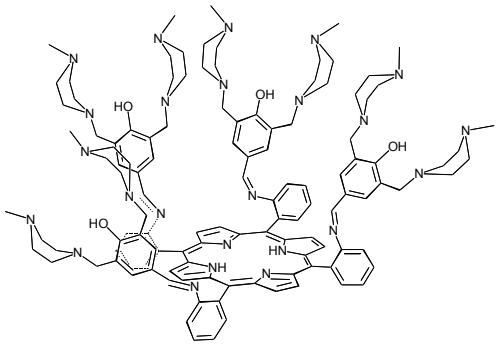

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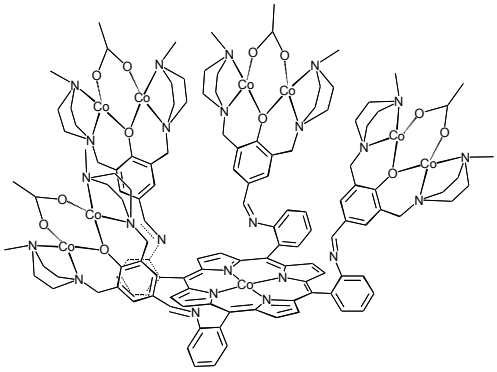

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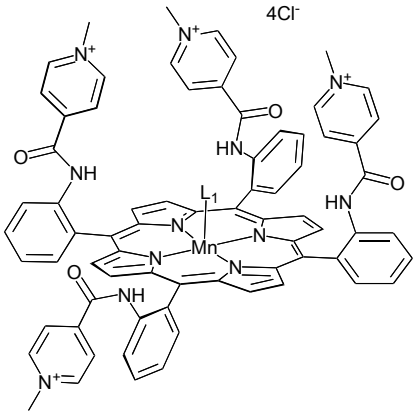

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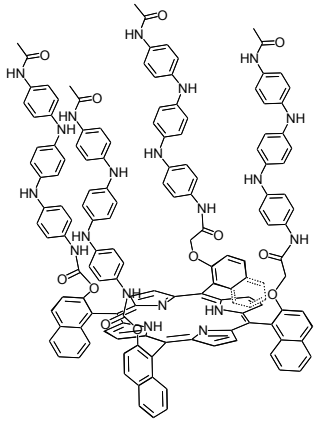

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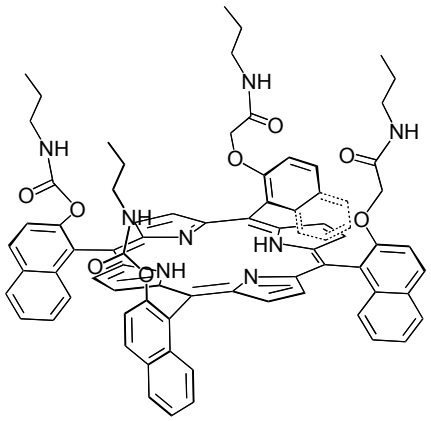
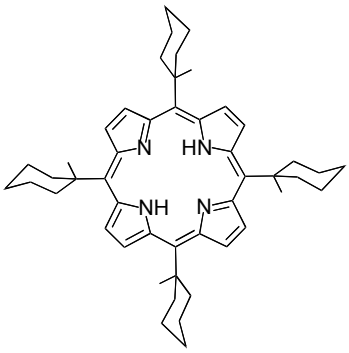
Figure 5a. Structures of Picket-Fence porphyrins and related derivatives in Table 5a



122

Figure 5b. Structures of *meso*-Tetraalkylporphyrins in Table 5b



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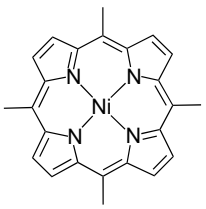

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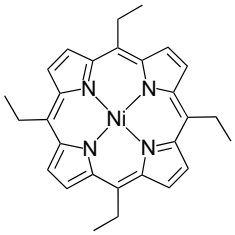

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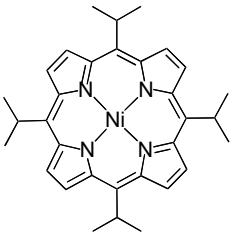

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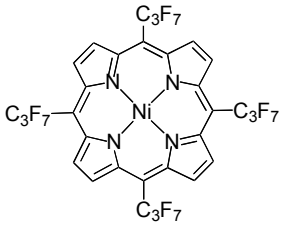

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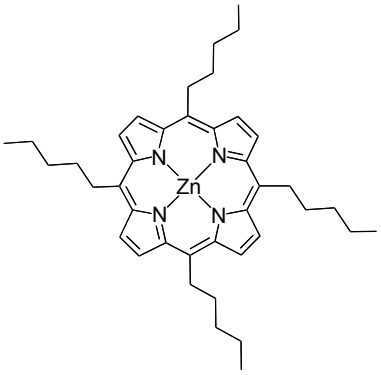

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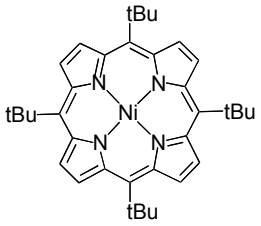
Figure 5b. Structures of *meso*-Tetraalkylporphyrins in Table 5b



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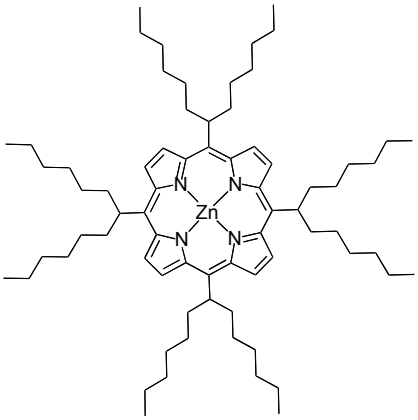

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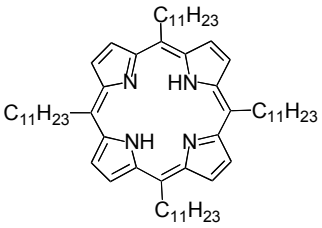

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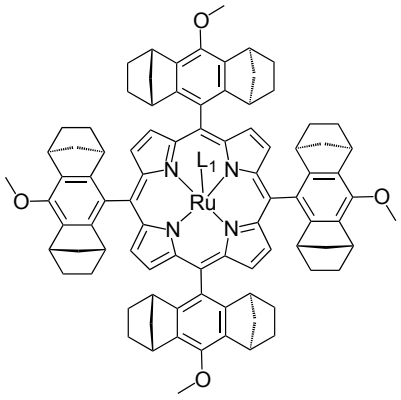
Figure 5c. Structures of *meso*-Tetraarylporphyrins in Table 5c



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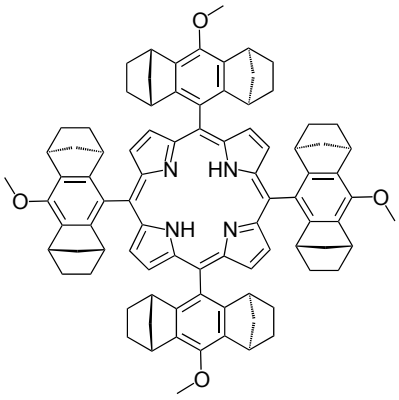

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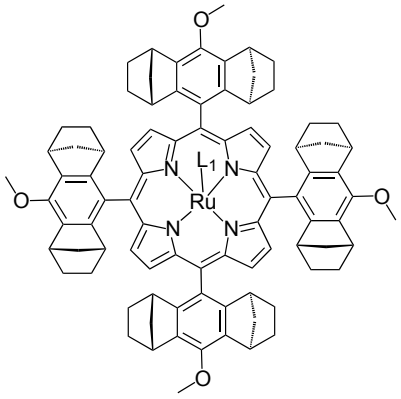

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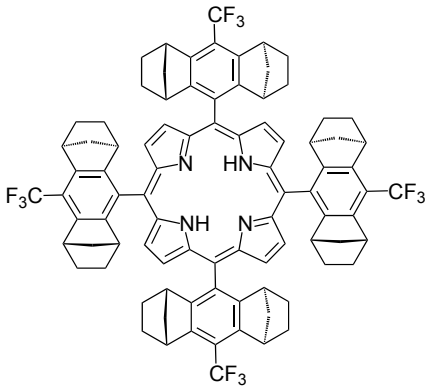

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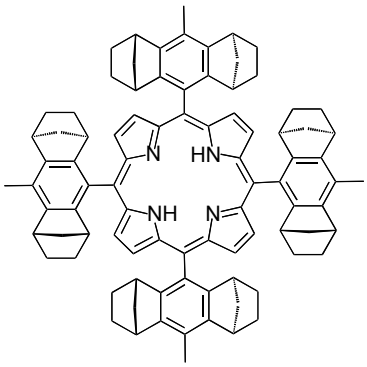

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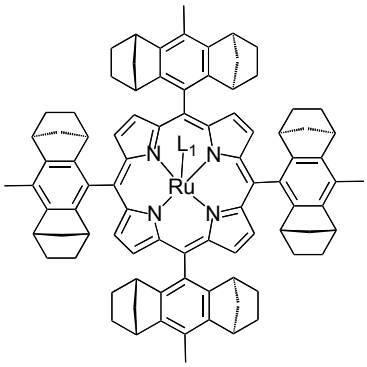

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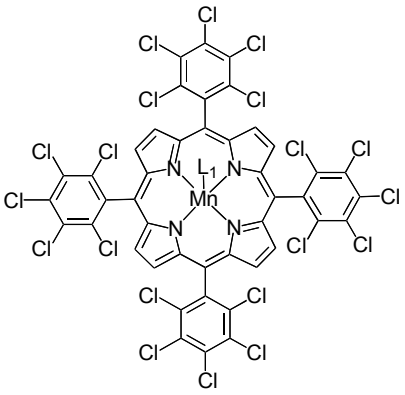
Figure 5c. Structures of *meso*-Tetraarylporphyrins in Table 5c



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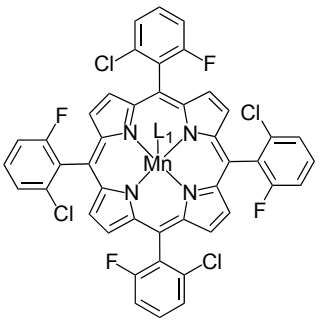

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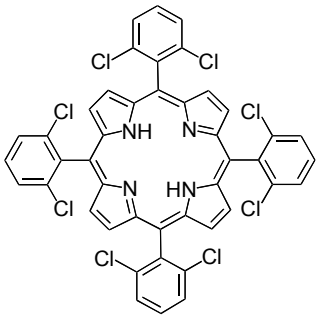

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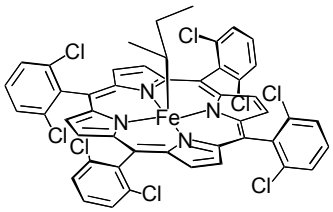

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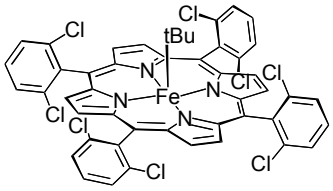

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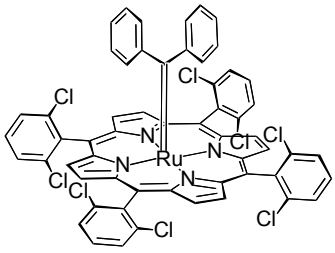
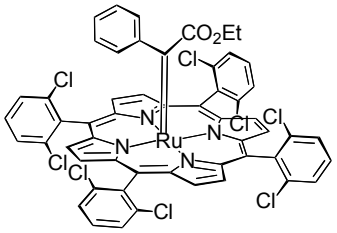


143

Figure 5c. Structures of *meso*-Tetraarylporphyrins in Table 5c



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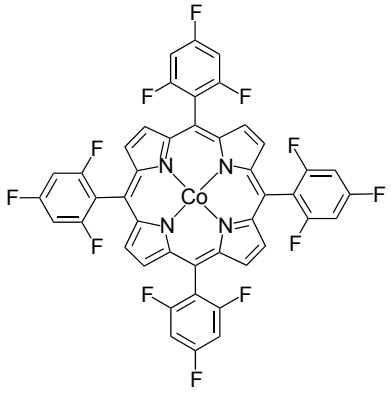

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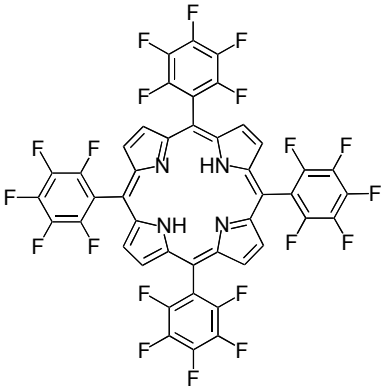

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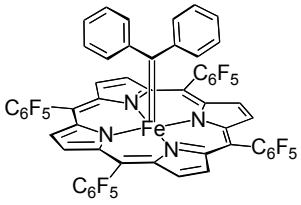

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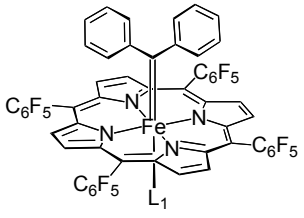

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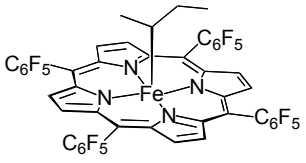

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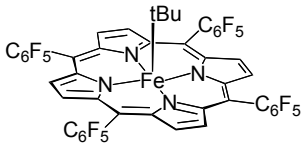
Figure 5c. Structures of *meso*-Tetraarylporphyrins in Table 5c



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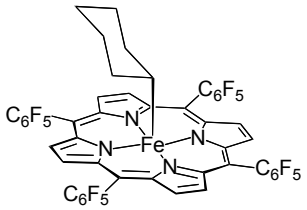

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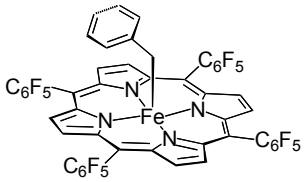

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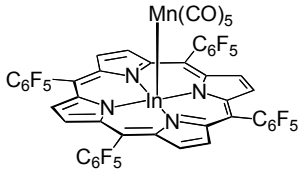

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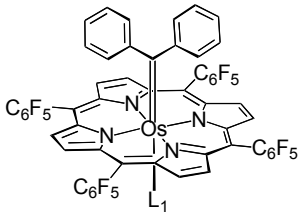

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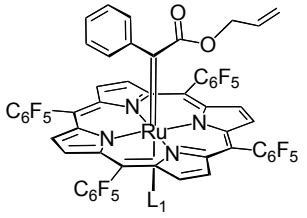

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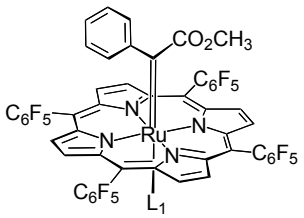
Figure 5c. Structures of *meso*-Tetraarylporphyrins in Table 5c



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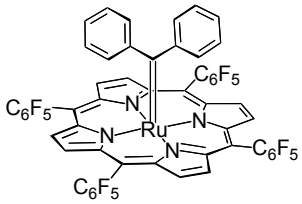

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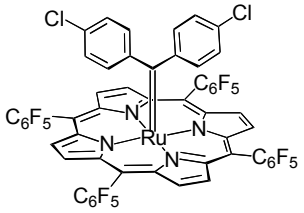

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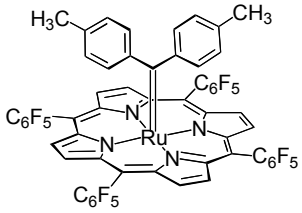

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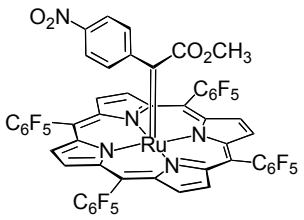

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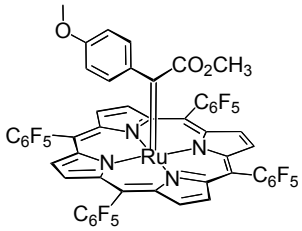

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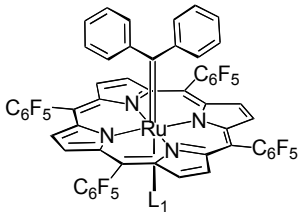
Figure 5c. Structures of *meso*-Tetraarylporphyrins in Table 5c



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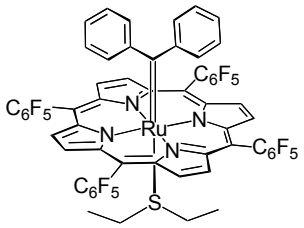

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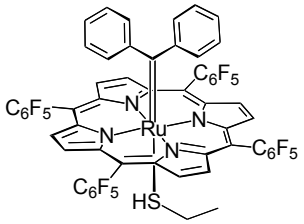

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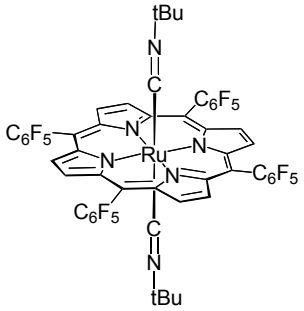

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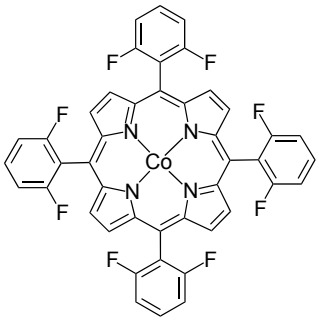

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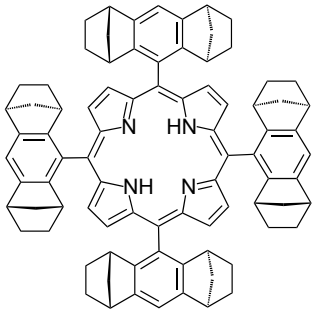

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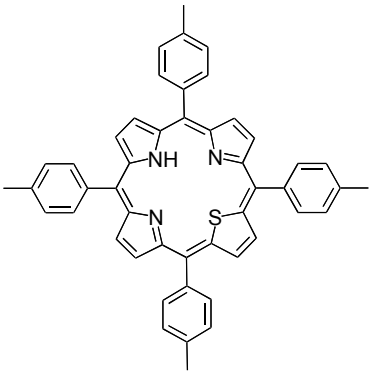
Figure 5c. Structures of *meso*-Tetraarylporphyrins in Table 5c



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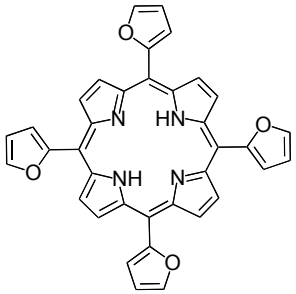

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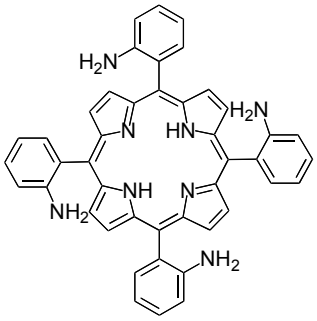

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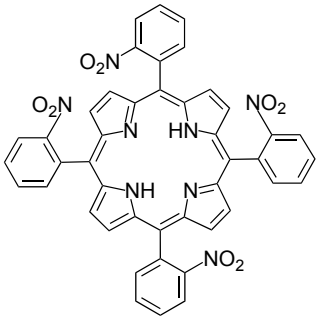

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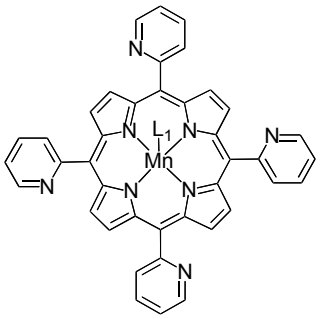

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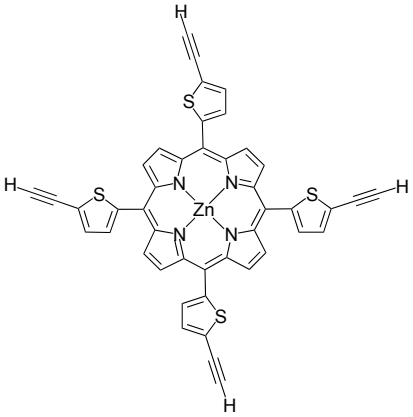

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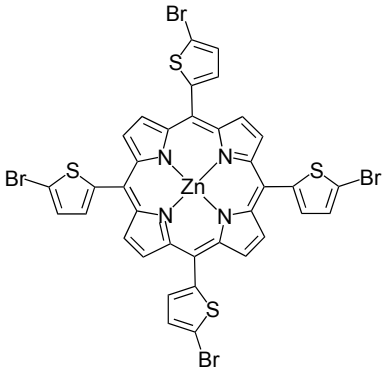
Figure 5c. Structures of *meso*-Tetraarylporphyrins in Table 5c



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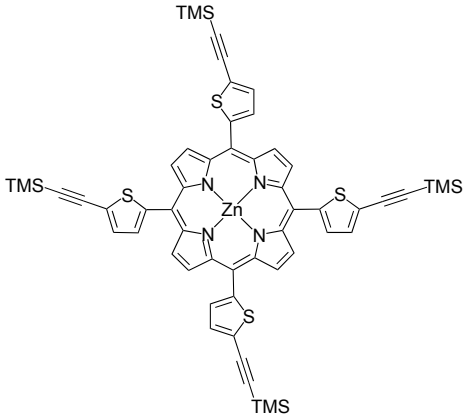

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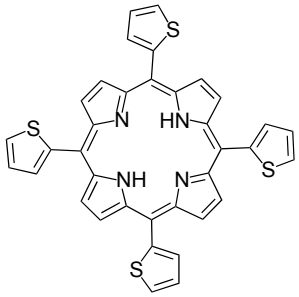

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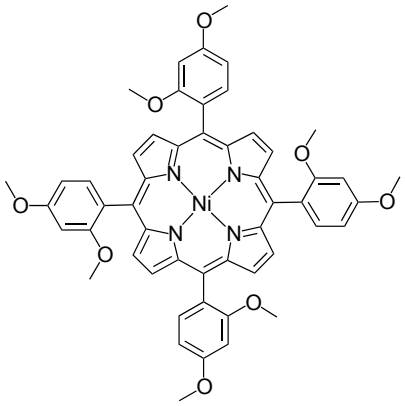

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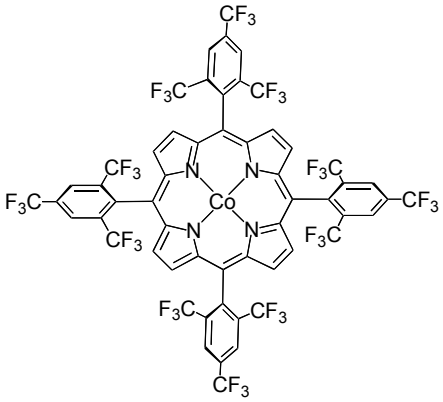

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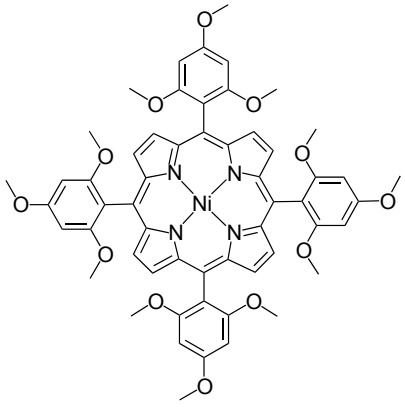

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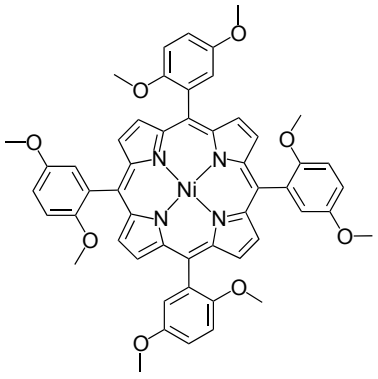
Figure 5c. Structures of *meso*-Tetraarylporphyrins in Table 5c



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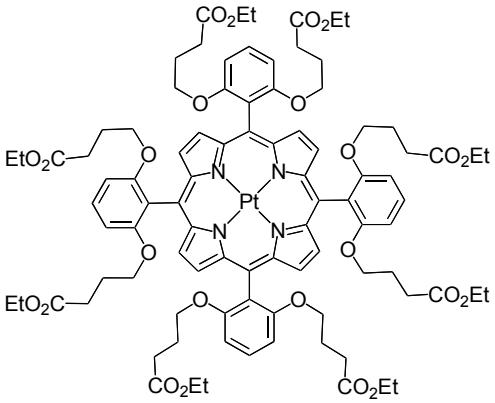

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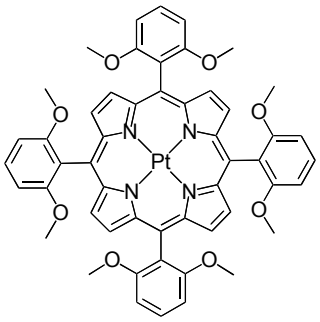

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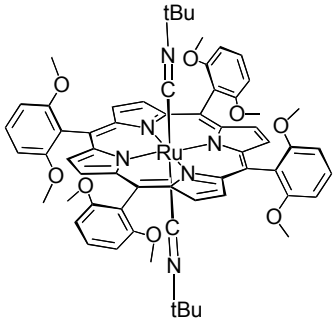

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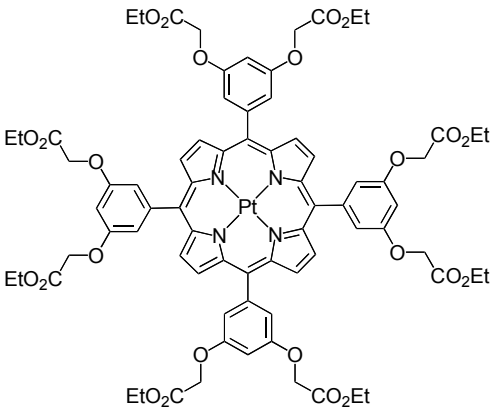

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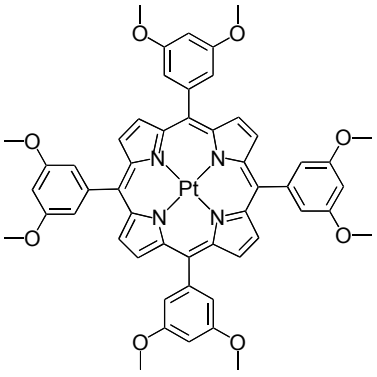

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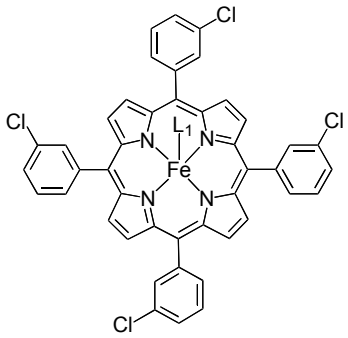
Figure 5c. Structures of *meso*-Tetraarylporphyrins in Table 5c



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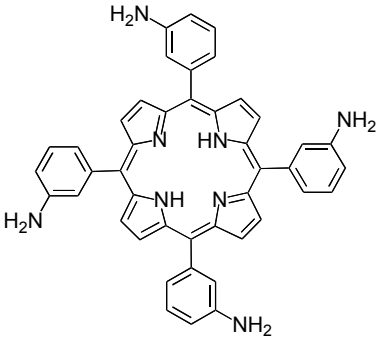

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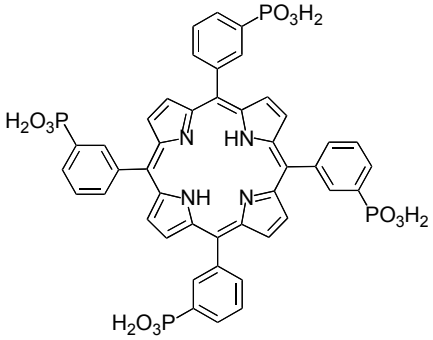

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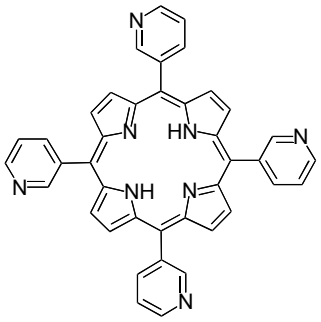

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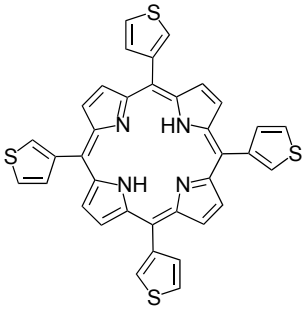

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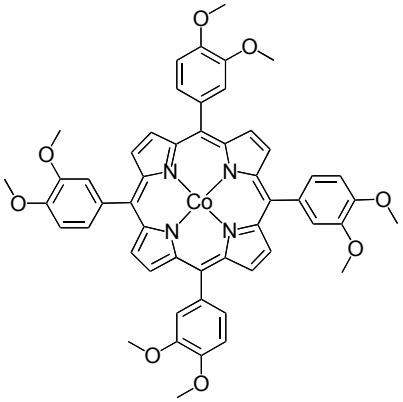

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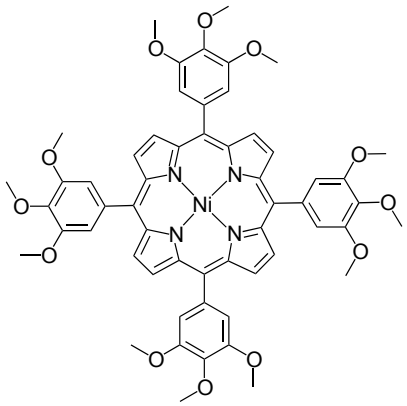
Figure 5c. Structures of *meso*-Tetraarylporphyrins in Table 5c



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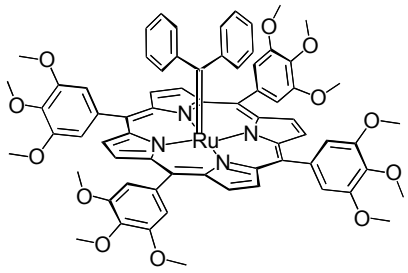

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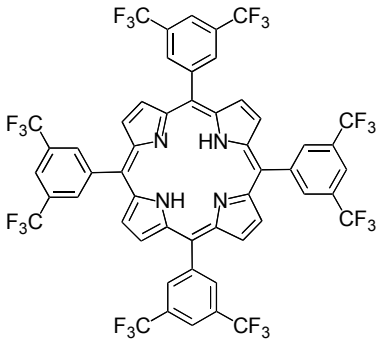

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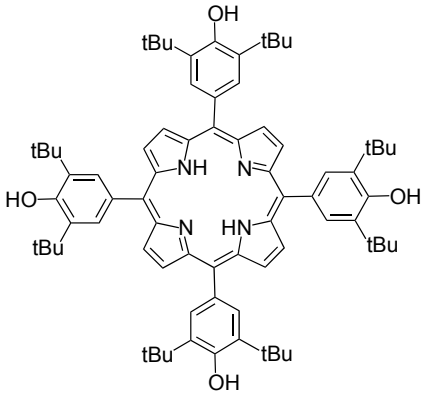

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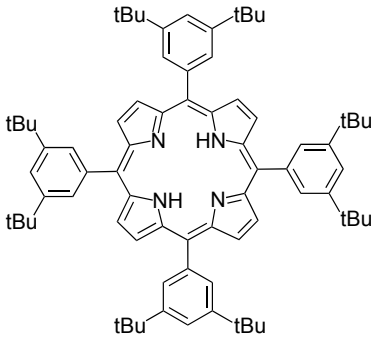

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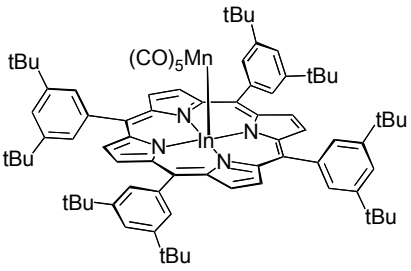

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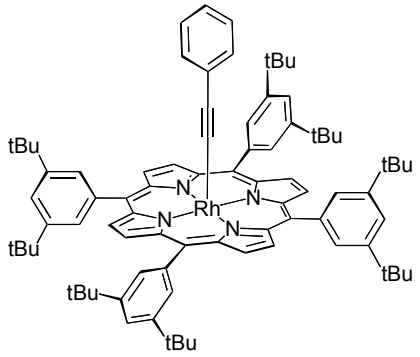
Figure 5c. Structures of *meso*-Tetraarylporphyrins in Table 5c



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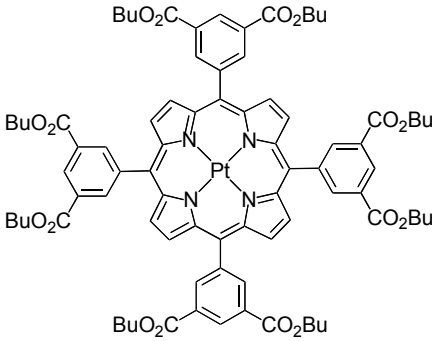

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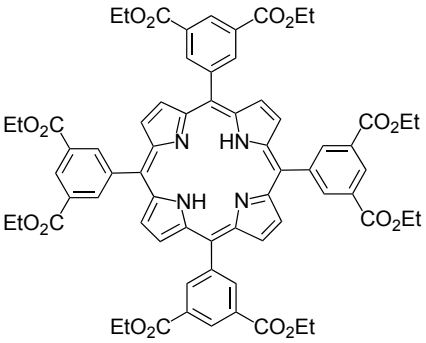

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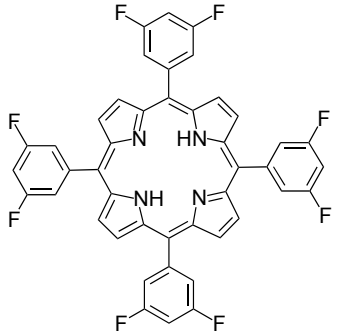

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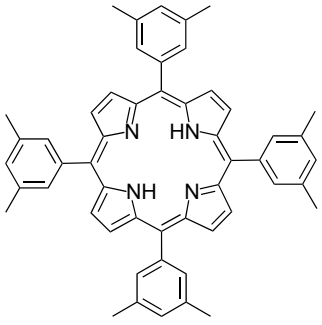

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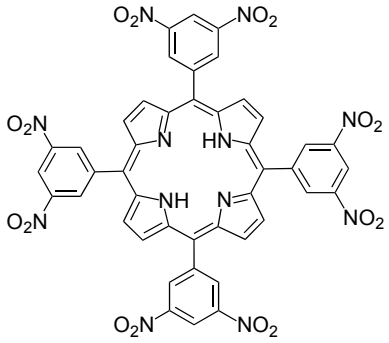

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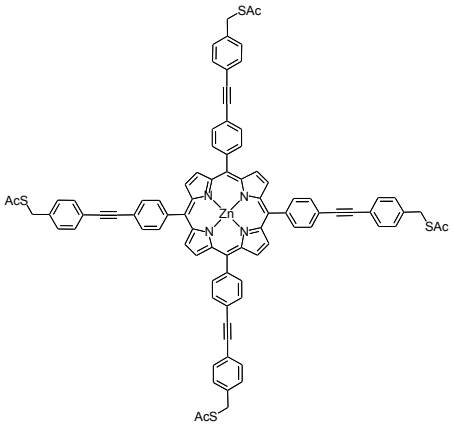
Figure 5c. Structures of *meso*-Tetraarylporphyrins in Table 5c



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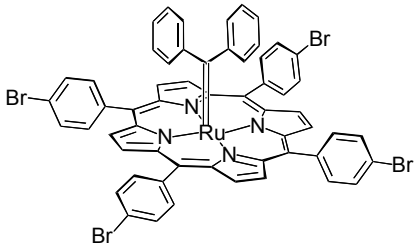

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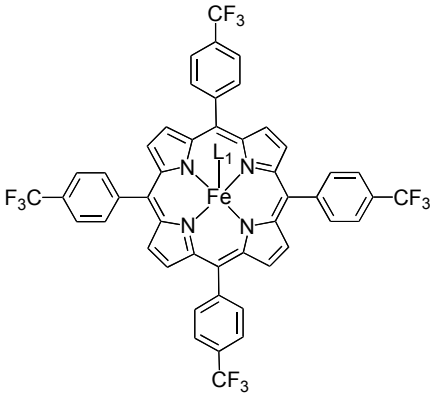

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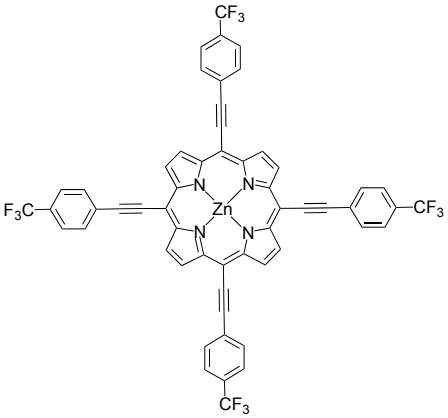

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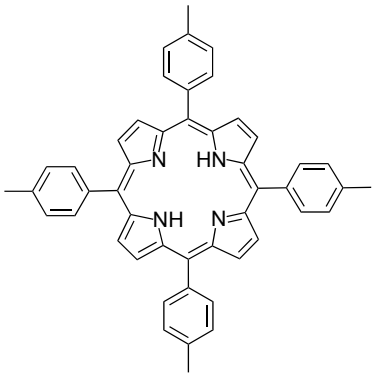

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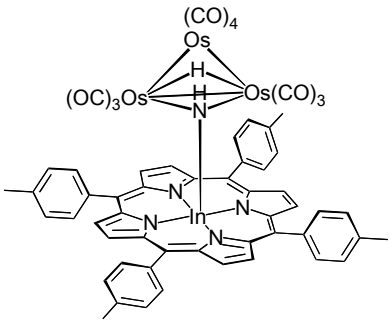

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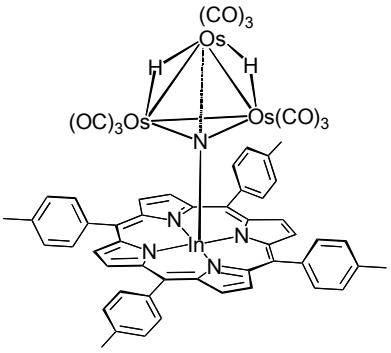
Figure 5c. Structures of *meso*-Tetraarylporphyrins in Table 5c



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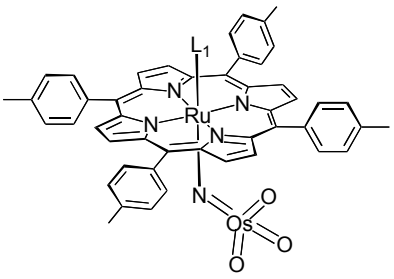

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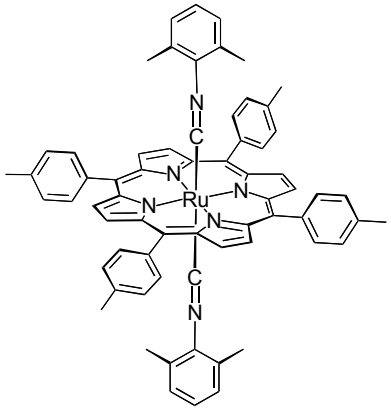

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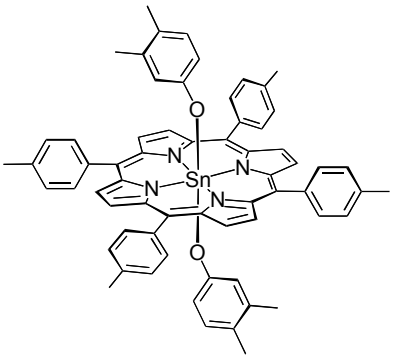

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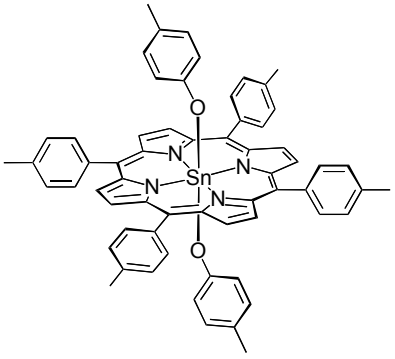

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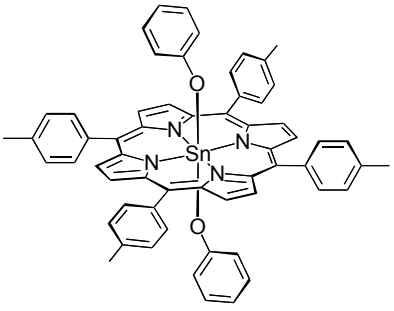

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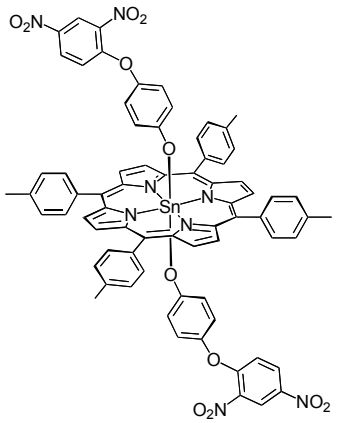
Figure 5c. Structures of *meso*-Tetraarylporphyrins in Table 5c



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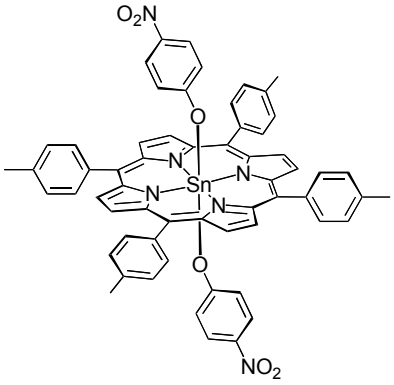

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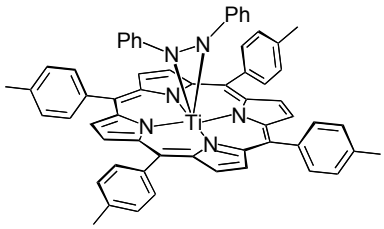

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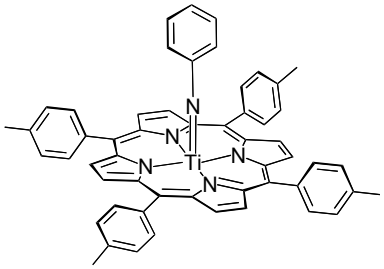

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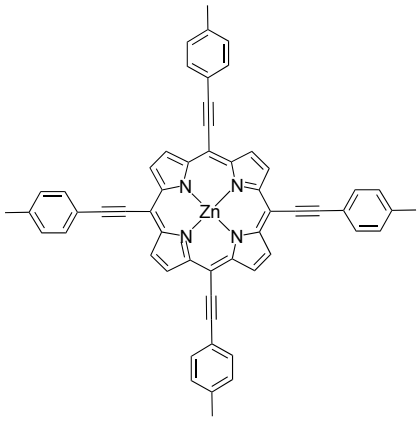

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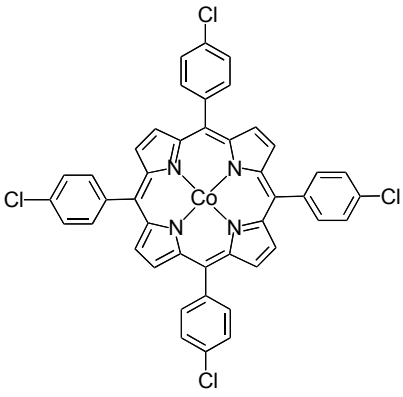

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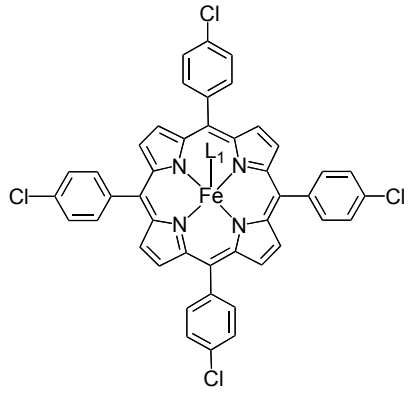
Figure 5c. Structures of *meso*-Tetraarylporphyrins in Table 5c



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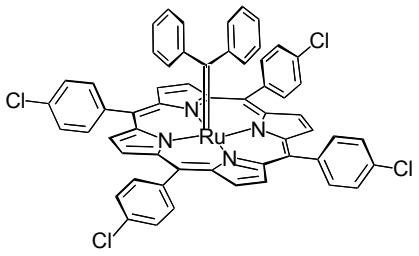

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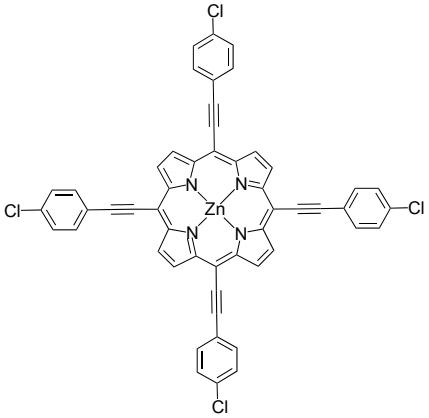

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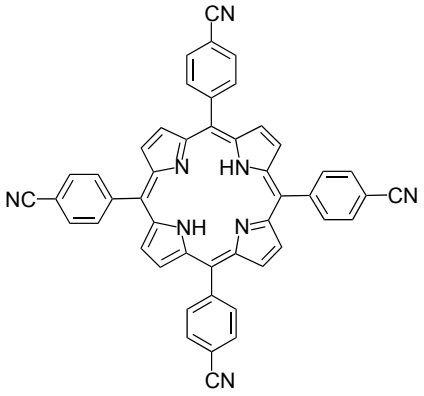

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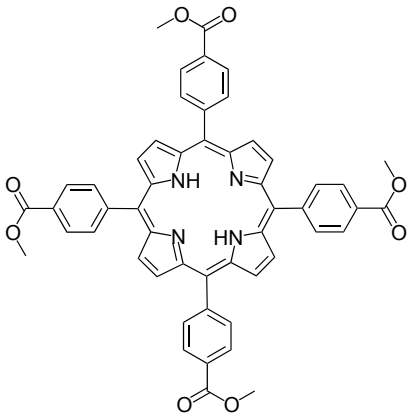

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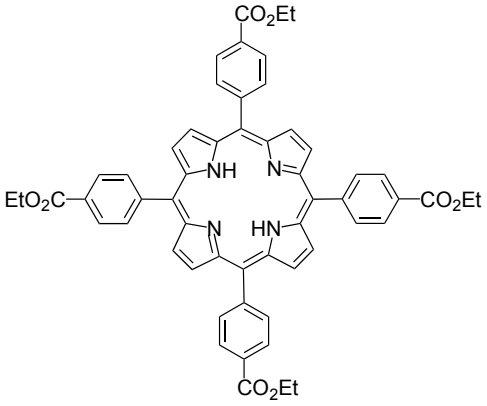

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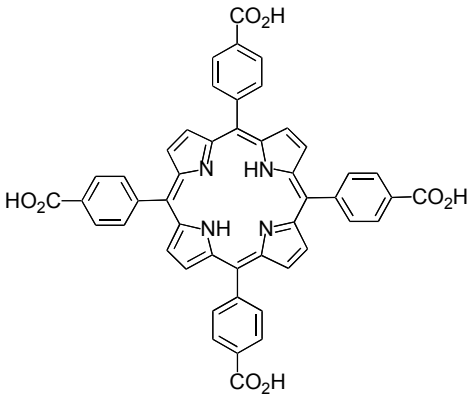
Figure 5c. Structures of *meso*-Tetraarylporphyrins in Table 5c



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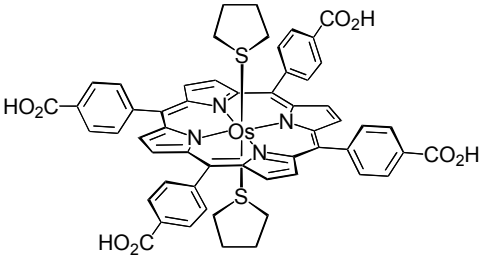

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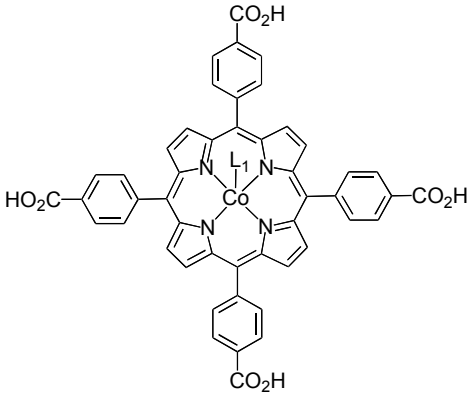

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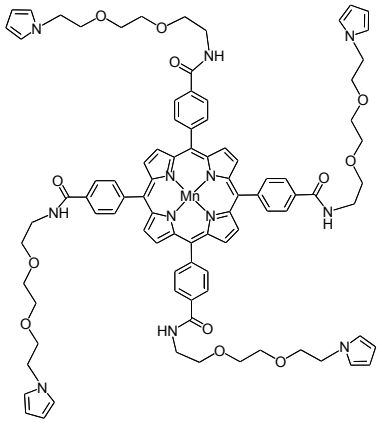

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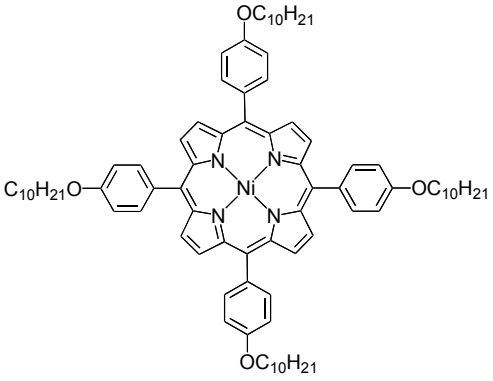

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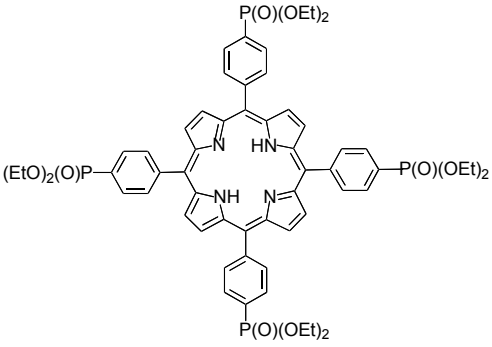

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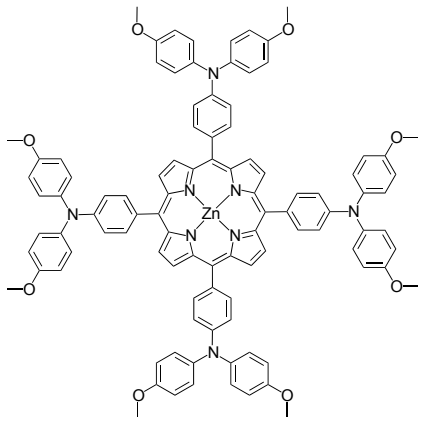
Figure 5c. Structures of *meso*-Tetraarylporphyrins in Table 5c



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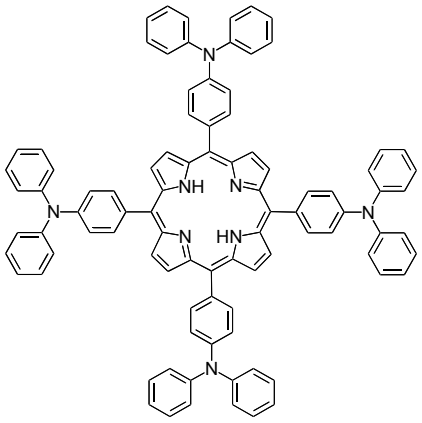

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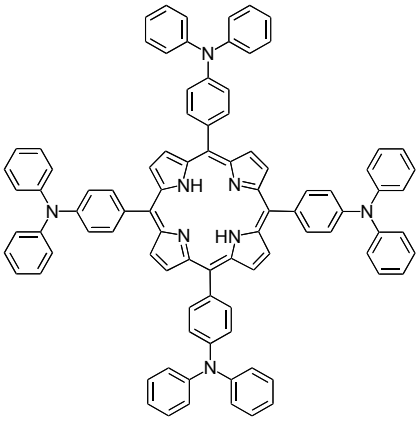

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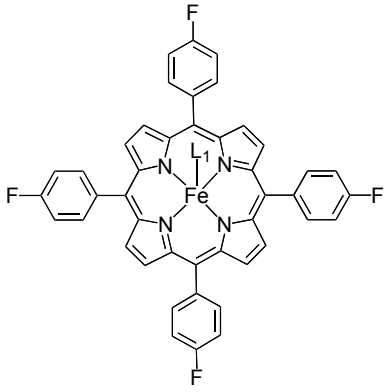

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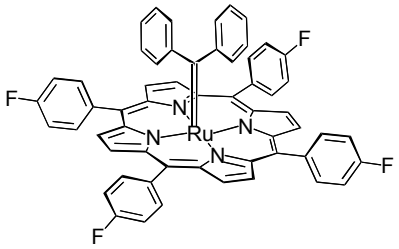

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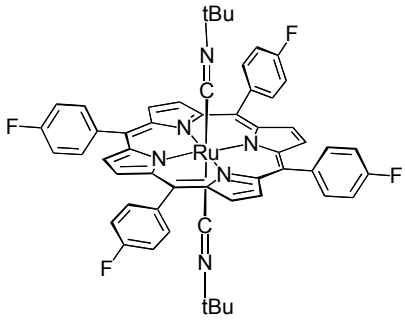

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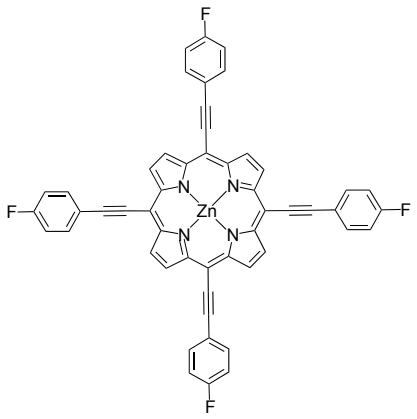
Figure 5c. Structures of *meso*-Tetraarylporphyrins in Table 5c



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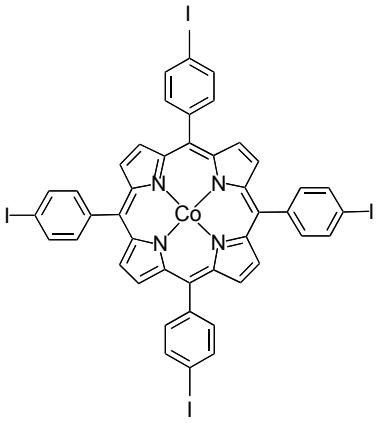

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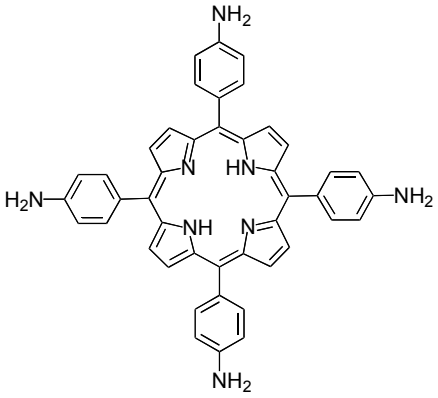

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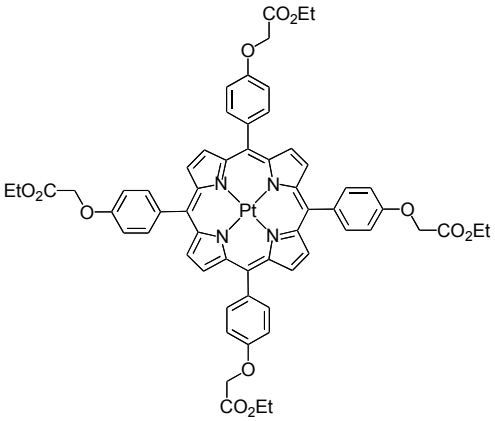

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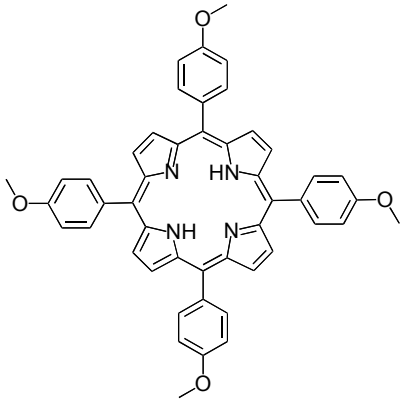

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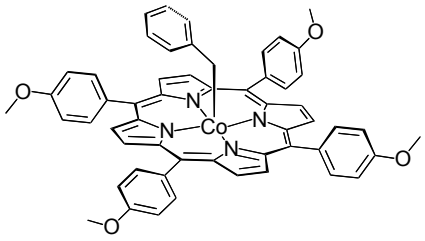

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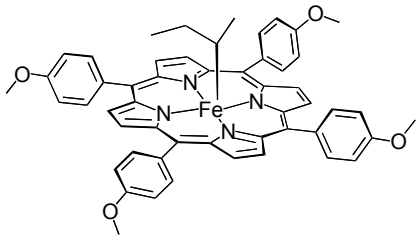
Figure 5c. Structures of *meso*-Tetraarylporphyrins in Table 5c



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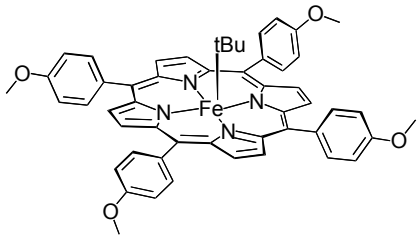

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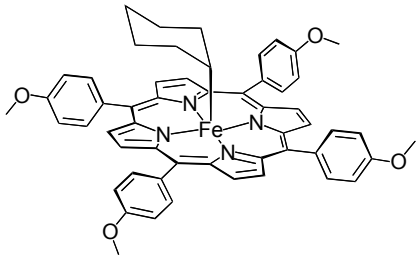

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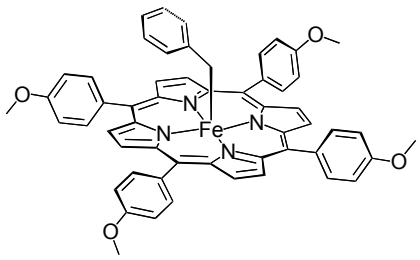

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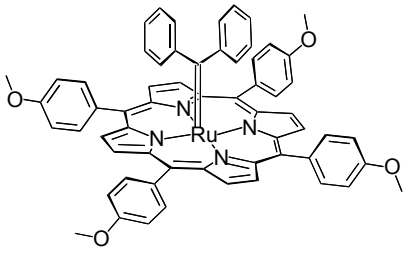

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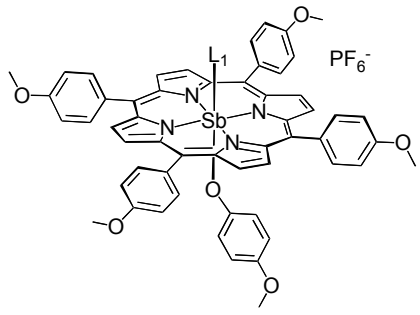

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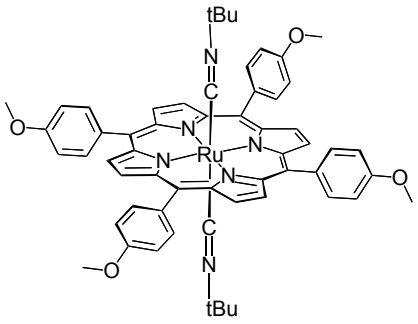
Figure 5c. Structures of *meso*-Tetraarylporphyrins in Table 5c



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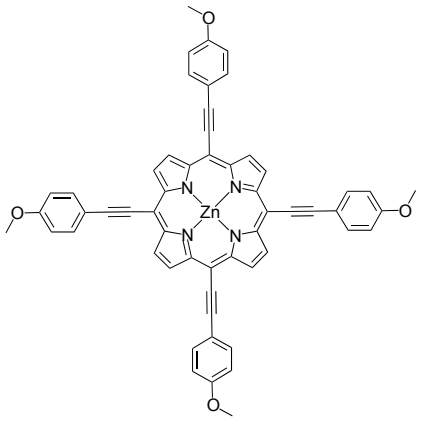

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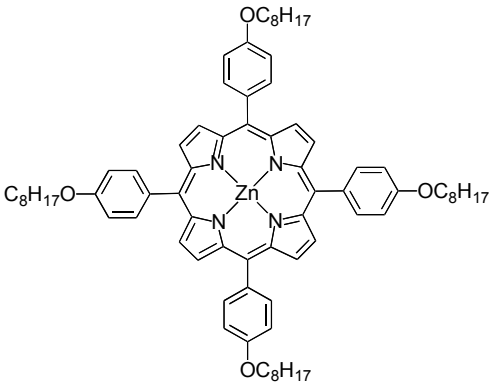

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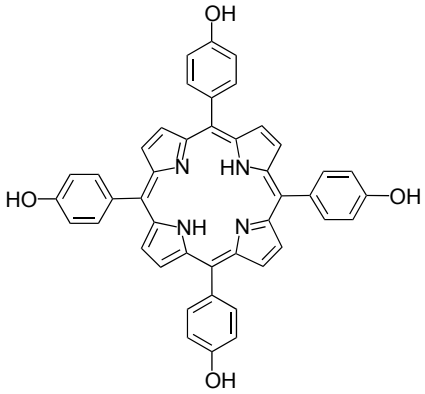

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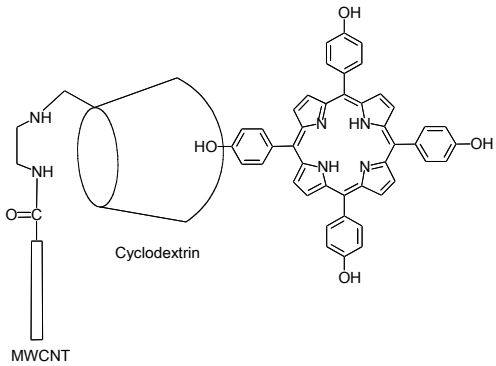

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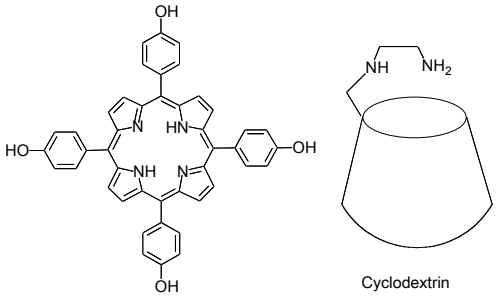

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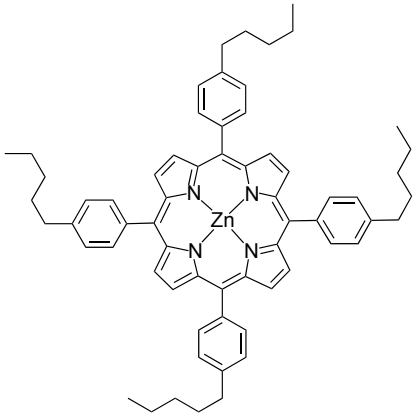
Figure 5c. Structures of *meso*-Tetraarylporphyrins in Table 5c



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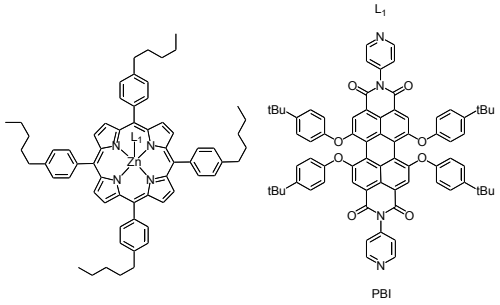

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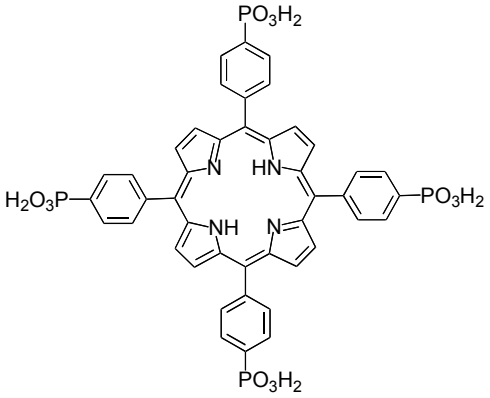

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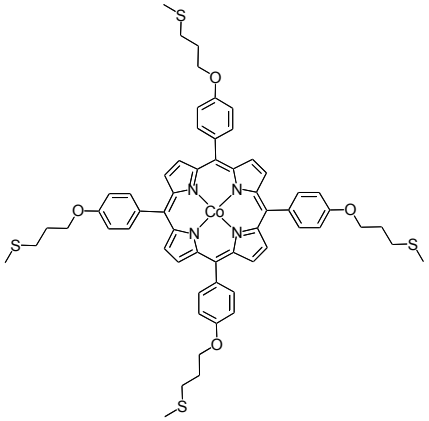

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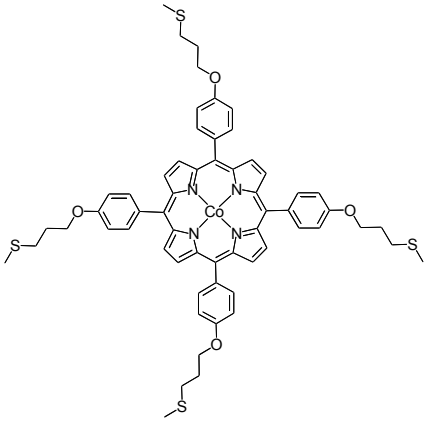

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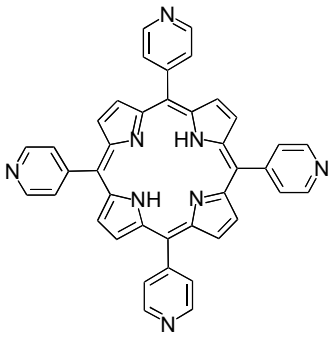

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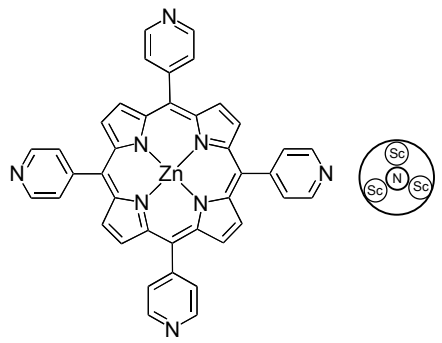
Figure 5c. Structures of *meso*-Tetraarylporphyrins in Table 5c



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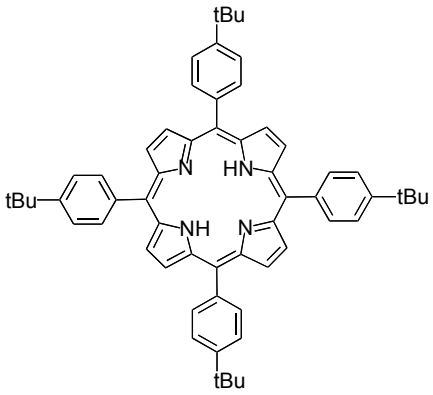

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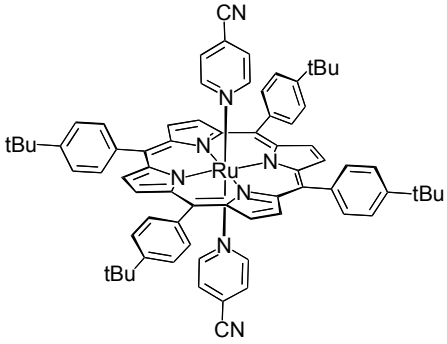

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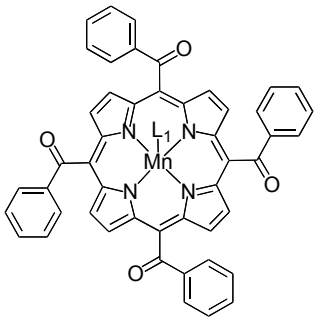

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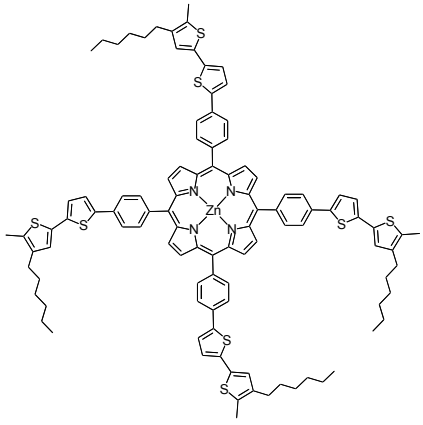

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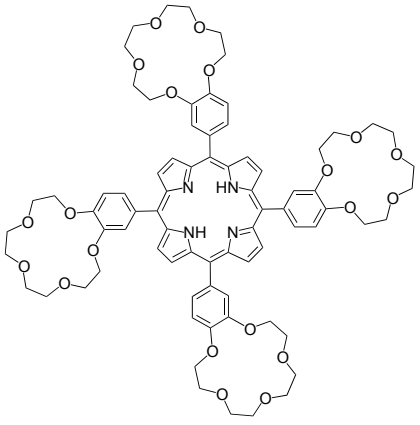

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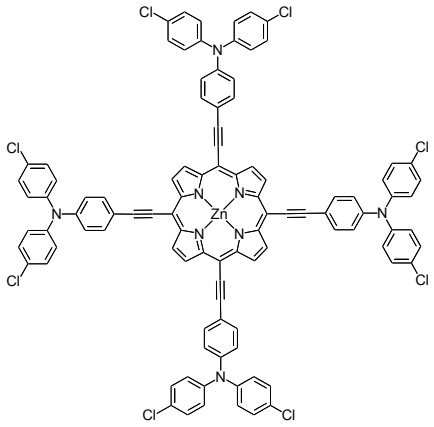
Figure 5c. Structures of *meso*-Tetraarylporphyrins in Table 5c



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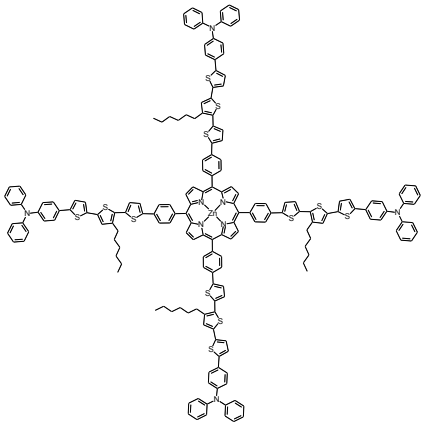

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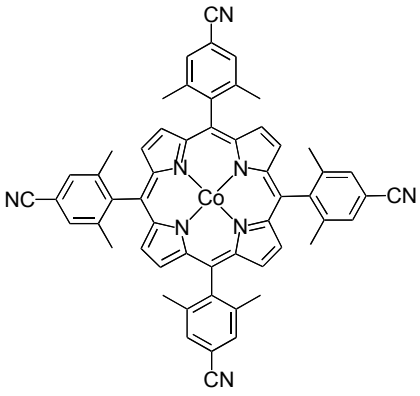

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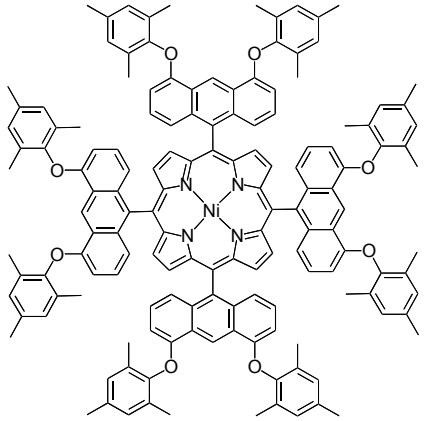

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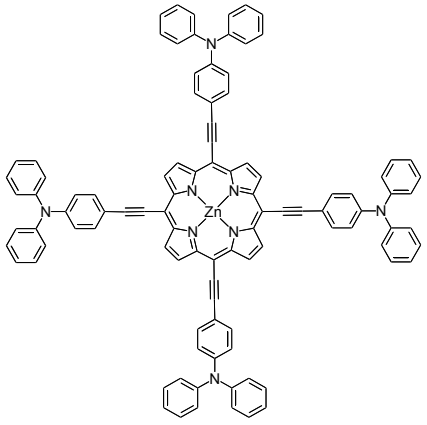

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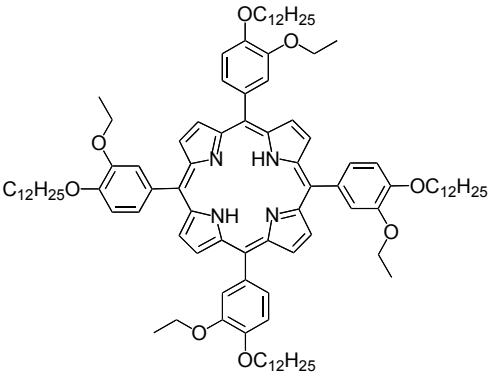

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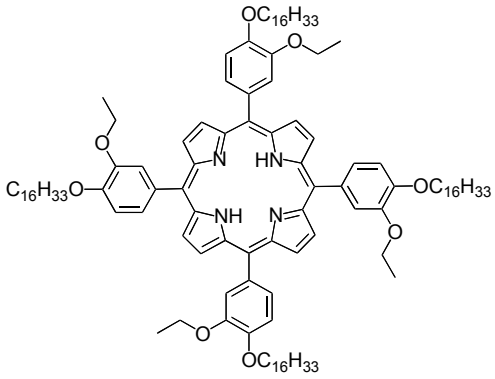
Figure 5c. Structures of *meso*-Tetraarylporphyrins in Table 5c



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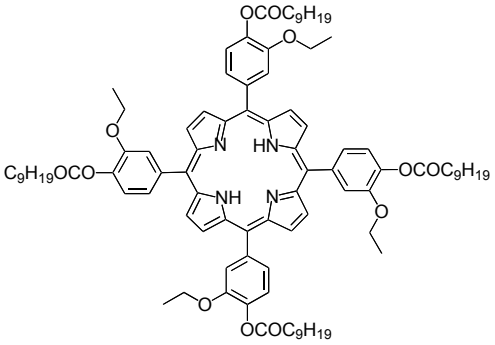

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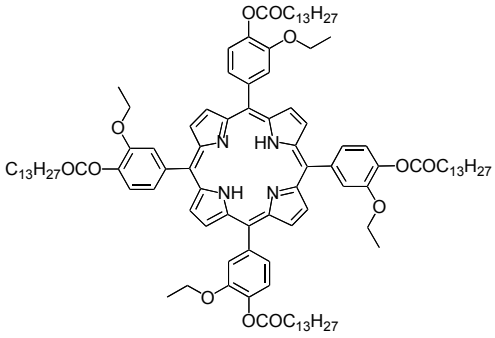

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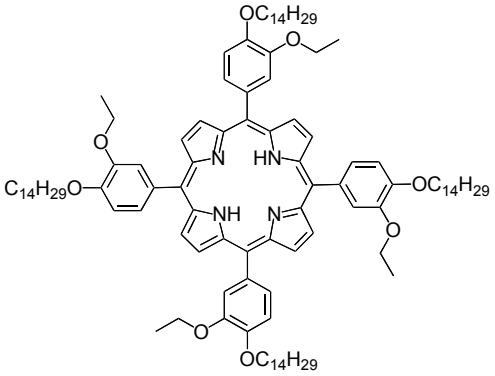

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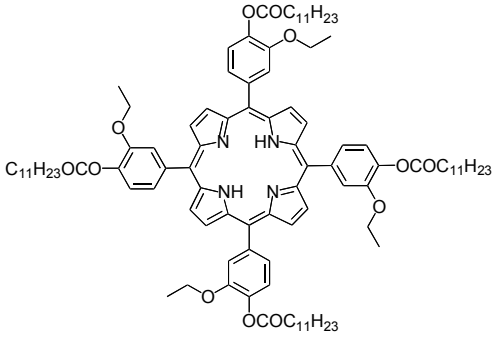

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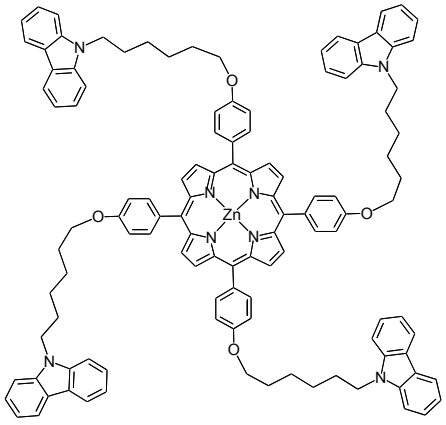

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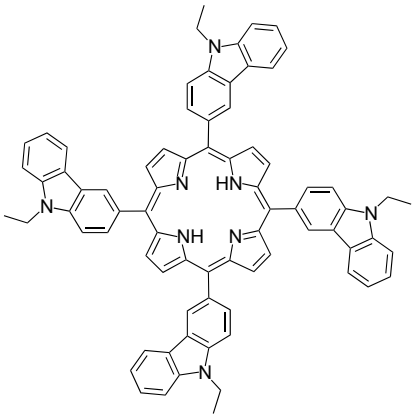
Figure 5c. Structures of *meso*-Tetraarylporphyrins in Table 5c



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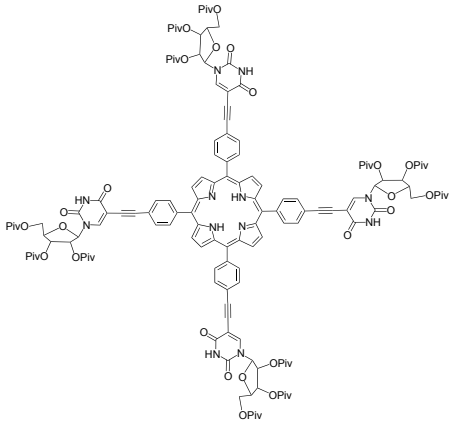

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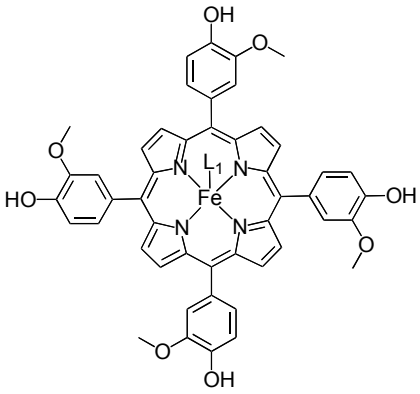

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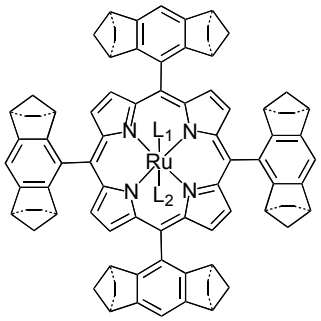

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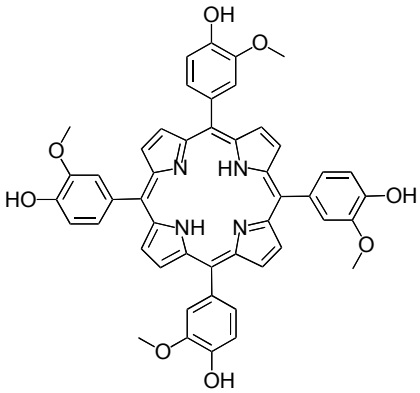

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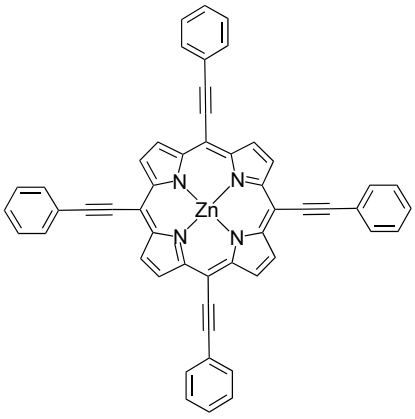

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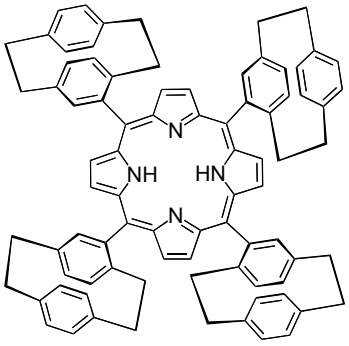
Figure 5c. Structures of *meso*-Tetraarylporphyrins in Table 5c



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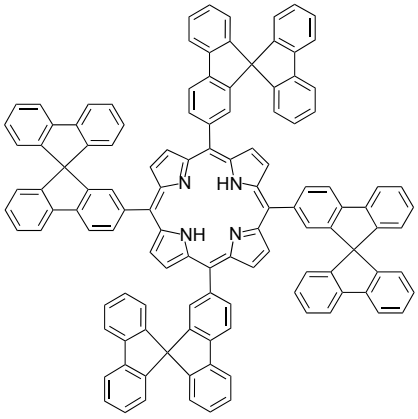

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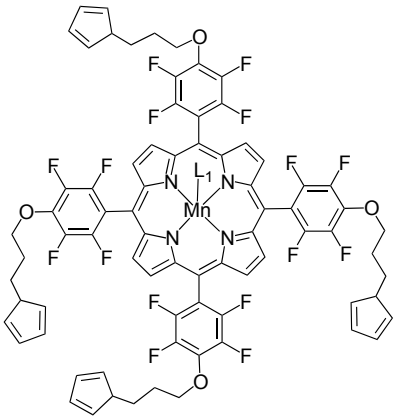

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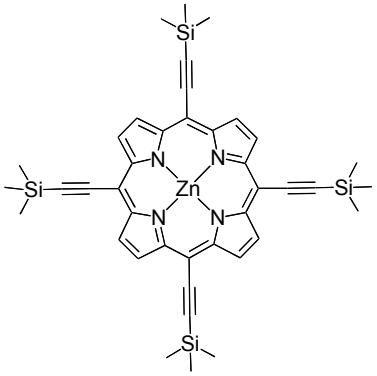

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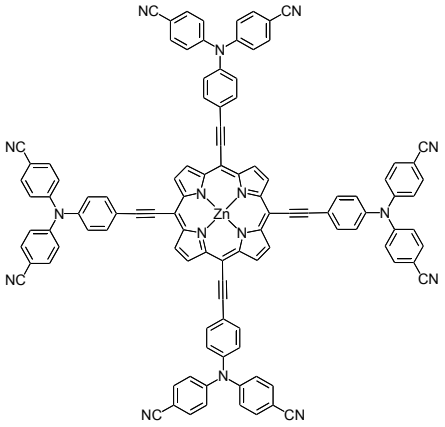

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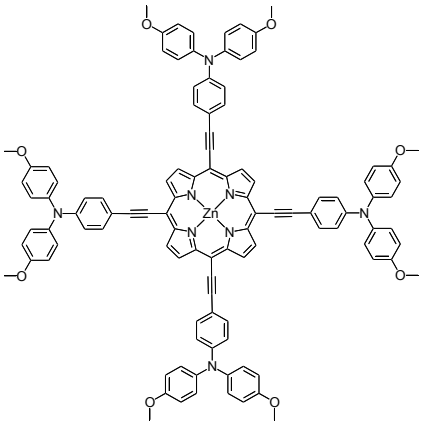

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Figure 5c. Structures of *meso*-Tetraarylporphyrins in Table 5c

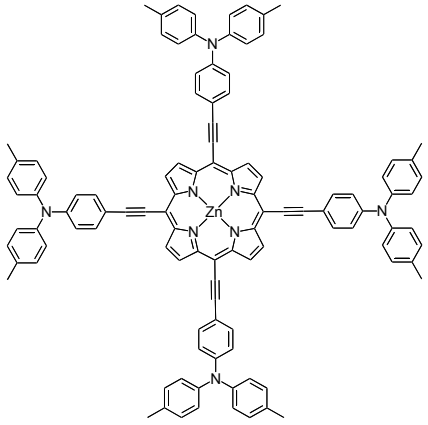

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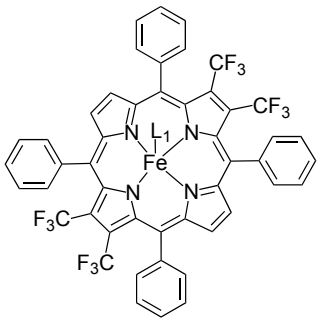
Figure 6a. Structures of β-alkyl and β-aryl substituted TPP macrocycles in Table 6a



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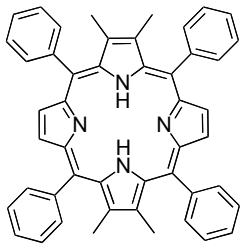

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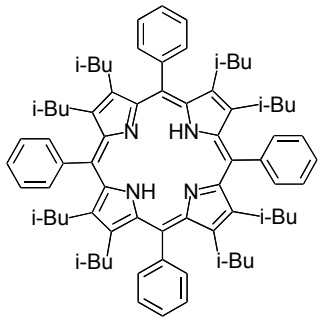

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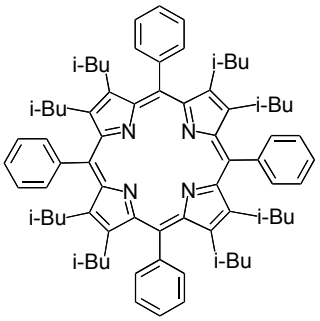

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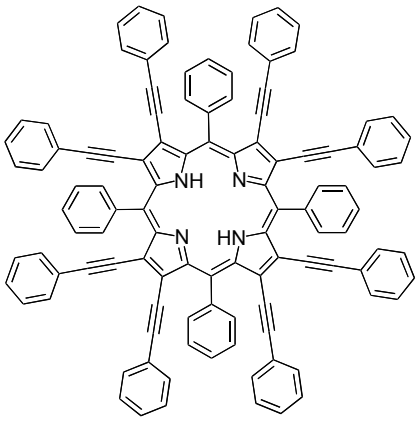

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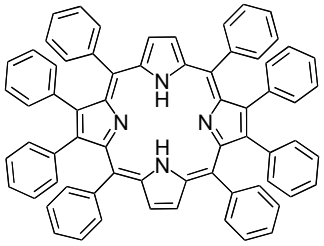

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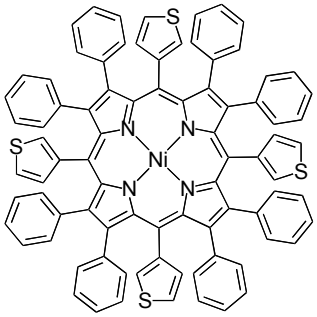
Figure 6a. Structures of β-alkyl and β-aryl substituted TPP macrocycles in Table 6a



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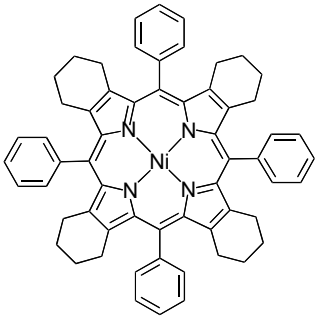

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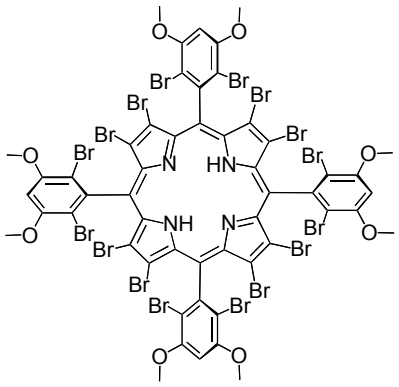
Figure 6b. Structures of β-pyrrole halogenated porphyrins in Table 6b



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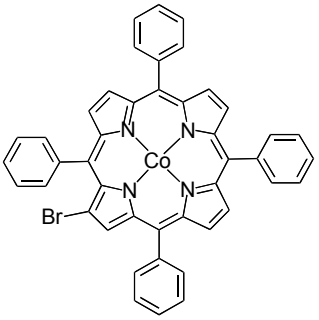

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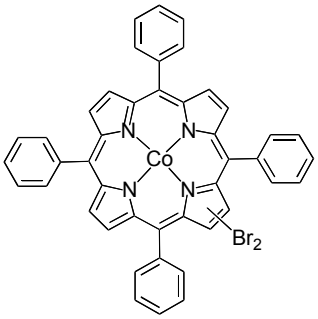
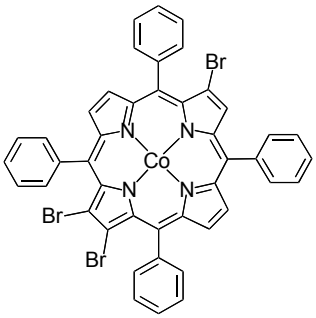


Mixture of 2,3 / 2,12 and 2,13-isomers

305



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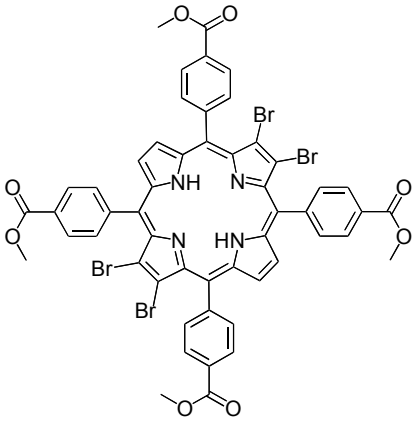

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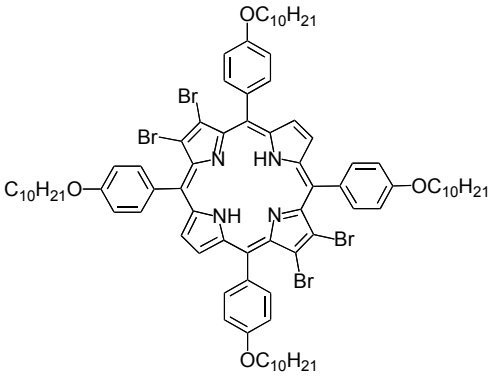

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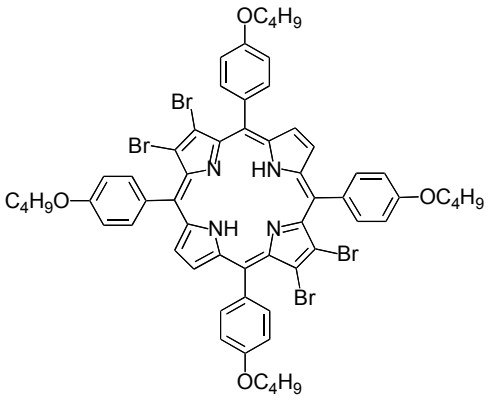
Figure 6b. Structures of β-pyrrole halogenated porphyrins in Table 6b



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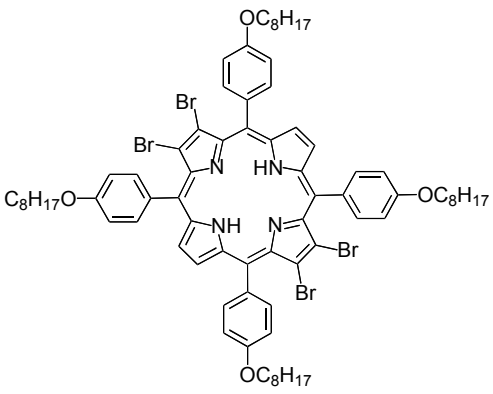

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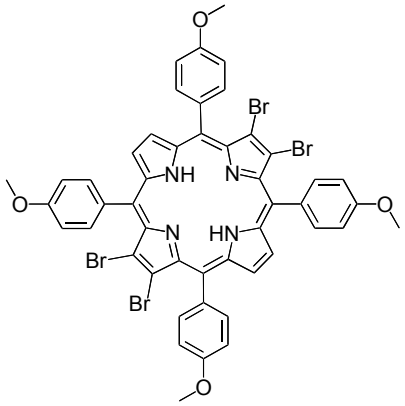

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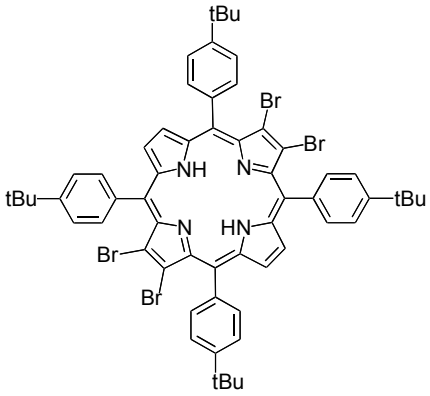

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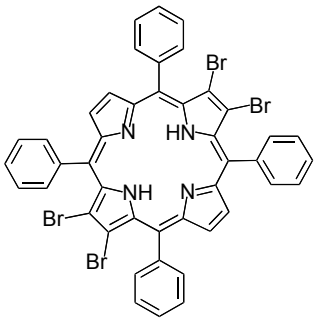

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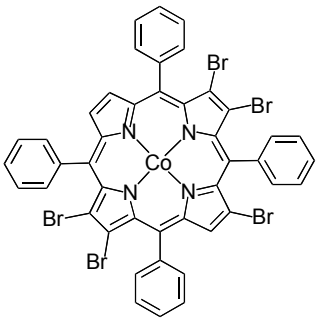

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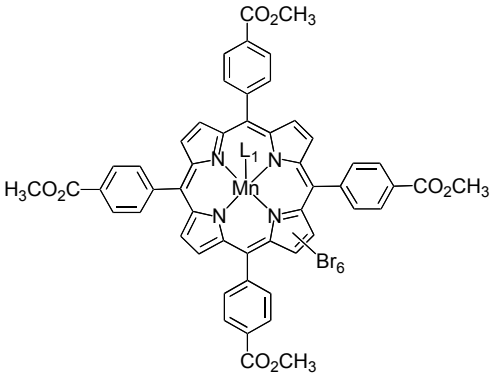
Figure 6b. Structures of β-pyrrole halogenated porphyrins in Table 6b



Mixture of isomers

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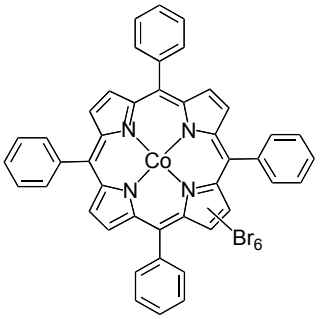

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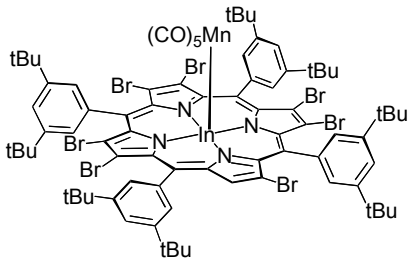

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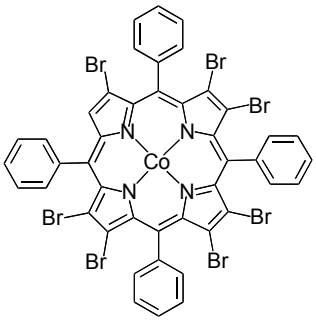

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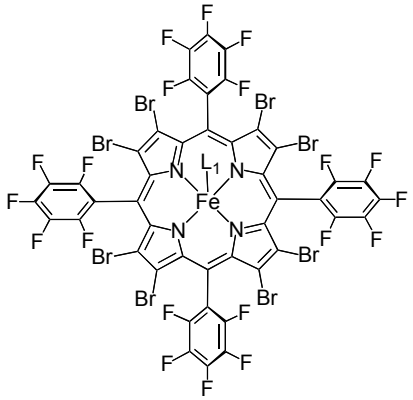

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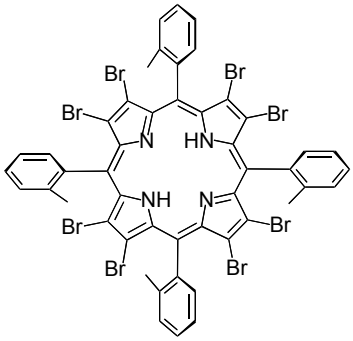

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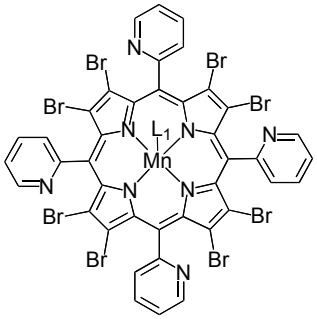
Figure 6b. Structures of β-pyrrole halogenated porphyrins in Table 6b



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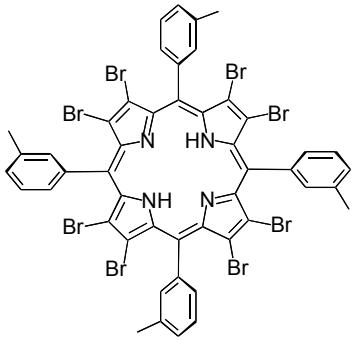

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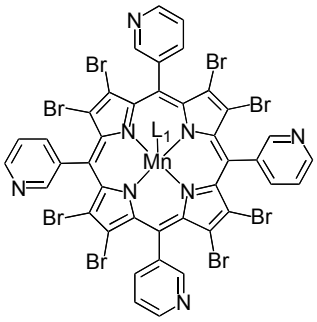

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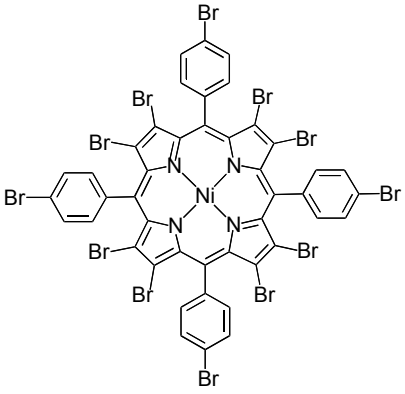

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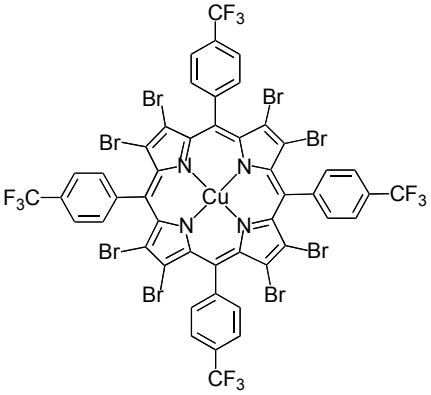

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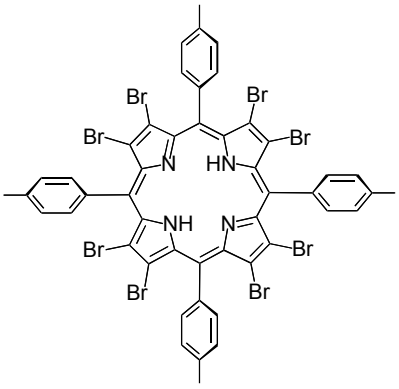

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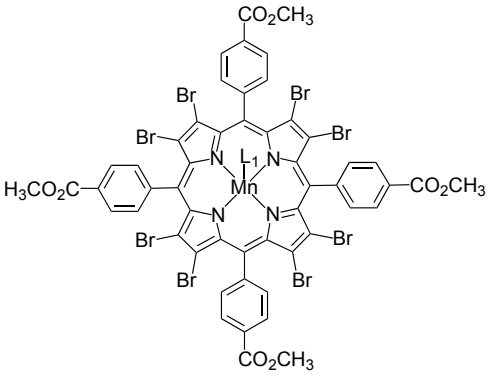
Figure 6b. Structures of β-pyrrole halogenated porphyrins in Table 6b



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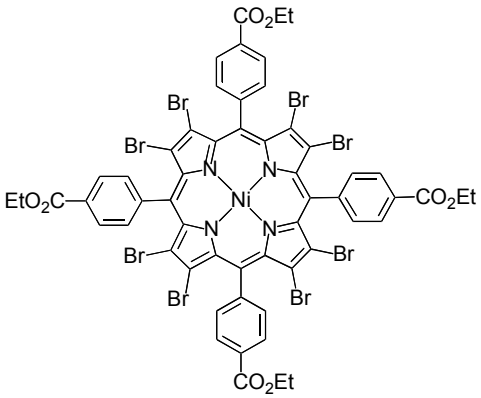

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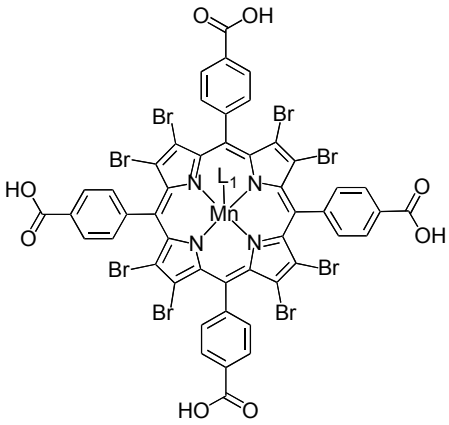

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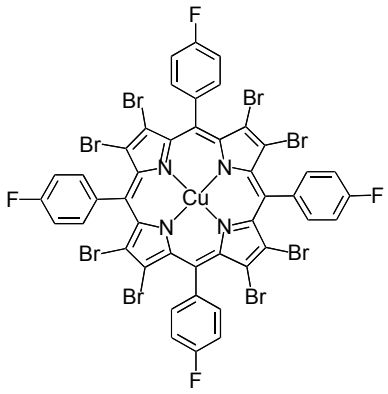

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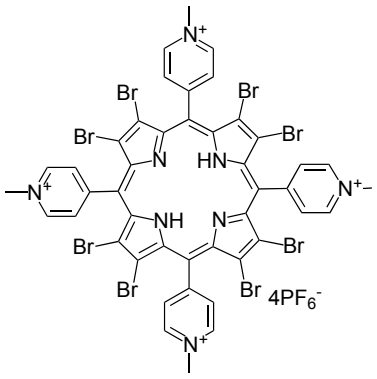

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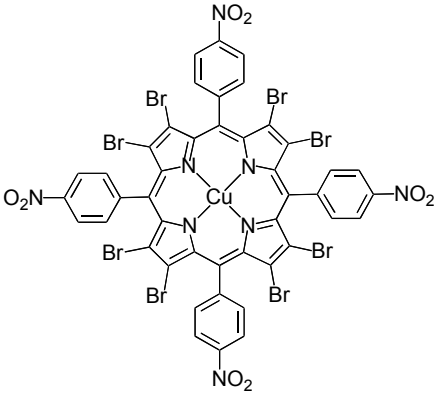

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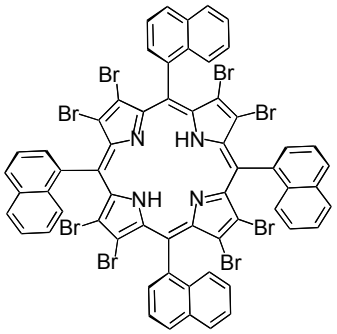
Figure 6b. Structures of β-pyrrole halogenated porphyrins in Table 6b



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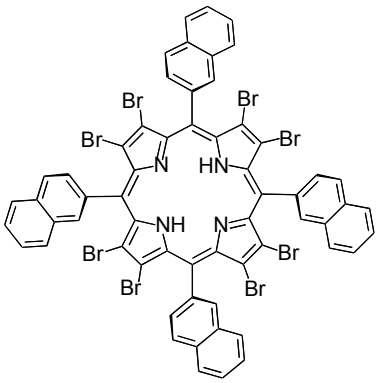

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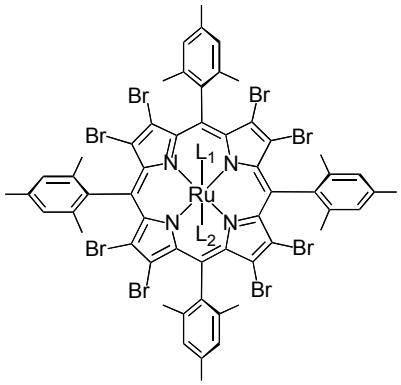

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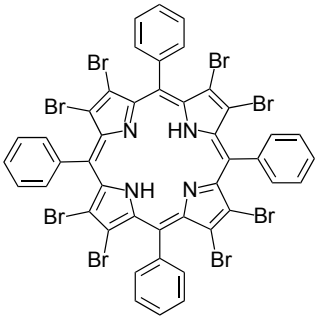

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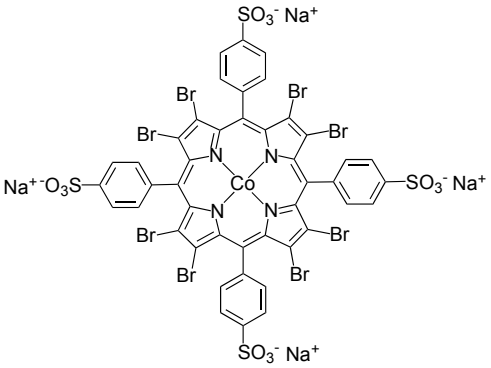

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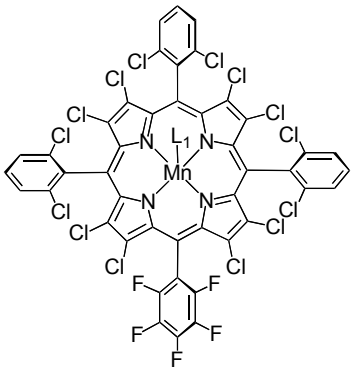

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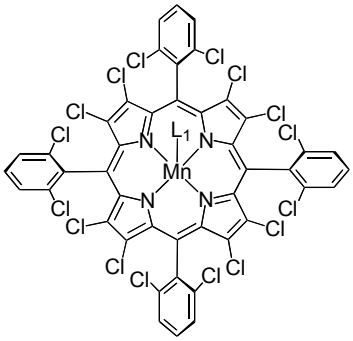
Figure 6b. Structures of β-pyrrole halogenated porphyrins in Table 6b



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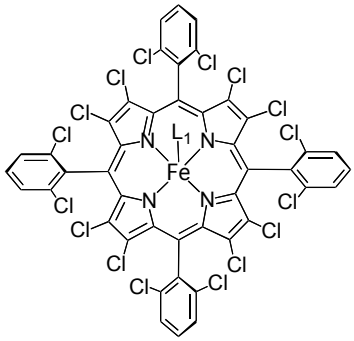

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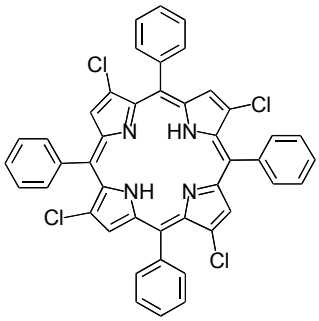

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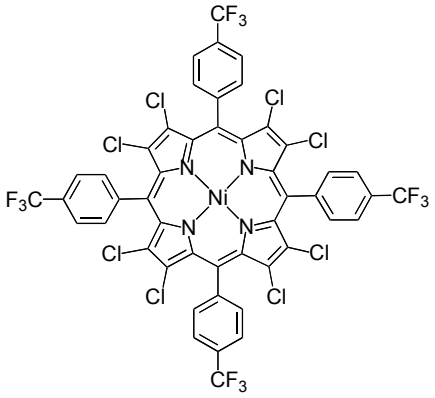

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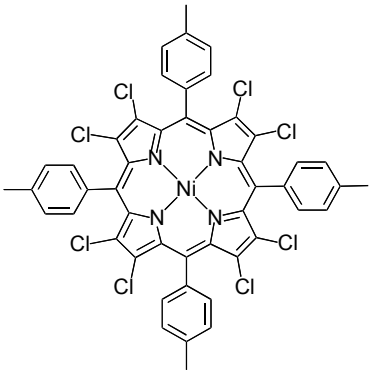

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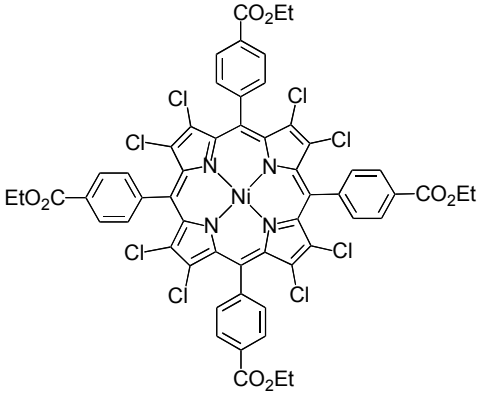

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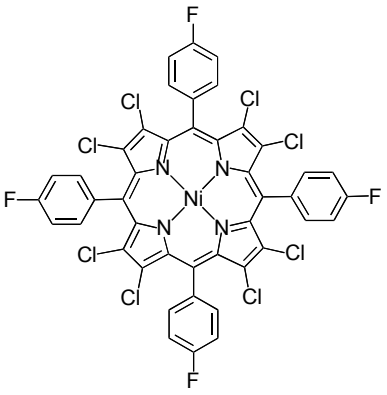
Figure 6b. Structures of β-pyrrole halogenated porphyrins in Table 6b



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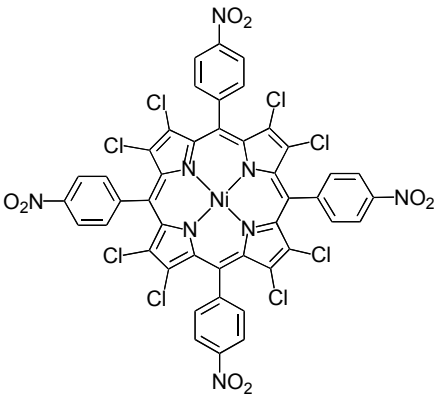

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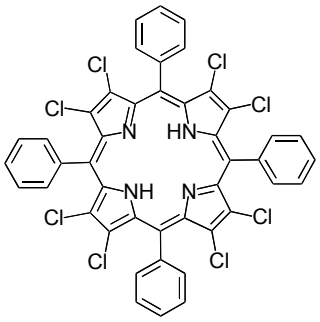

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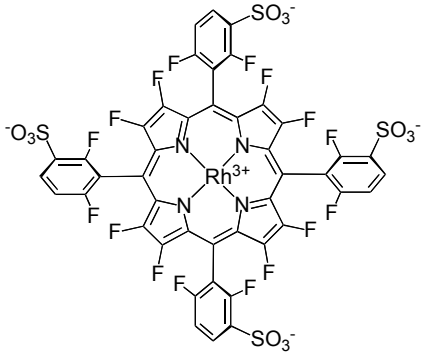

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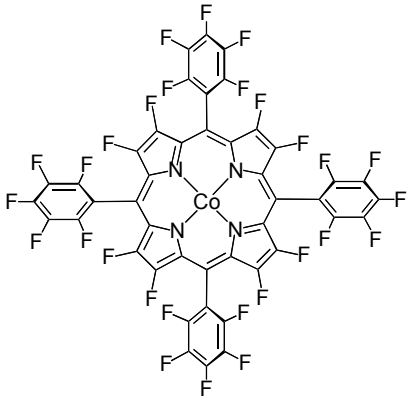

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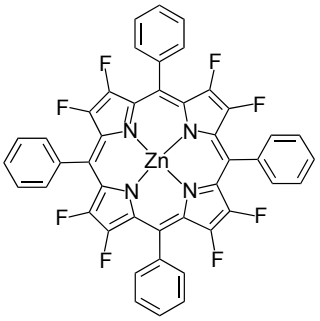

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Figure 6b. Structures of β-pyrrole halogenated porphyrins in Table 6b

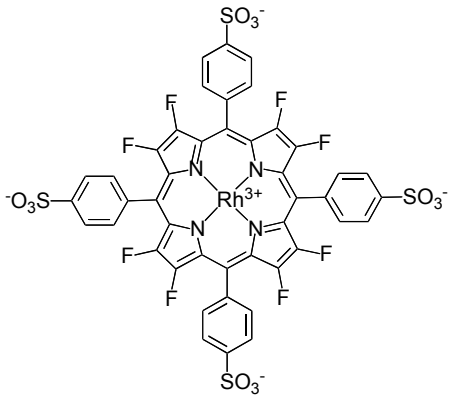

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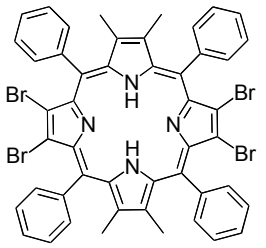
Figure 6c. Structures of TPP with mixed β-pyrrole substituents in Table 6c



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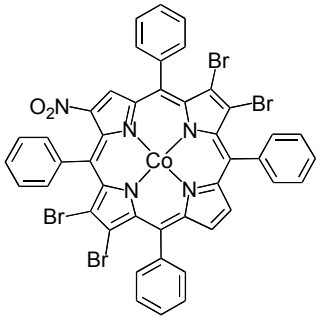

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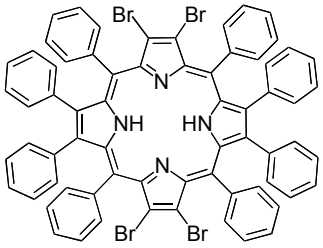

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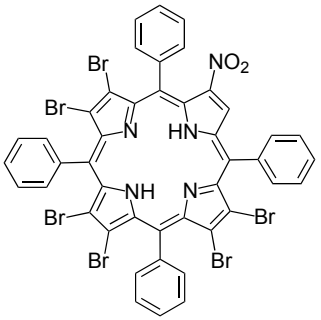

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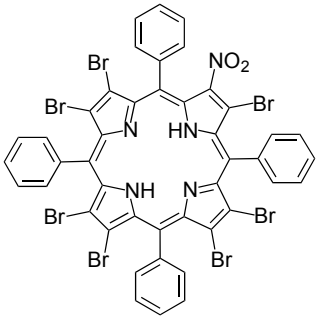

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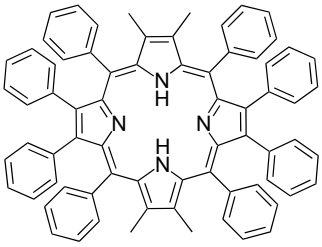

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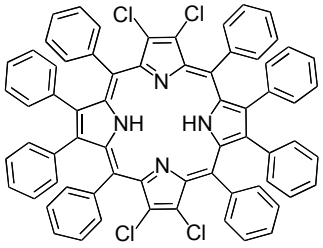
Figure 6c. Structures of TPP with mixed β-pyrrole substituents in Table 6c



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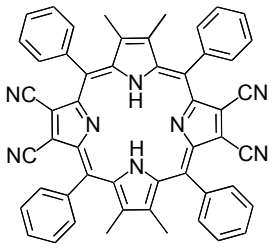

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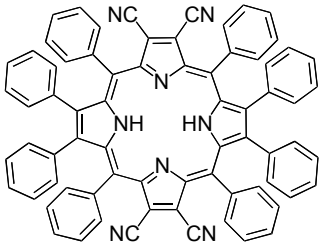

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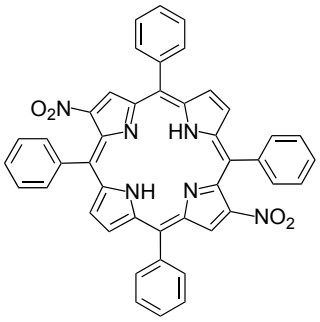
Figure 6d. Structures of nitro substituted TPP and tetraarylporphyrin (TArP) derivatives in Table 6d



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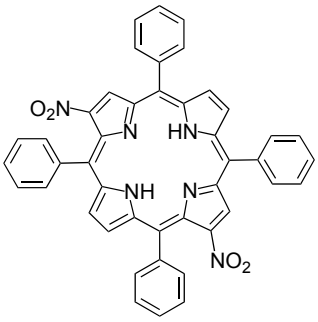

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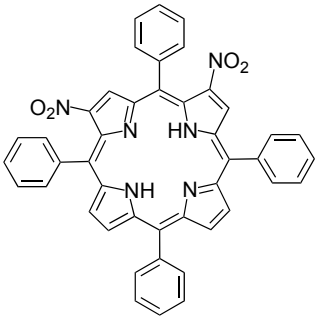

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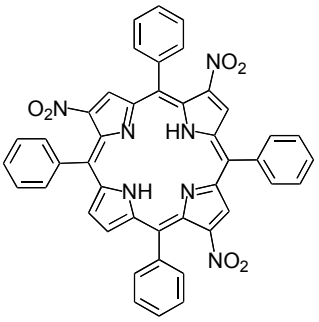

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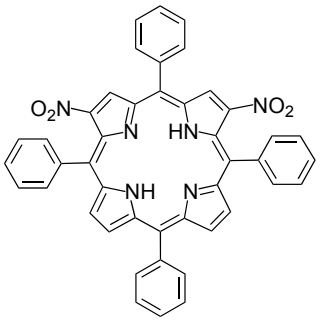

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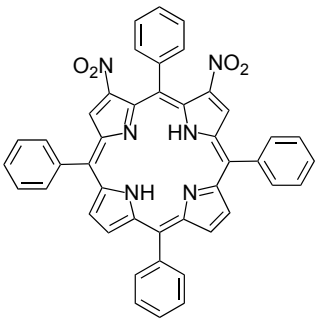

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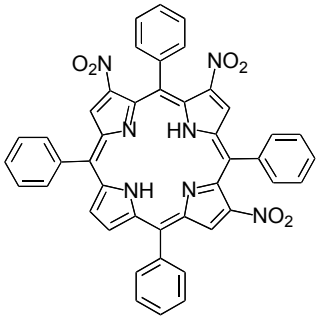
Figure 6d. Structures of nitro substituted TPP and tetraarylporphyrin (TArP) derivatives in Table 6d



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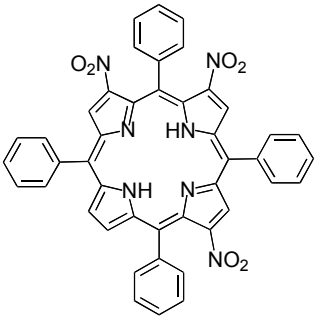

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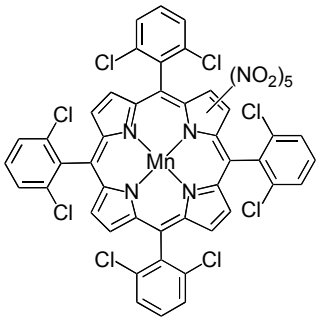

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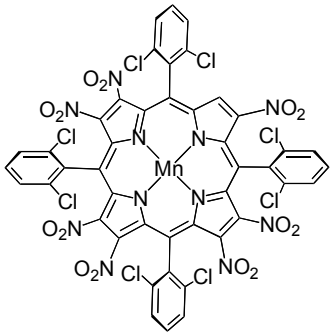

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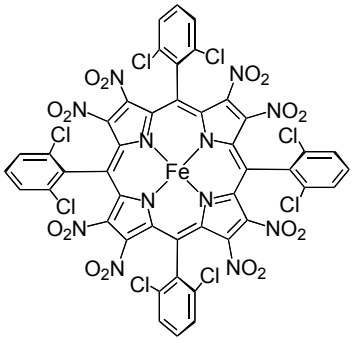

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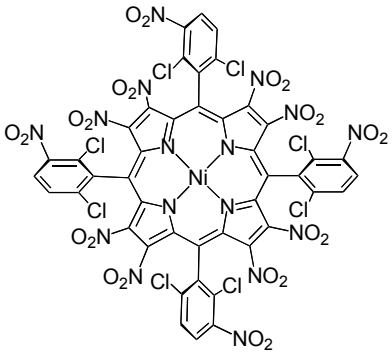

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Figure 6d. Structures of nitro substituted TPP and tetraarylporphyrin (TArP) derivatives in Table 6d

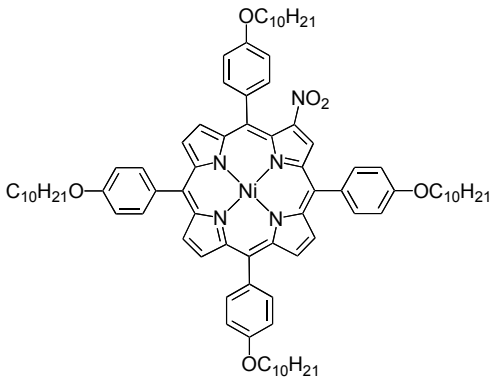

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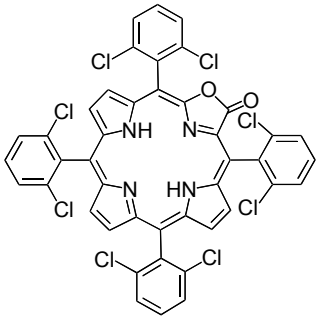
Figure 6e. Structures of porphiones in Table 6e



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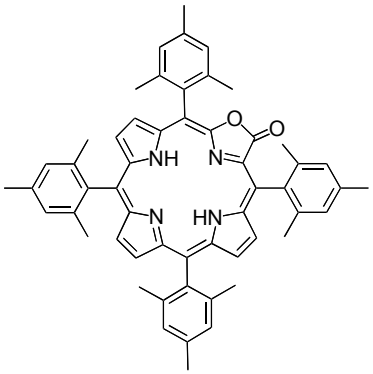

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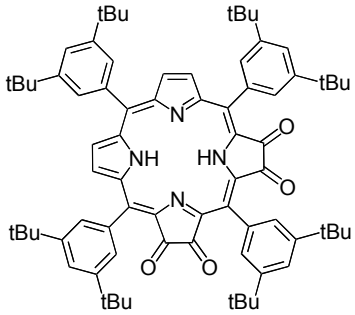

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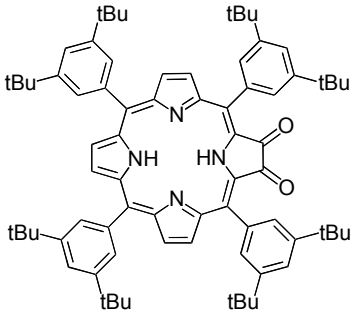

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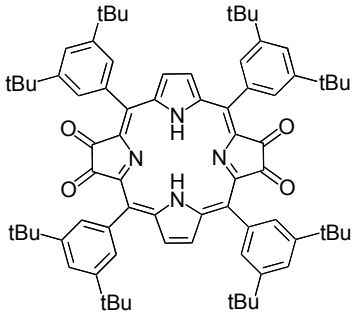

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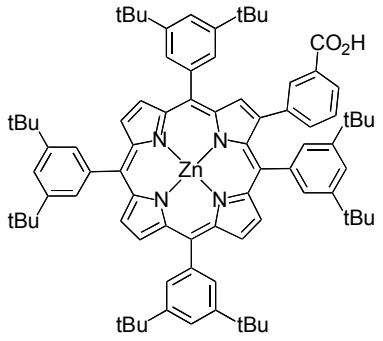
Figure 6f. Structures of mono β-pyrrole substituted porphyrins in Table 6f



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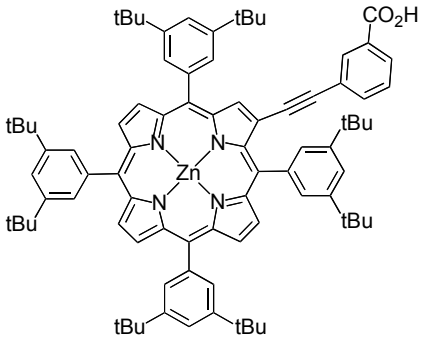

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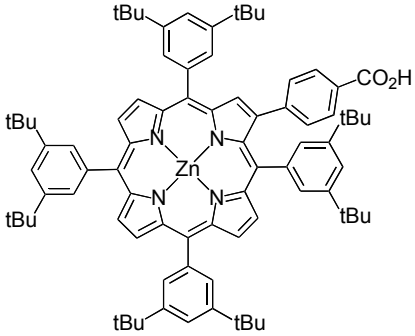

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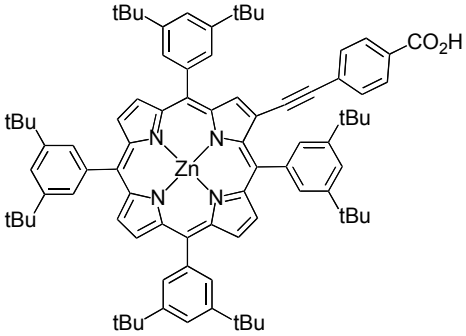

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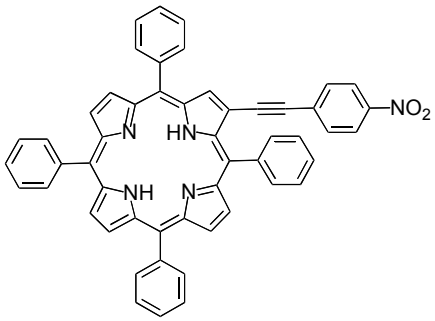

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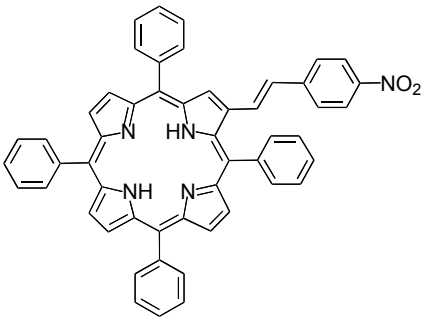

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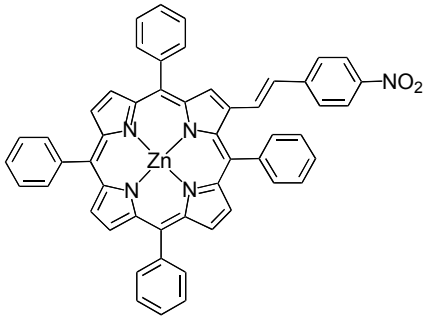
Figure 6f. Structures of mono β-pyrrole substituted porphyrins in Table 6f



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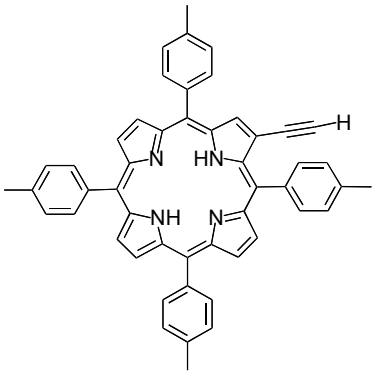

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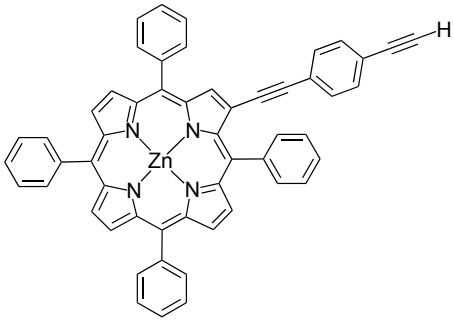

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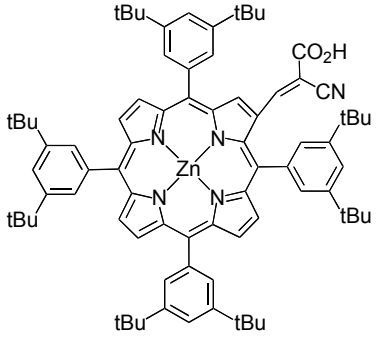

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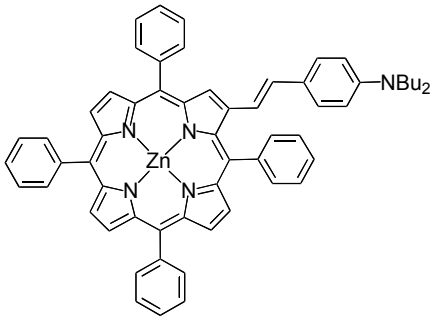

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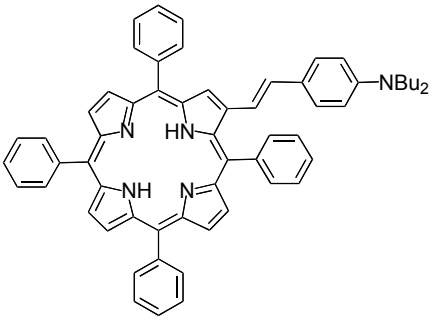

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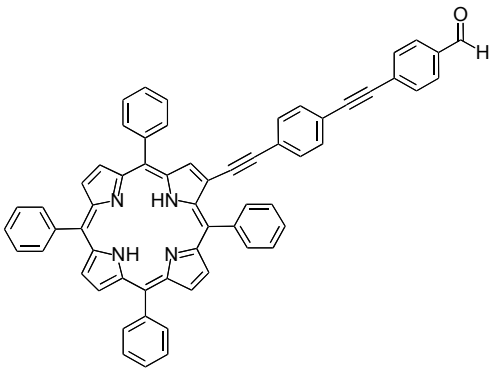
Figure 6f. Structures of mono β-pyrrole substituted porphyrins in Table 6f



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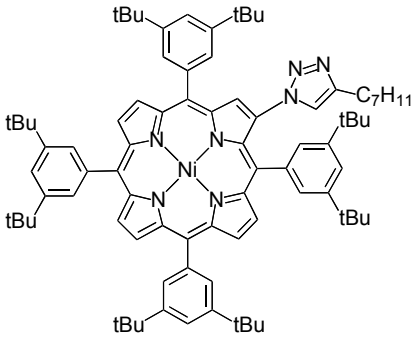

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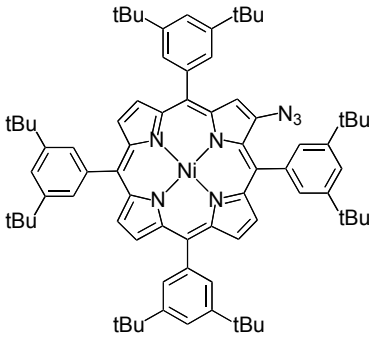

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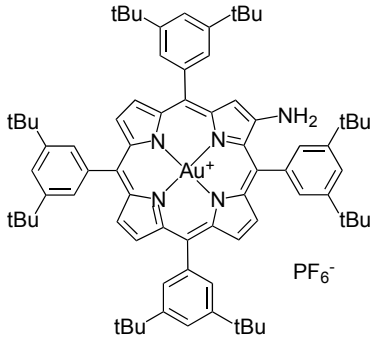

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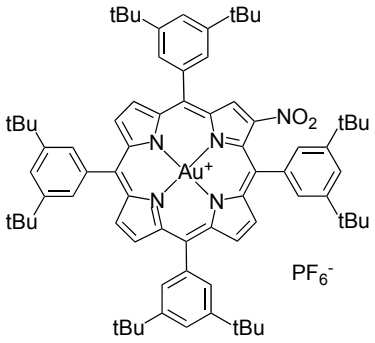

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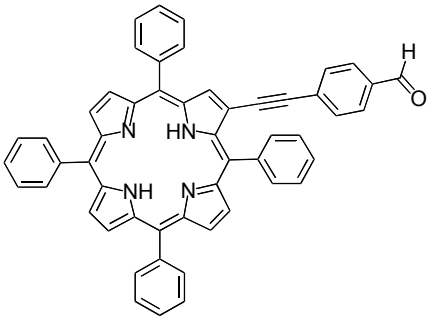

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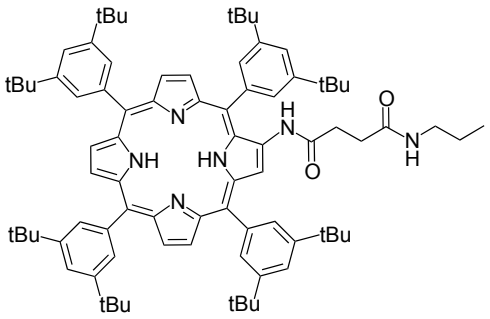
Figure 6f. Structures of mono β-pyrrole substituted porphyrins in Table 6f



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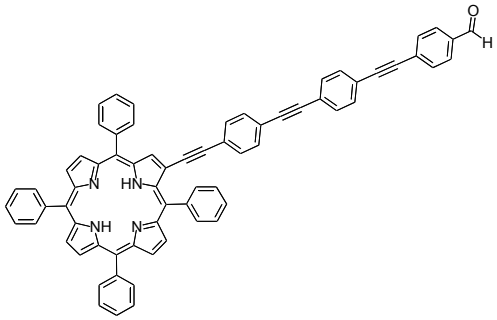

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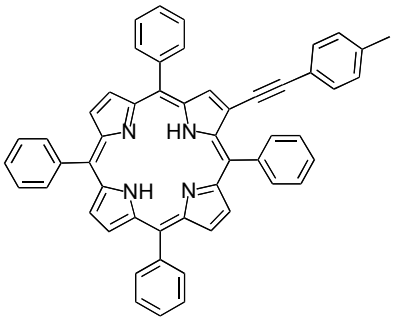

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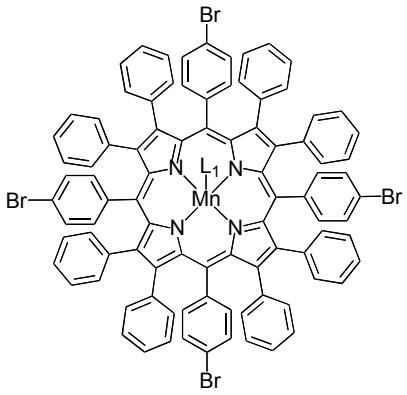
Figure 7. Structures of dodecaphenylporphyrin (DPP) and substituted DPP macrocycles in Table 7



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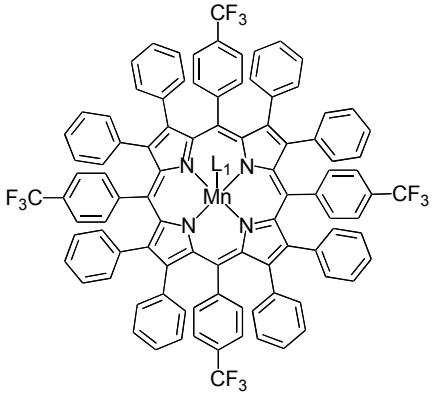

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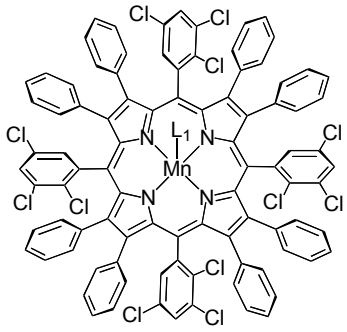

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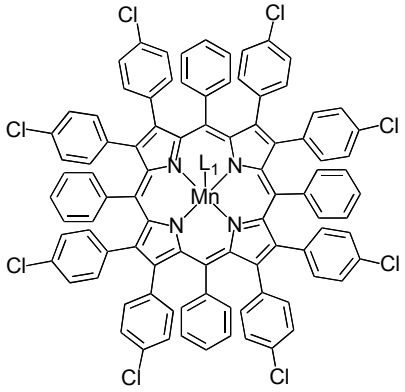

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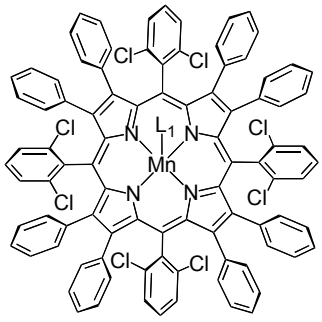

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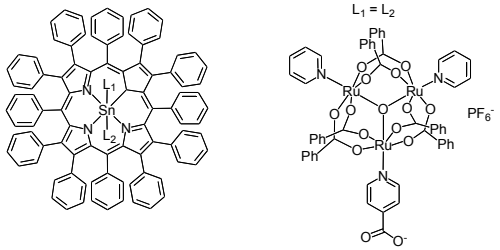

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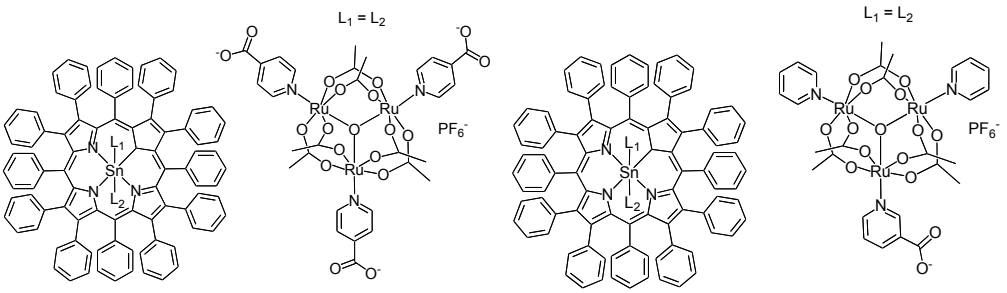
Figure 7. Structures of dodecaphenylporphyrin (DPP) and substituted DPP macrocycles in Table 7



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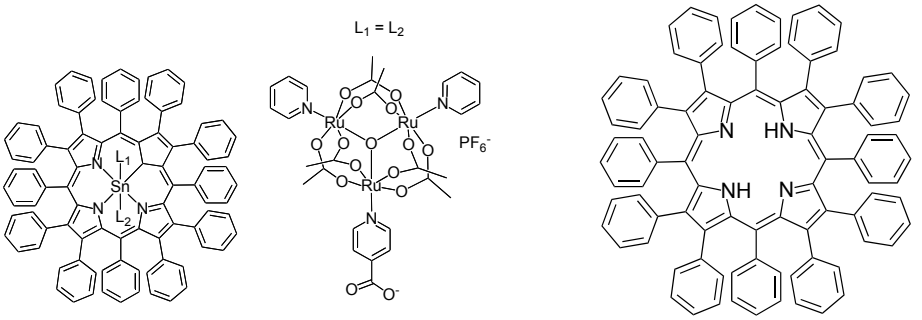

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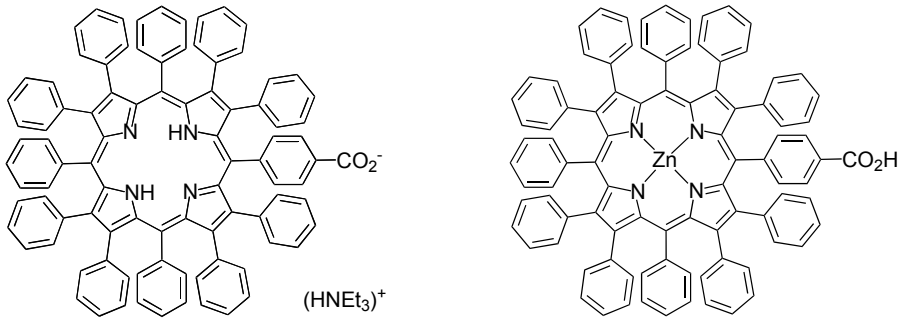

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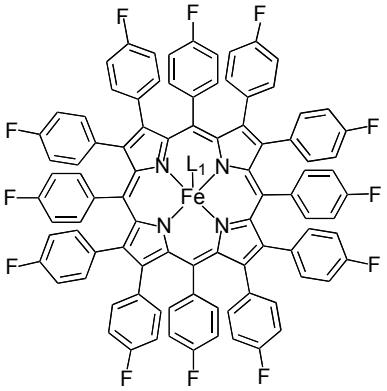
Figure 7. Structures of dodecaphenylporphyrin (DPP) and substituted DPP macrocycles in Table 7



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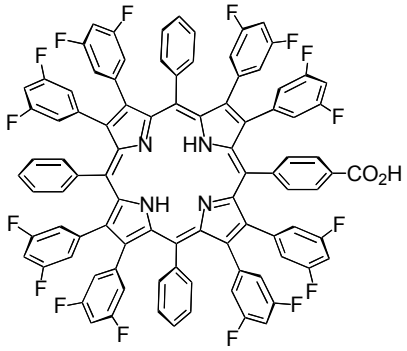

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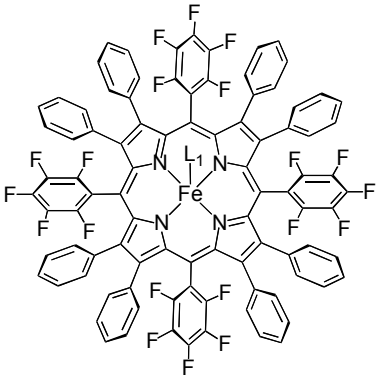

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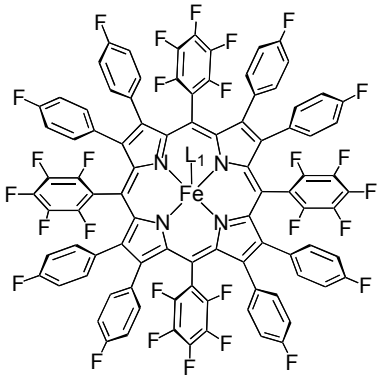

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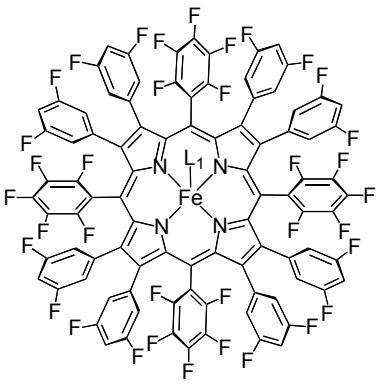

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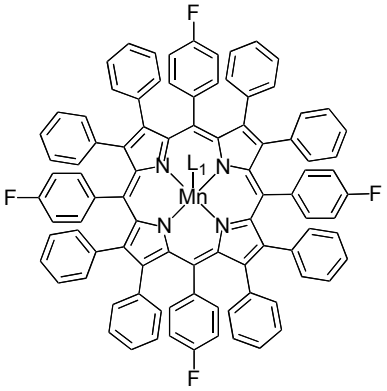

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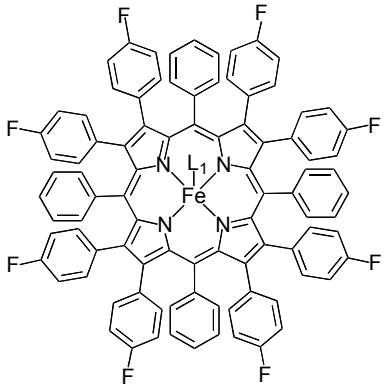
Figure 7. Structures of dodecaphenylporphyrin (DPP) and substituted DPP macrocycles in Table 7



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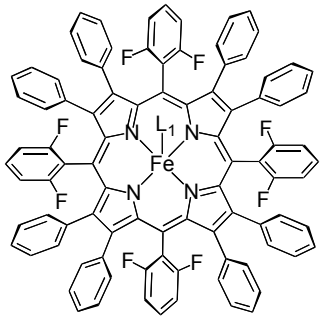

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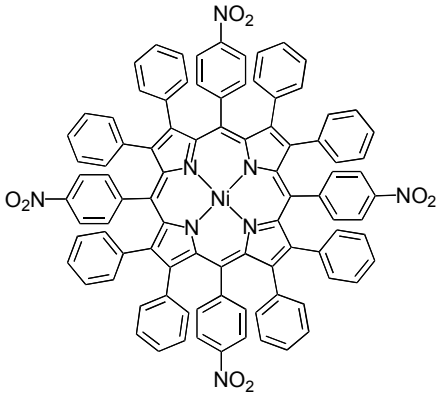

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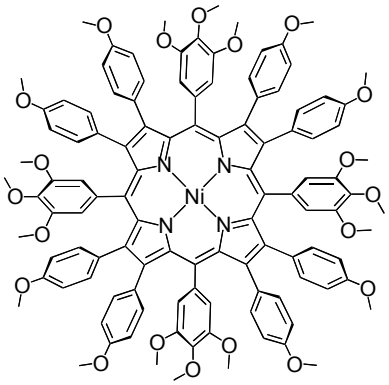

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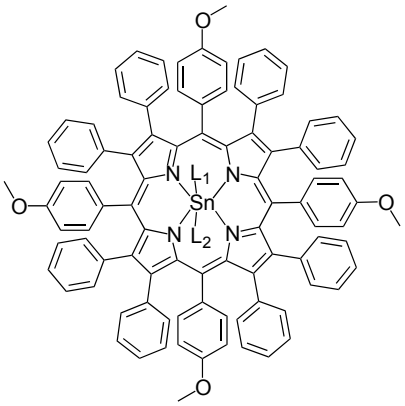

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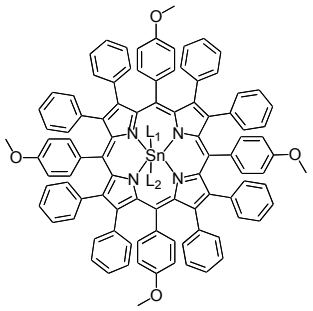
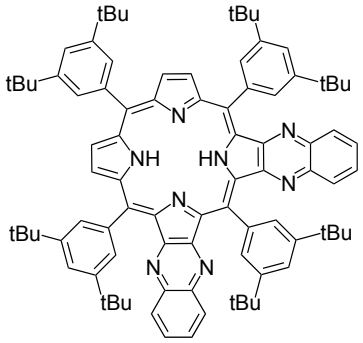


423

POM
(5 mM)

Figure 8a. Structures of quinoxalinoporphyrins in Table 8a



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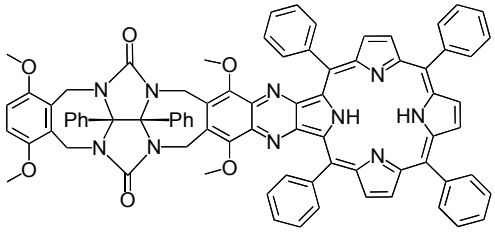

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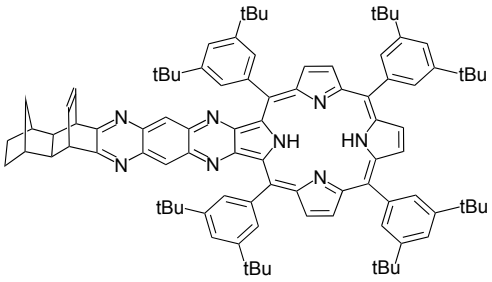

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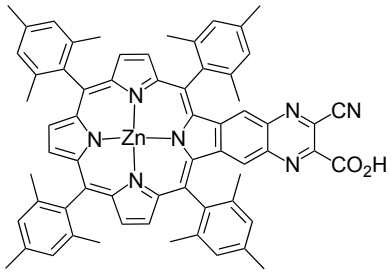

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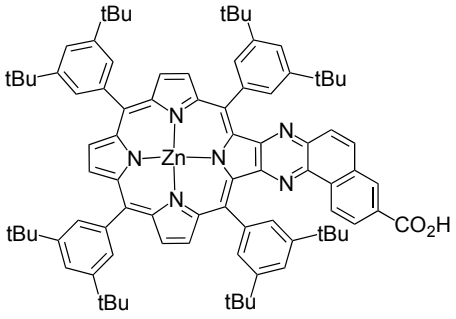

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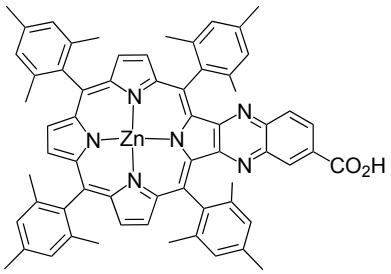

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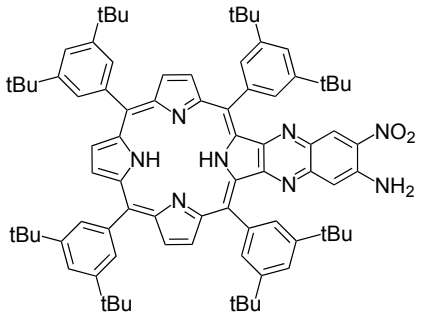
Figure 8a. Structures of quinoxalinoporphyrins in Table 8a



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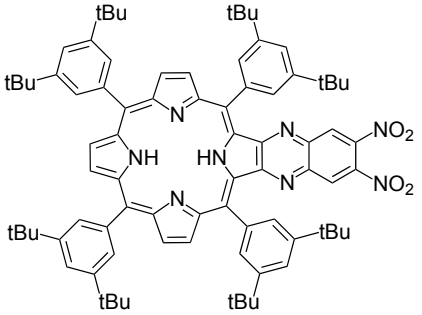

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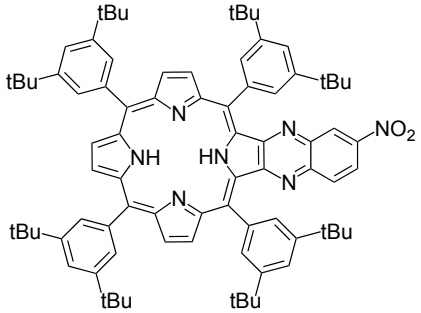

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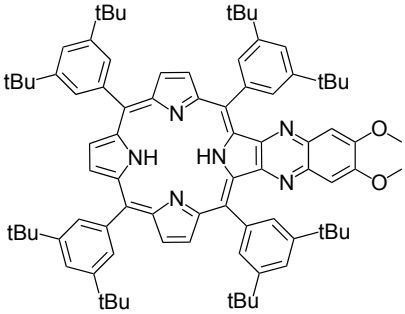

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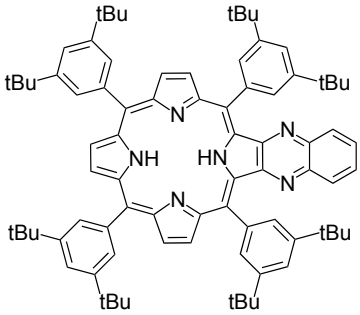

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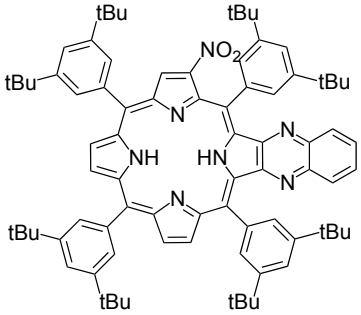

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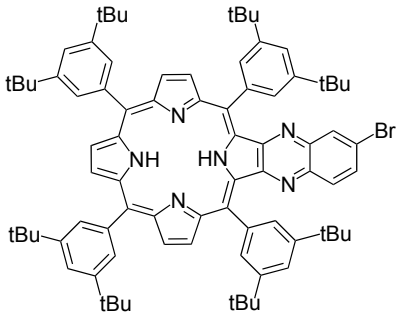
Figure 8a. Structures of quinoxalinoporphyrins in Table 8a



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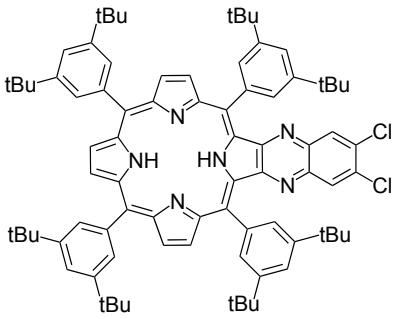

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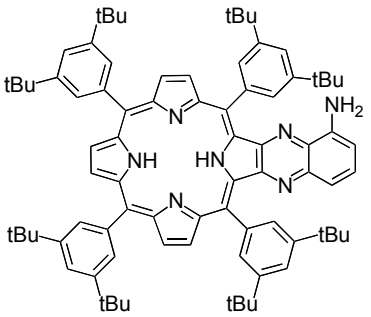

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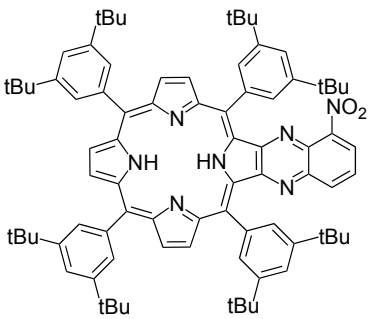

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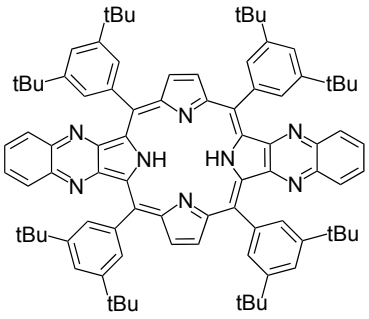

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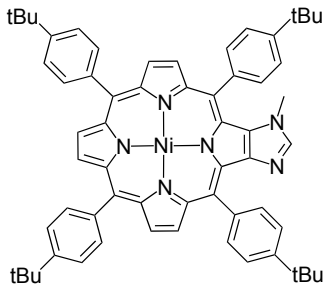
Figure 8b. Structures of TPP macrocycles with fused groups in Table 8b



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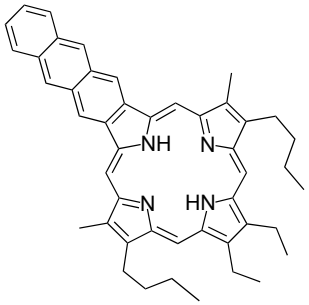

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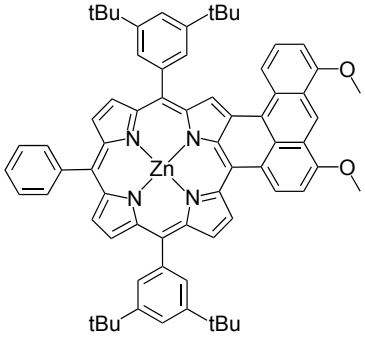

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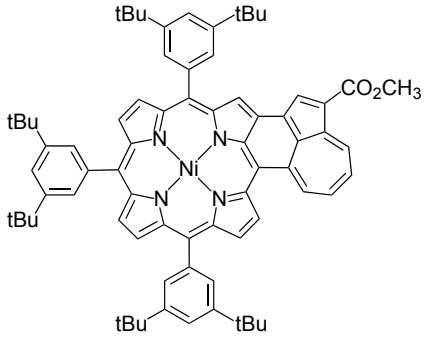

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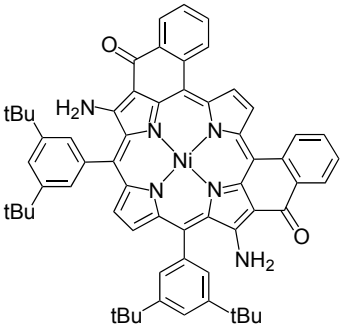

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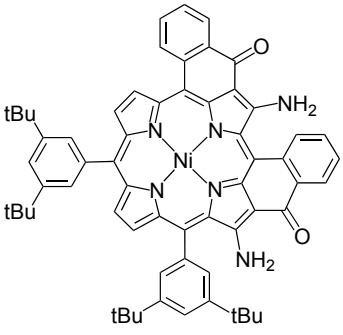

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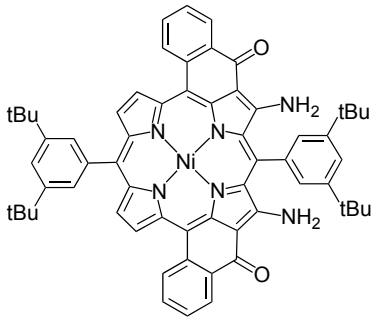
Figure 8b. Structures of TPP macrocycles with fused groups in Table 8b



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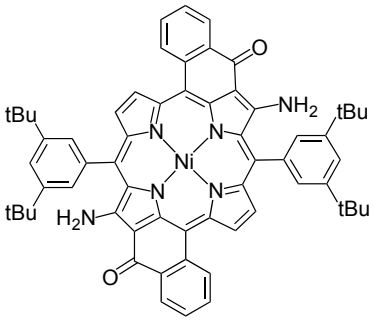

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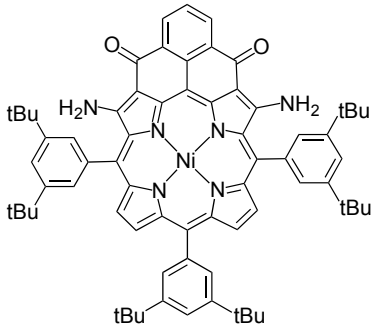

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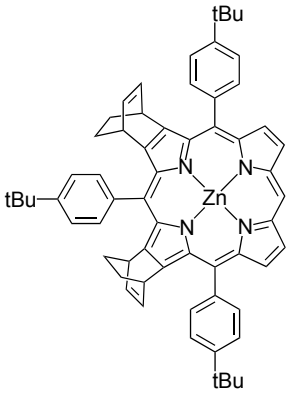

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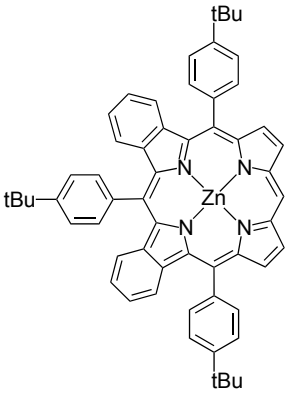

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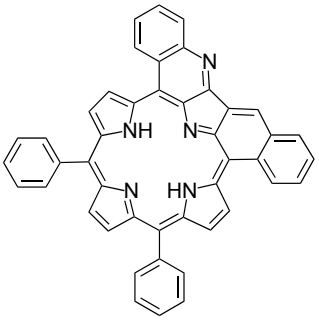

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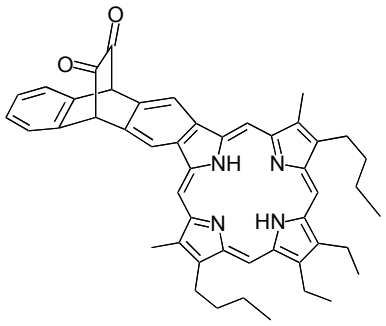
Figure 8b. Structures of TPP macrocycles with fused groups in Table 8b



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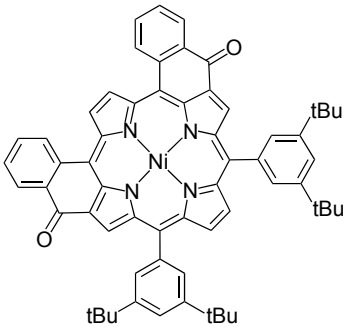

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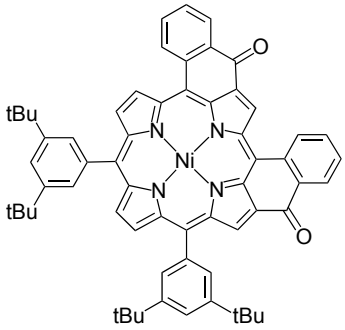

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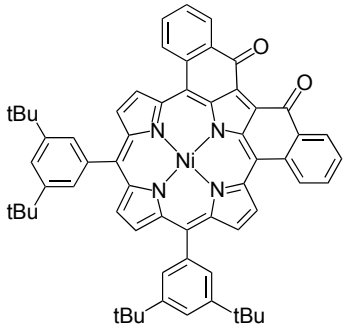

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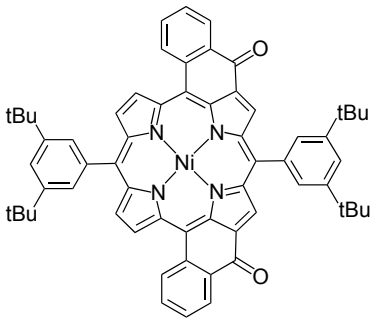

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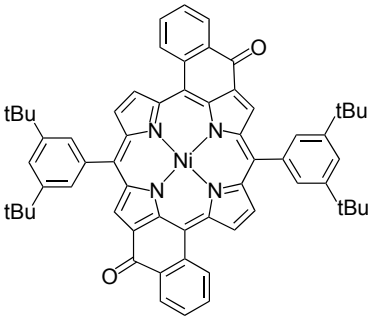

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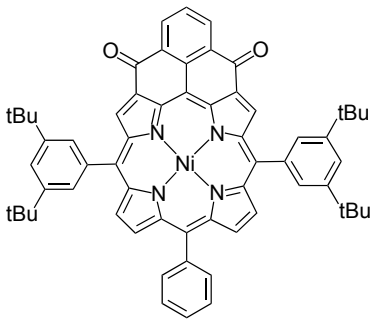
Figure 8b. Structures of TPP macrocycles with fused groups in Table 8b



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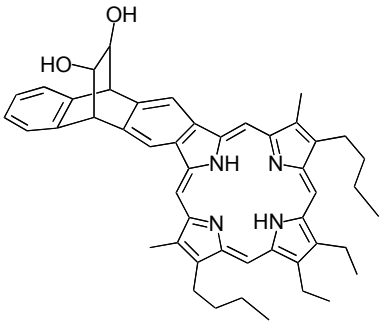

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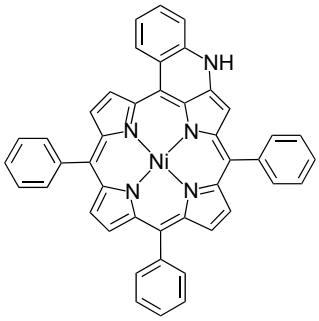

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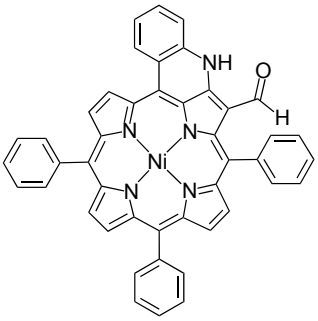

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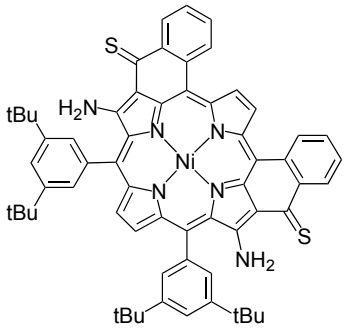

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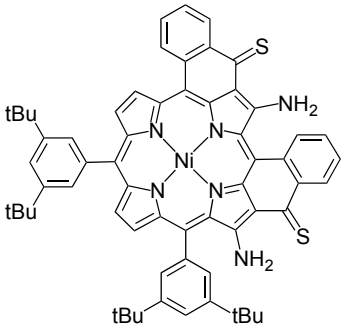

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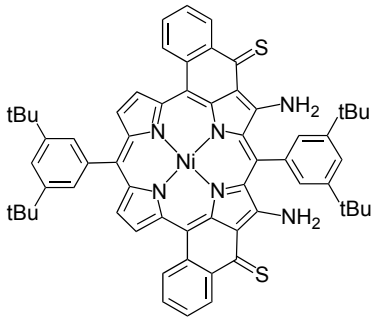
Figure 8b. Structures of TPP macrocycles with fused groups in Table 8b



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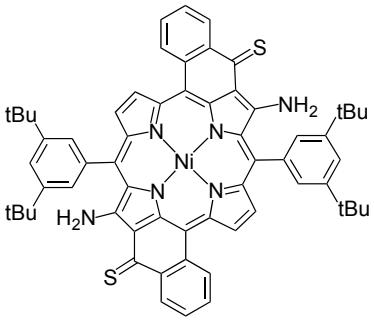

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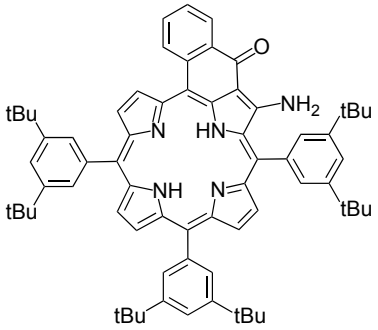

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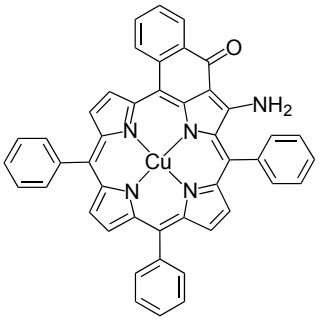

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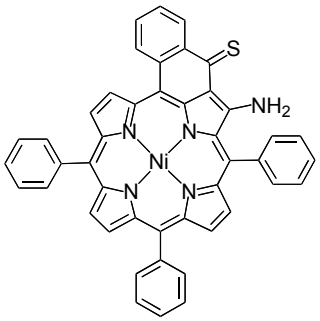

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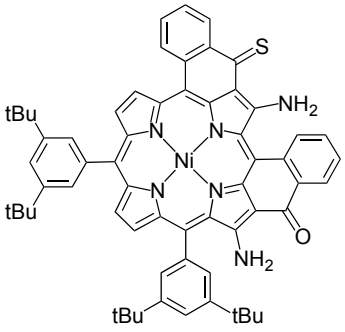

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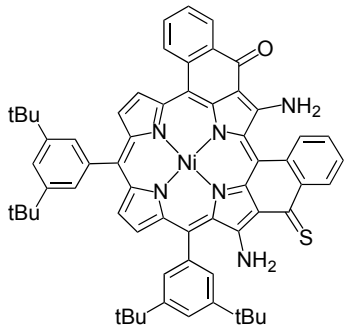
Figure 8b. Structures of TPP macrocycles with fused groups in Table 8b



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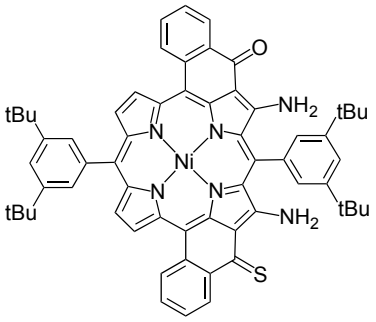

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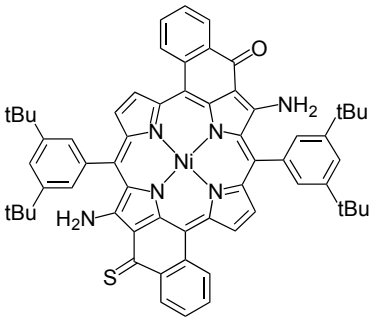

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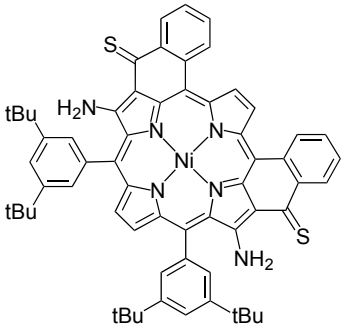

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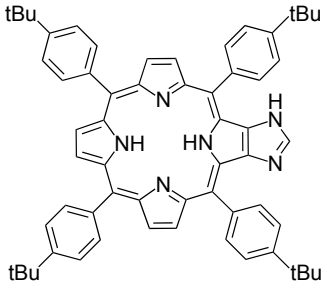

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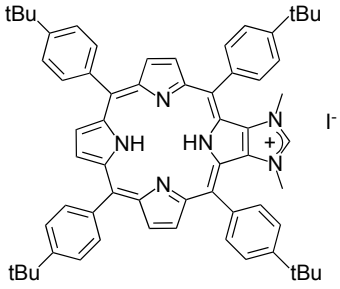

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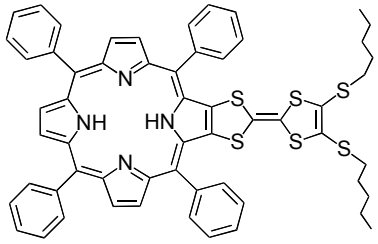
Figure 8b. Structures of TPP macrocycles with fused groups in Table 8b



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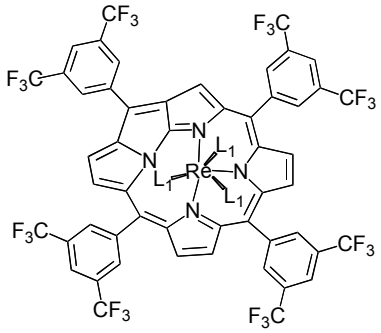

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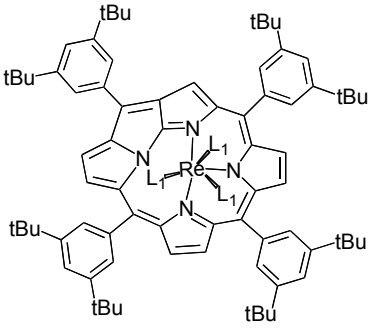

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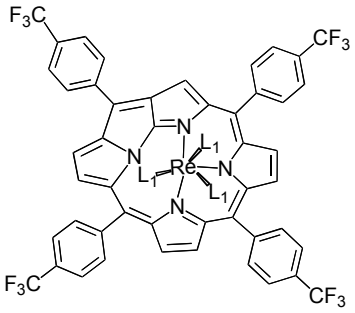

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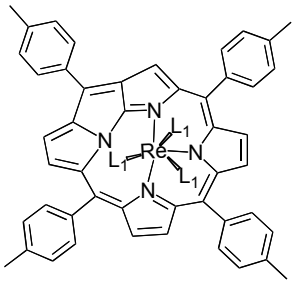

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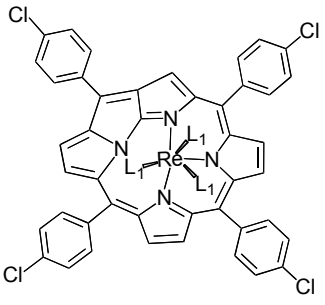

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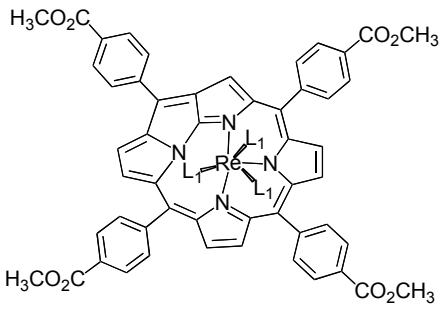
Figure 8b. Structures of TPP macrocycles with fused groups in Table 8b



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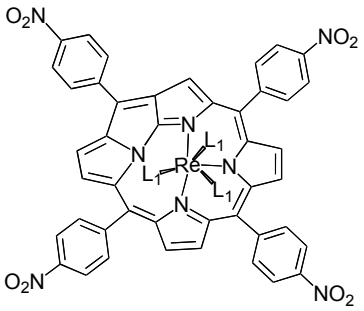

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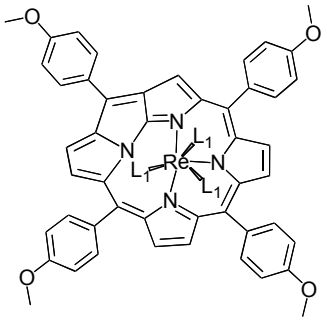

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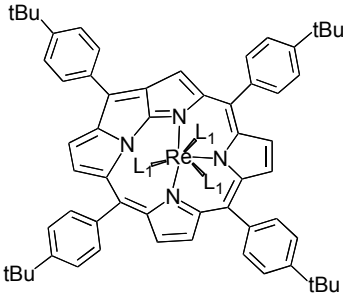

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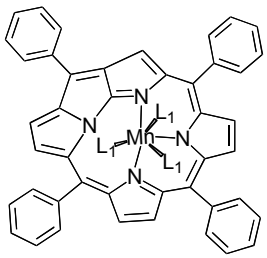

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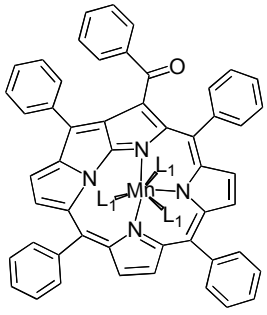

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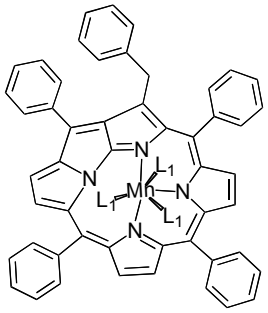
Figure 8b. Structures of TPP macrocycles with fused groups in Table 8b



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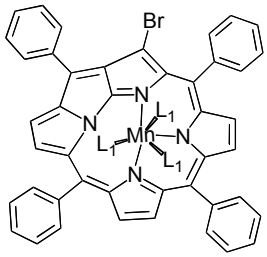

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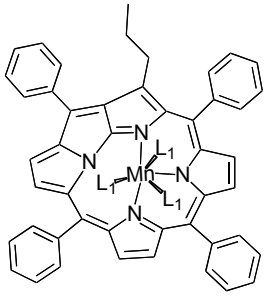

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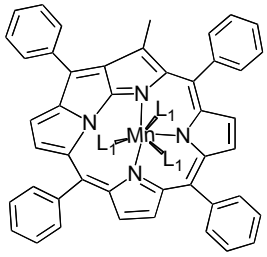

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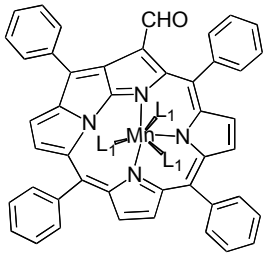

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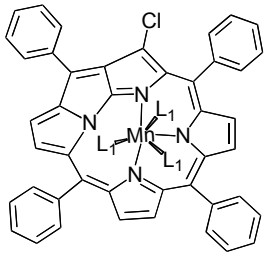

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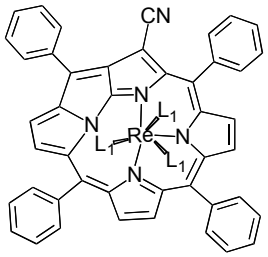
Figure 8b. Structures of TPP macrocycles with fused groups in Table 8b



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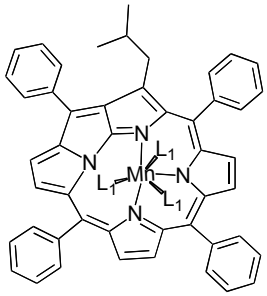

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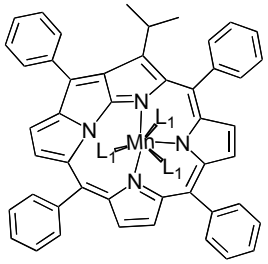

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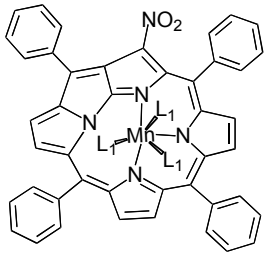

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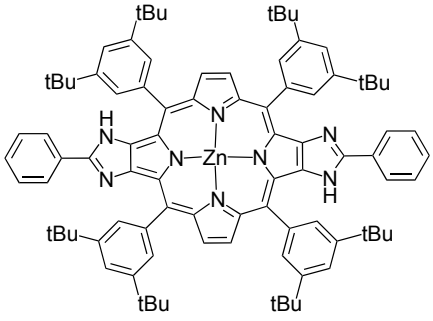

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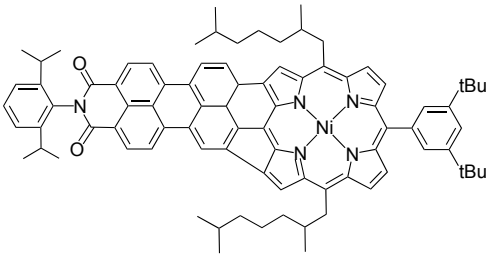

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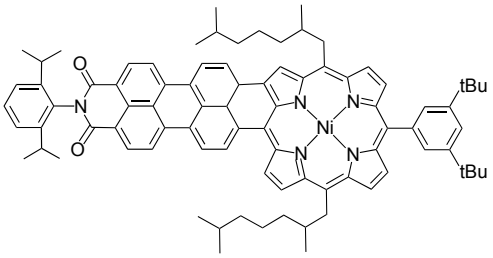
Figure 8b. Structures of TPP macrocycles with fused groups in Table 8b



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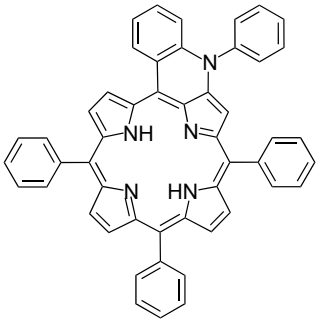

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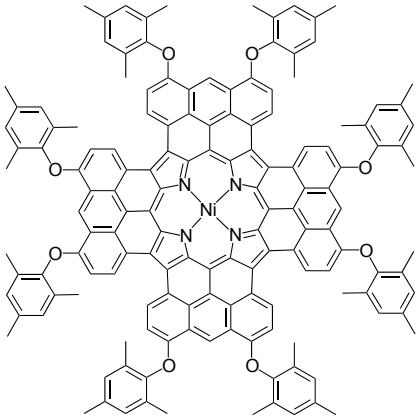

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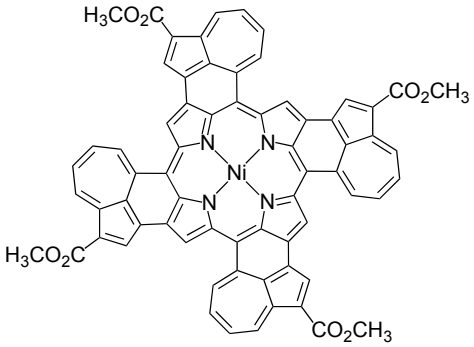

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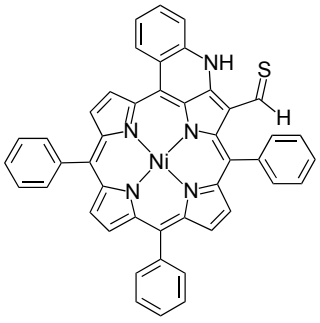

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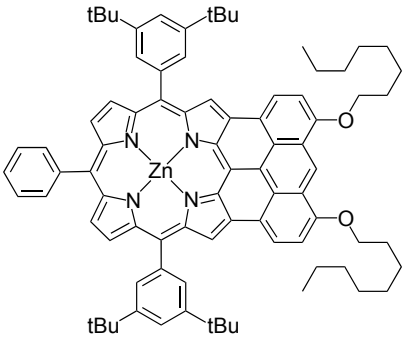

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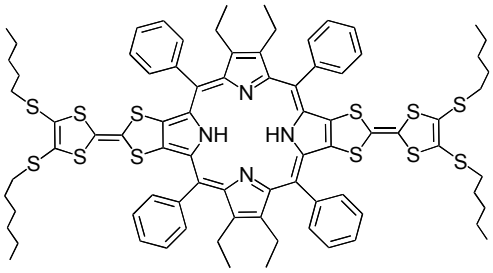
Figure 8b. Structures of TPP macrocycles with fused groups in Table 8b



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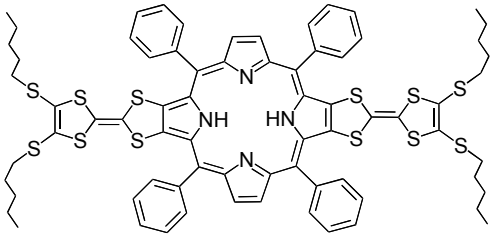

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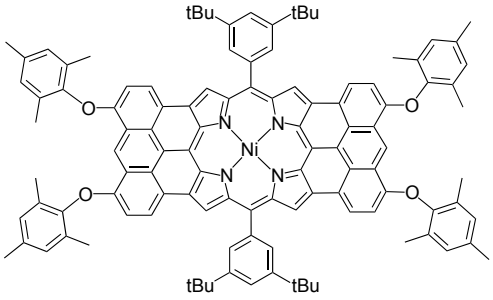

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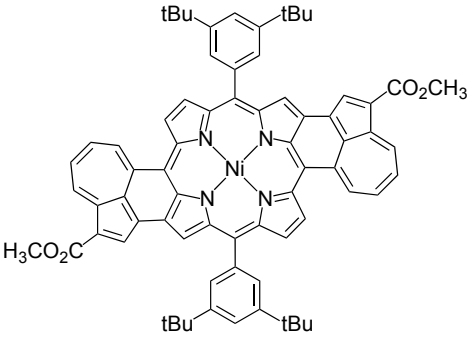

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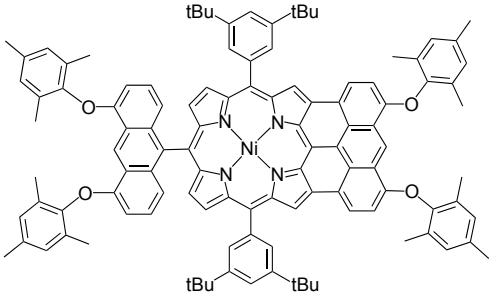

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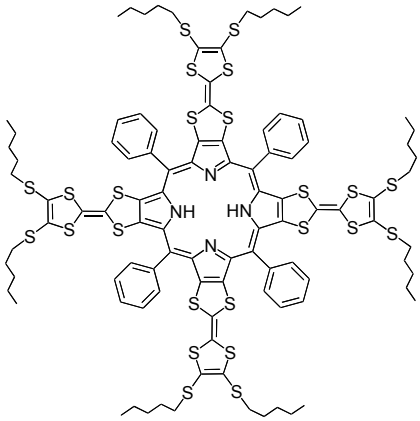

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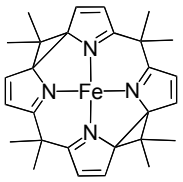
Figure 9a. Structures of N-substituted tetraarylporphyrins in Table 9a



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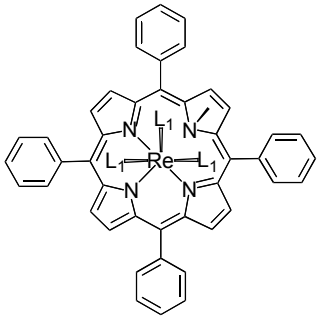

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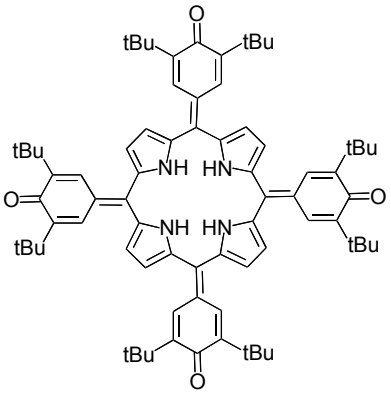

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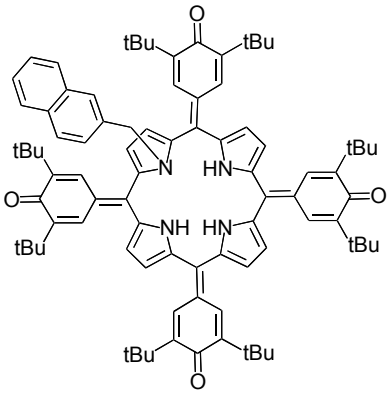

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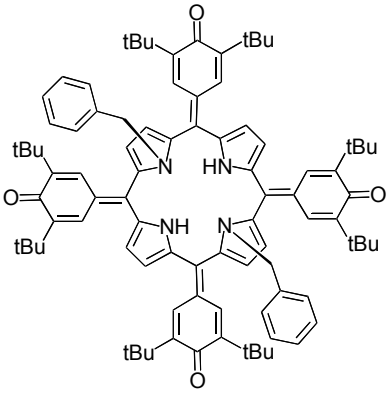

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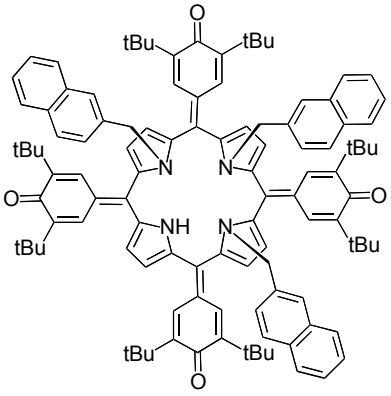

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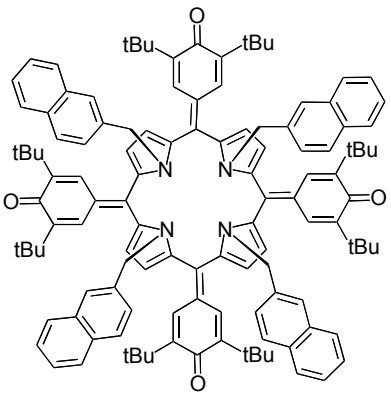
Figure 9a. Structures of N-substituted tetraarylporphyrins in Table 9a



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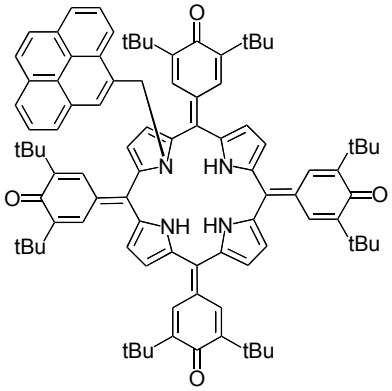

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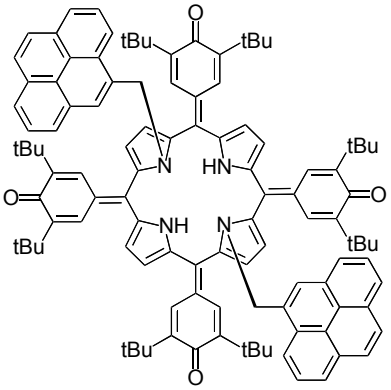

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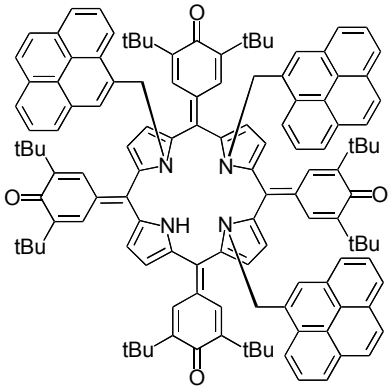

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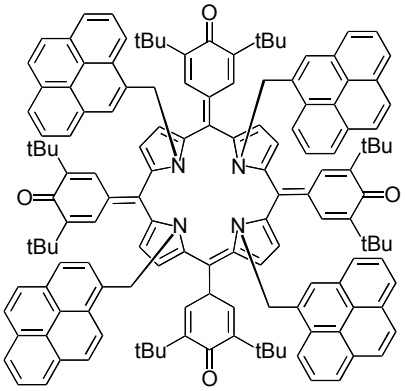

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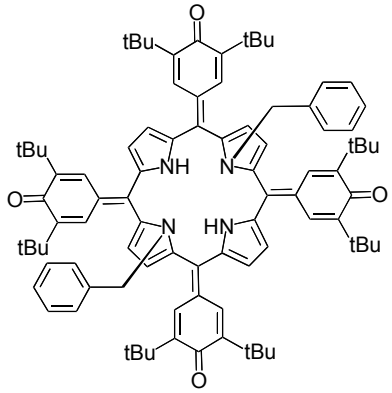

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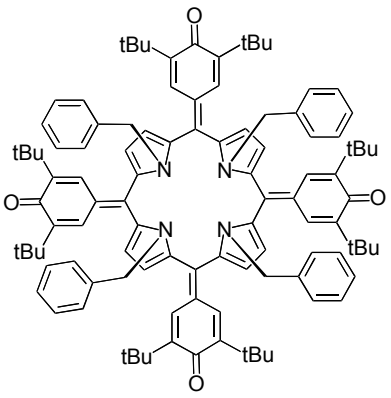
Figure 9a. Structures of N-substituted tetraarylporphyrins in Table 9a



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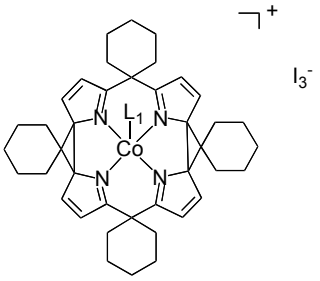

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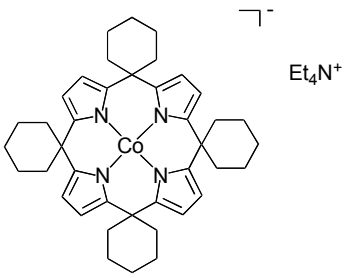

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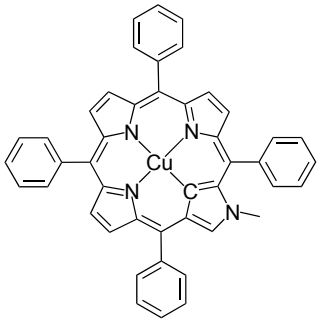
Figure 9b. Structures of heteroporphyrins in Table 9b



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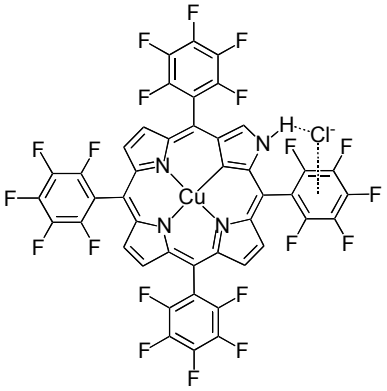

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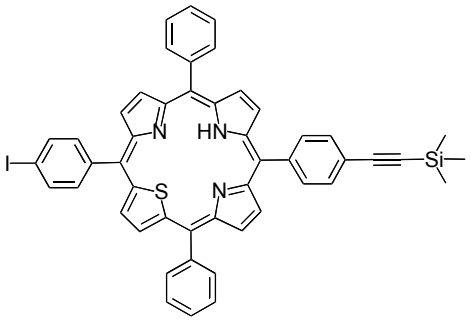

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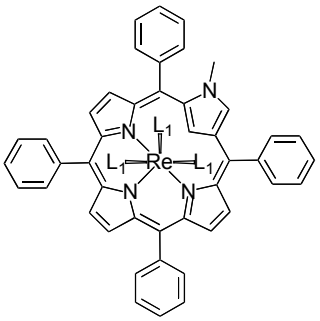

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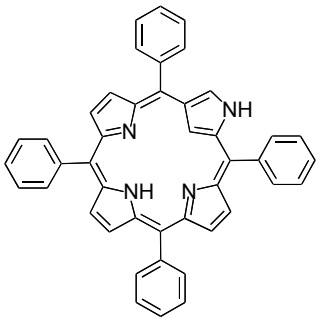

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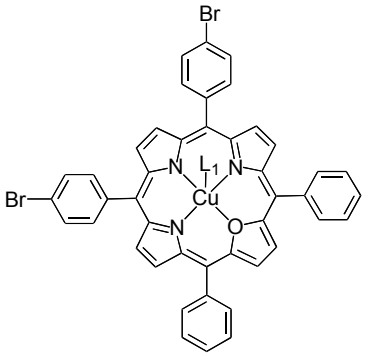

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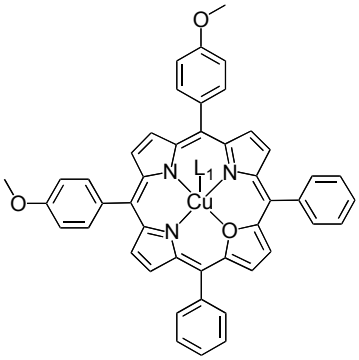
Figure 9b. Structures of heteroporphyrins in Table 9b



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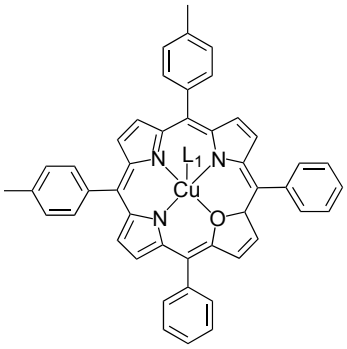

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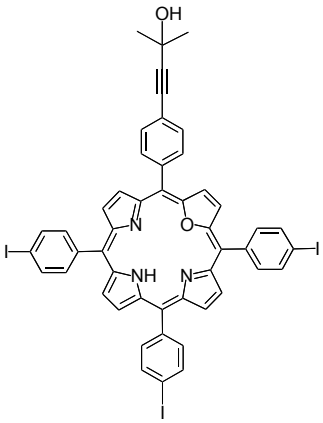

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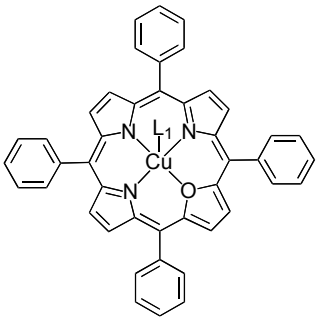

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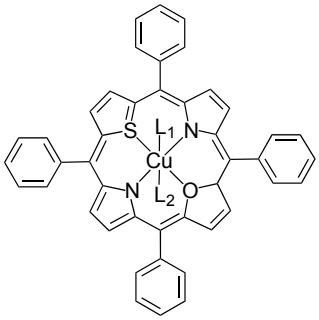

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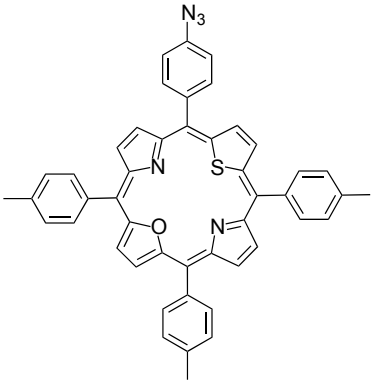

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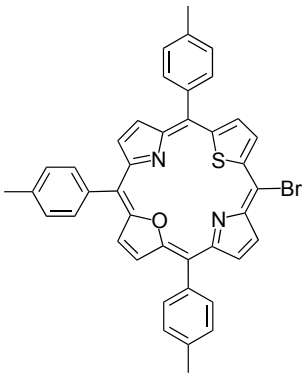
Figure 9b. Structures of heteroporphyrins in Table 9b



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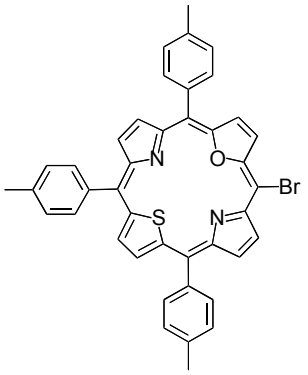

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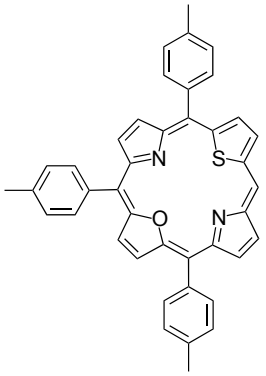

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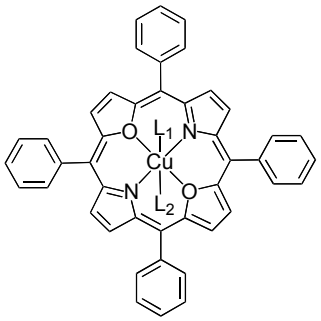

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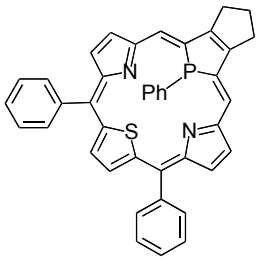

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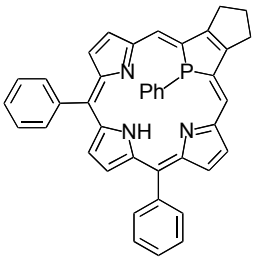

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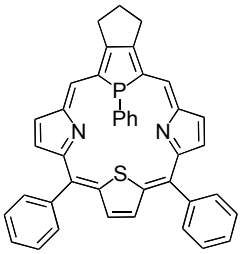
Figure 9b. Structures of heteroporphyrins in Table 9b



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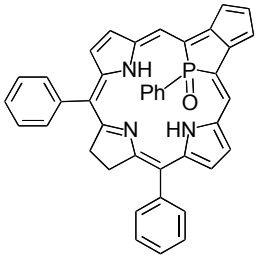

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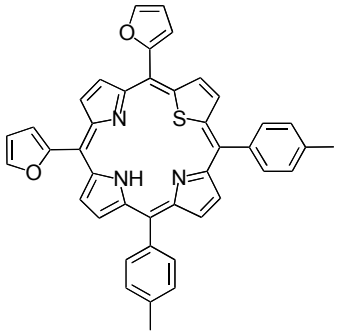

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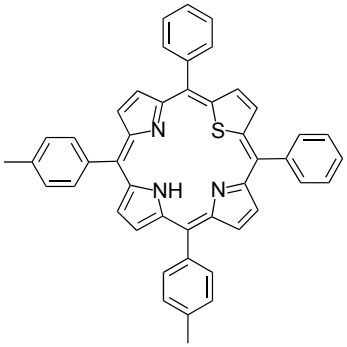

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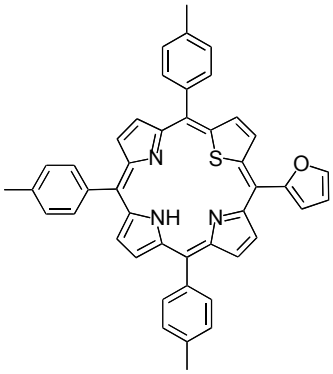

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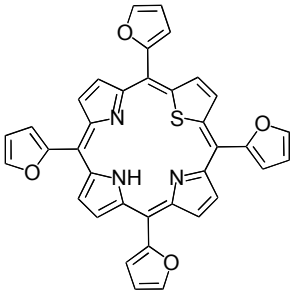

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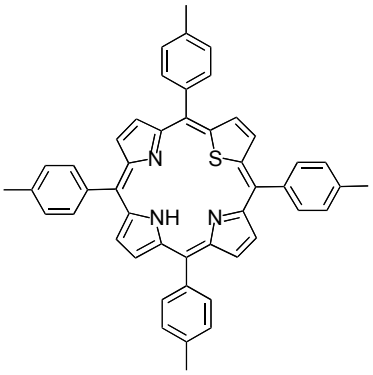
Figure 9b. Structures of heteroporphyrins in Table 9b



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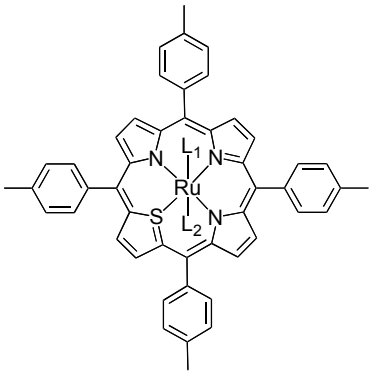

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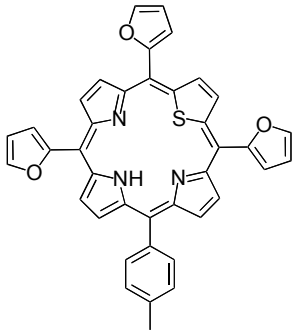

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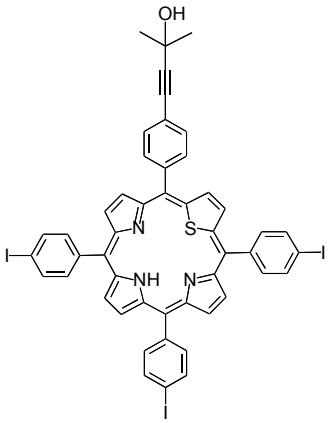

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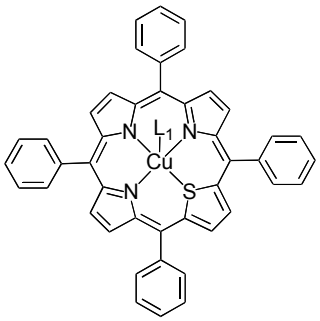

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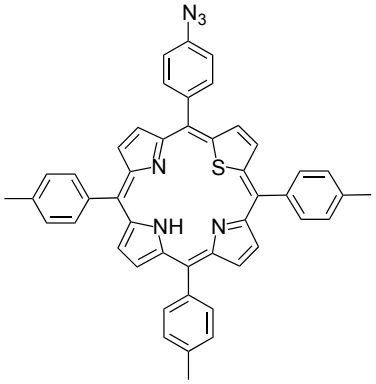

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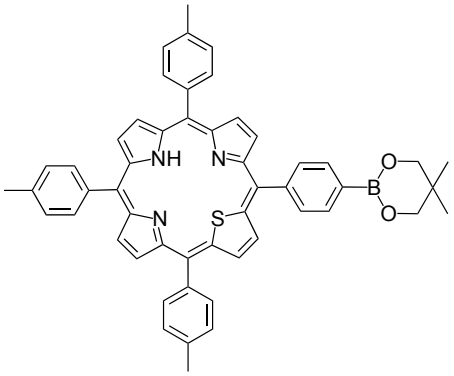
Figure 9b. Structures of heteroporphyrins in Table 9b



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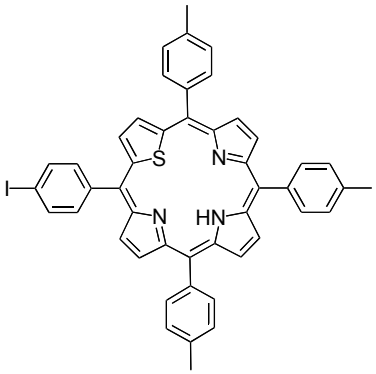

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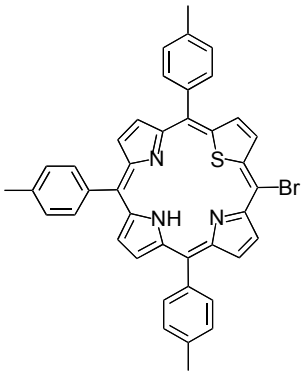

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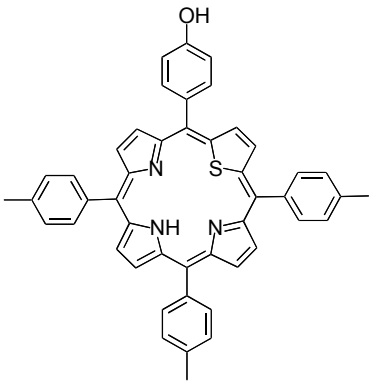

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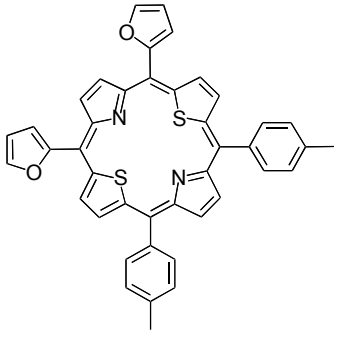

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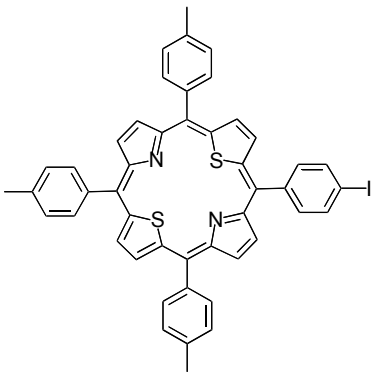

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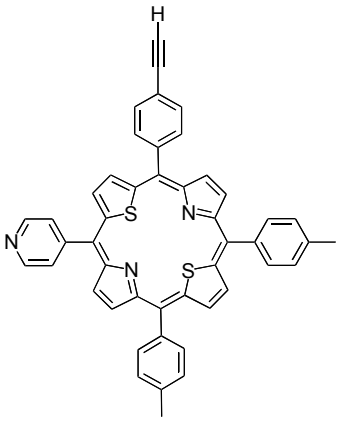
Figure 9b. Structures of heteroporphyrins in Table 9b



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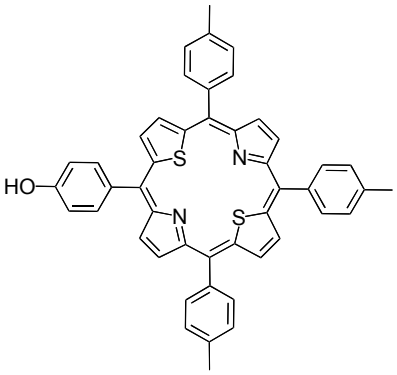

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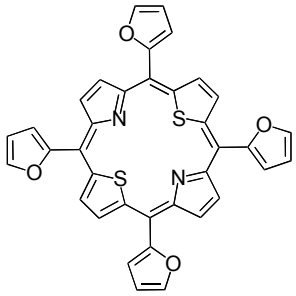

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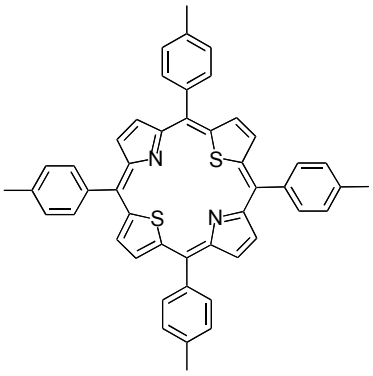

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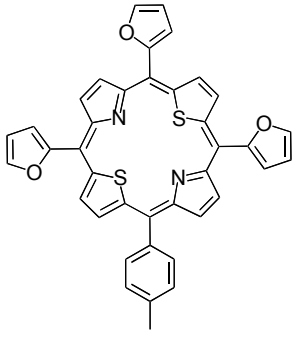

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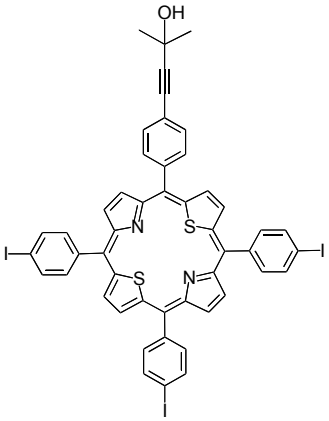
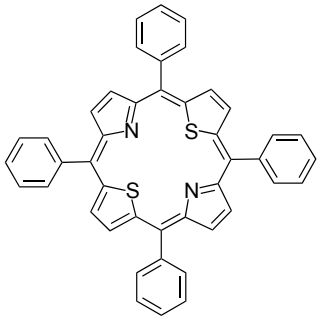


569

Figure 9b. Structures of heteroporphyrins in Table 9b



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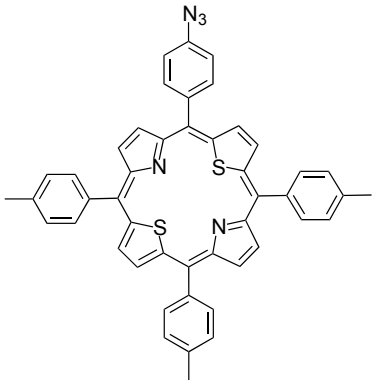

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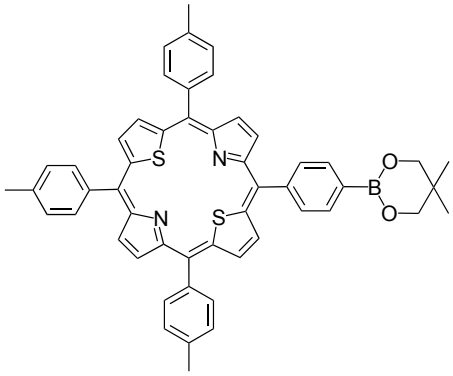

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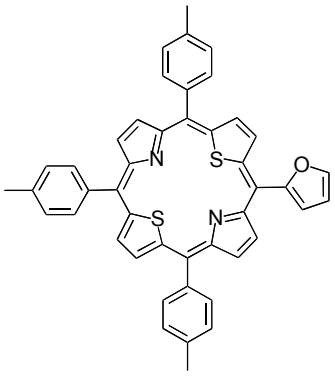

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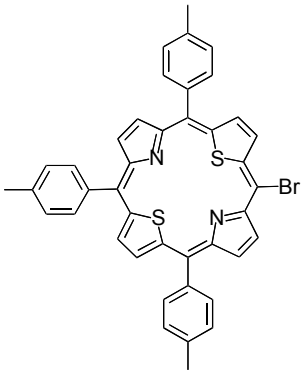

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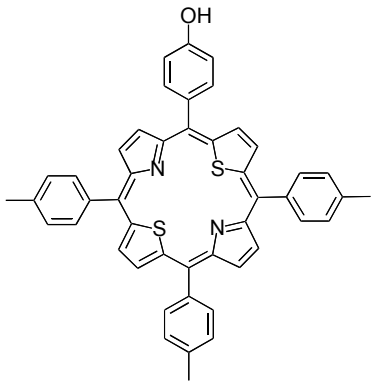

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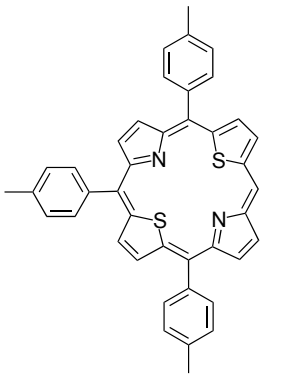
Figure 9b. Structures of heteroporphyrins in Table 9b



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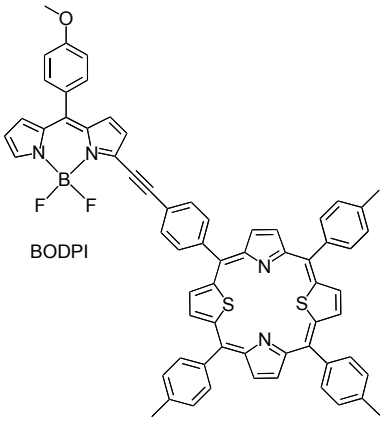

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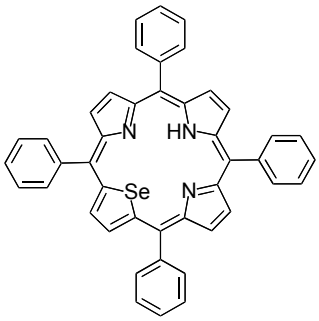

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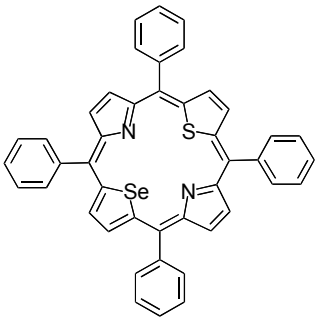

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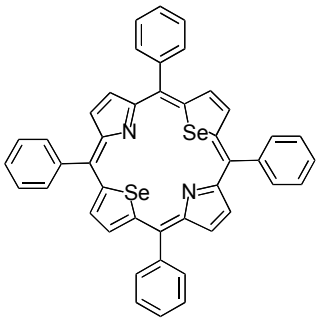

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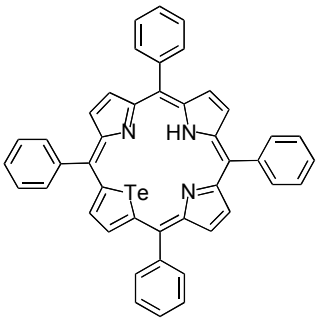

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Figure 9b. Structures of heteroporphyrins in Table 9b

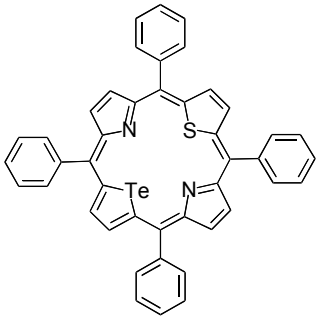

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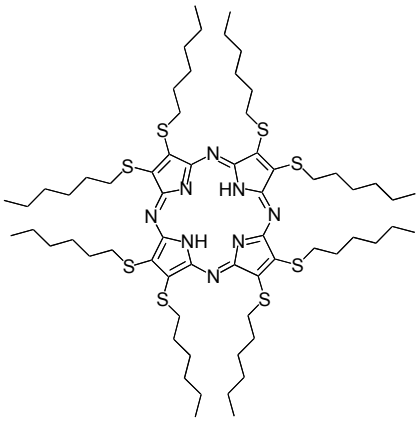
Figure 10. Structures of tetrabenzoporphyrins (TBP) and tetraazaporphyrins (TArP) in Table 10



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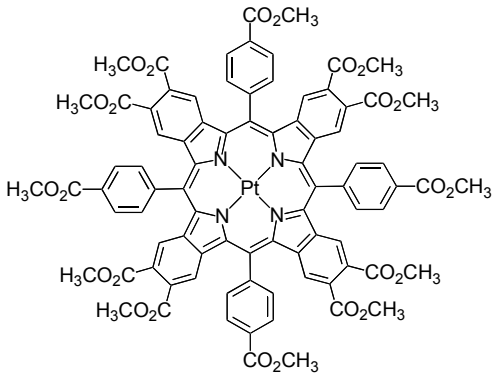

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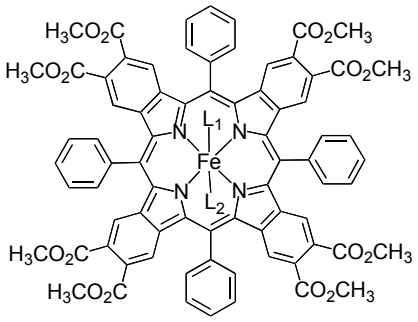

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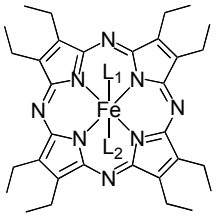

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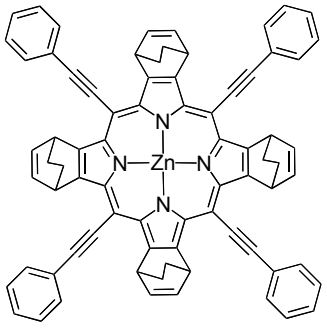

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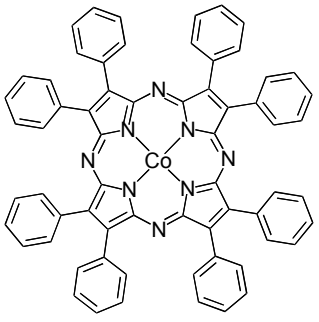

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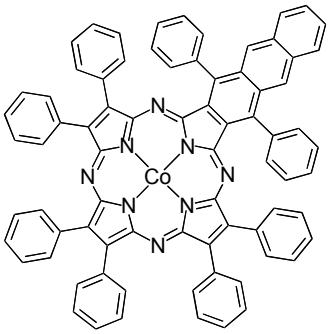
Figure 10. Structures of tetrabenzoporphyrins (TBP) and tetraazaporphyrins (TArP) in Table 10



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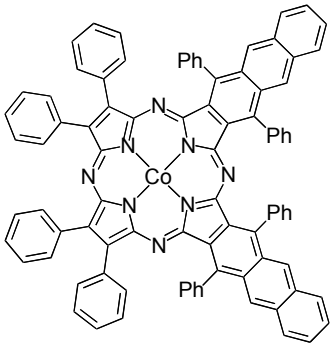

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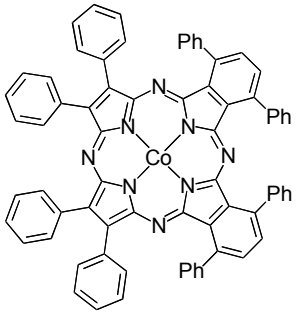

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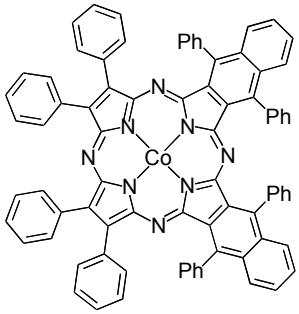

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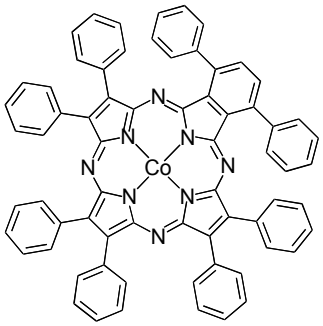

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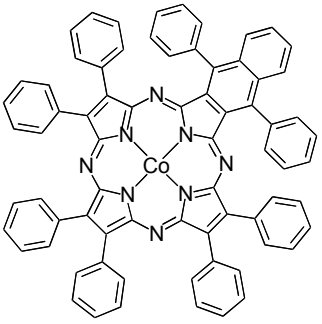

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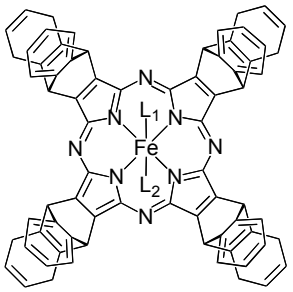
Figure 10. Structures of tetrabenzoporphyrins (TBP) and tetraazaporphyrins (TArP) in Table 10



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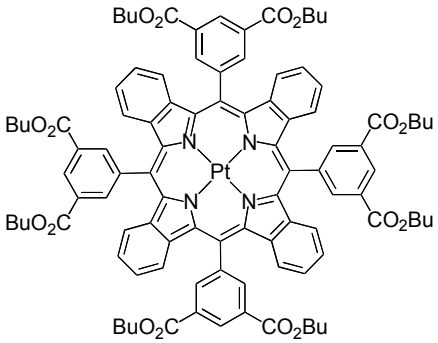

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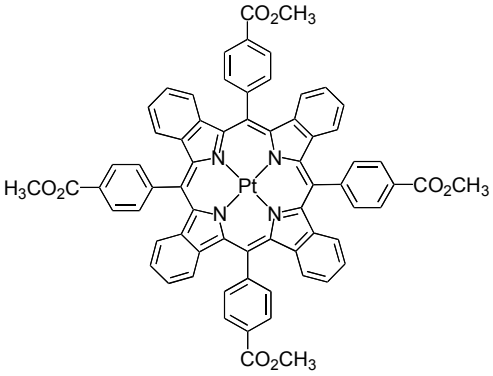

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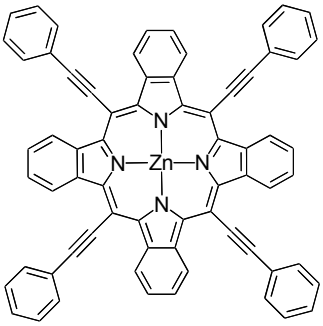

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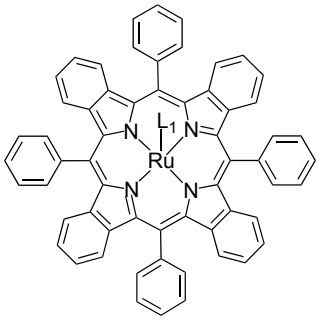

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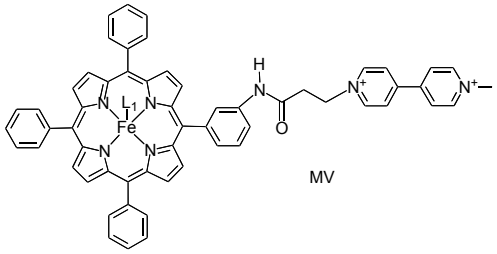
Figure 11a. Structures of tetraarylporphyrins with charged peripheral groups in Table 11a



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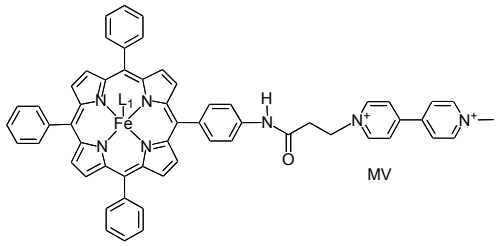

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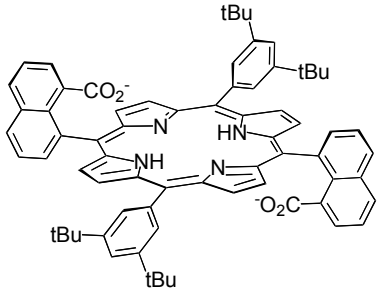

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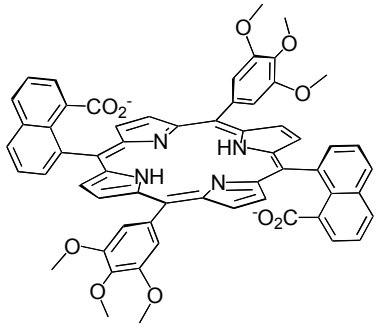

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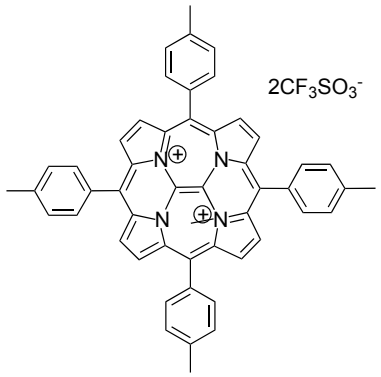

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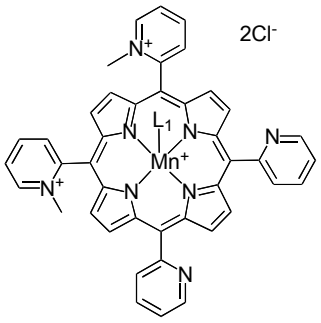

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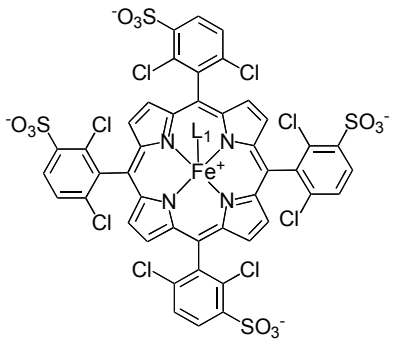
Figure 11a. Structures of tetraarylporphyrins with charged peripheral groups in Table 11a



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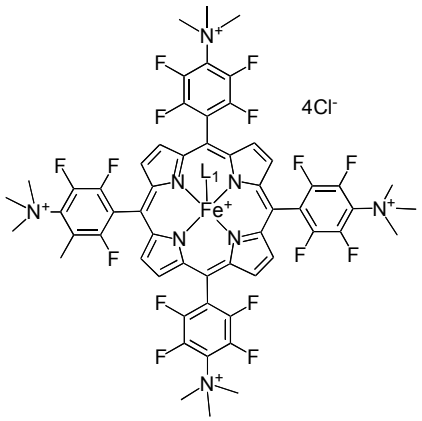

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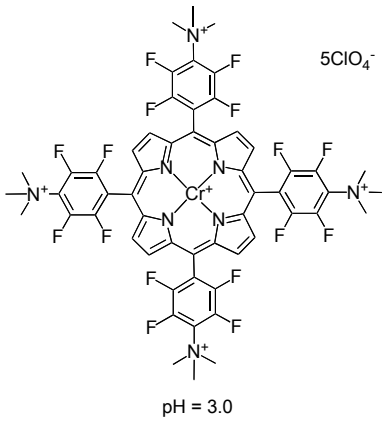

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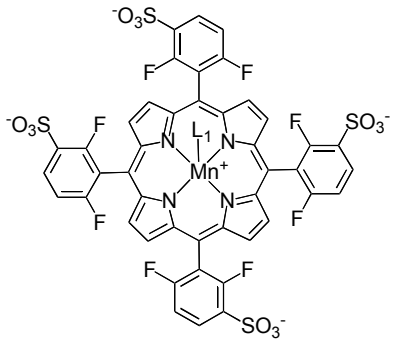

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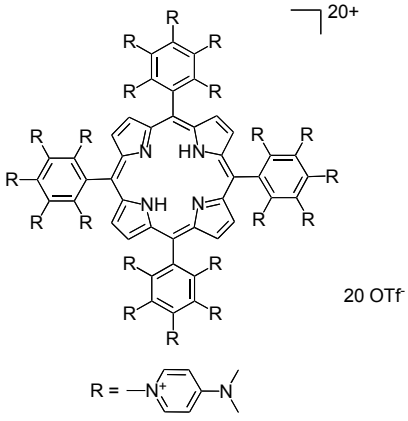

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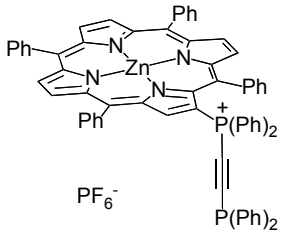

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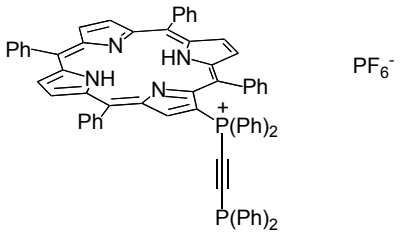
Figure 11a. Structures of tetraarylporphyrins with charged peripheral groups in Table 11a



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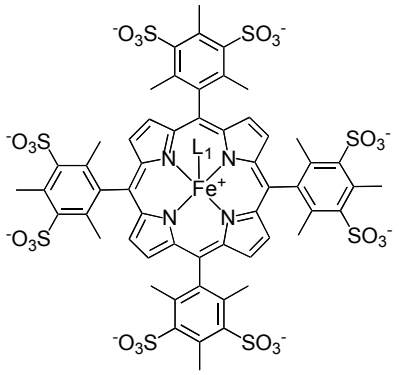

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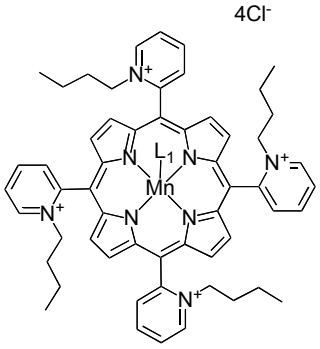

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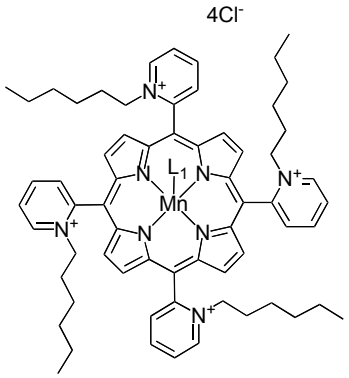

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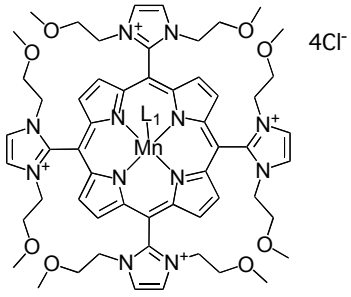

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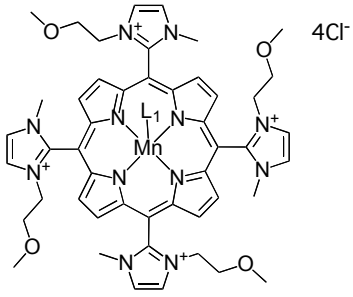

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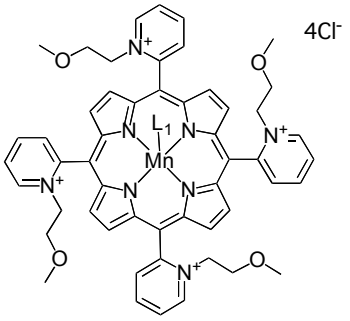
Figure 11a. Structures of tetraarylporphyrins with charged peripheral groups in Table 11a



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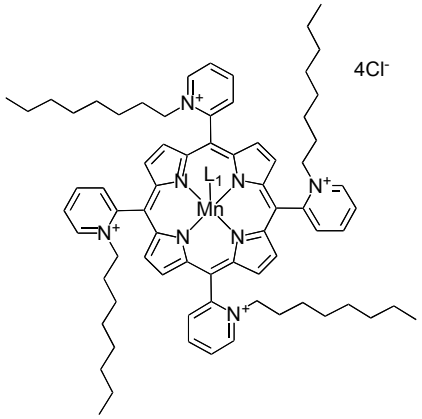

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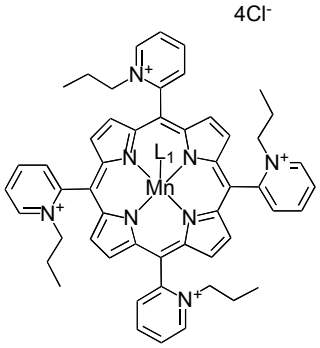

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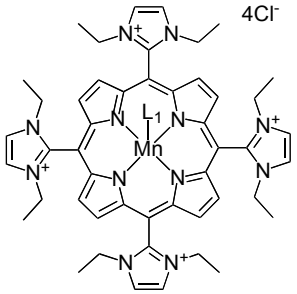

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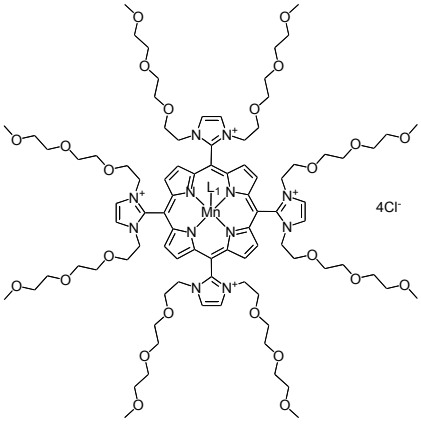

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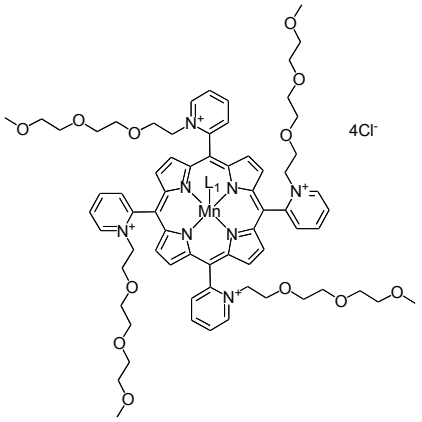

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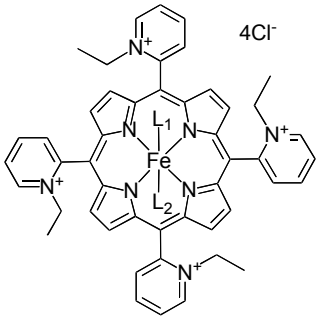
Figure 11a. Structures of tetraarylporphyrins with charged peripheral groups in Table 11a



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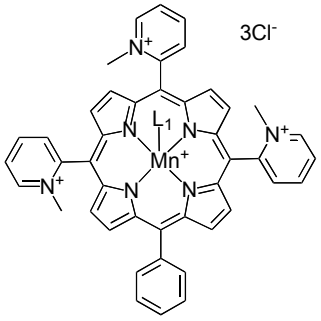

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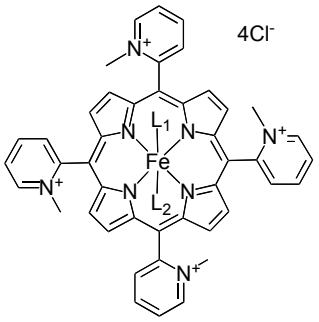

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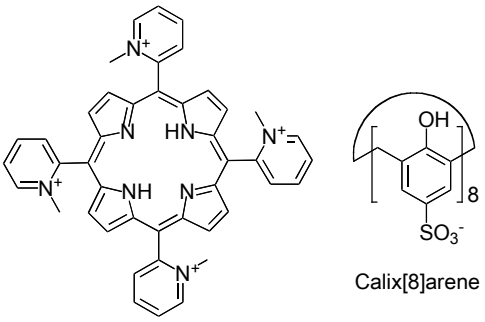

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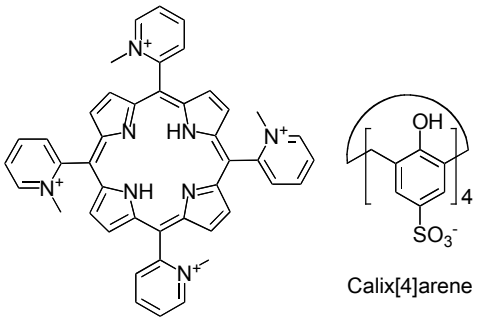

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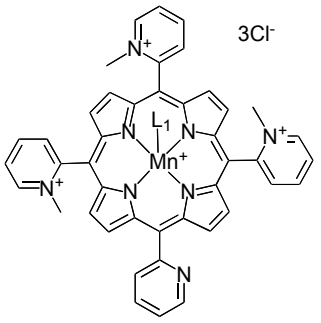

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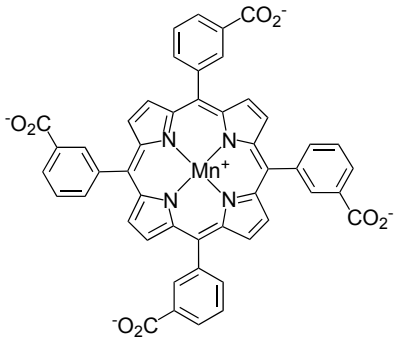
Figure 11a. Structures of tetraarylporphyrins with charged peripheral groups in Table 11a



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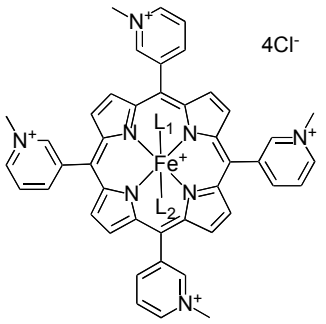

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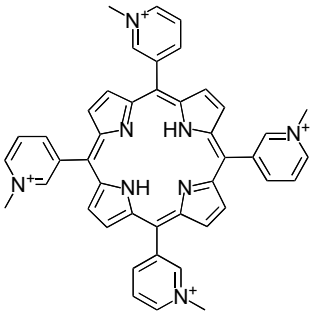

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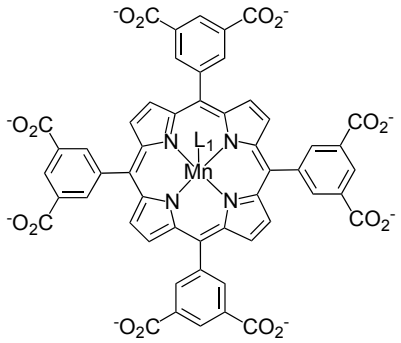

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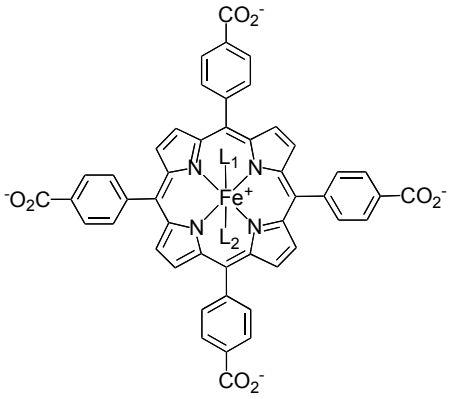

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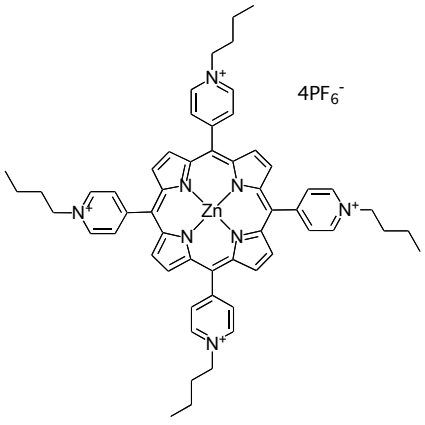

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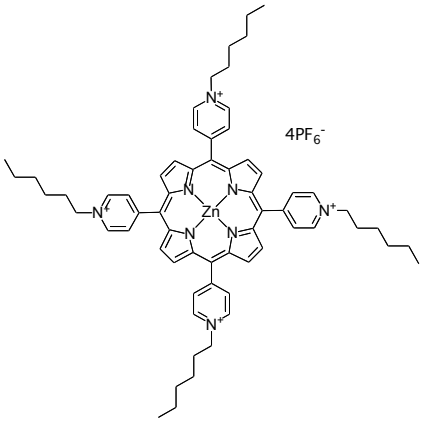
Figure 11a. Structures of tetraarylporphyrins with charged peripheral groups in Table 11a



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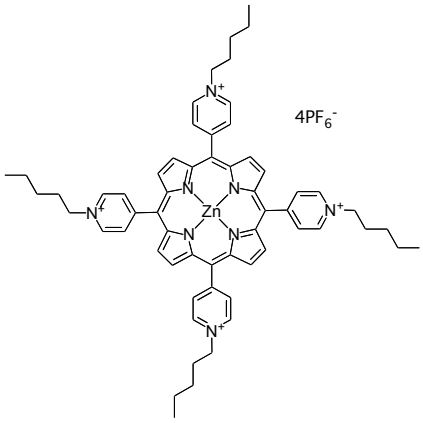

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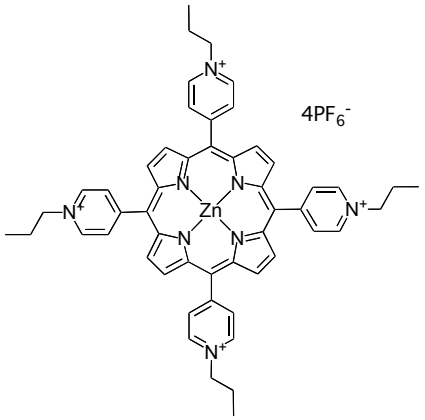

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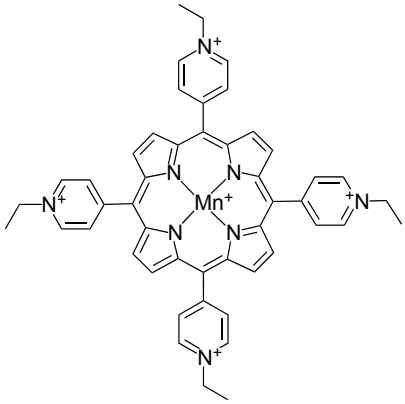

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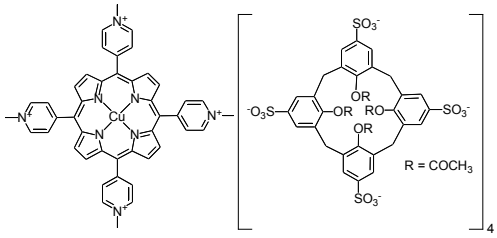

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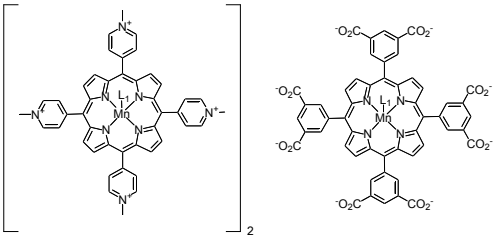

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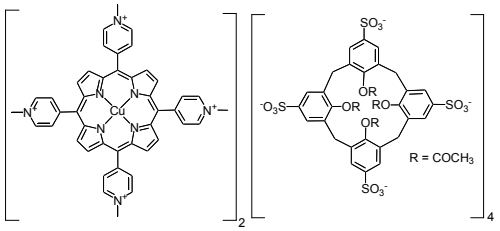
Figure 11a. Structures of tetraarylporphyrins with charged peripheral groups in Table 11a



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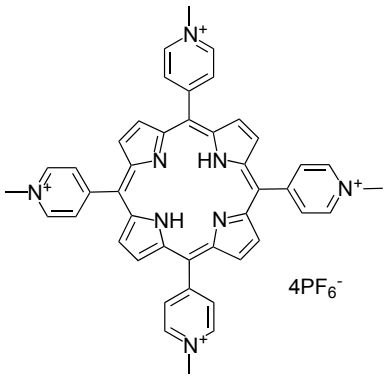

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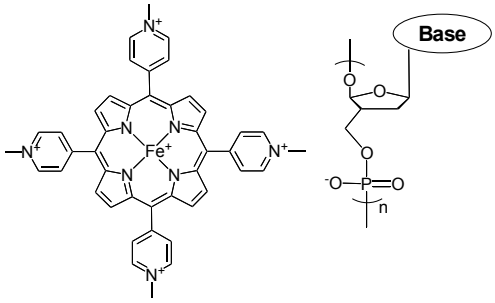

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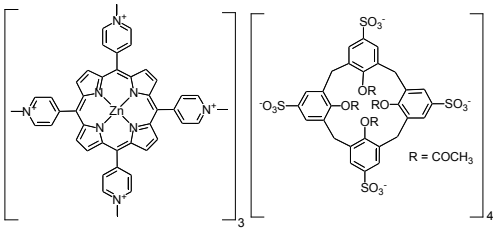

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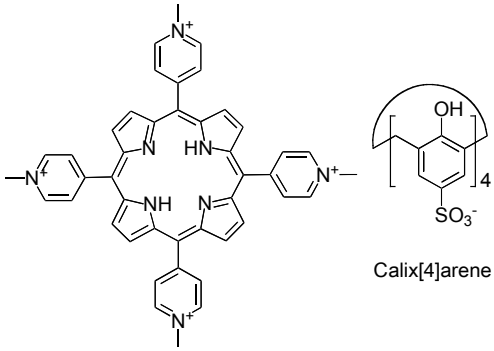

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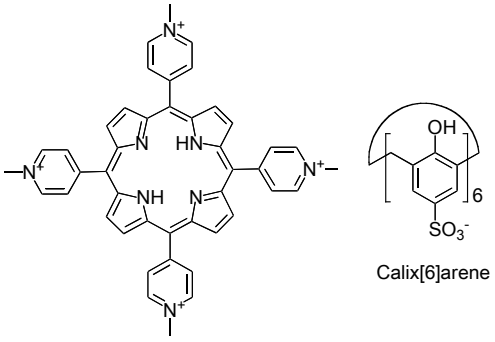

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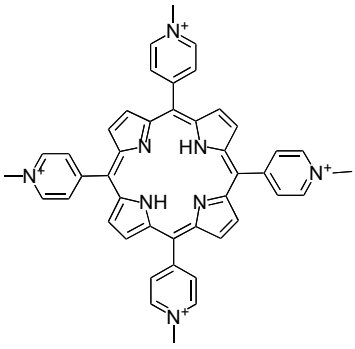
Figure 11a. Structures of tetraarylporphyrins with charged peripheral groups in Table 11a



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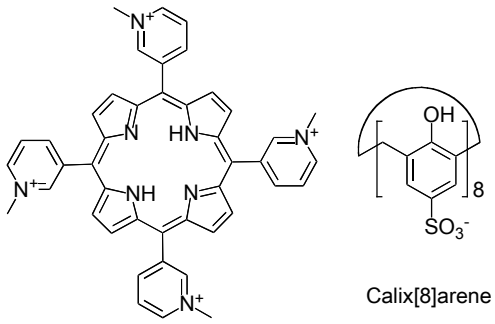

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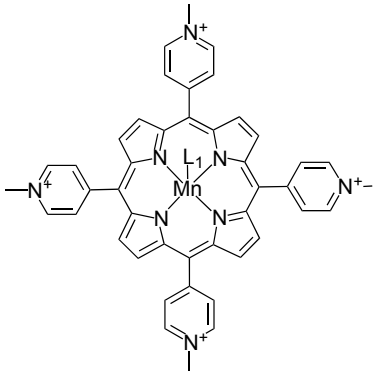

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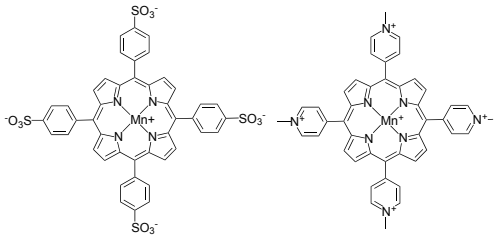

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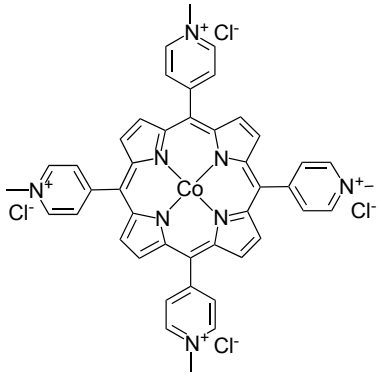

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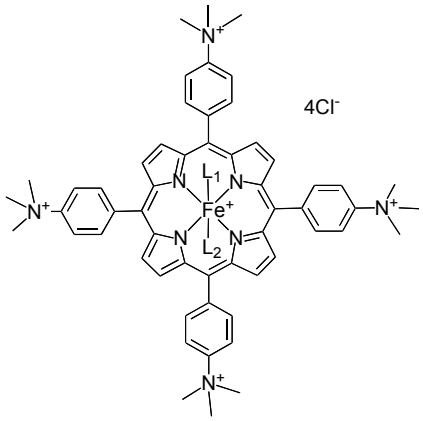

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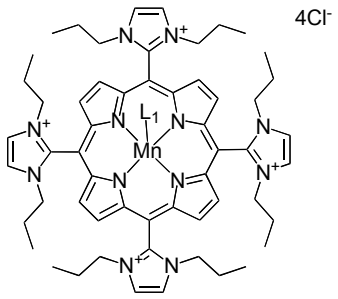
Figure 11a. Structures of tetraarylporphyrins with charged peripheral groups in Table 11a



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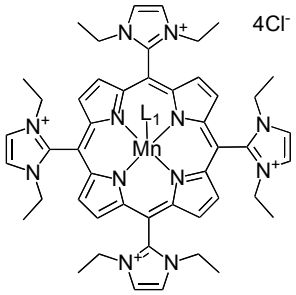

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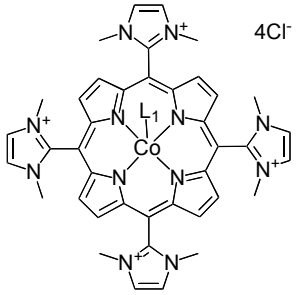

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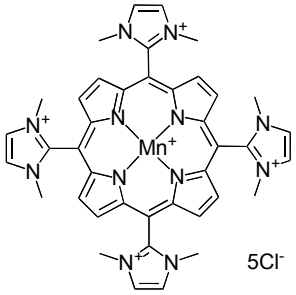

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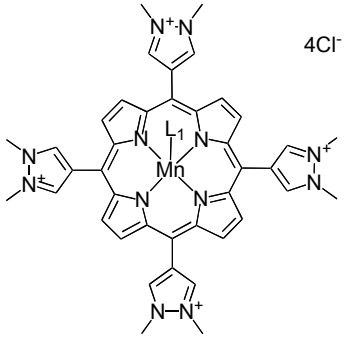

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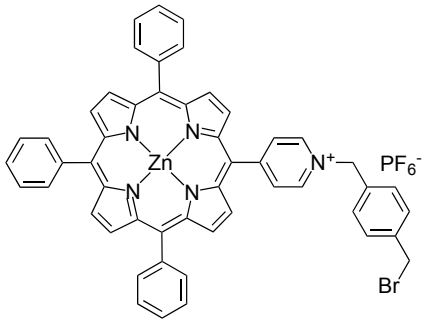

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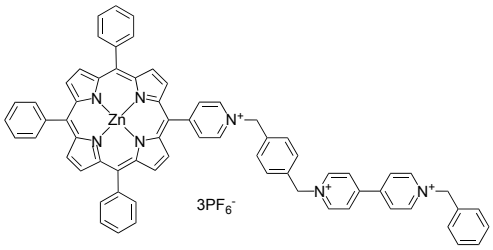
Figure 11a. Structures of tetraarylporphyrins with charged peripheral groups in Table 11a



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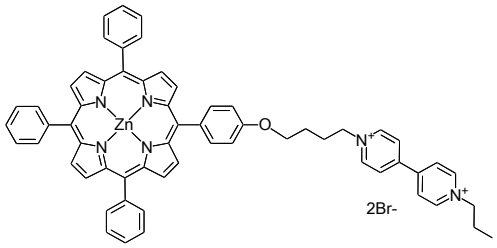

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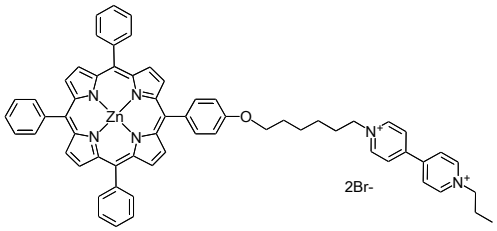

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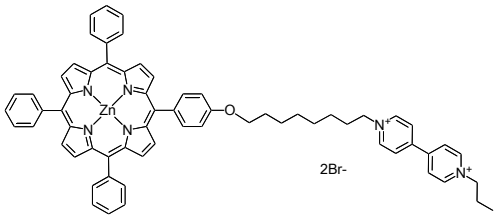

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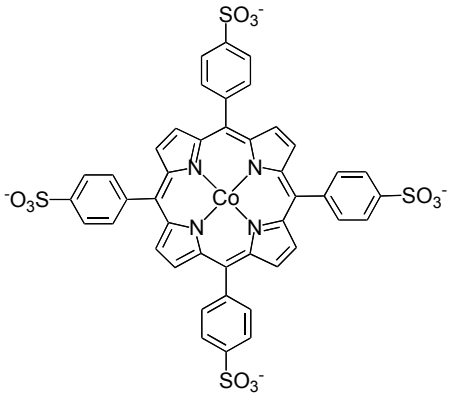

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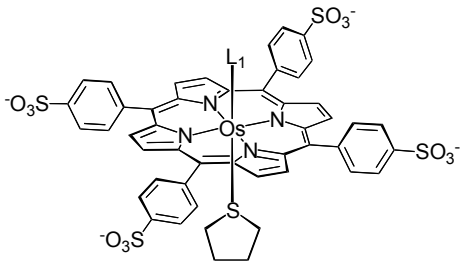

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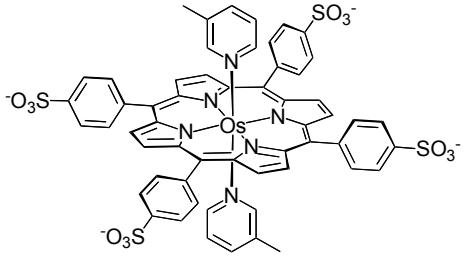
Figure 11a. Structures of tetraarylporphyrins with charged peripheral groups in Table 11a



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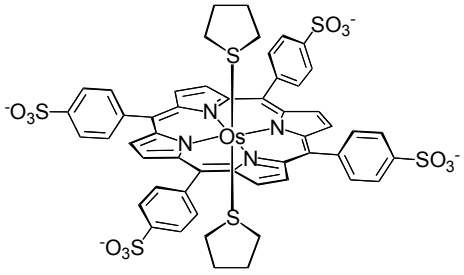

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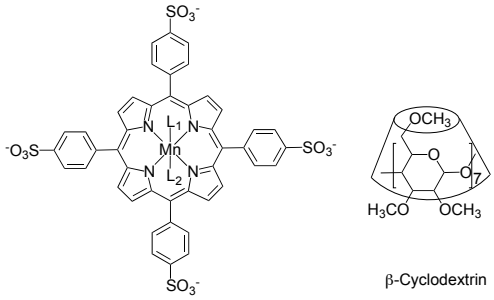

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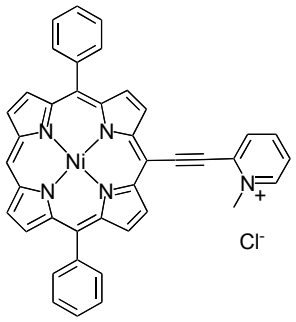

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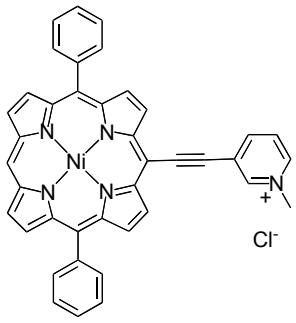

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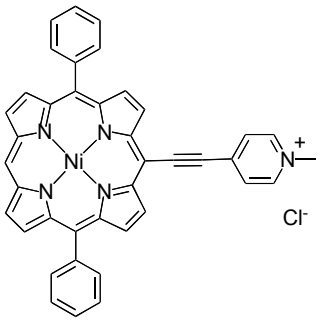

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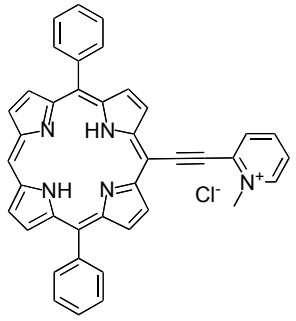
Figure 11a. Structures of tetraarylporphyrins with charged peripheral groups in Table 11a



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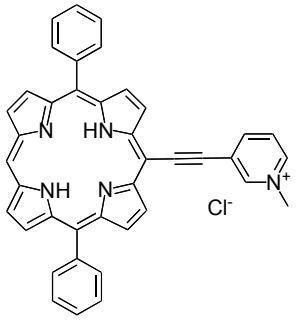

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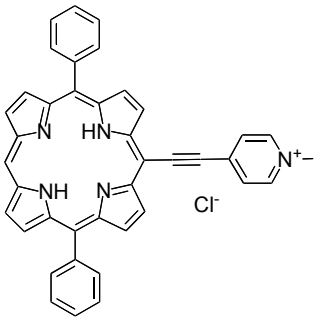

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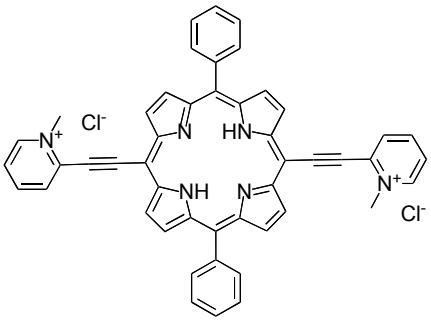

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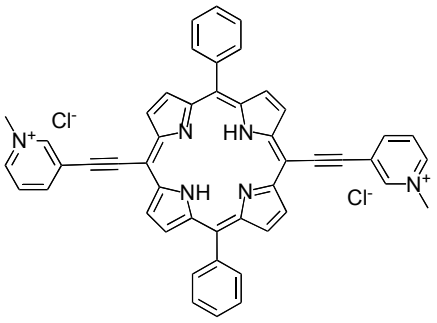

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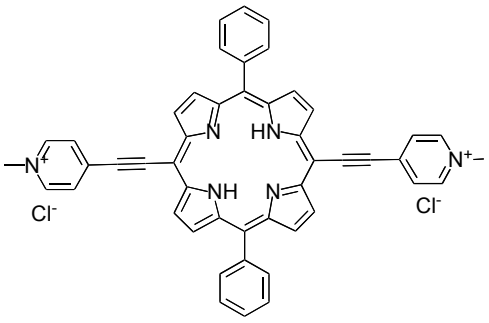

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Figure 11a. Structures of tetraarylporphyrins with charged peripheral groups in Table 11a

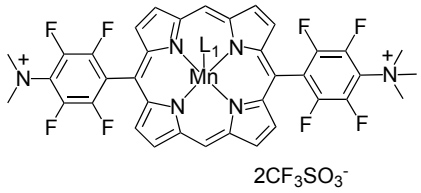

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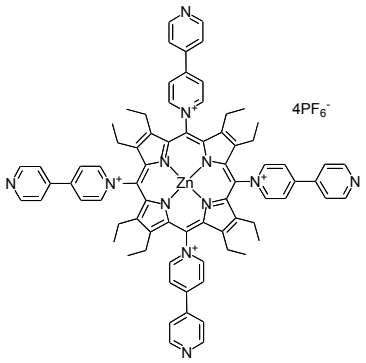
Figure 11b. Structures of octaethylporphyrins with charged peripheral groups in Table 11b



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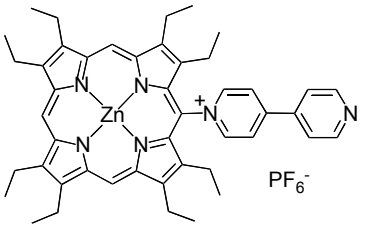

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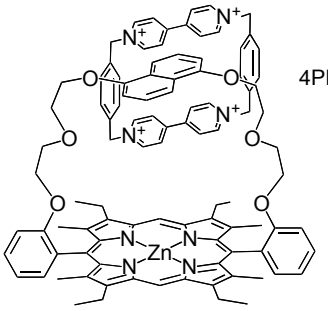

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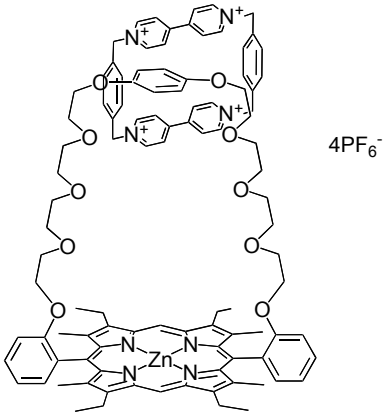

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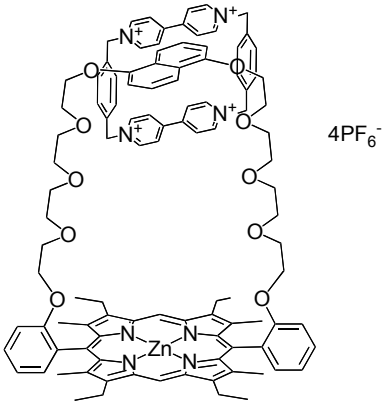

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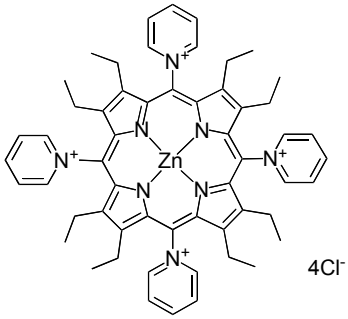

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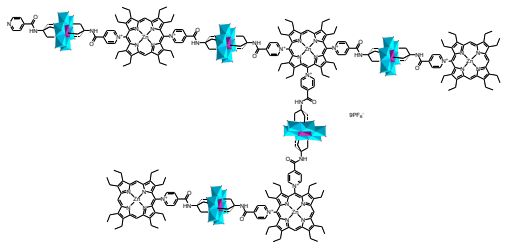
Figure 11b. Structures of octaethylporphyrins with charged peripheral groups in Table 11b



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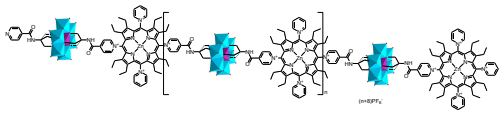

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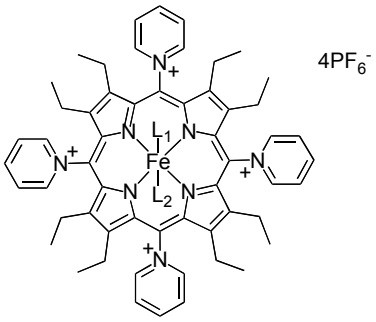

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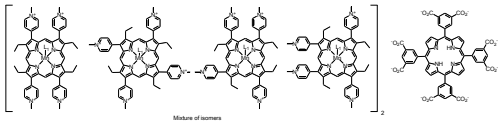

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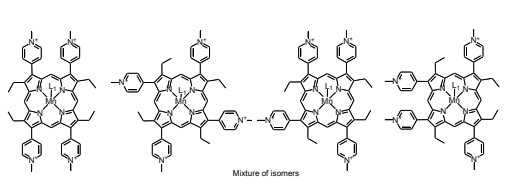

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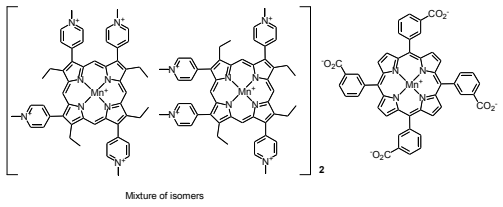

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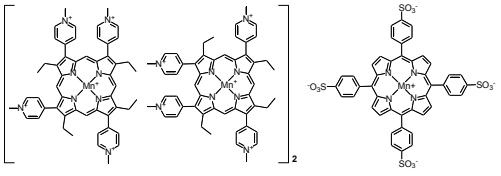
Figure 11b. Structures of octaethylporphyrins with charged peripheral groups in Table 11b



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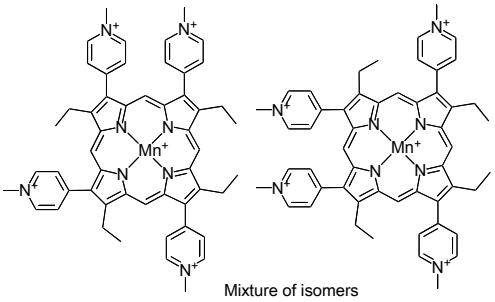

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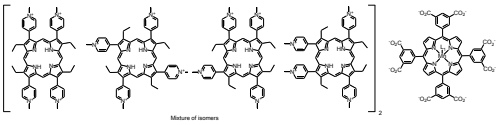

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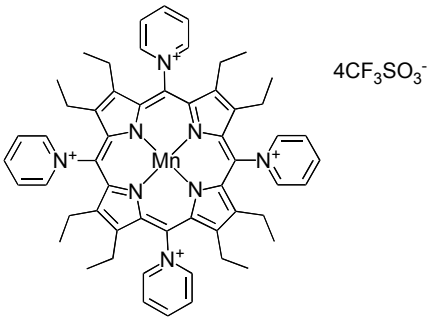

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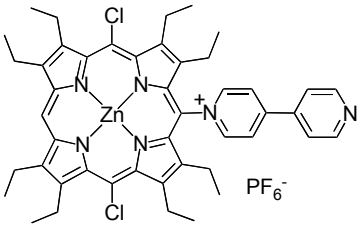

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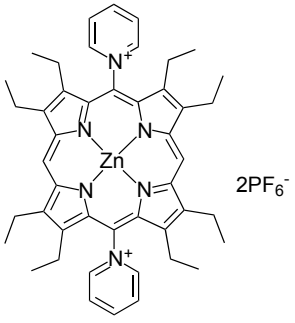

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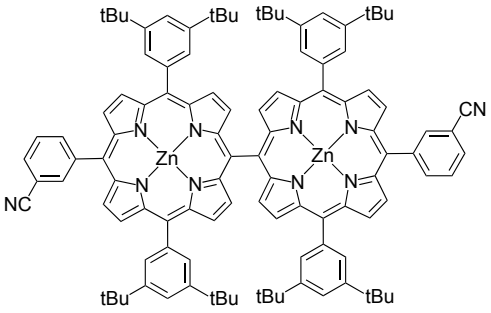
Figure 12. Structures of porphyrin dimers in Table 12



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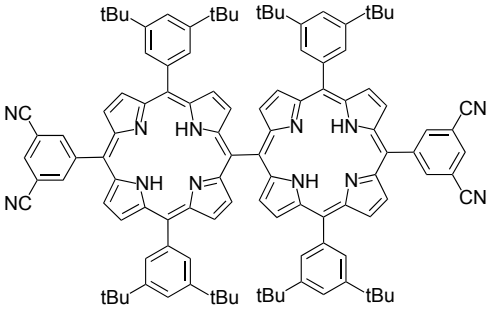

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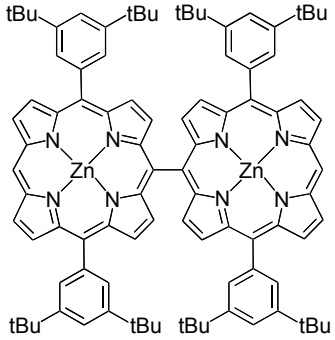

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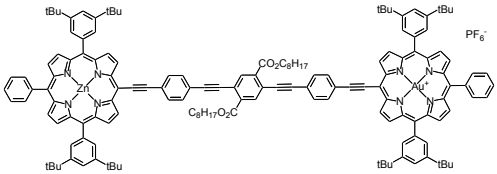

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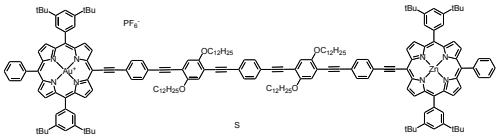

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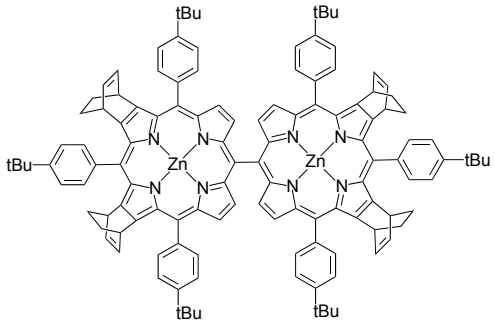

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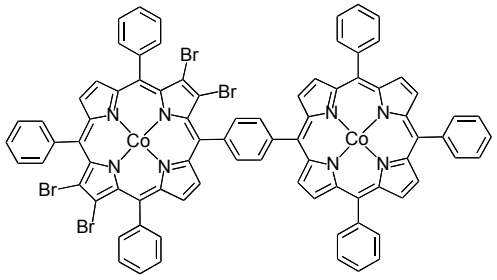
Figure 12. Structures of porphyrin dimers in Table 12



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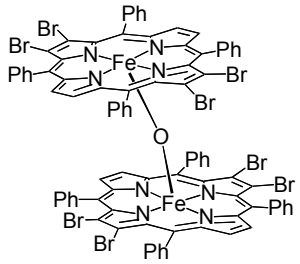

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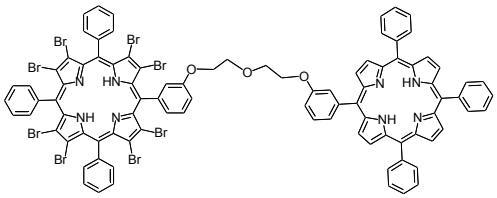

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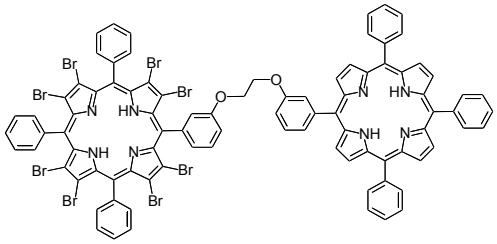

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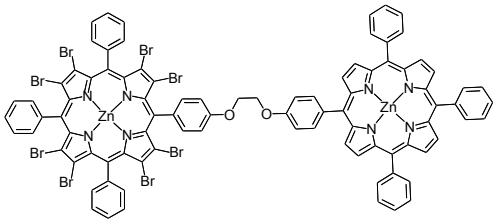

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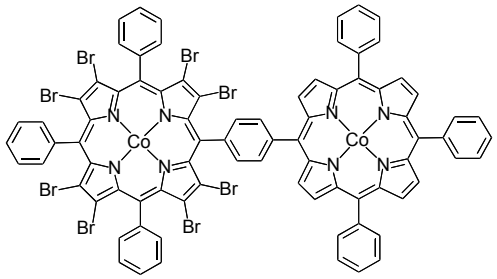

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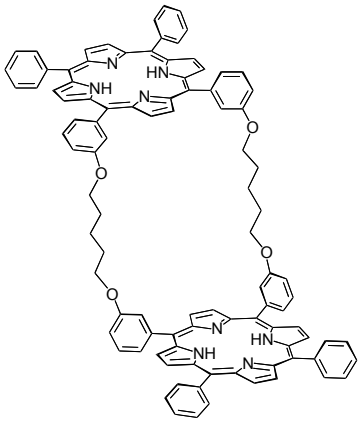
Figure 12. Structures of porphyrin dimers in Table 12



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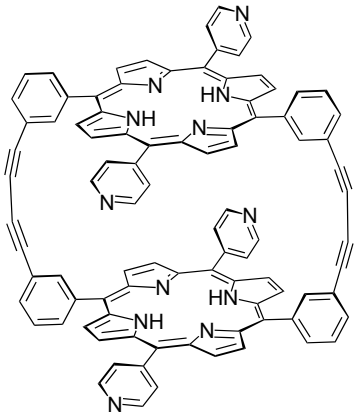

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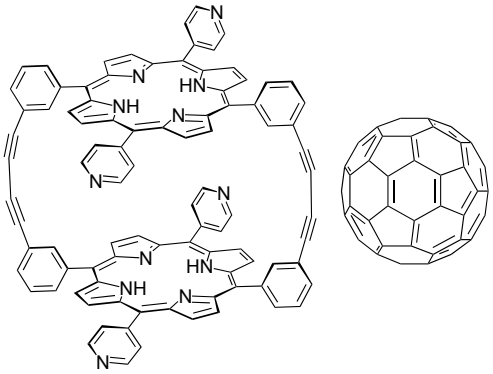

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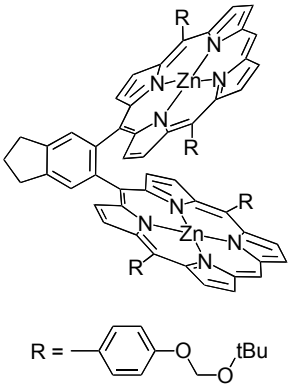

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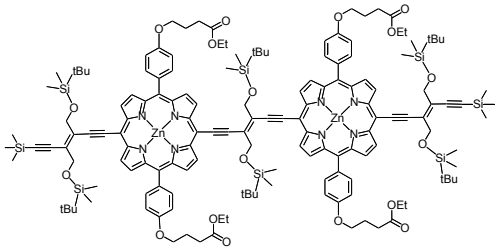

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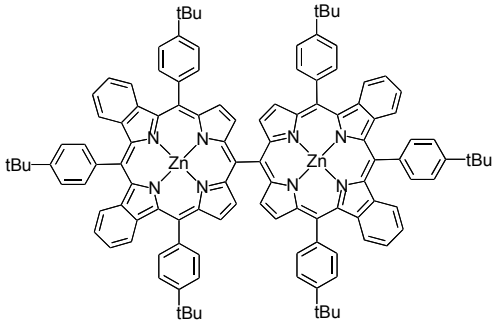

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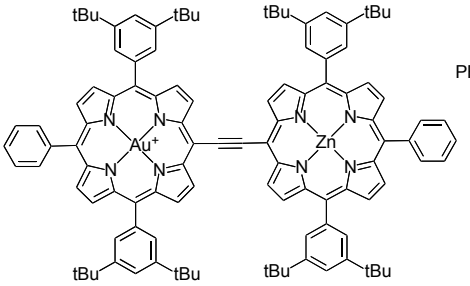
Figure 12. Structures of porphyrin dimers in Table 12



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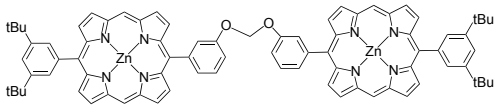

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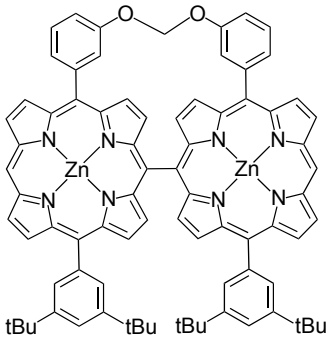

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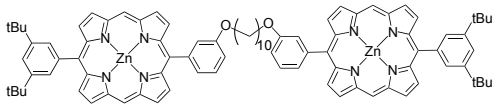

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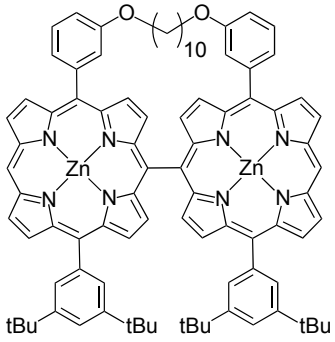

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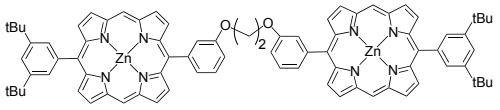

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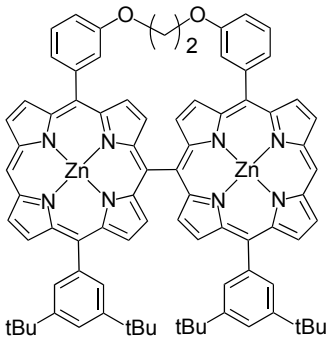
Figure 12. Structures of porphyrin dimers in Table 12



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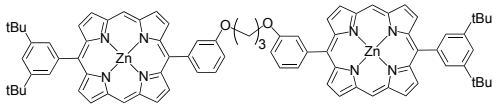

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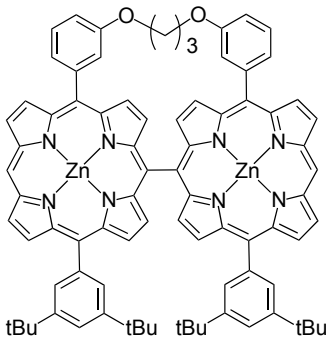

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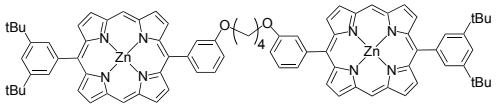

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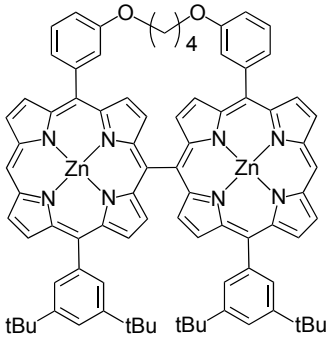

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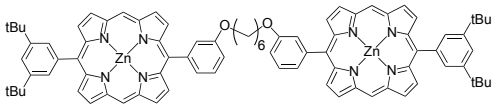

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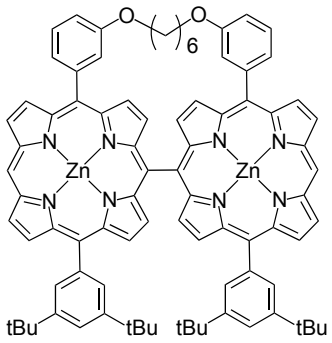
Figure 12. Structures of porphyrin dimers in Table 12



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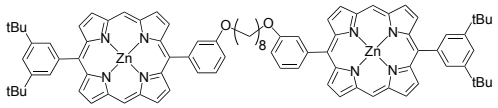

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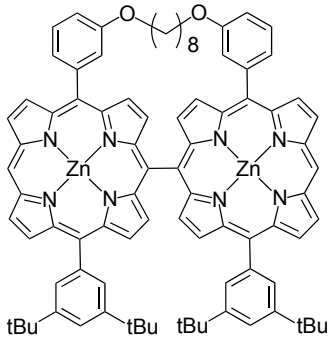

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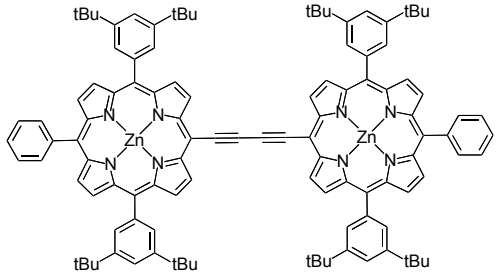

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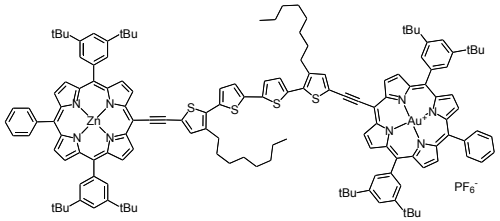

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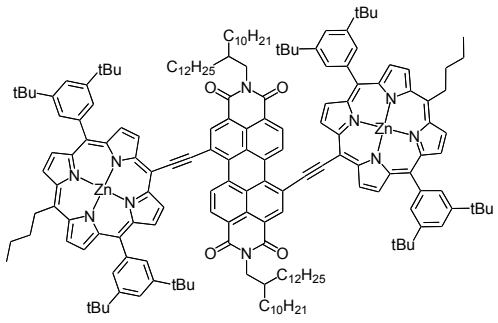

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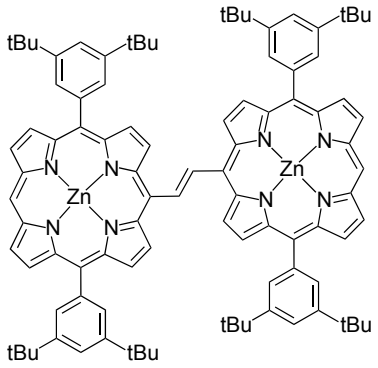
Figure 12. Structures of porphyrin dimers in Table 12



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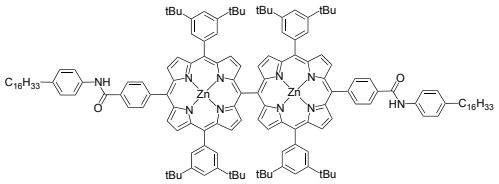

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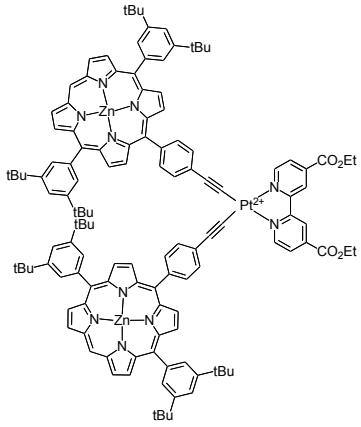

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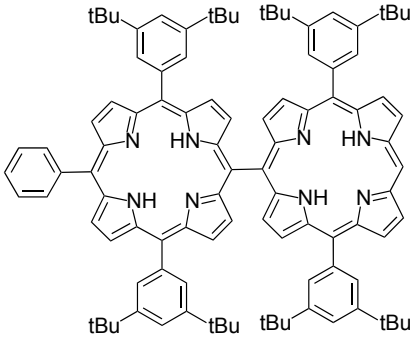

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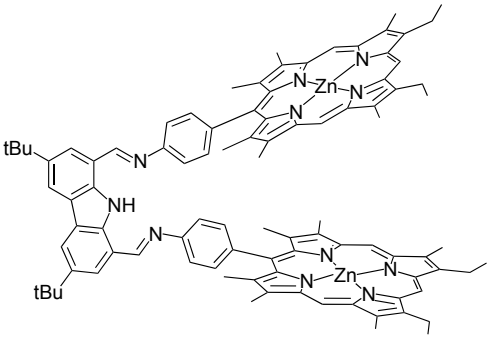

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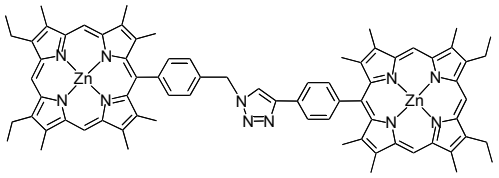

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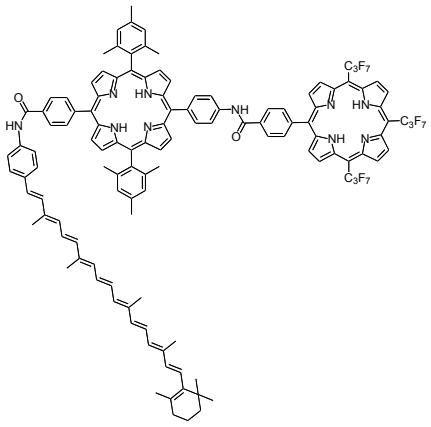
Figure 12. Structures of porphyrin dimers in Table 12



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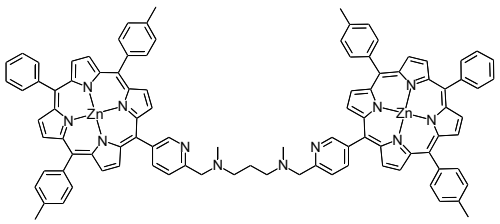

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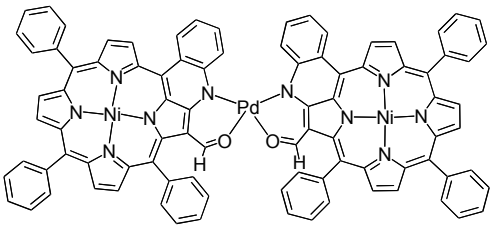

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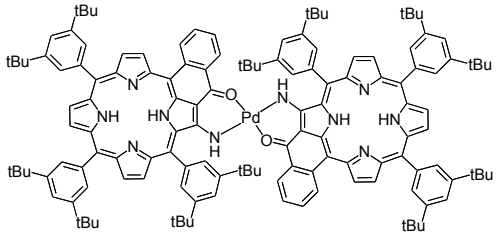

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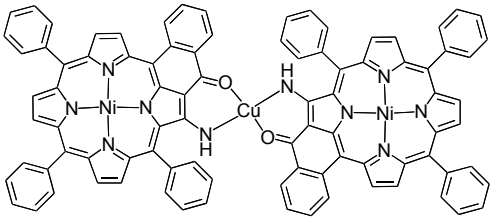

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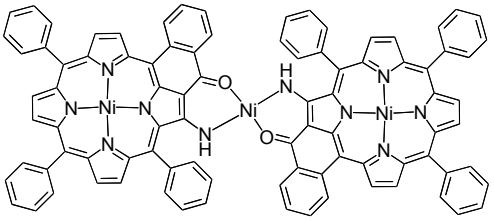

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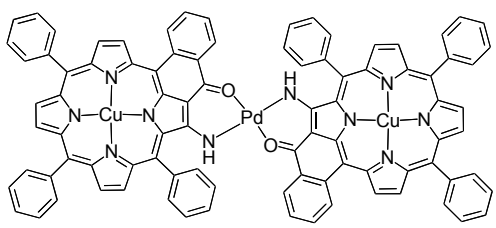
Figure 12. Structures of porphyrin dimers in Table 12



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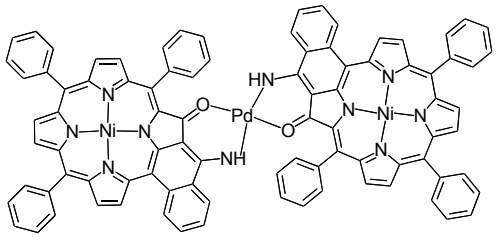

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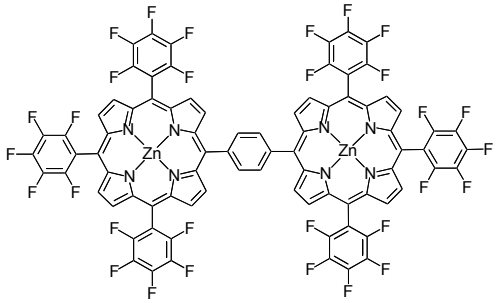

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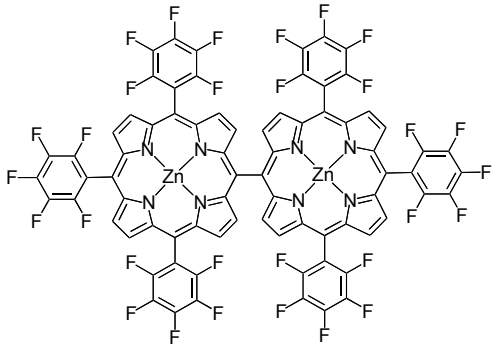

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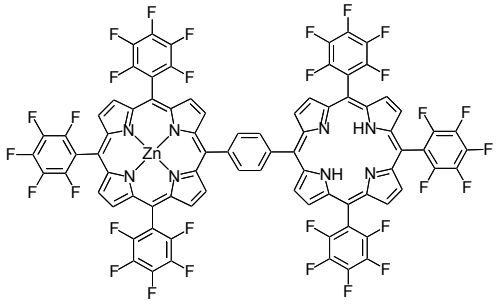

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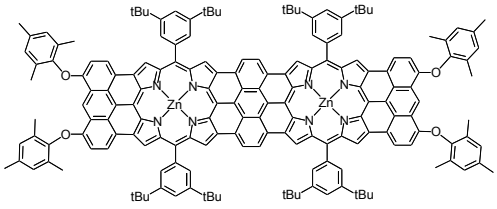

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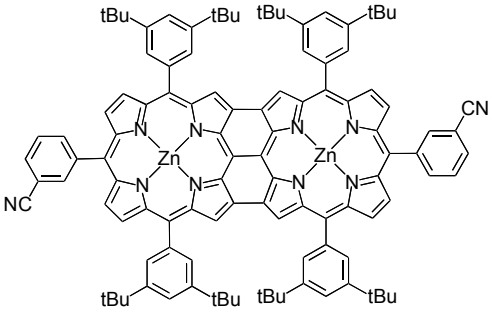
Figure 12. Structures of porphyrin dimers in Table 12



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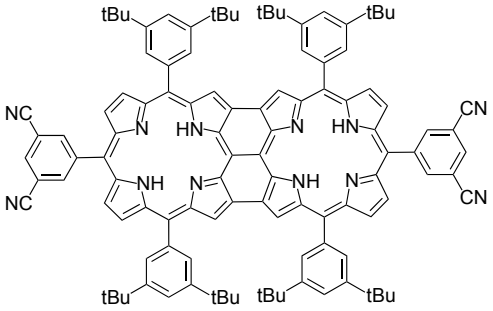

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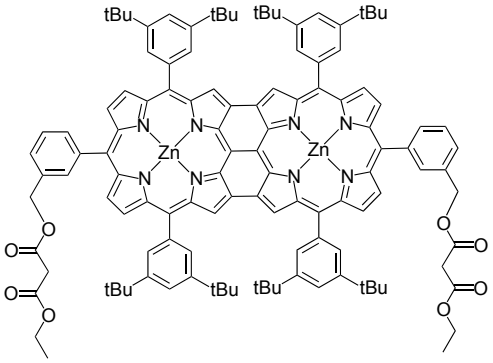

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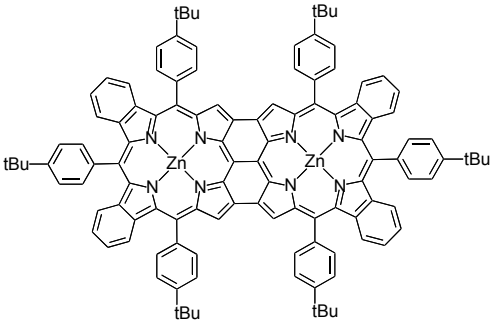

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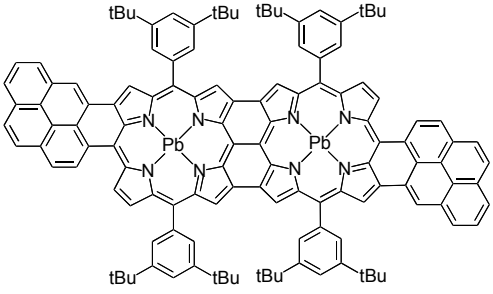

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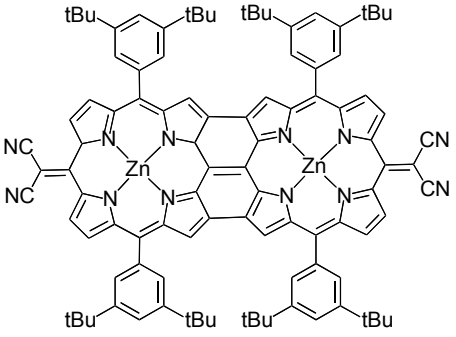

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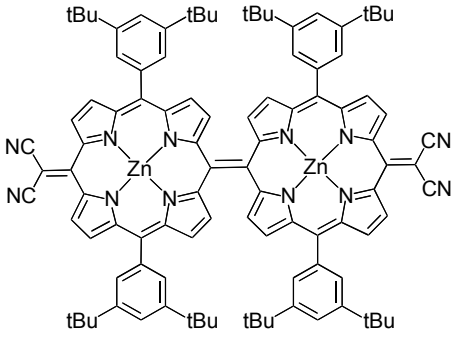
Figure 12. Structures of porphyrin dimers in Table 12



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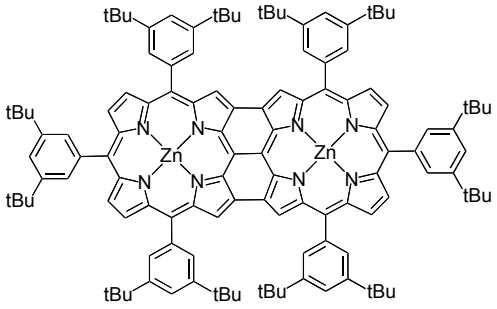

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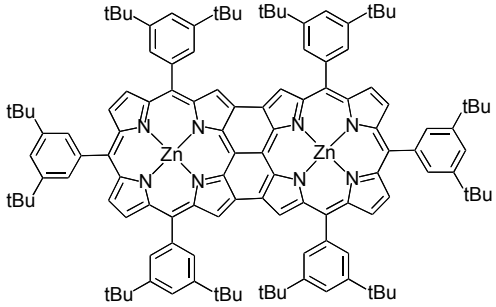

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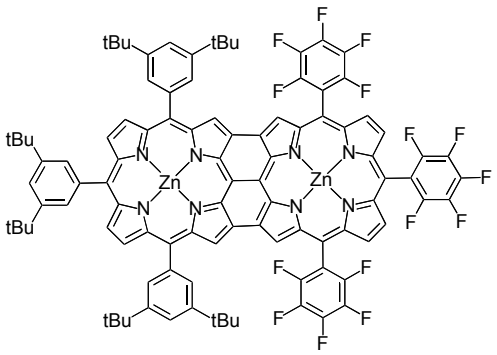

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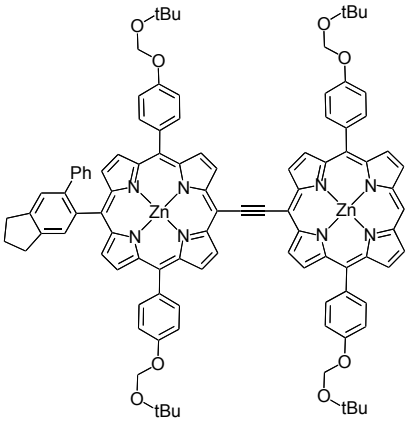

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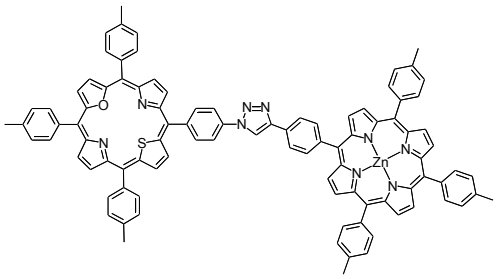

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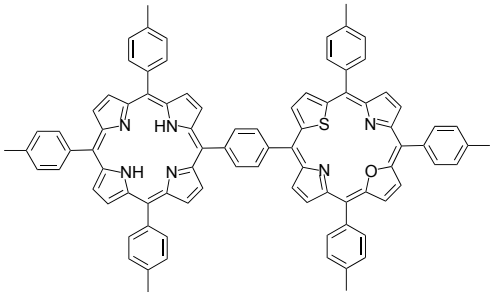
Figure 12. Structures of porphyrin dimers in Table 12



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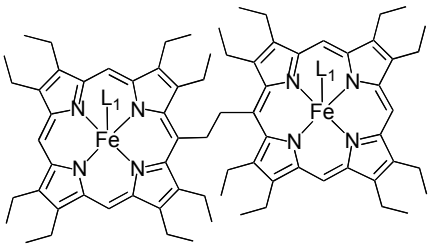

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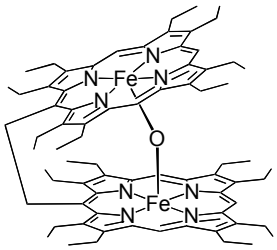

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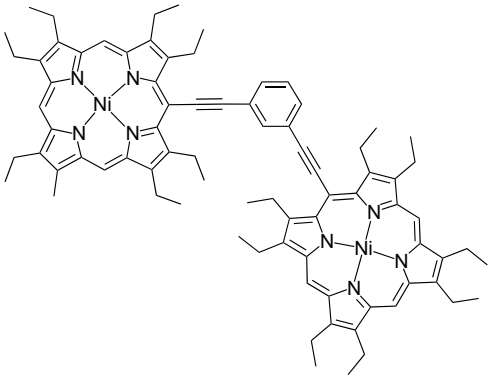

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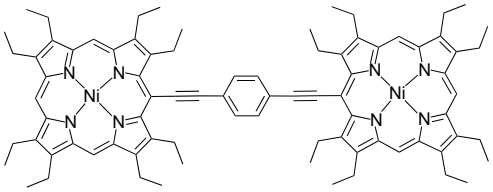

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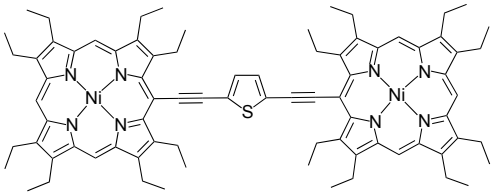

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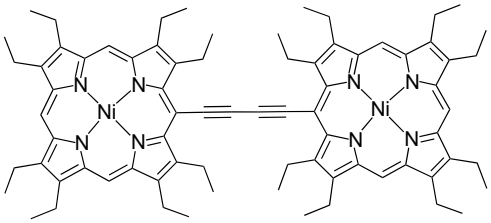
Figure 12. Structures of porphyrin dimers in Table 12



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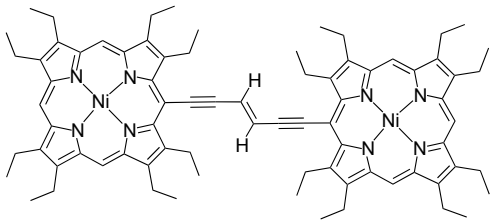

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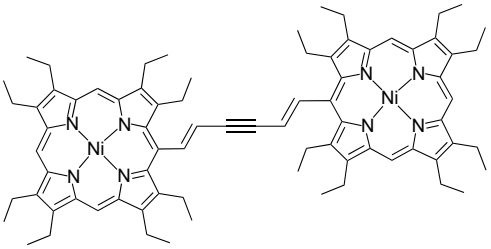

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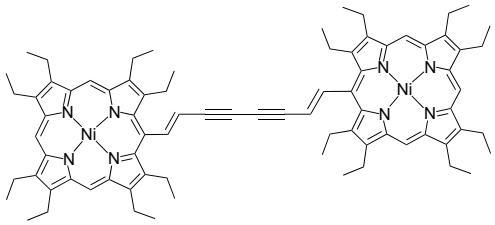

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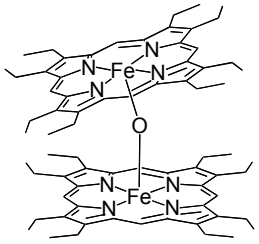

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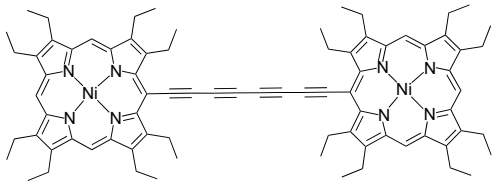

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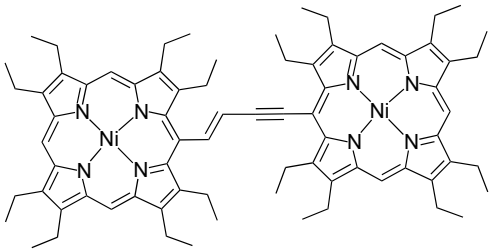
Figure 12. Structures of porphyrin dimers in Table 12



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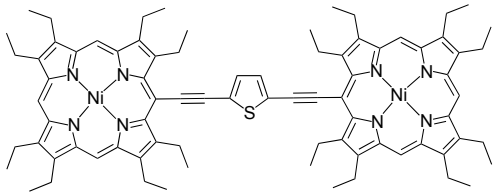

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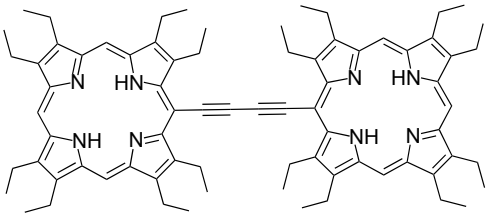

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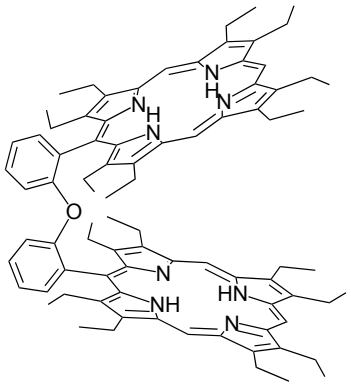

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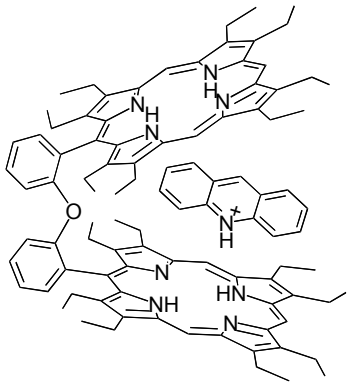

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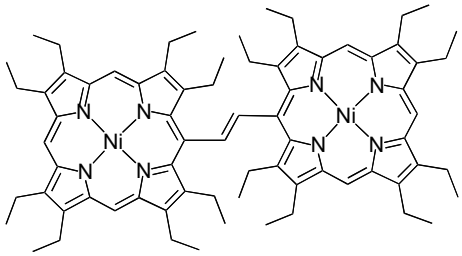

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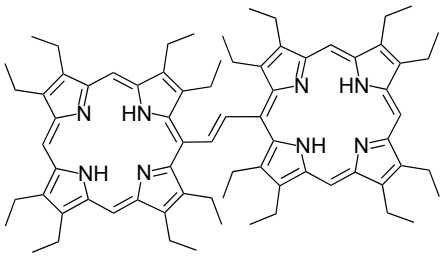
Figure 12. Structures of porphyrin dimers in Table 12



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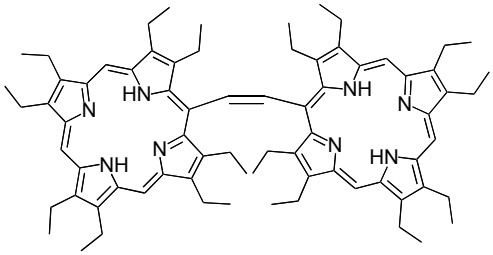

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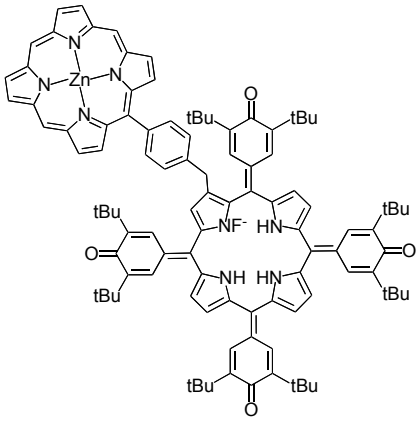

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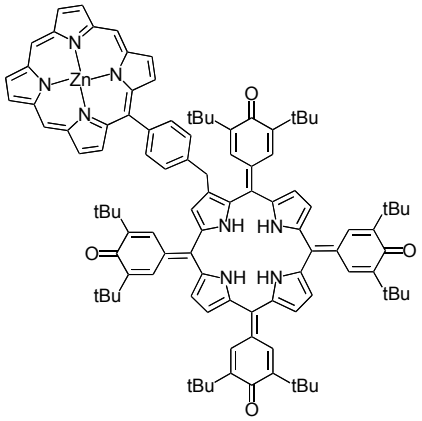

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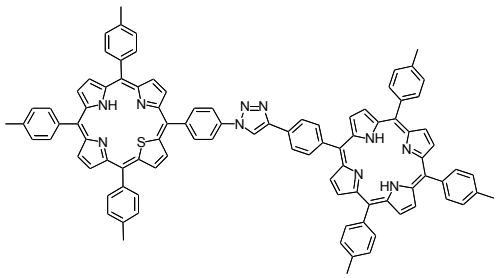

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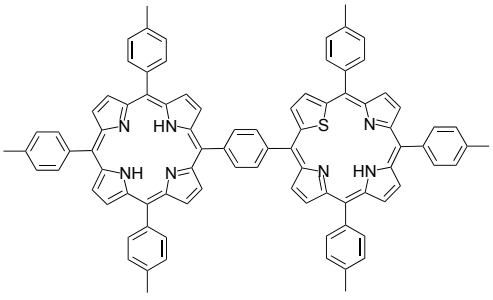

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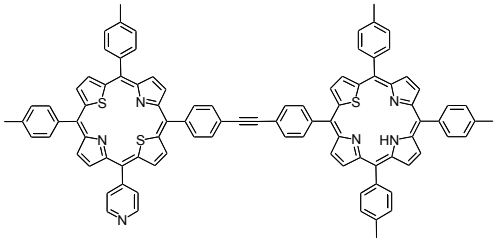
Figure 12. Structures of porphyrin dimers in Table 12



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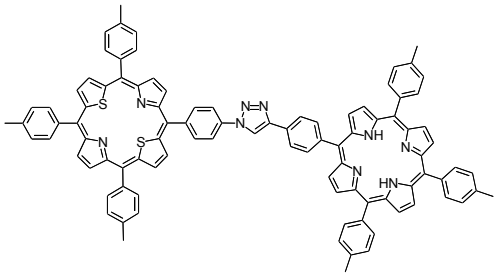

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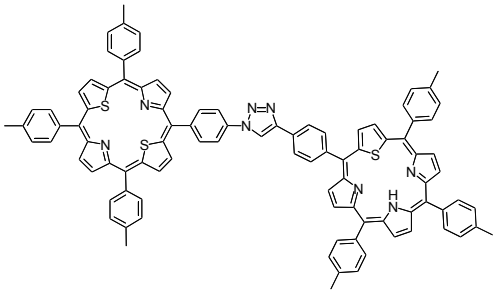

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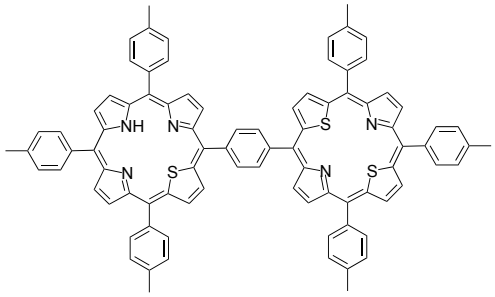

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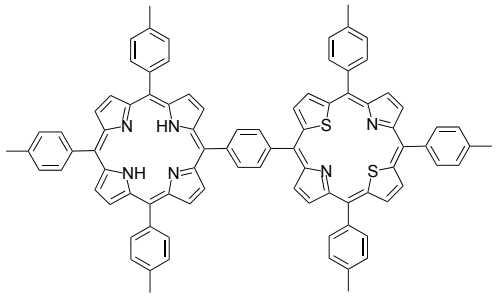

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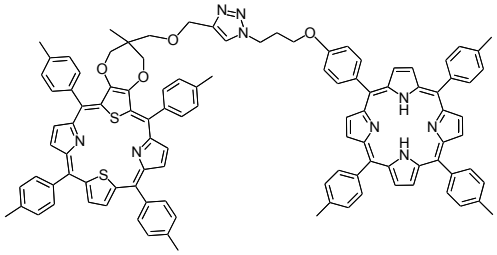

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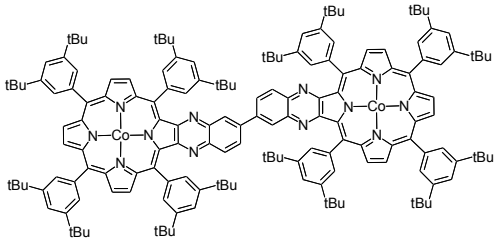
Figure 12. Structures of porphyrin dimers in Table 12



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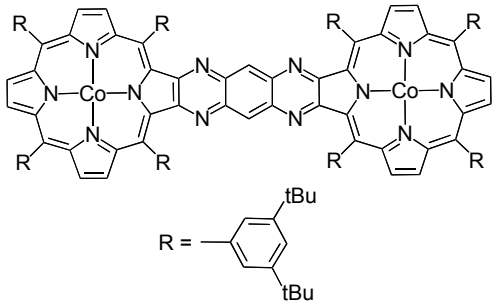

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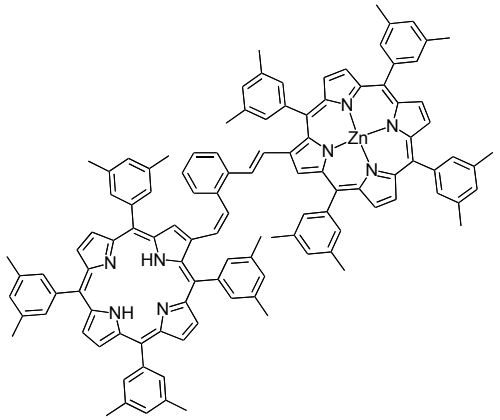

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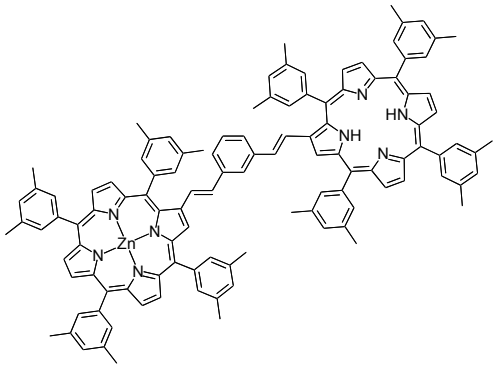

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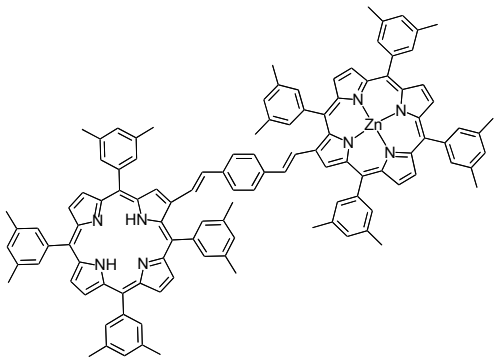

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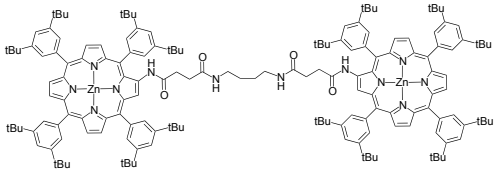

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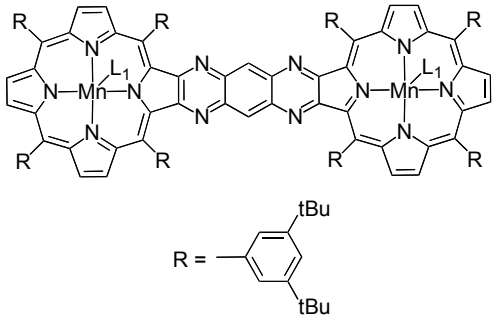
Figure 12. Structures of porphyrin dimers in Table 12



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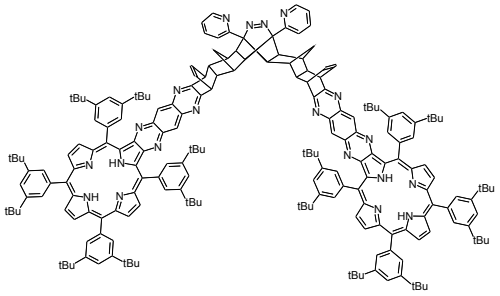

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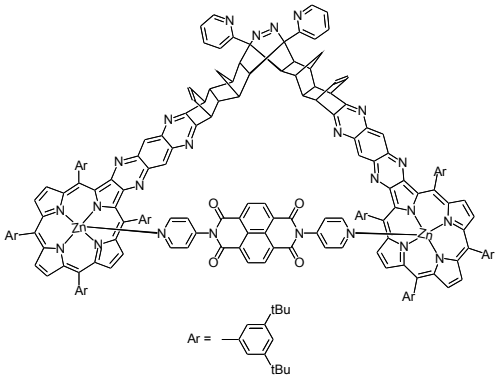

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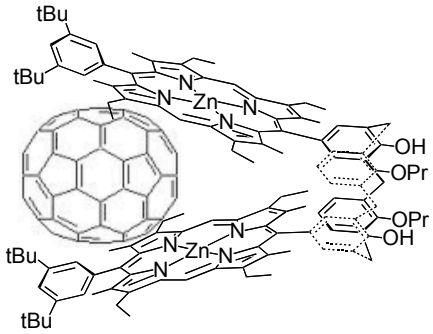

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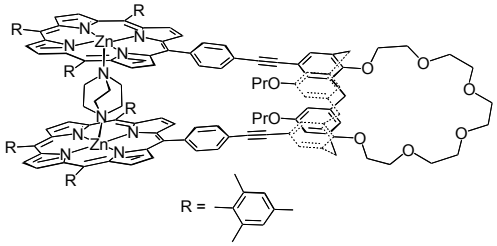

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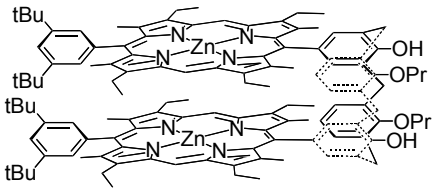

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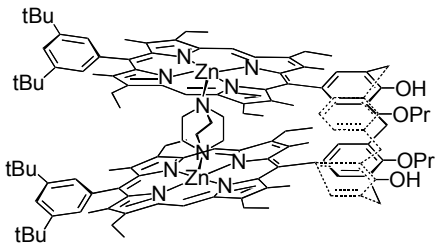
Figure 12. Structures of porphyrin dimers in Table 12



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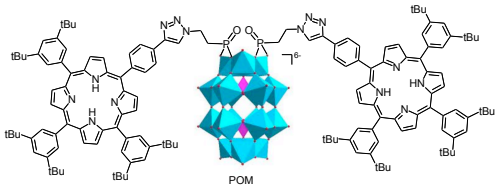

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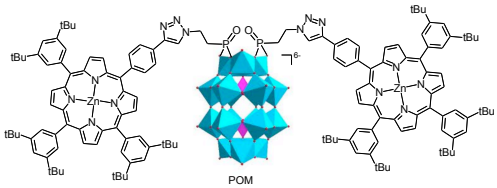

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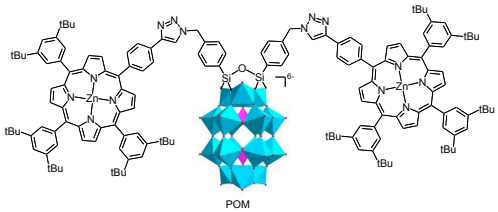

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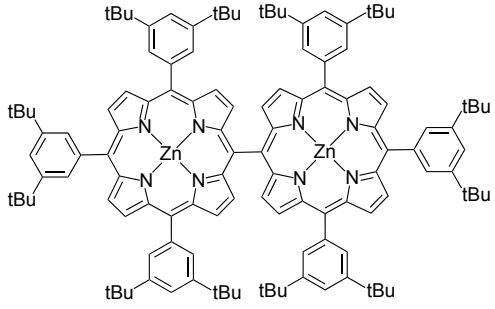

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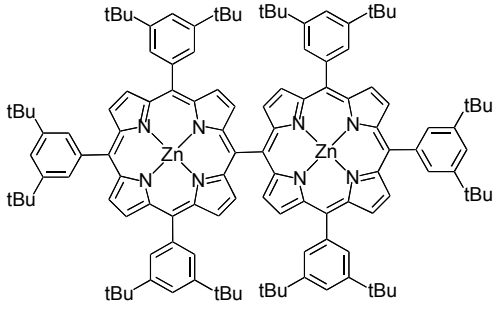

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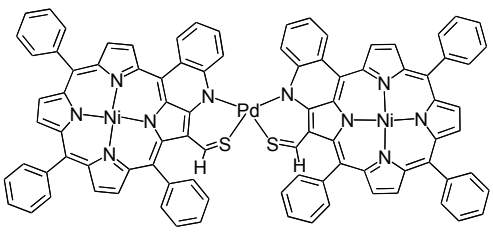
Figure 12. Structures of porphyrin dimers in Table 12



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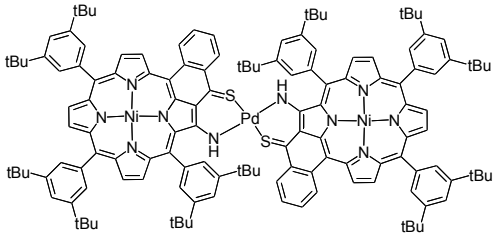

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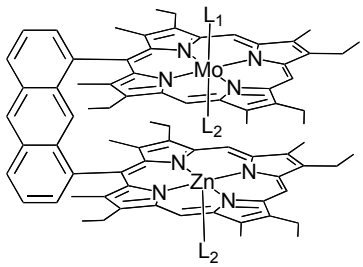

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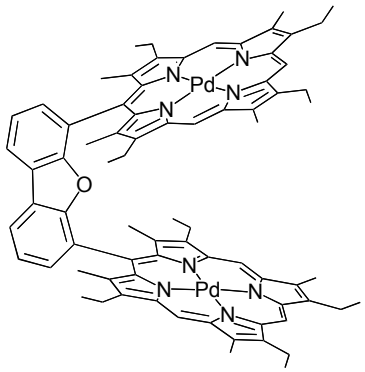

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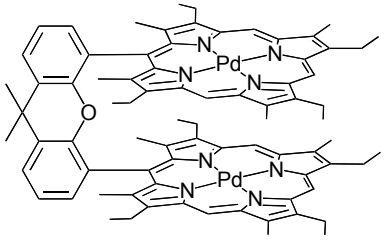

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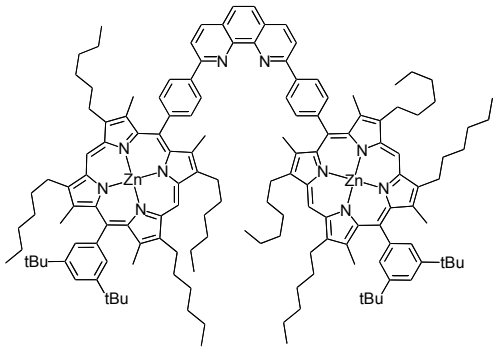

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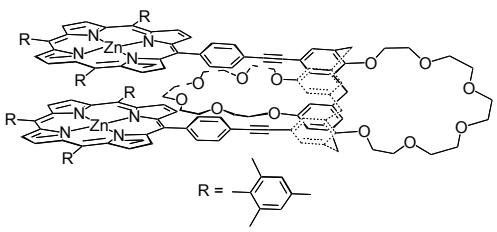
Figure 12. Structures of porphyrin dimers in Table 12



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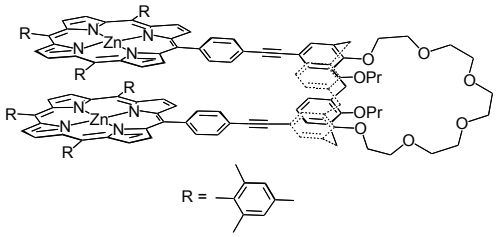

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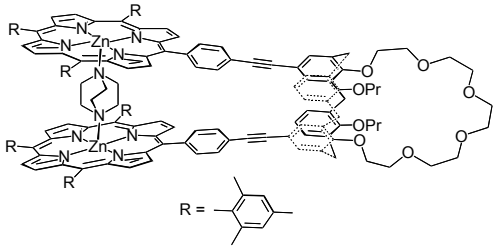

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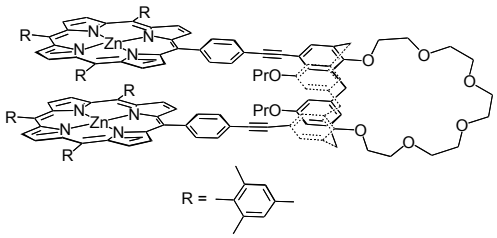

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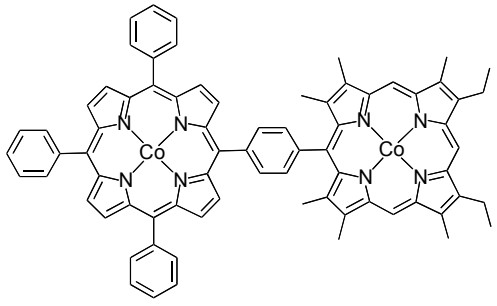

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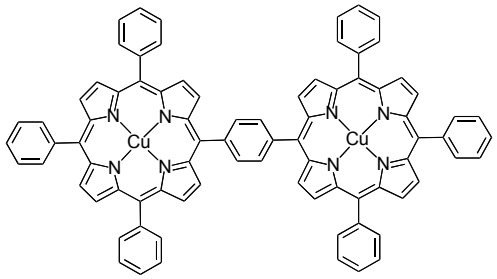

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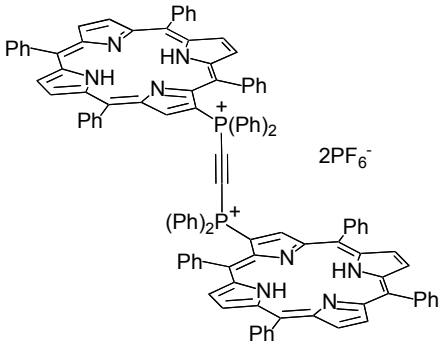
Figure 12. Structures of porphyrin dimers in Table 12



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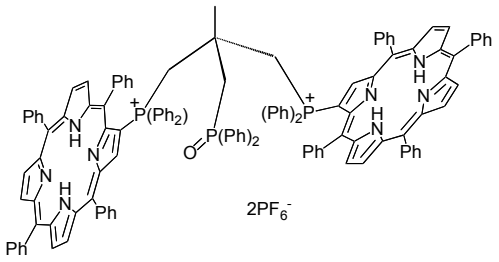

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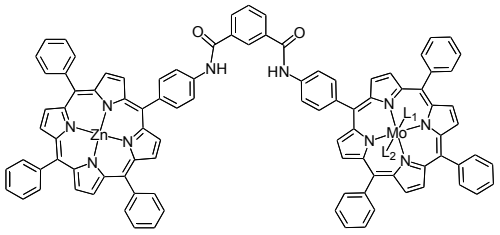

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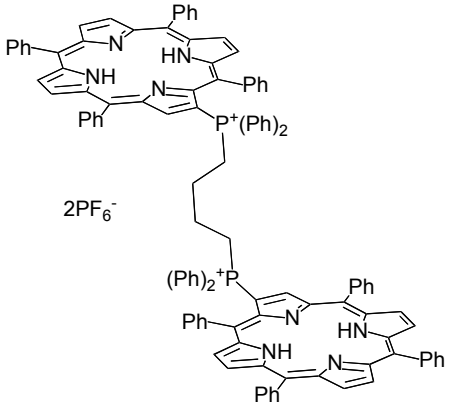

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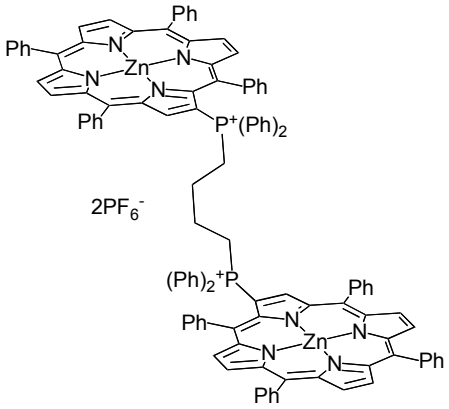

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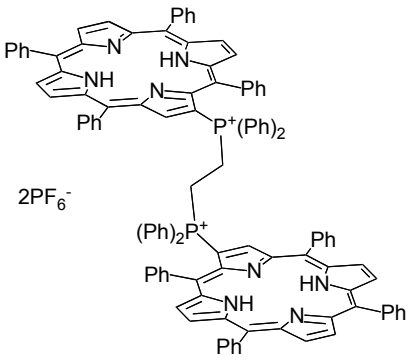

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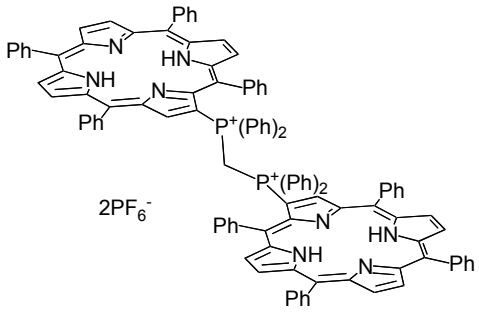
Figure 12. Structures of porphyrin dimers in Table 12



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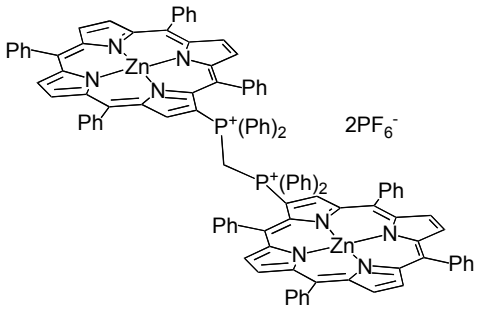

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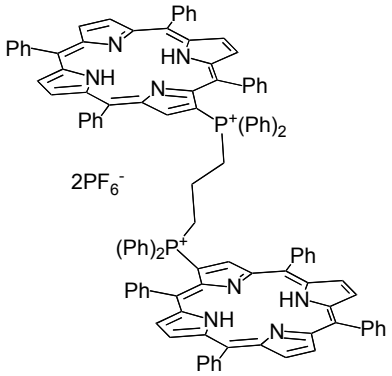

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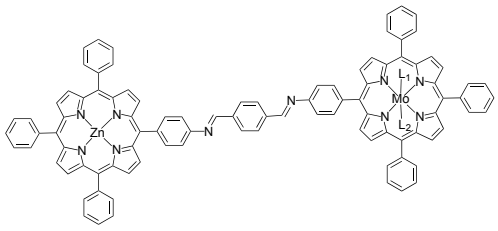

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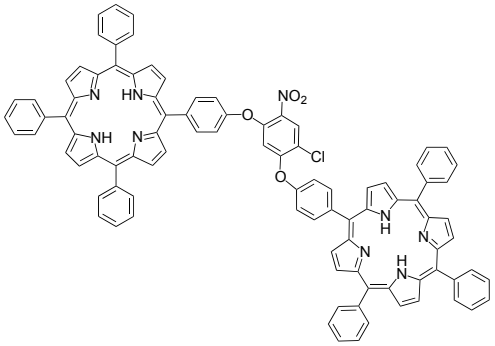

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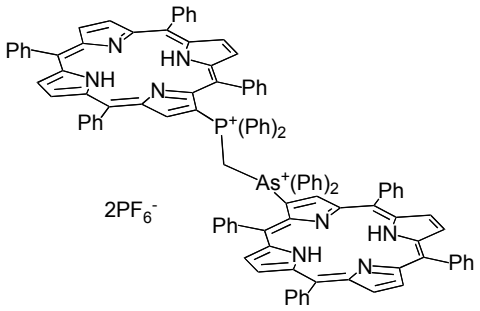

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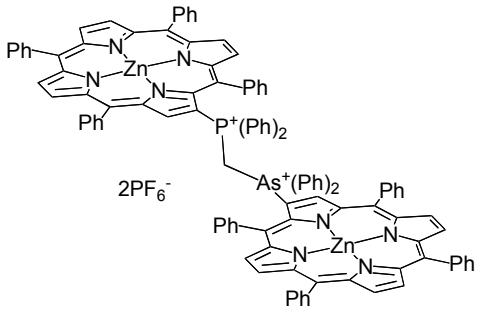
Figure 12. Structures of porphyrin dimers in Table 12



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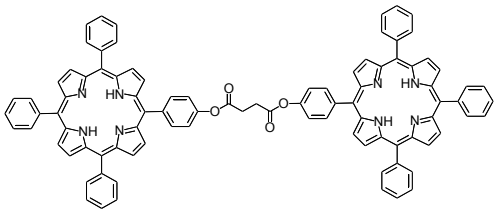

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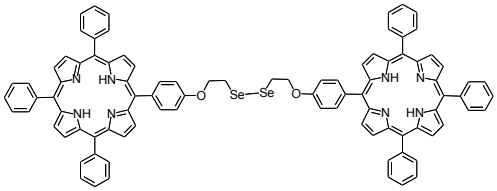

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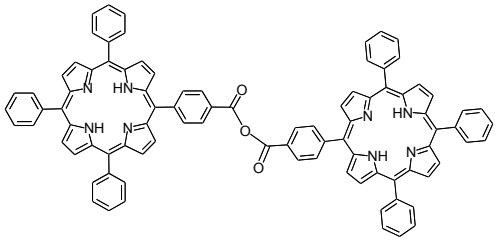

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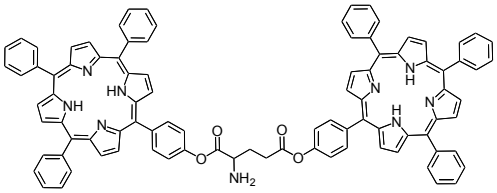

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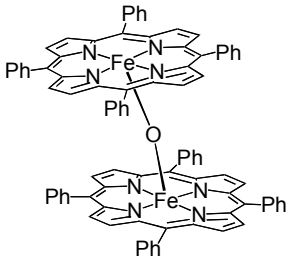

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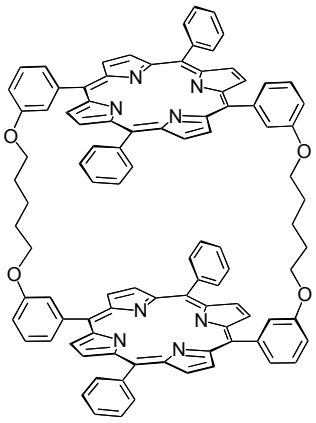
Figure 12. Structures of porphyrin dimers in Table 12



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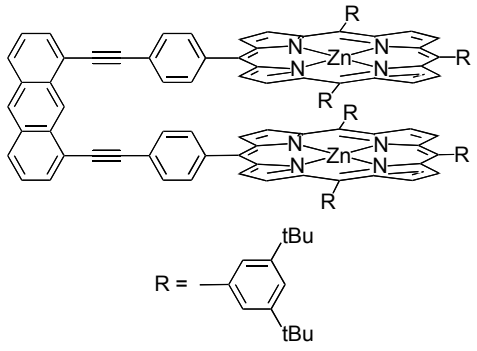

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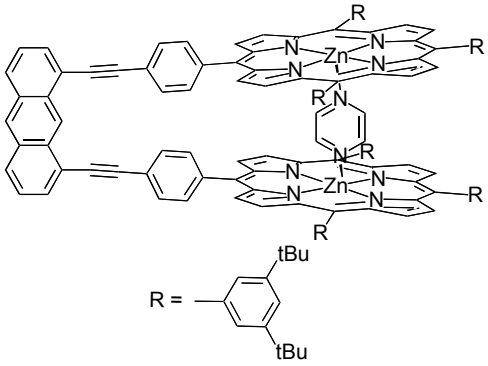

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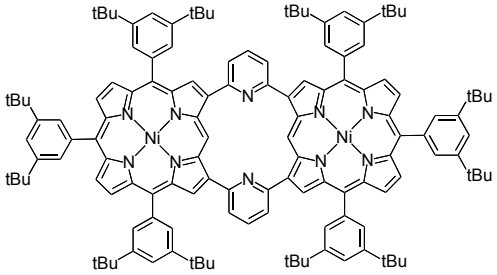

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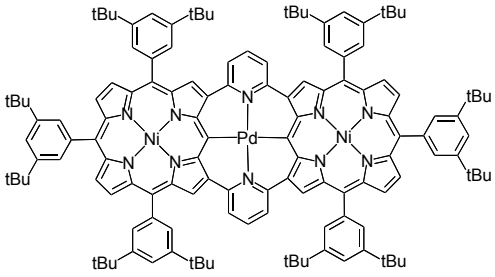

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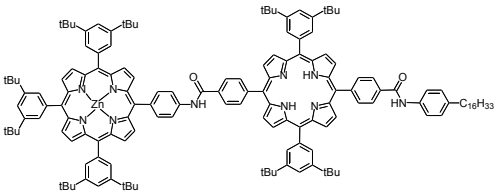

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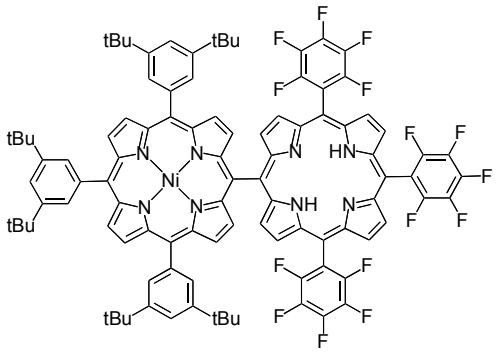
Figure 12. Structures of porphyrin dimers in Table 12



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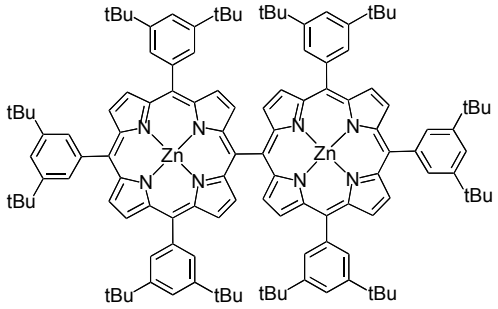

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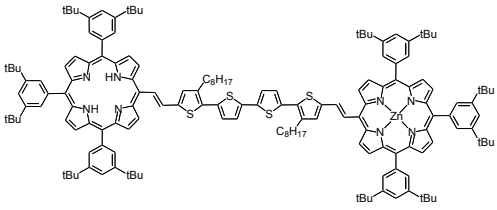

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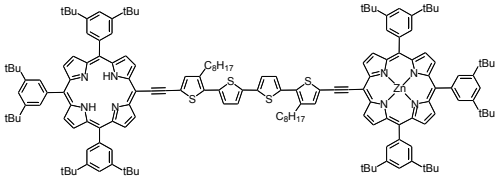

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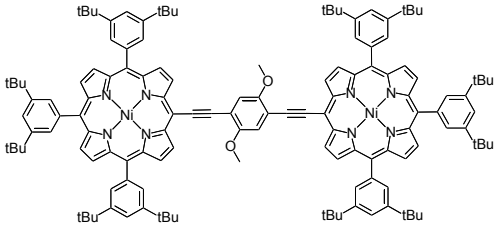

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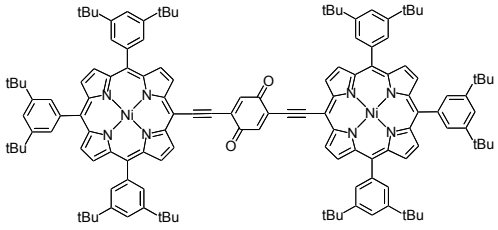

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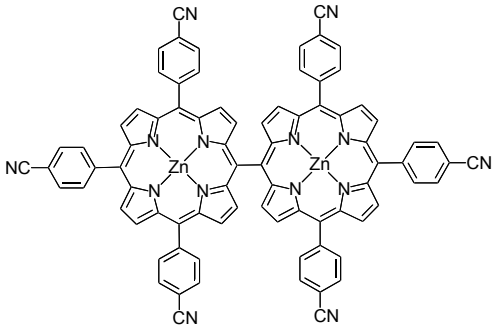
Figure 12. Structures of porphyrin dimers in Table 12



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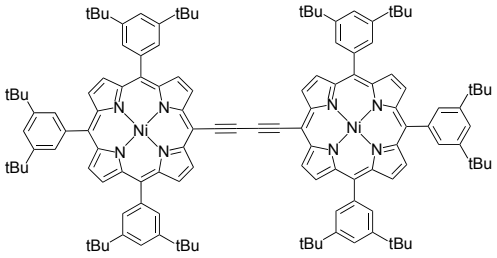

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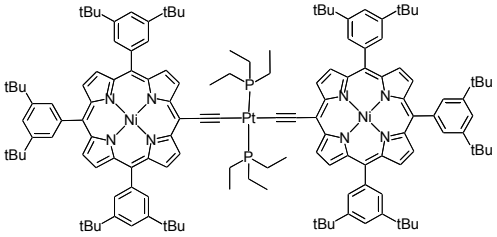

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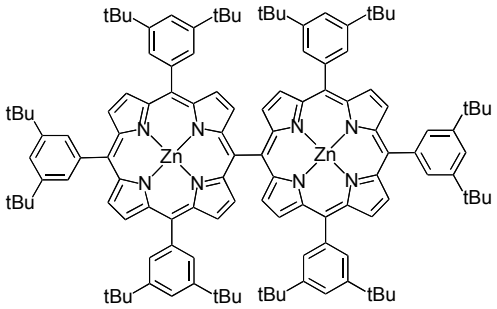

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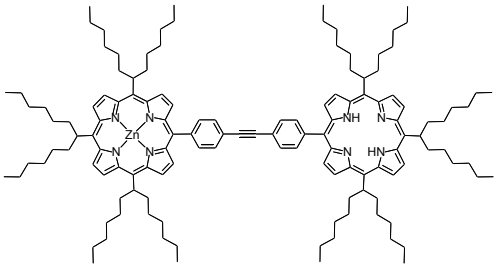

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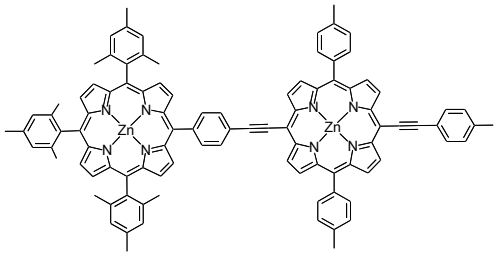

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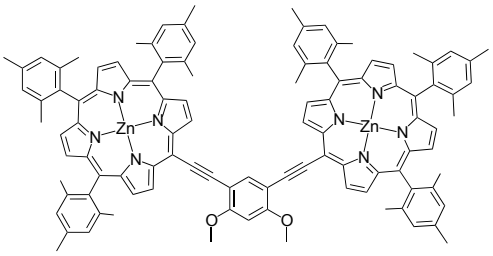
Figure 12. Structures of porphyrin dimers in Table 12



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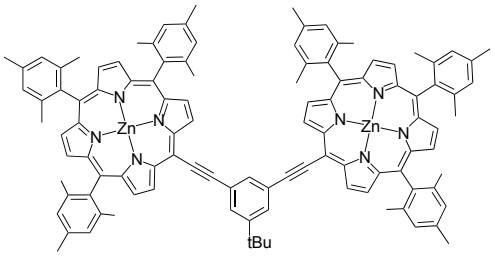

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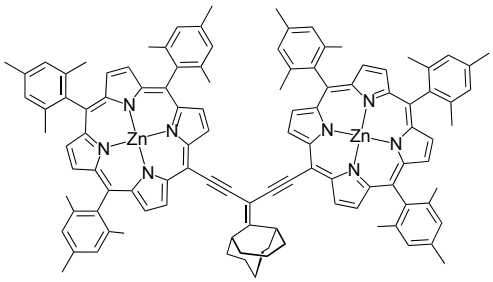

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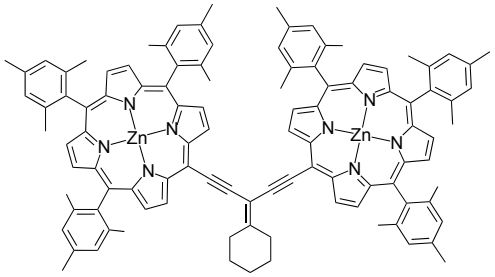

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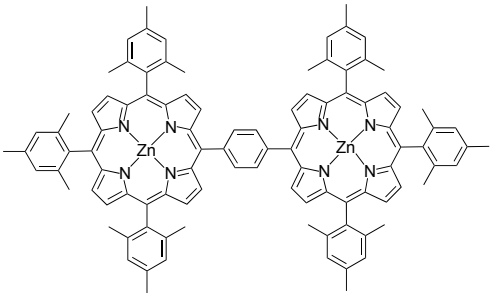

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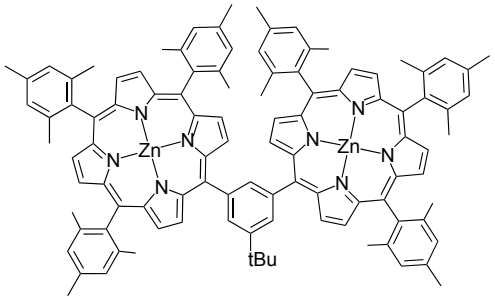

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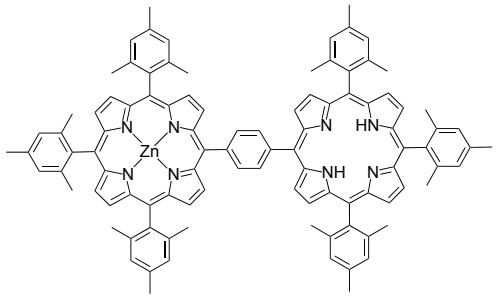
Figure 12. Structures of porphyrin dimers in Table 12



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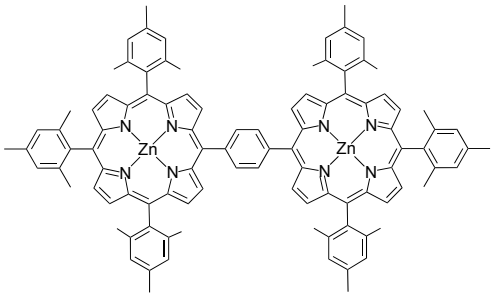

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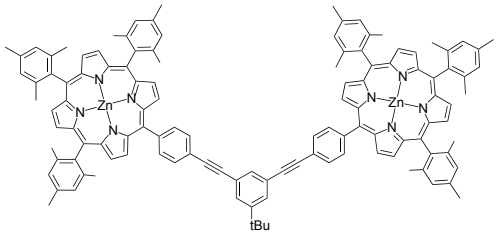

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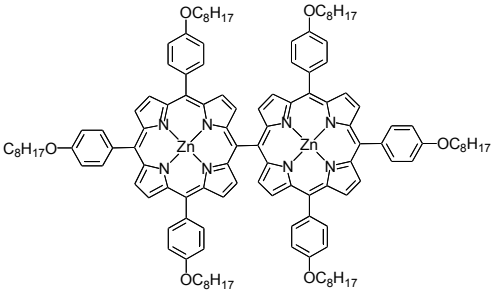

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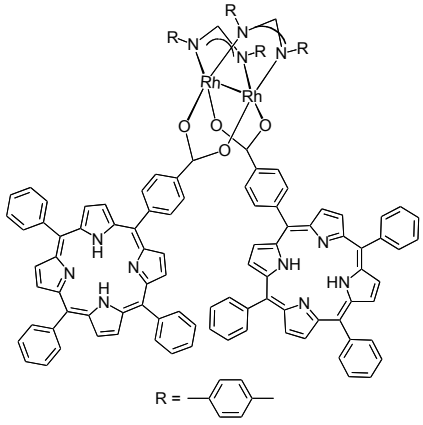

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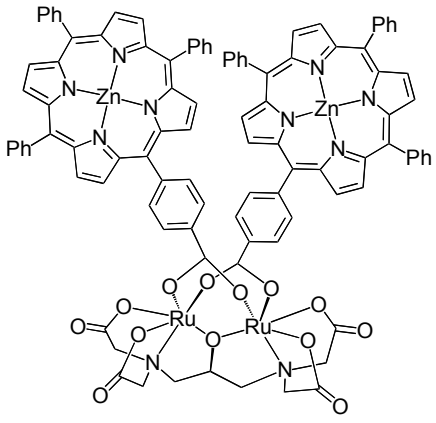

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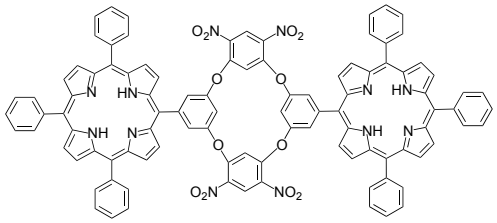
Figure 12. Structures of porphyrin dimers in Table 12



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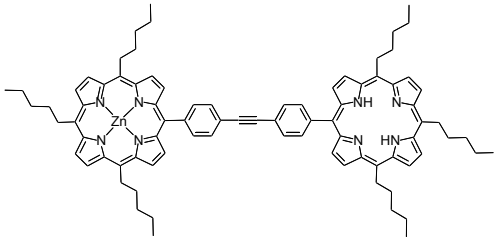

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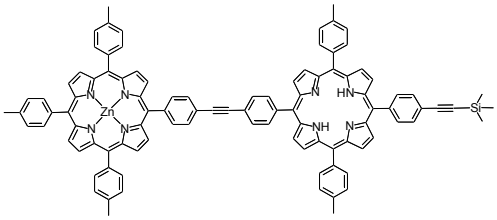

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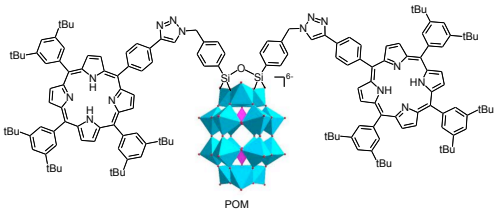

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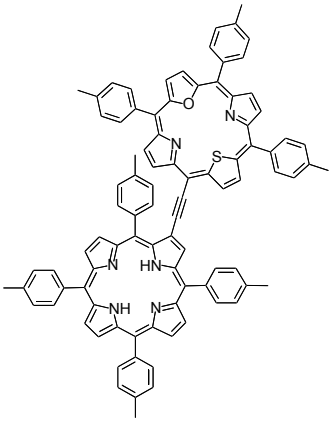

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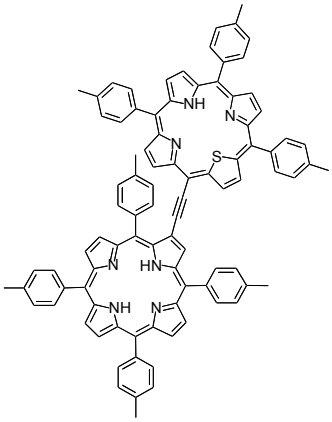

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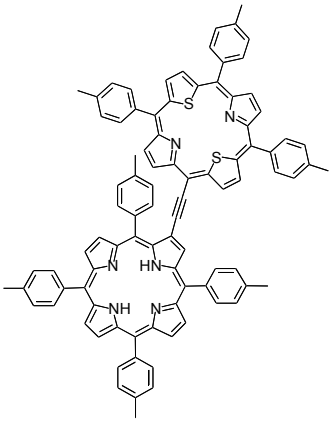
Figure 12. Structures of porphyrin dimers in Table 12



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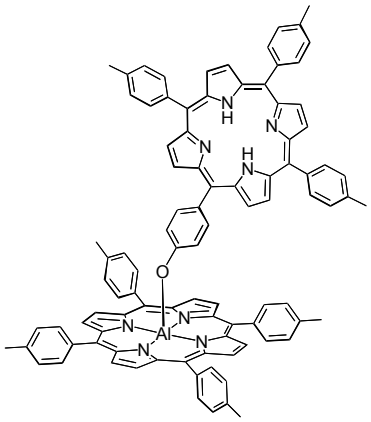

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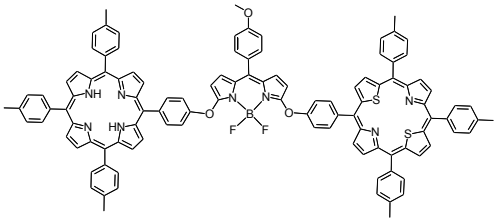

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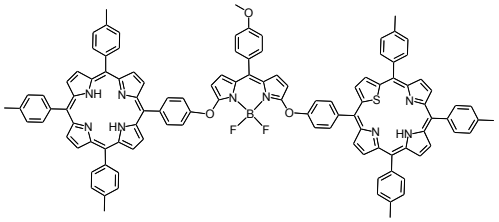

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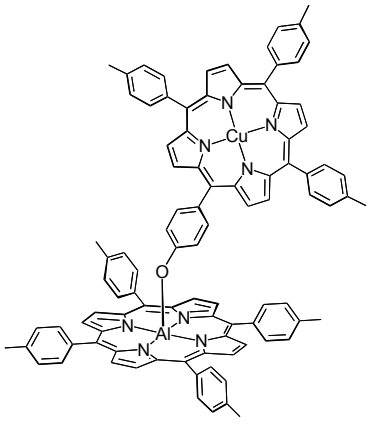

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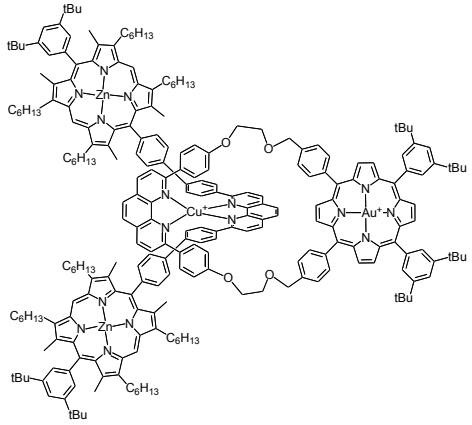
Figure 13. Structures of porphyrin trimers in Table 13



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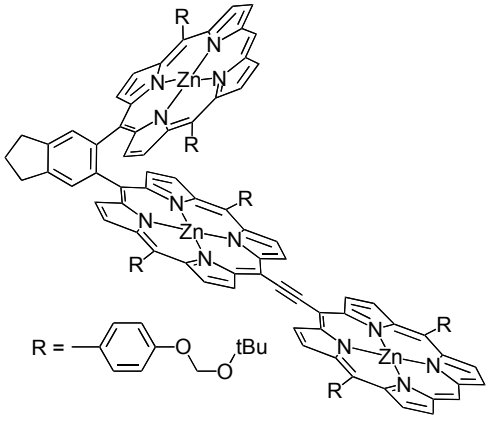

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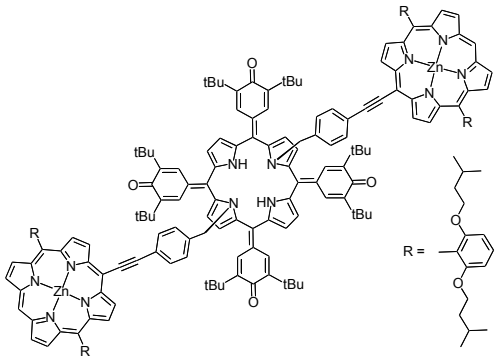

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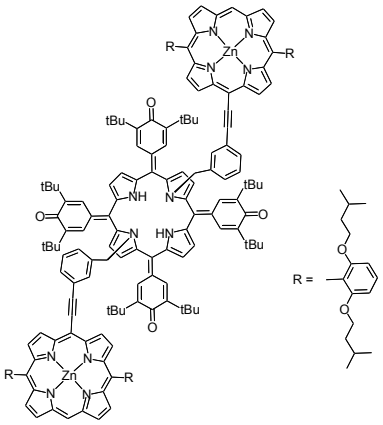

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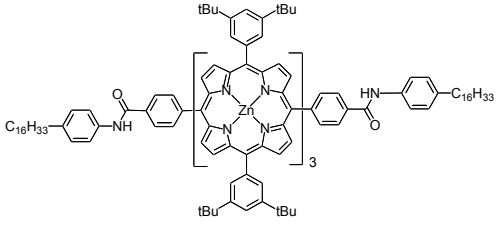

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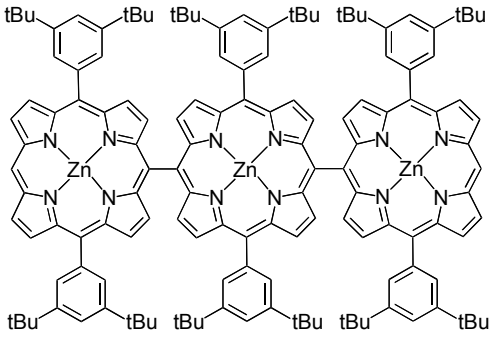

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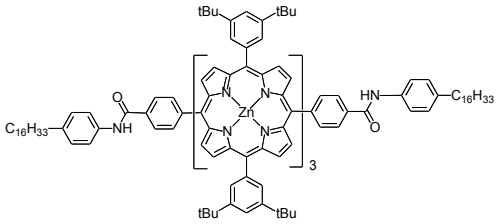
Figure 13. Structures of porphyrin trimers in Table 13



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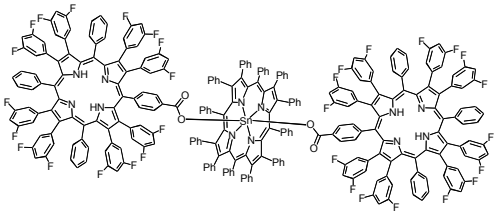

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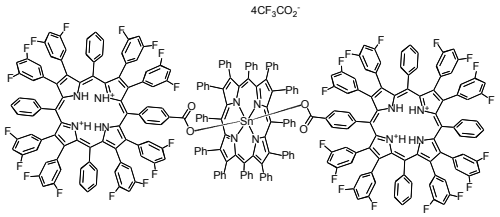

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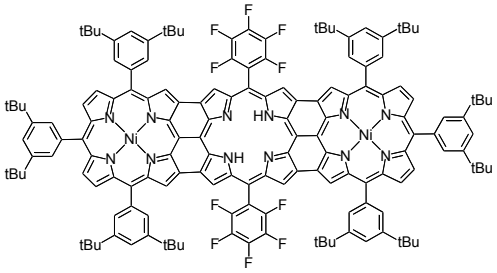

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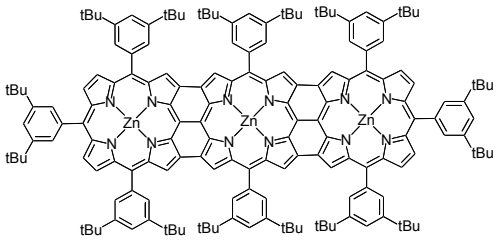

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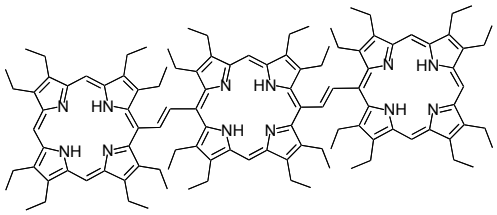

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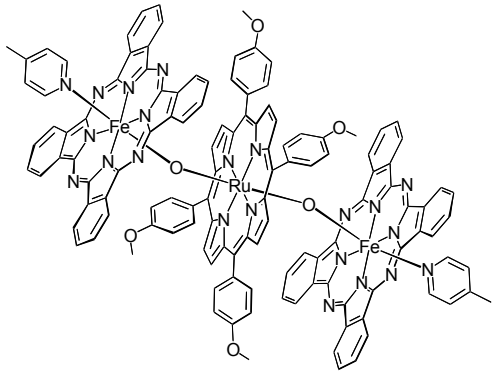
Figure 13. Structures of porphyrin trimers in Table 13



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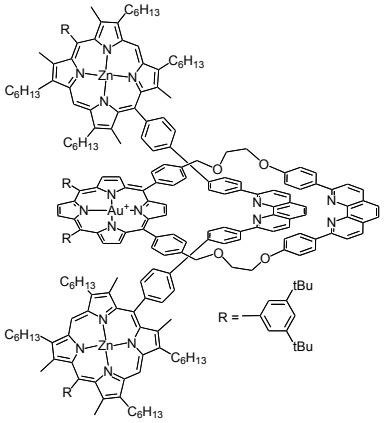

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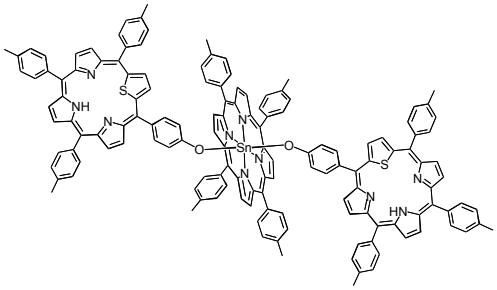

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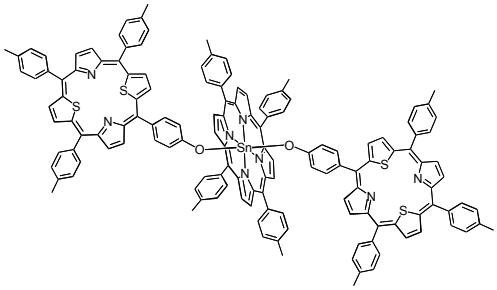

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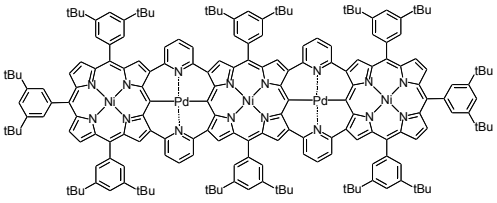

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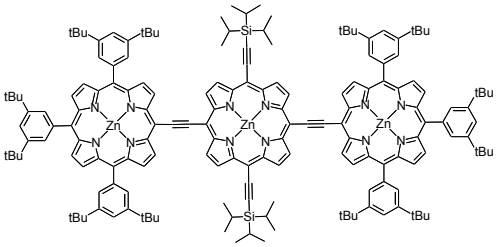

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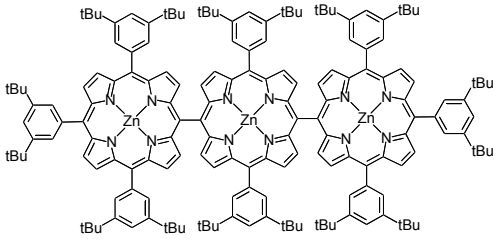
Figure 13. Structures of porphyrin trimers in Table 13



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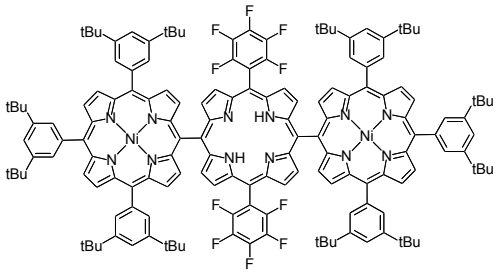

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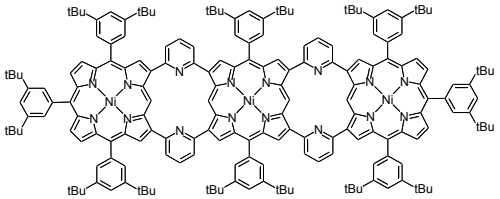

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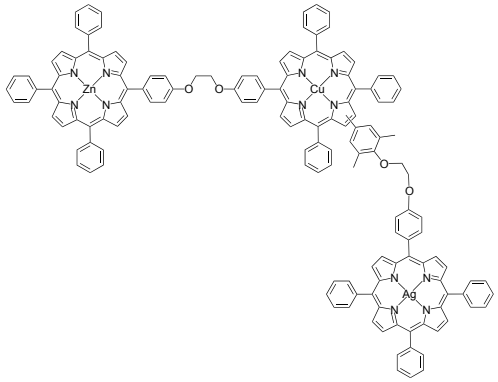

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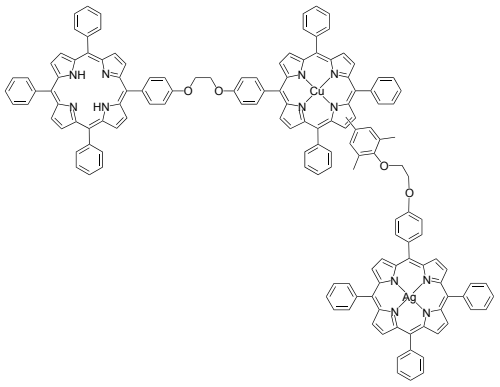

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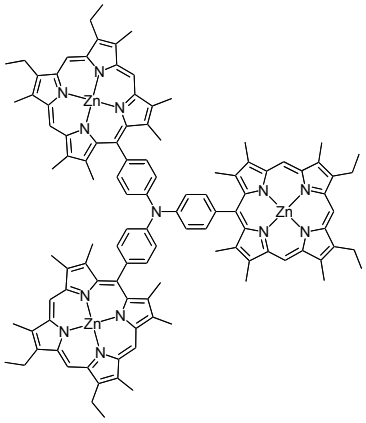

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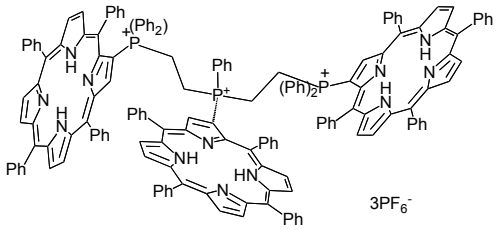
Figure 13. Structures of porphyrin trimers in Table 13



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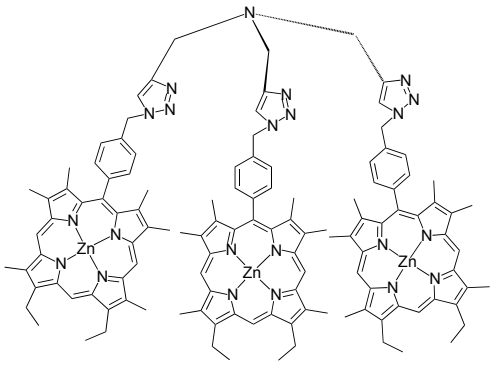

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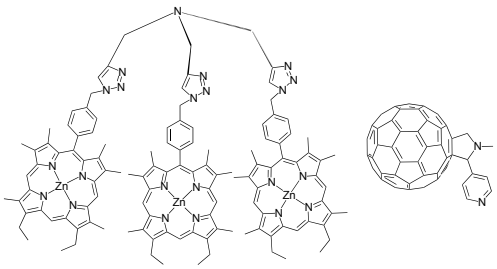

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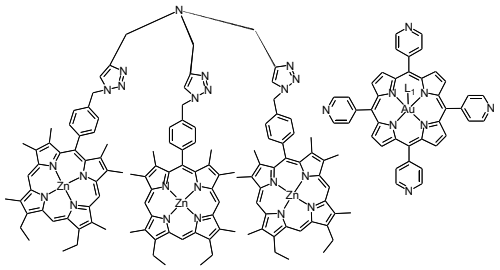

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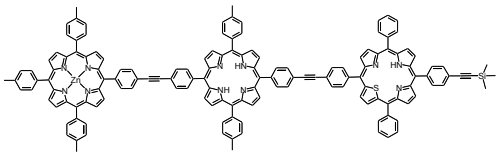

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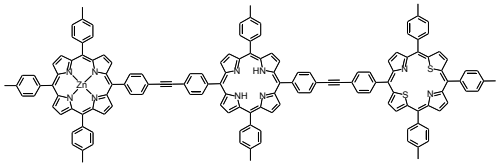

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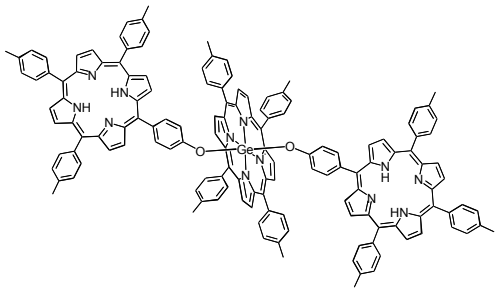
Figure 13. Structures of porphyrin trimers in Table 13



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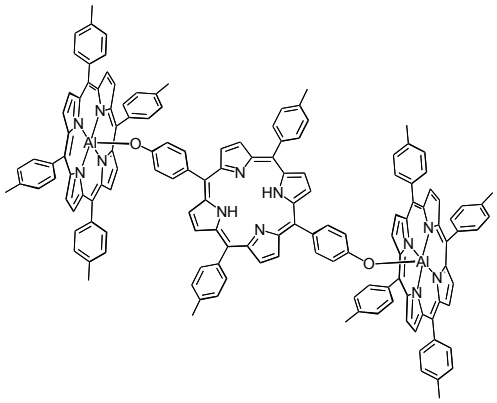

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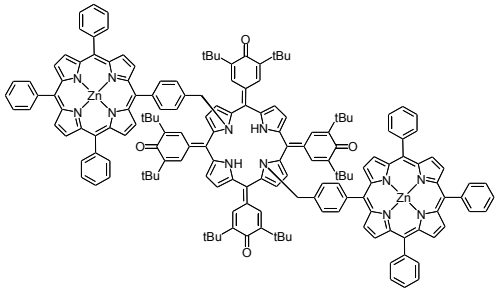

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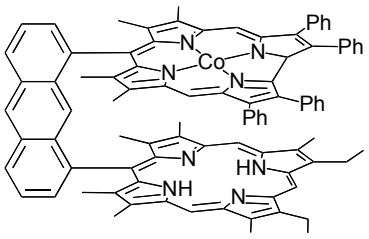
Figure 14. Structures of porphyrin-corrole dyads in Table 14



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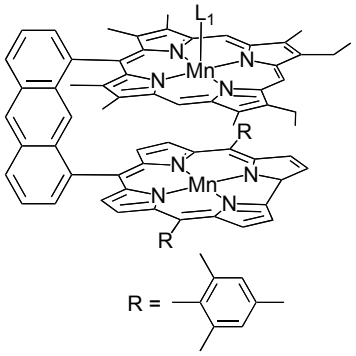

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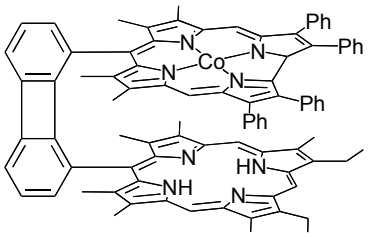

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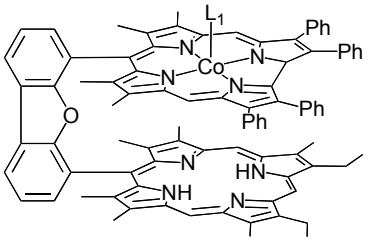

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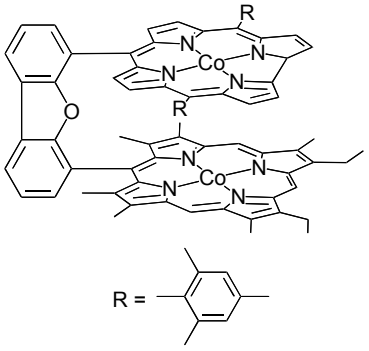

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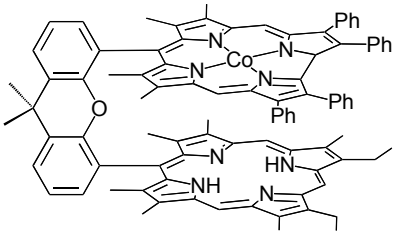

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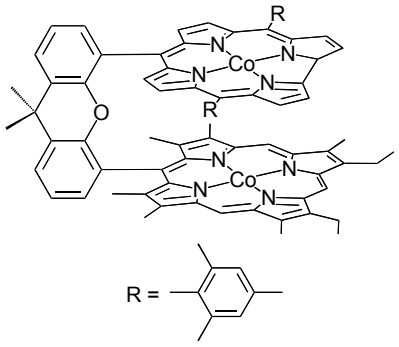
Figure 14. Structures of porphyrin-corrole dyads in Table 14



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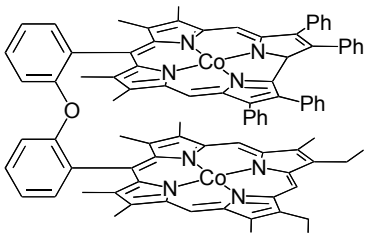

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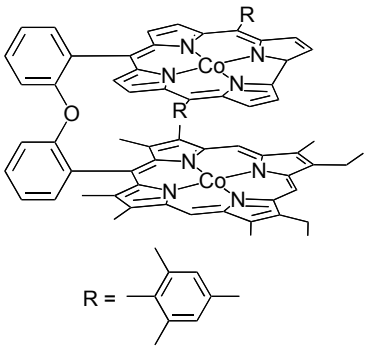

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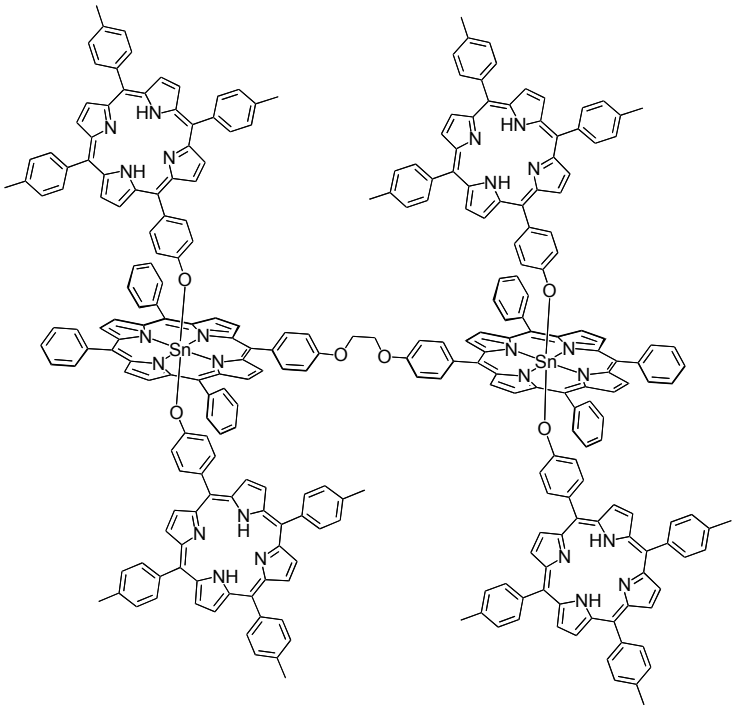
Figure 15. Structures of porphyrin dendrimers, and oligimeric or polymeric porphyrins in Table 15



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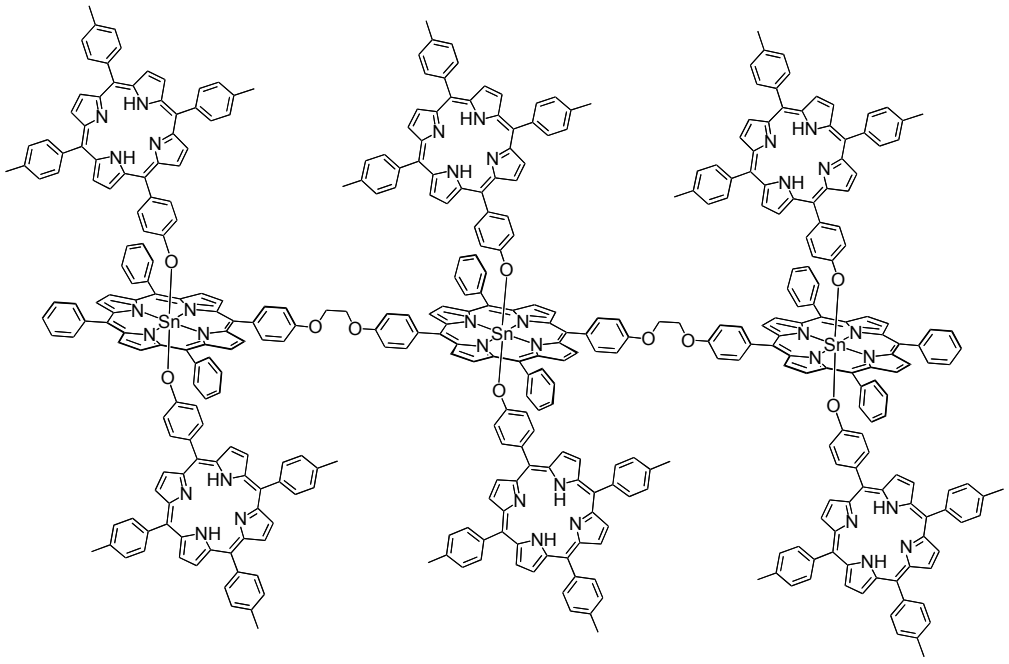

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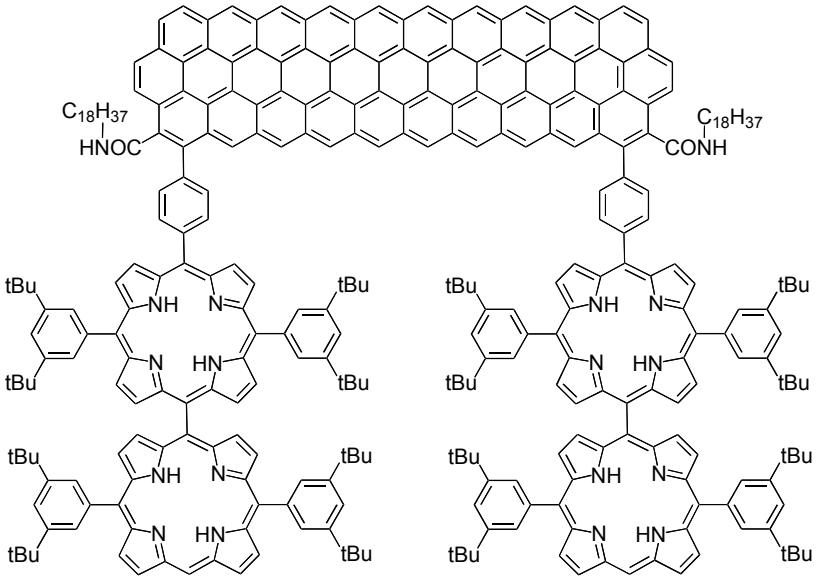
Figure 15. Structures of porphyrin dendrimers, and oligimeric or polymeric porphyrins in Table 15



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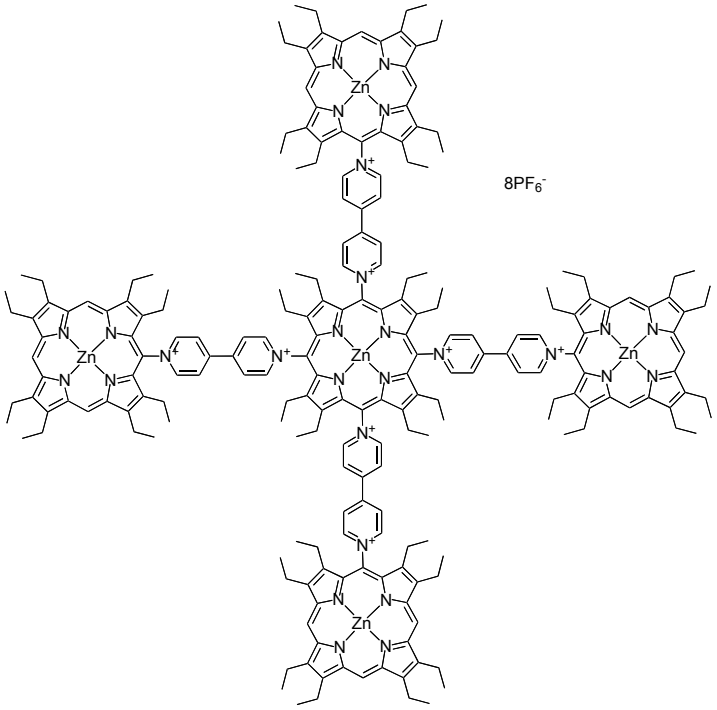

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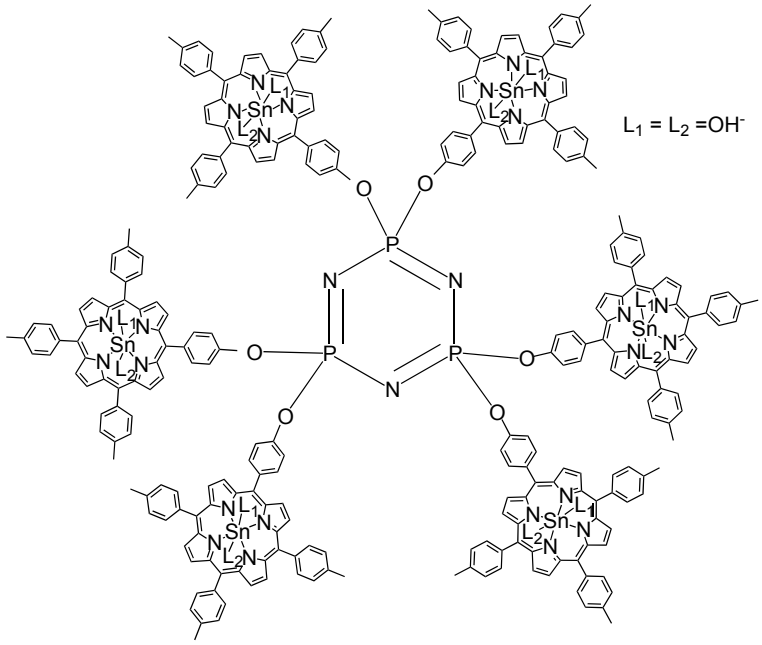
Figure 15. Structures of porphyrin dendrimers, and oligimeric or polymeric porphyrins in Table 15



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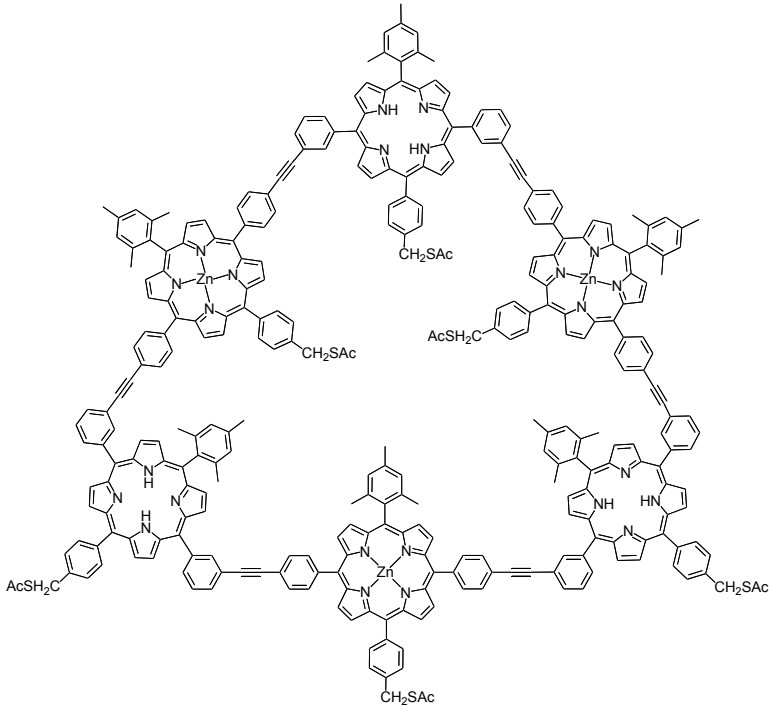

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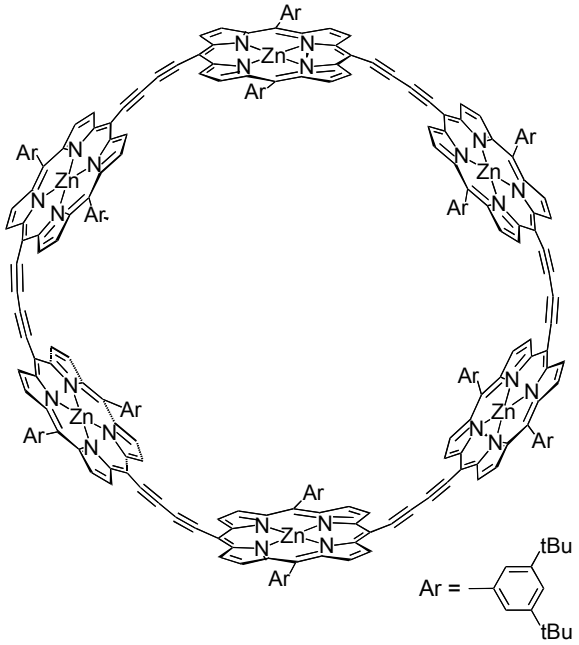
Figure 15. Structures of porphyrin dendrimers, and oligimeric or polymeric porphyrins in Table 15



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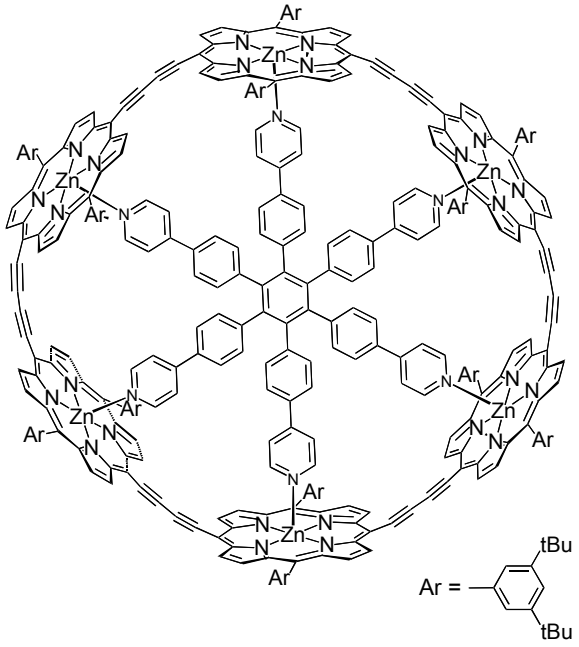

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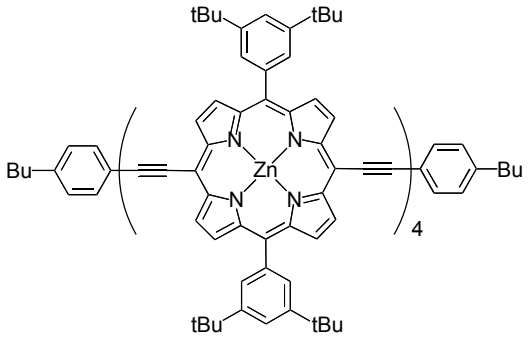
Figure 15. Structures of porphyrin dendrimers, and oligimeric or polymeric porphyrins in Table 15



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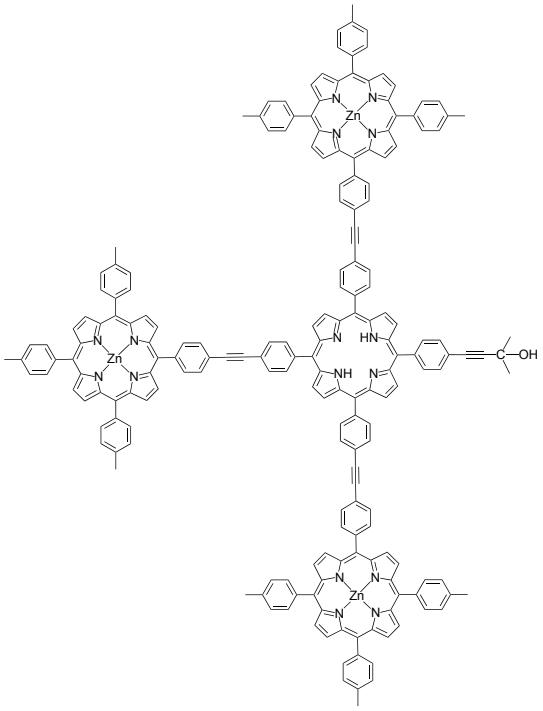

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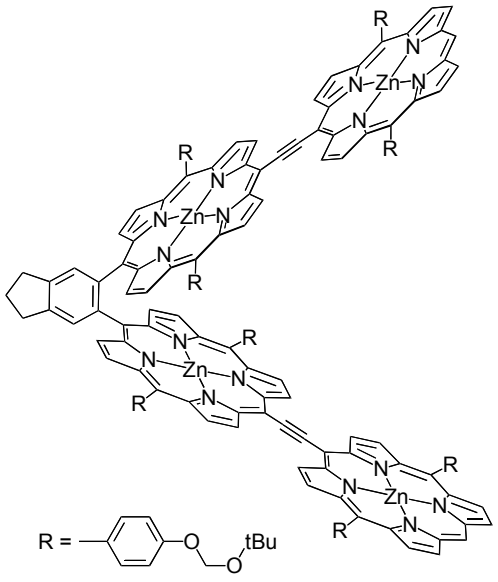
Figure 15. Structures of porphyrin dendrimers, and oligimeric or polymeric porphyrins in Table 15



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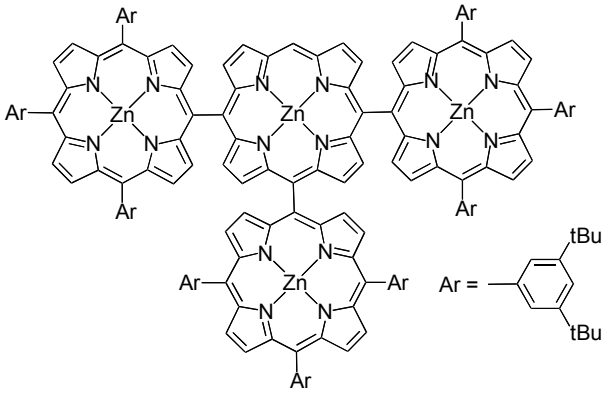

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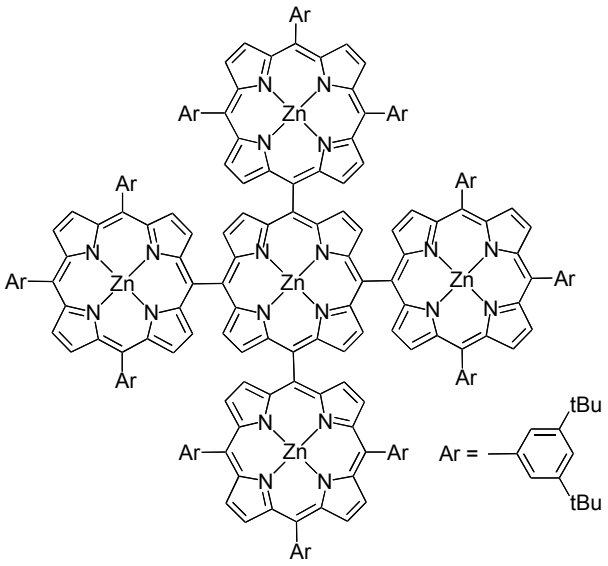
Figure 15. Structures of porphyrin dendrimers, and oligimeric or polymeric porphyrins in Table 15



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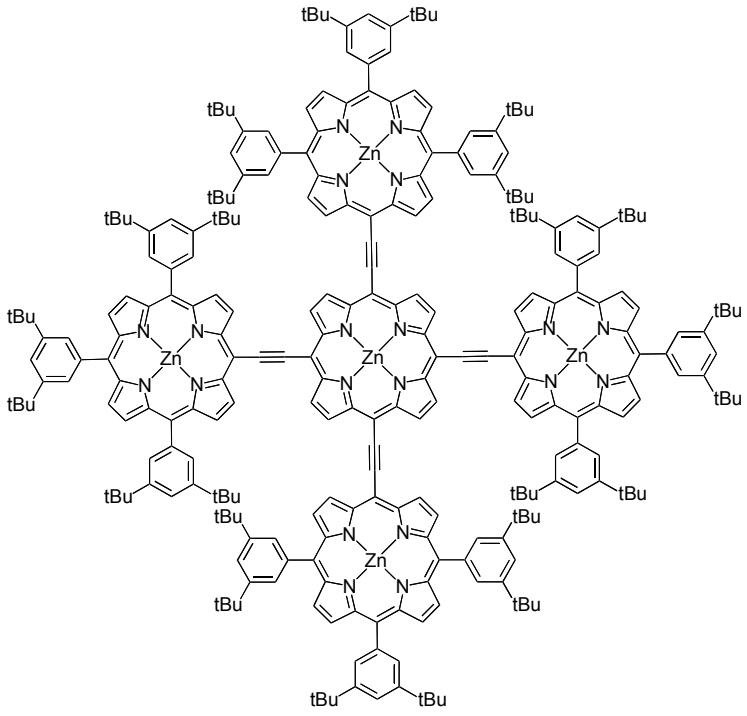

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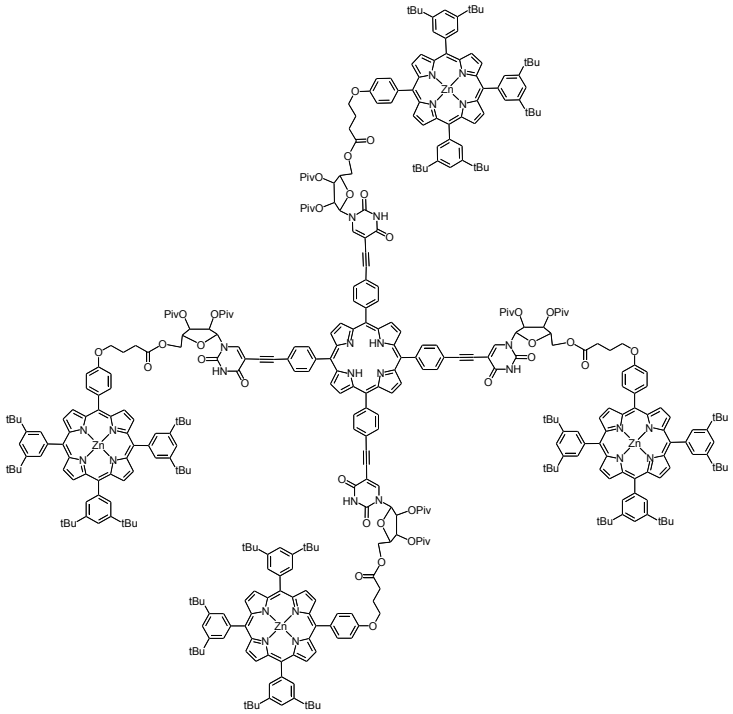
Figure 15. Structures of porphyrin dendrimers, and oligimeric or polymeric porphyrins in Table 15



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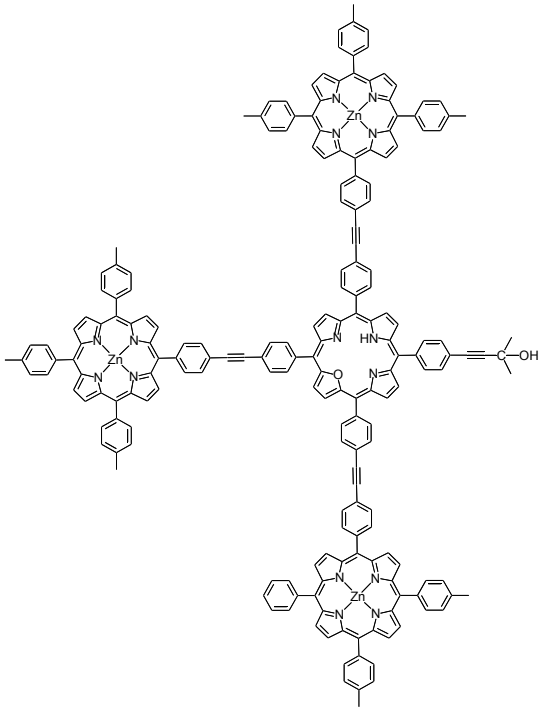

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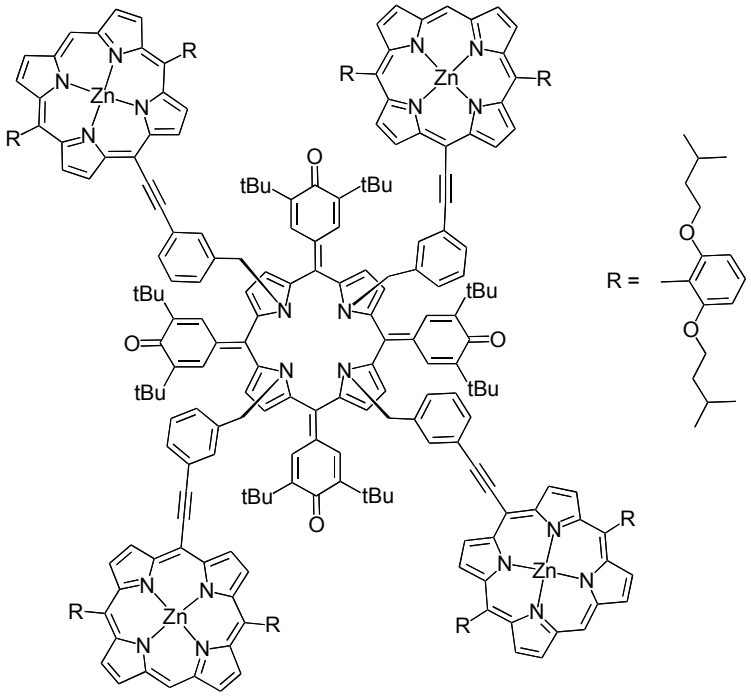
Figure 15. Structures of porphyrin dendrimers, and oligimeric or polymeric porphyrins in Table 15



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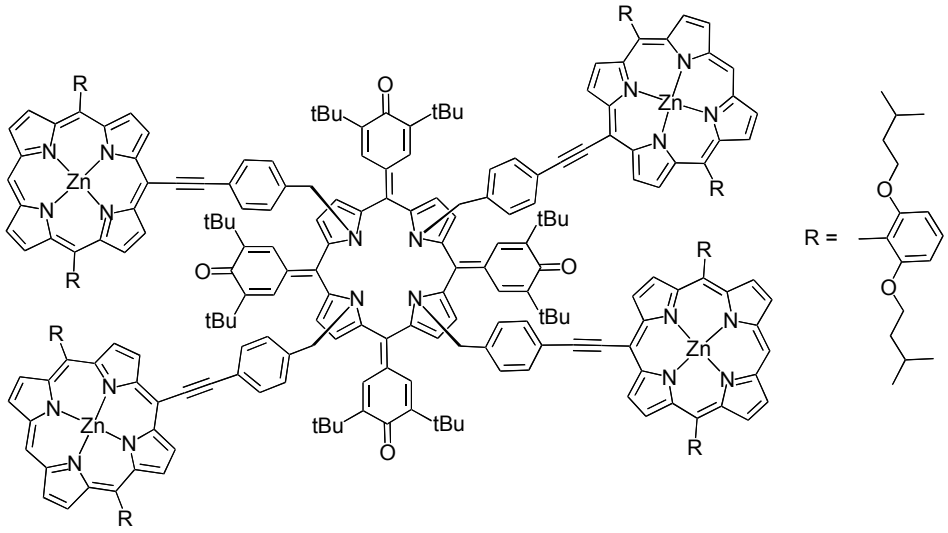

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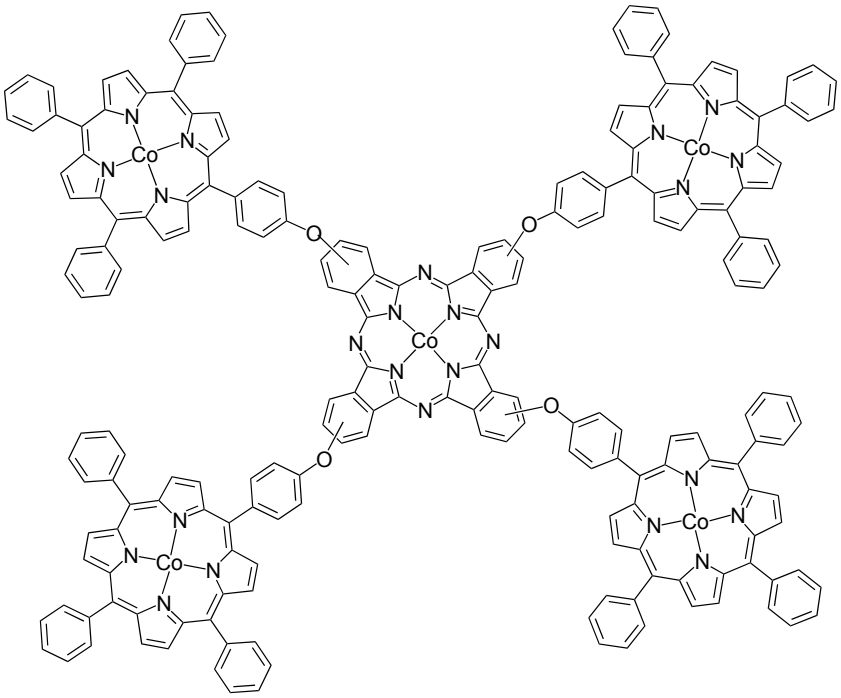
Figure 15. Structures of porphyrin dendrimers, and oligimeric or polymeric porphyrins in Table 15



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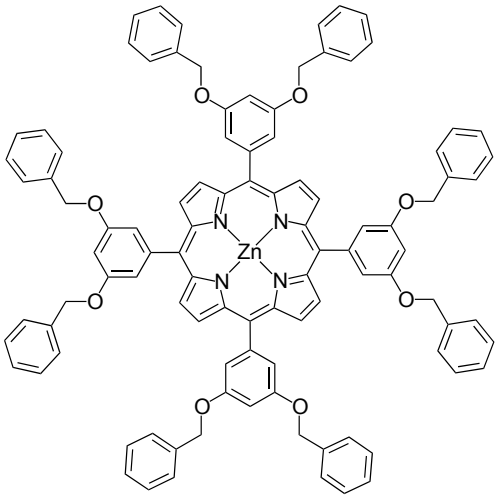

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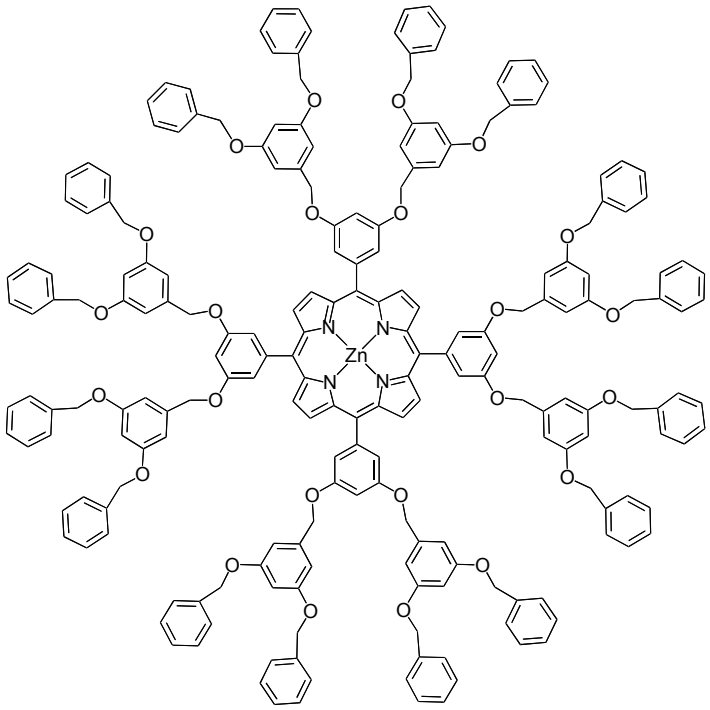
Figure 15. Structures of porphyrin dendrimers, and oligimeric or polymeric porphyrins in Table 15



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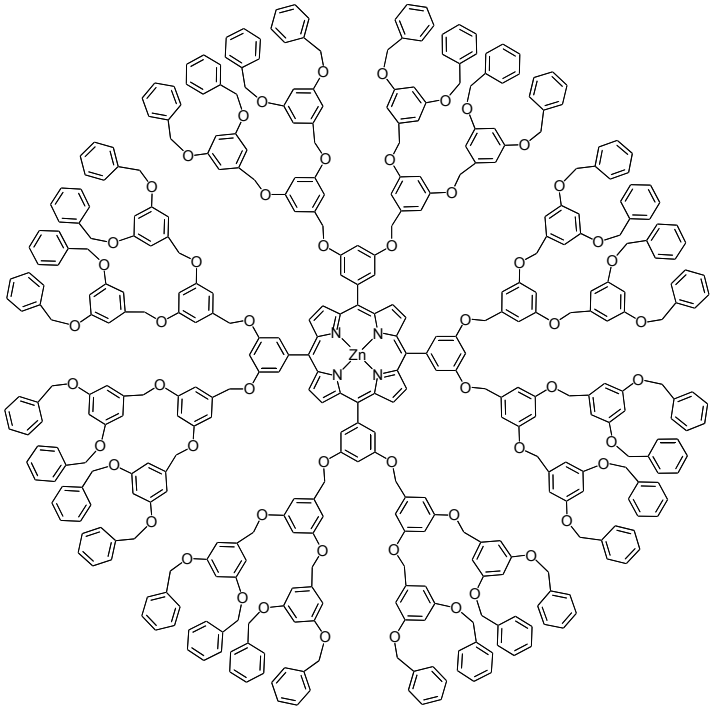

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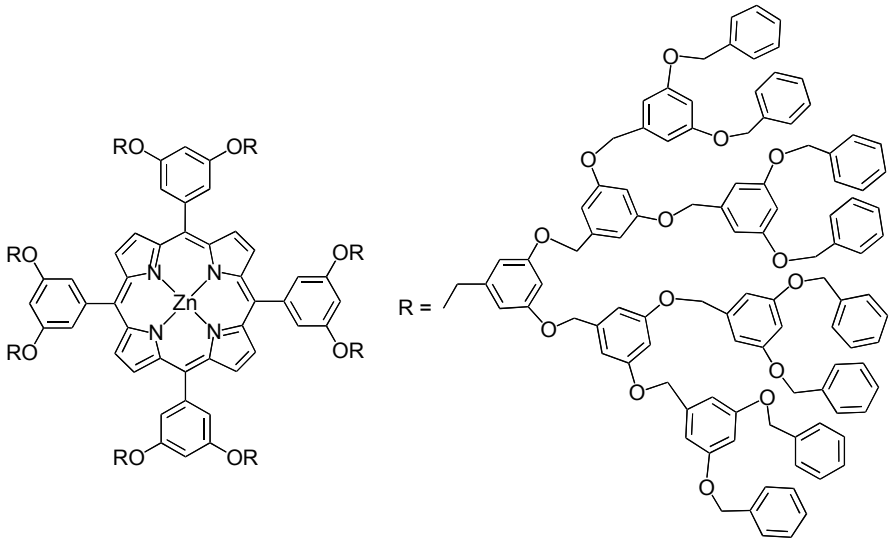
Figure 15. Structures of porphyrin dendrimers, and oligimeric or polymeric porphyrins in Table 15



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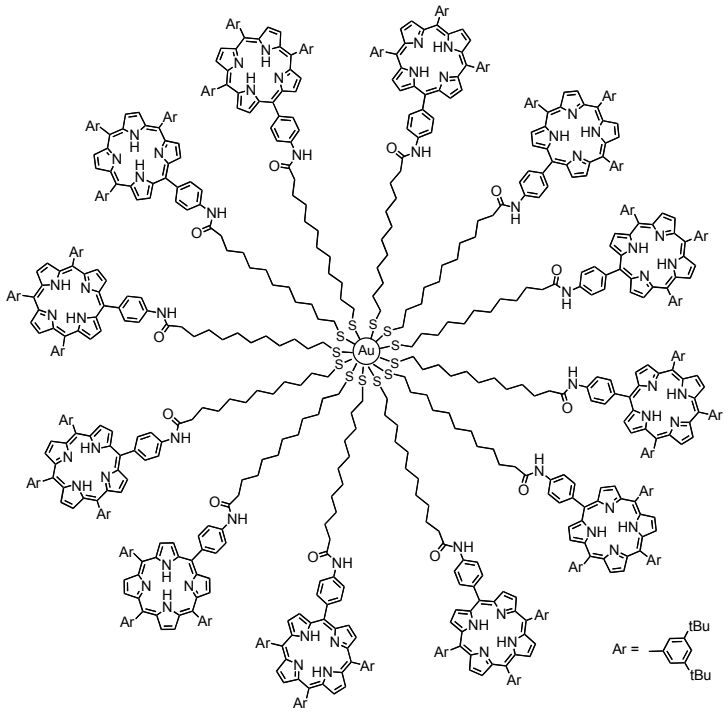

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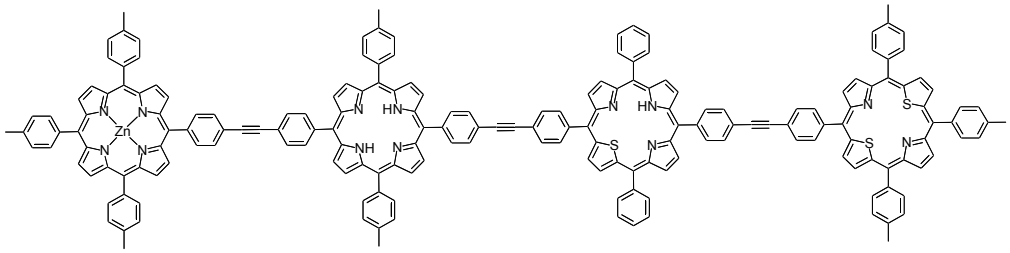
Figure 15. Structures of porphyrin dendrimers, and oligimeric or polymeric porphyrins in Table 15



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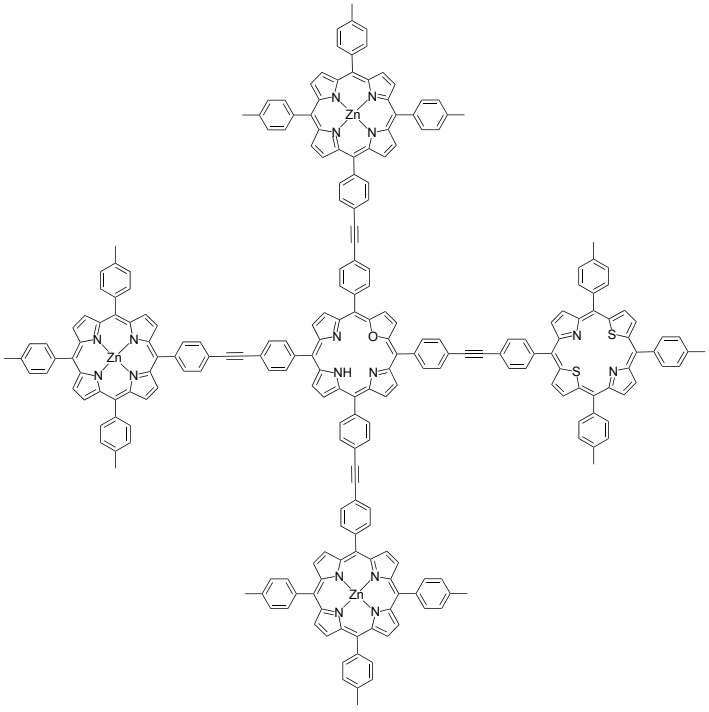

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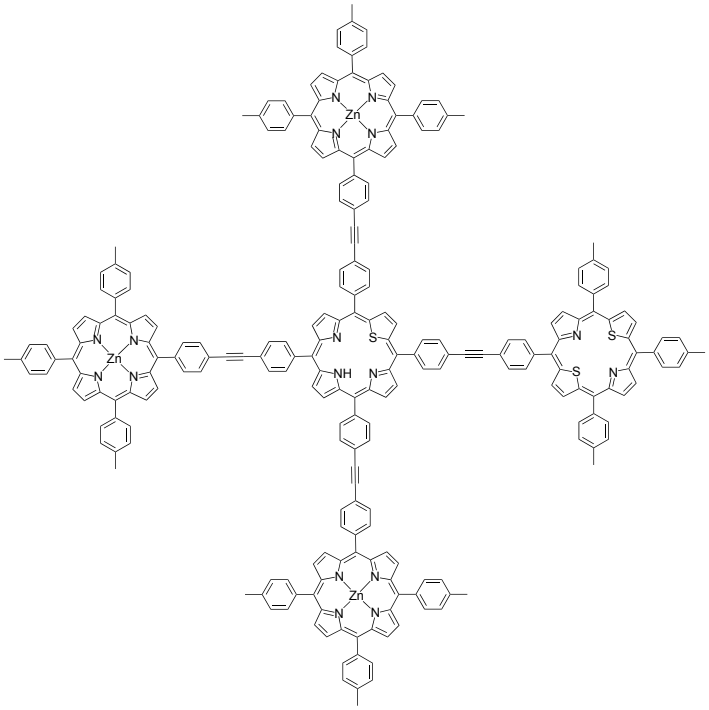
Figure 15. Structures of porphyrin dendrimers, and oligimeric or polymeric porphyrins in Table 15



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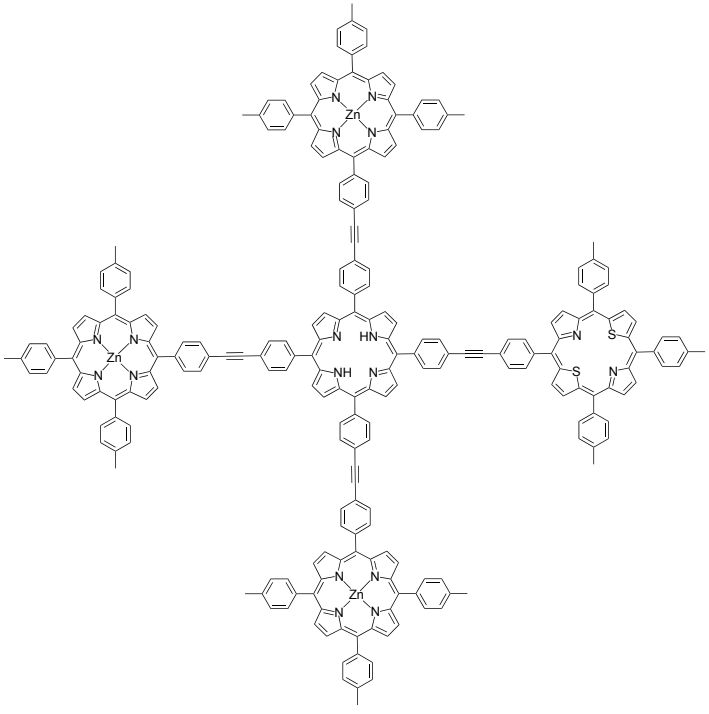

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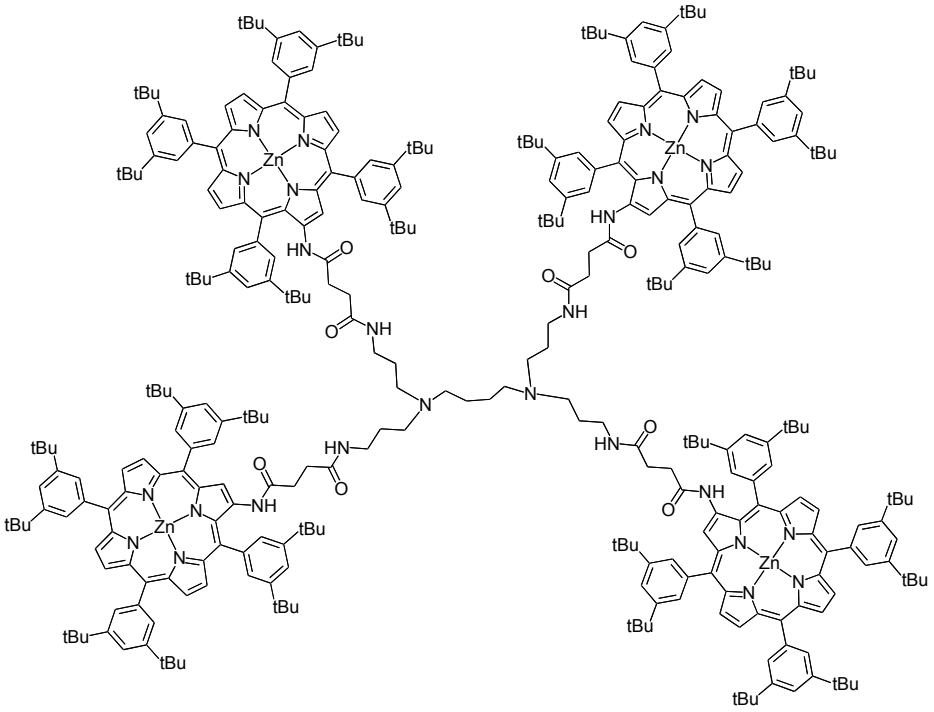
Figure 15. Structures of porphyrin dendrimers, and oligimeric or polymeric porphyrins in Table 15



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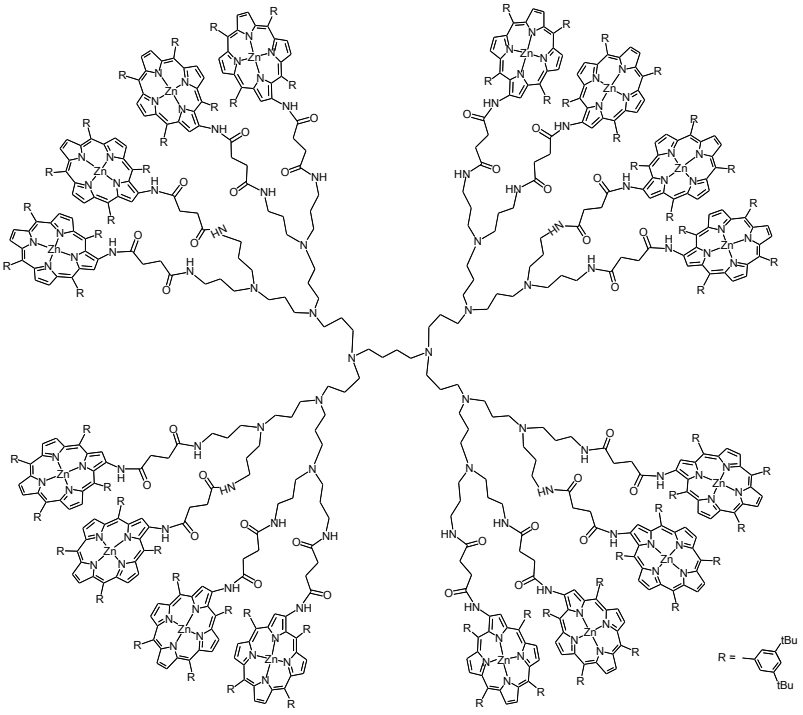

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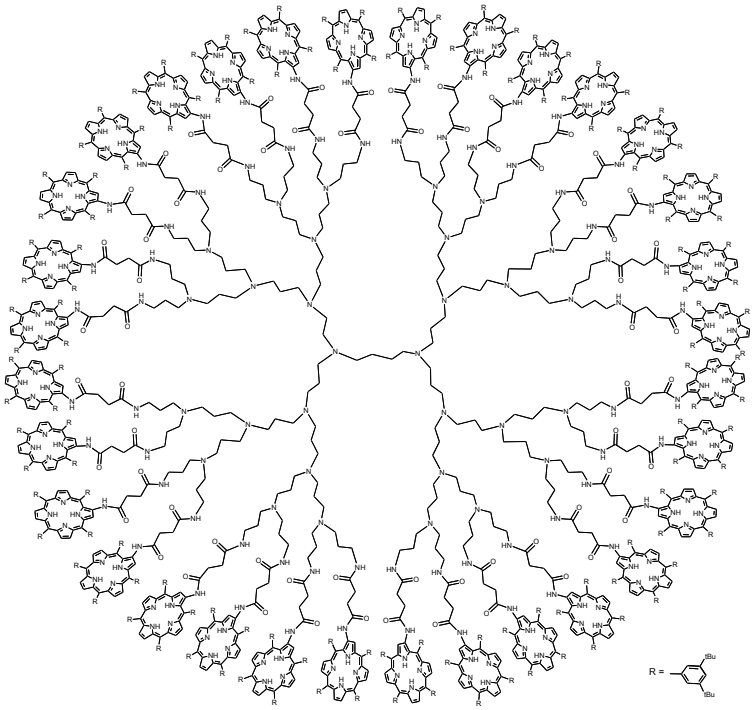
Figure 15. Structures of porphyrin dendrimers, and oligimeric or polymeric porphyrins in Table 15



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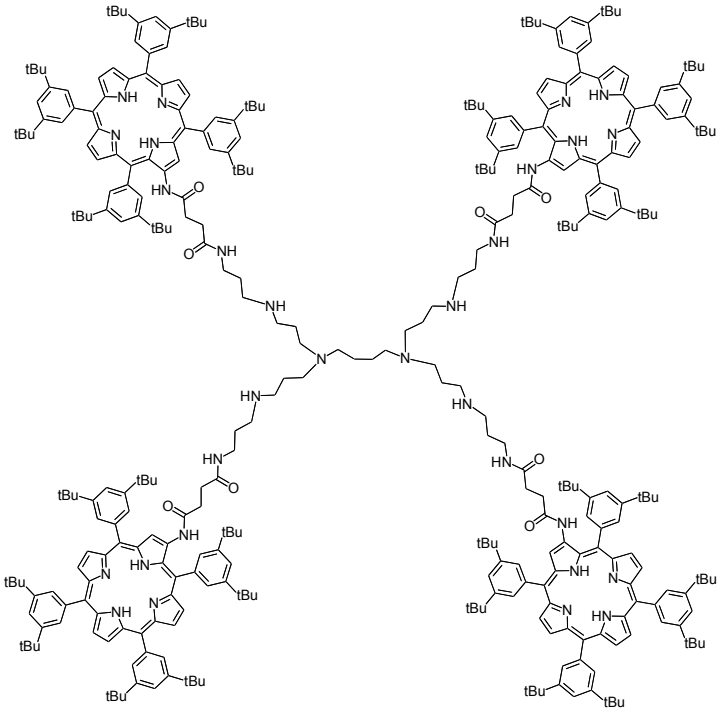

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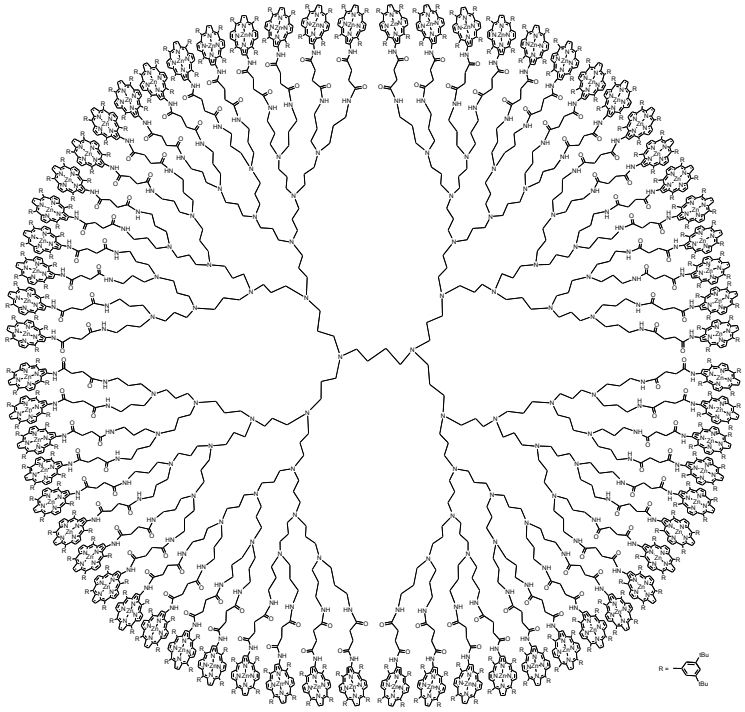
Figure 15. Structures of porphyrin dendrimers, and oligimeric or polymeric porphyrins in Table 15



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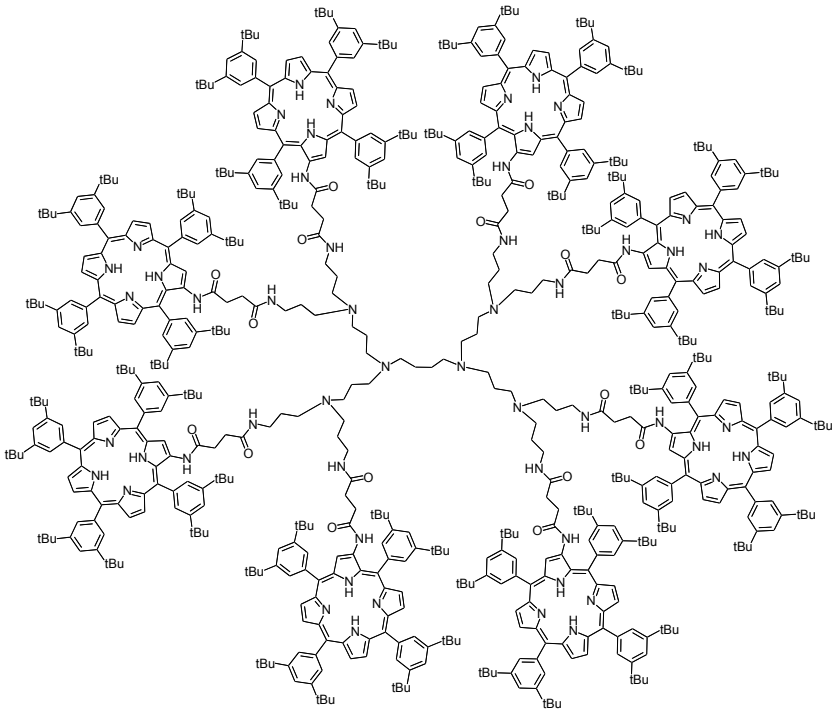

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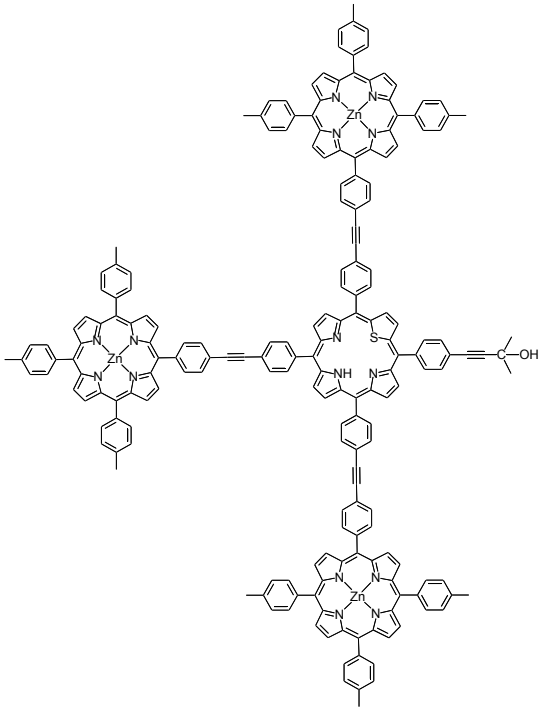
Figure 15. Structures of porphyrin dendrimers, and oligimeric or polymeric porphyrins in Table 15



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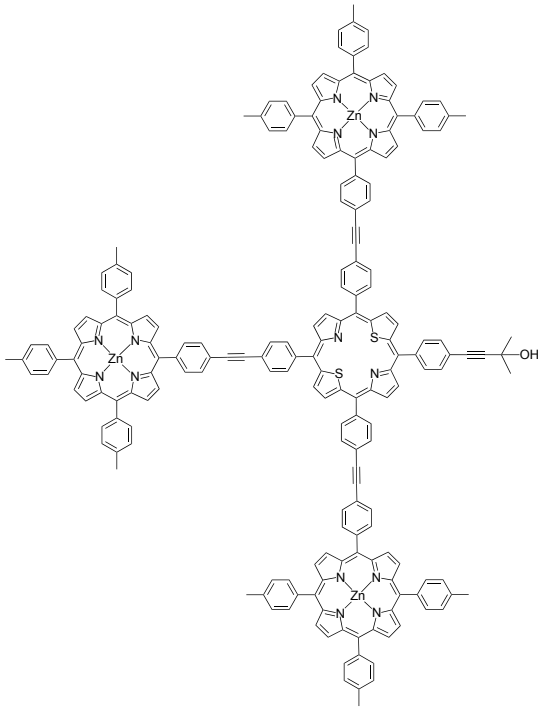

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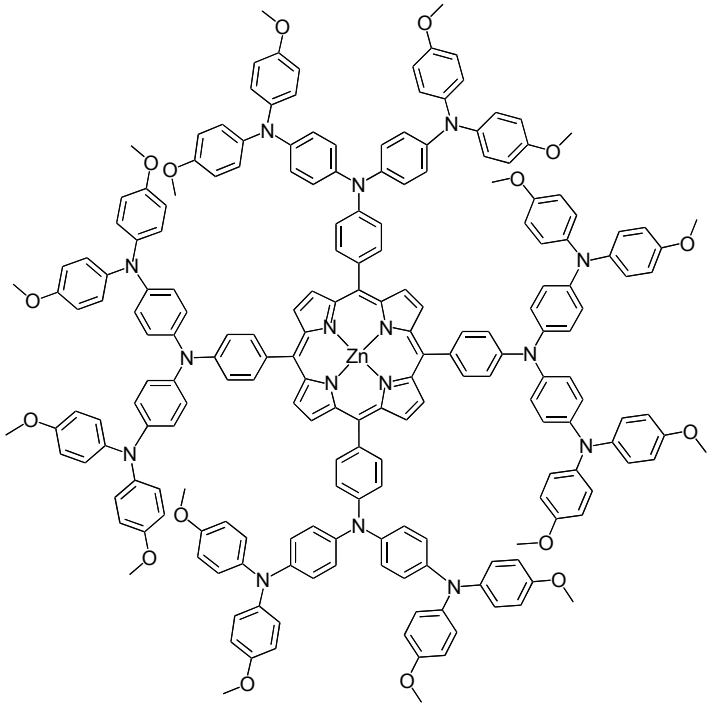
Figure 15. Structures of porphyrin dendrimers, and oligimeric or polymeric porphyrins in Table 15



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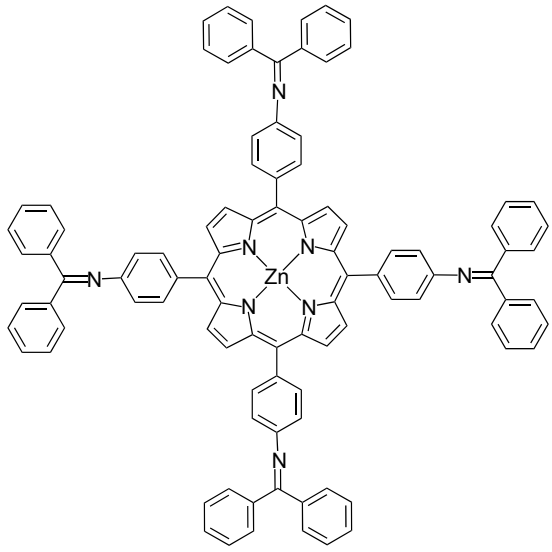

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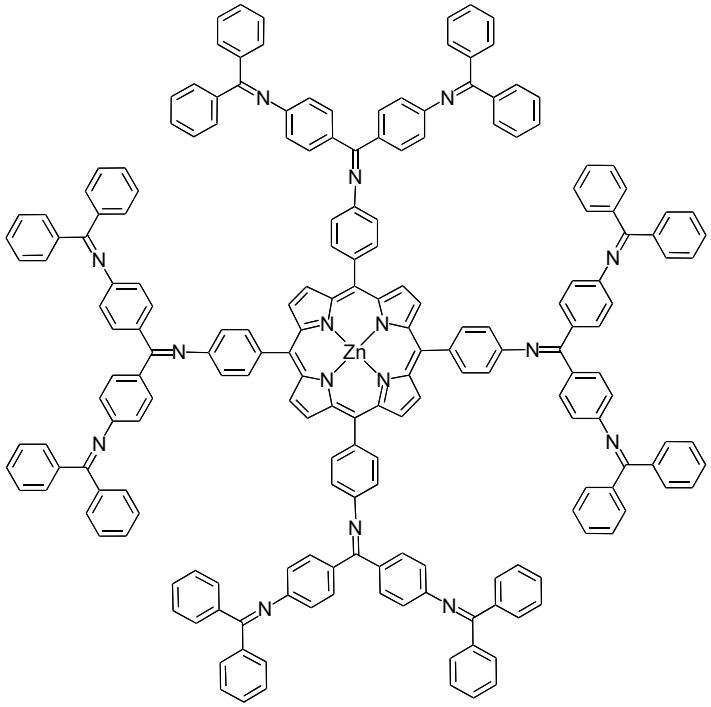

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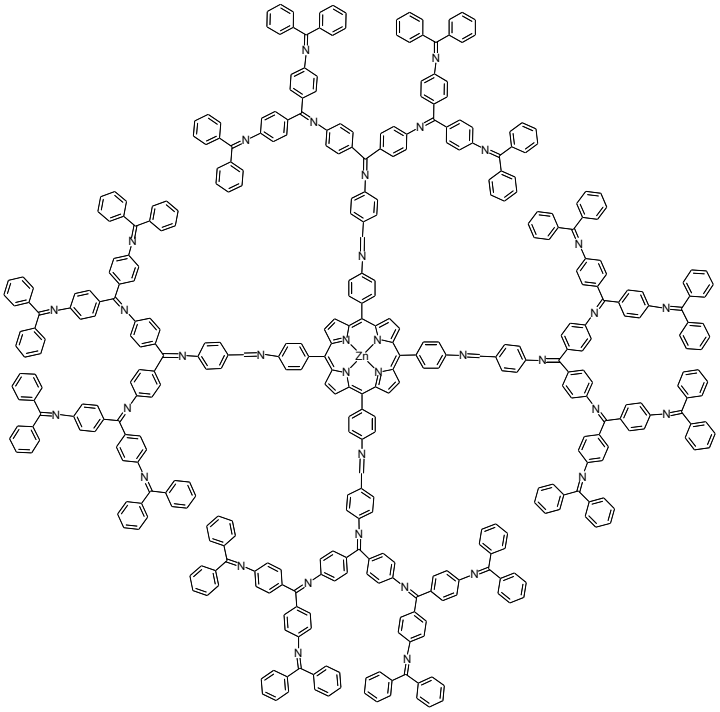

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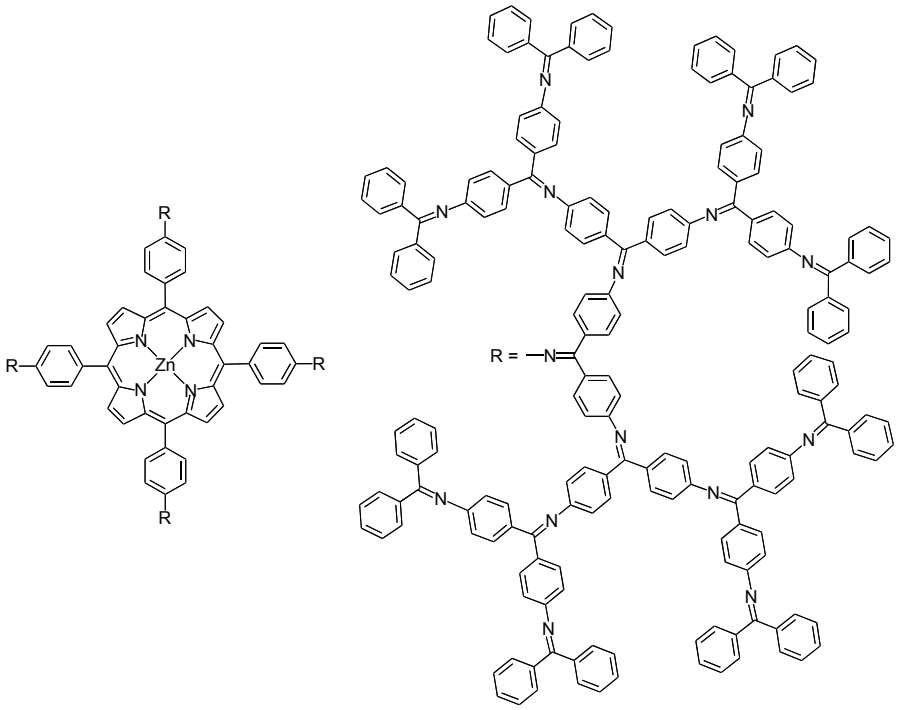
Figure 15. Structures of porphyrin dendrimers, and oligimeric or polymeric porphyrins in Table 15



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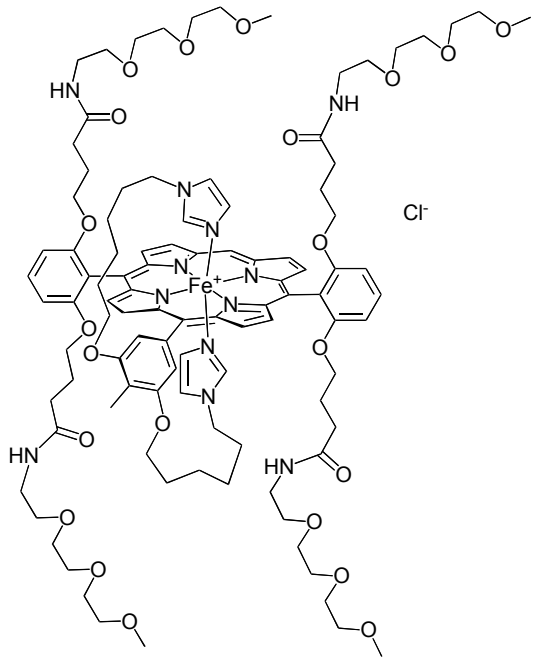

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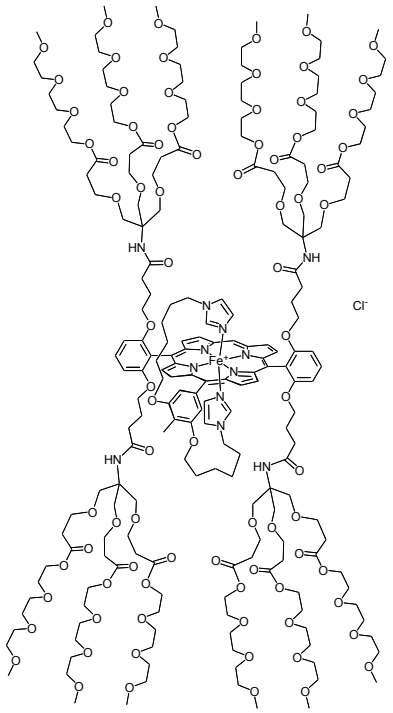
Figure 15. Structures of porphyrin dendrimers, and oligimeric or polymeric porphyrins in Table 15



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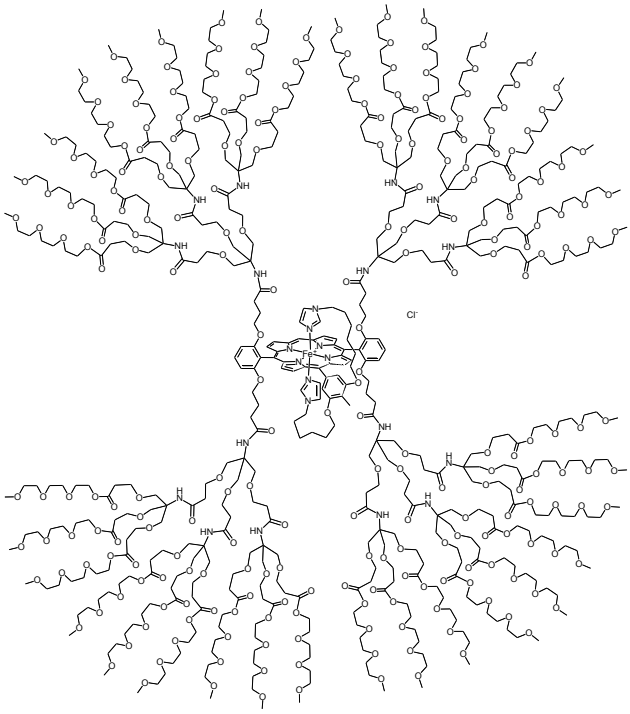

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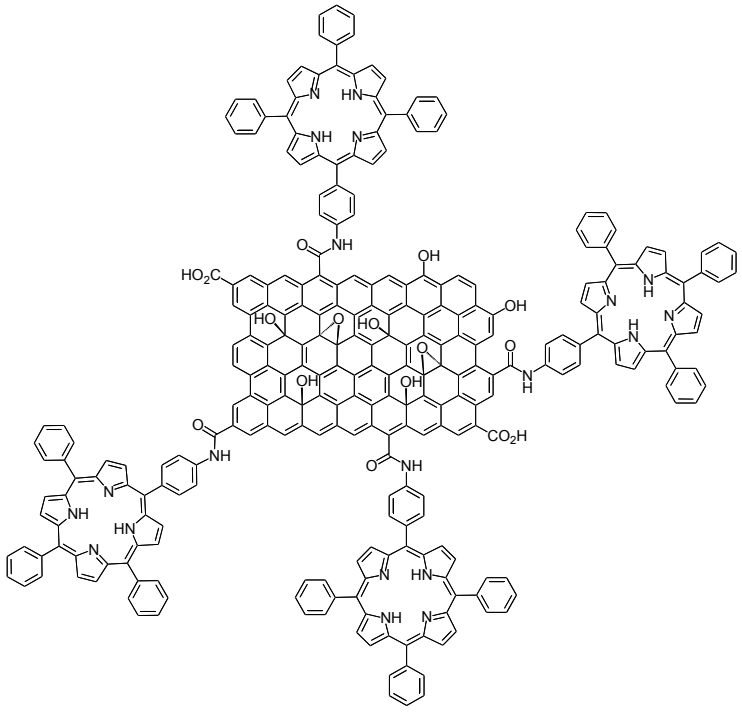
Figure 15. Structures of porphyrin dendrimers, and oligimeric or polymeric porphyrins in Table 15



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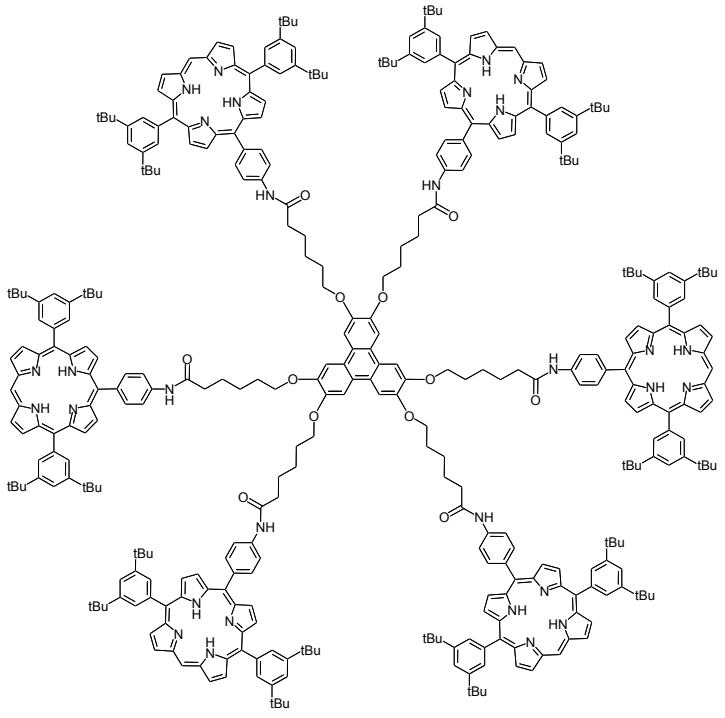

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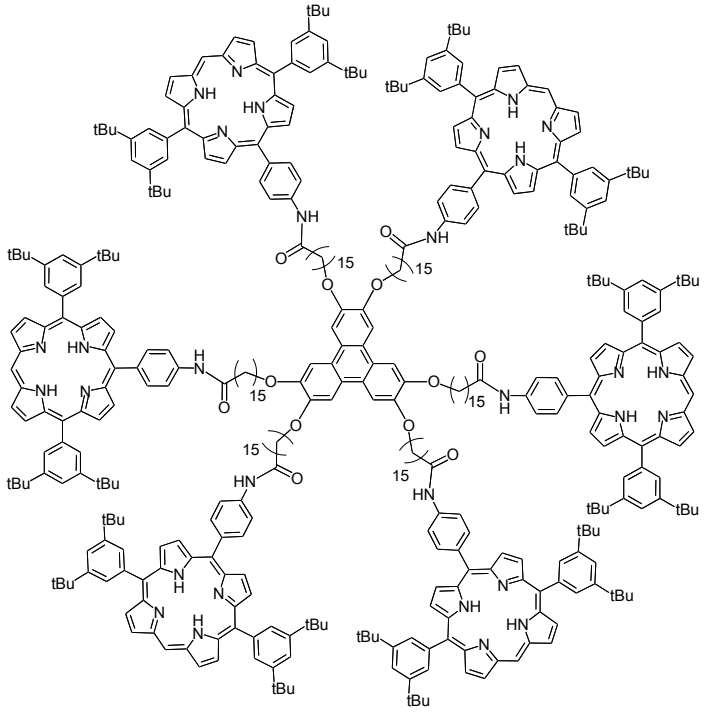
Figure 15. Structures of porphyrin dendrimers, and oligimeric or polymeric porphyrins in Table 15



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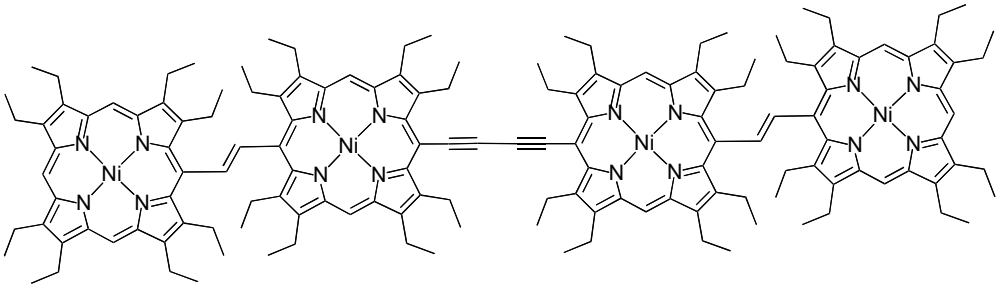

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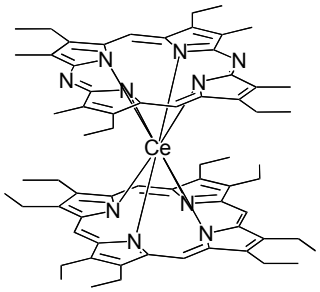
Figure 16. Structures of porphyrin metal sandwich complexes in Table 16



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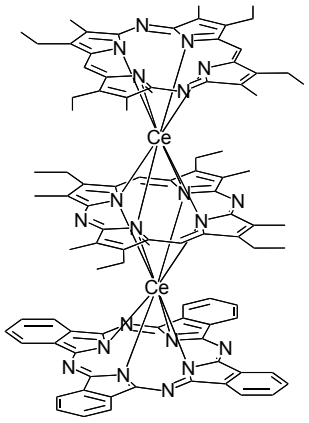

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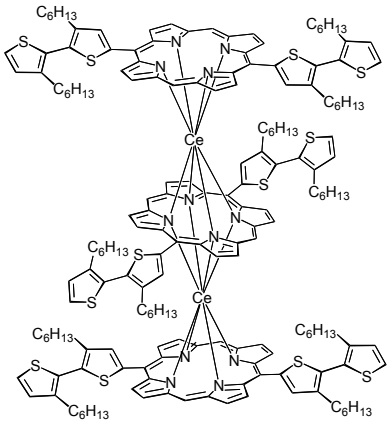

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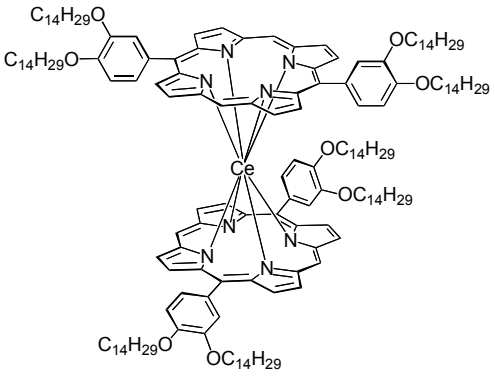

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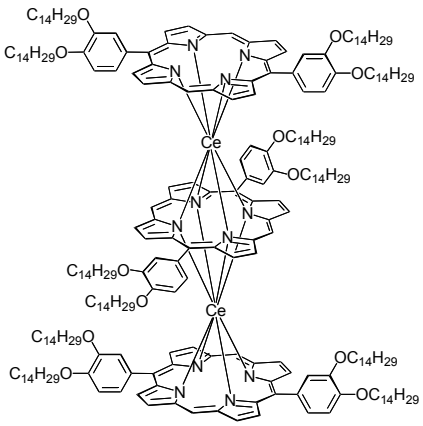

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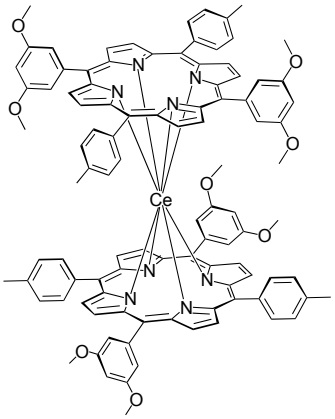

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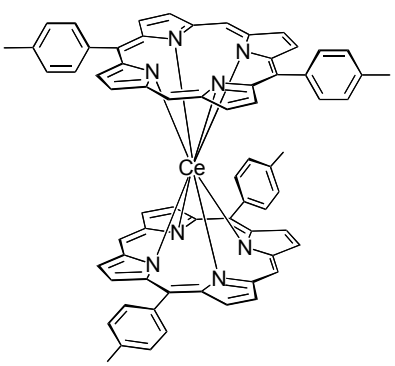
Figure 16. Structures of porphyrin metal sandwich complexes in Table 16



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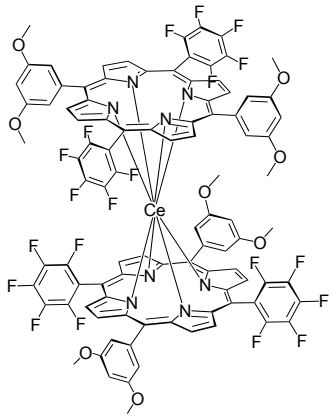

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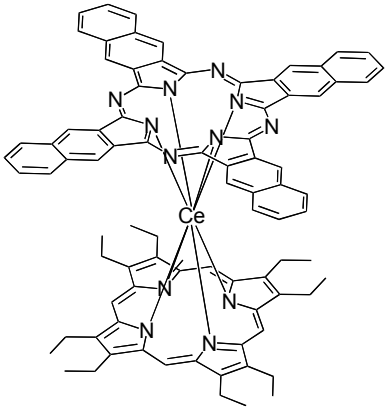

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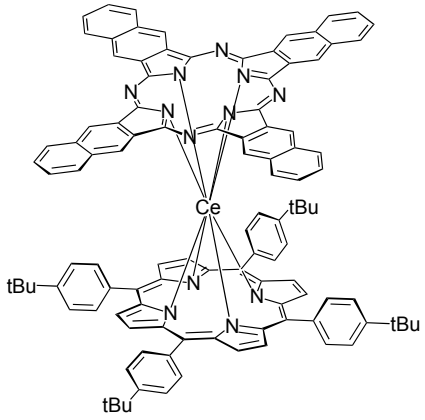

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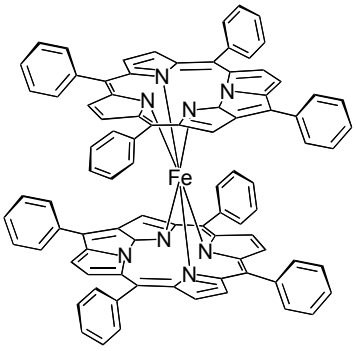

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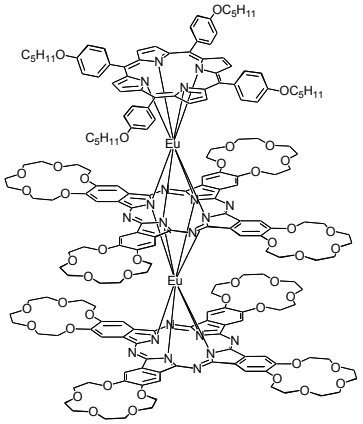

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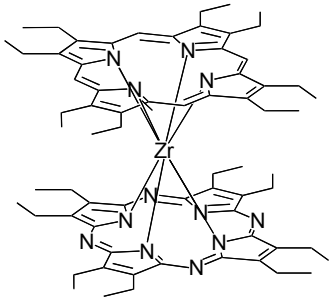
Figure 16. Structures of porphyrin metal sandwich complexes in Table 16



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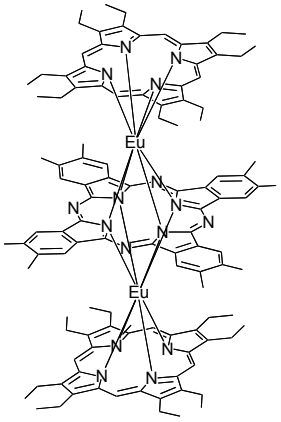

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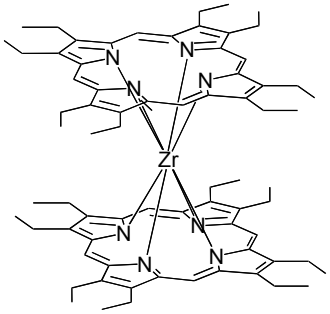

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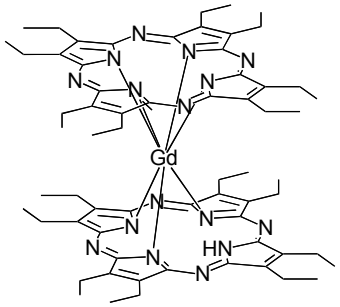

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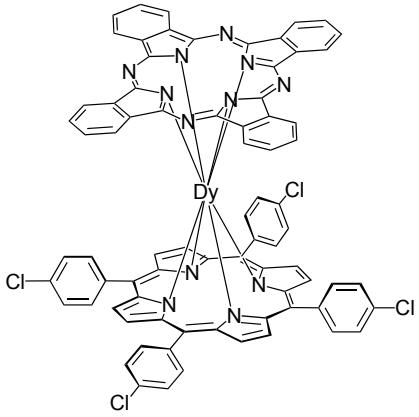

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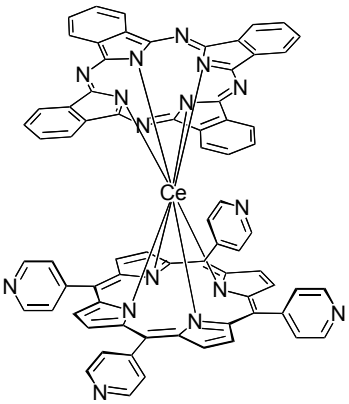

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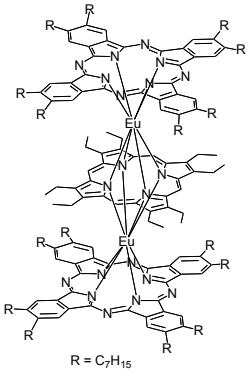
Figure 16. Structures of porphyrin metal sandwich complexes in Table 16



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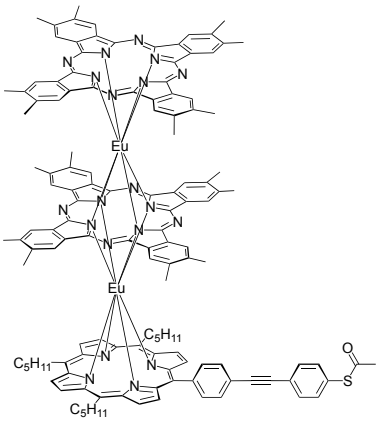

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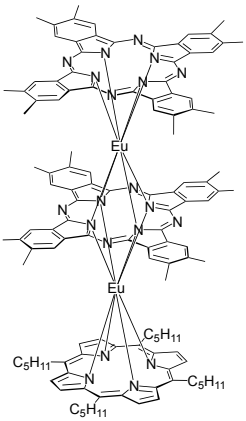

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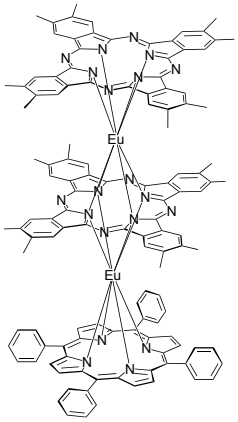

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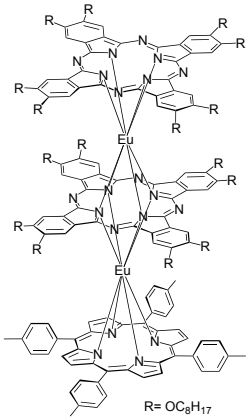

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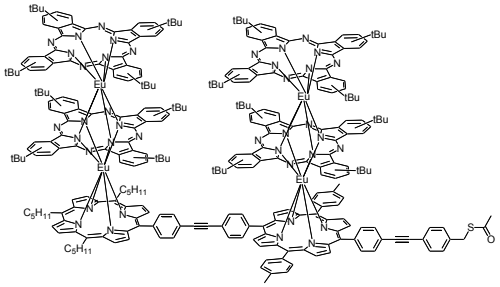

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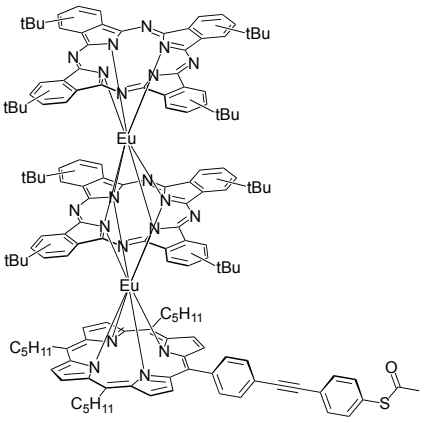
Figure 16. Structures of porphyrin metal sandwich complexes in Table 16



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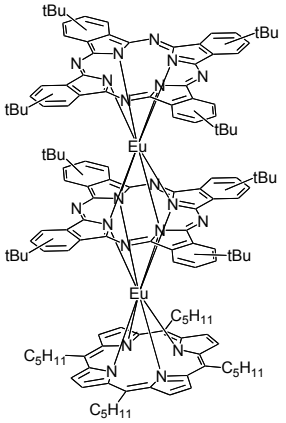

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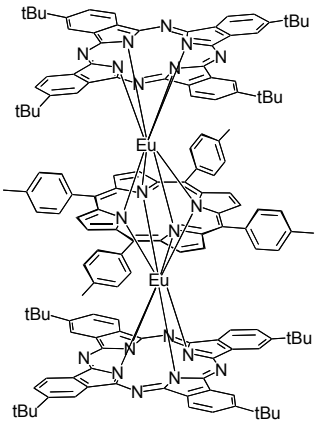

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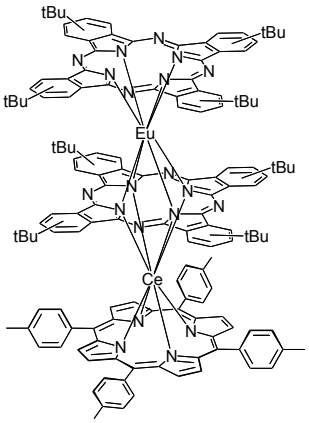

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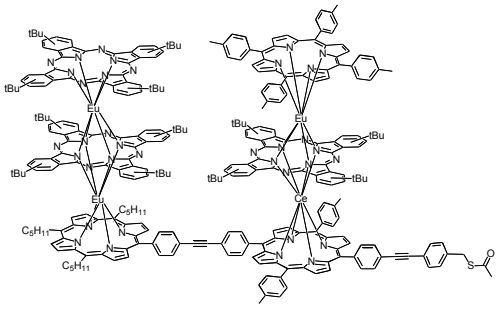

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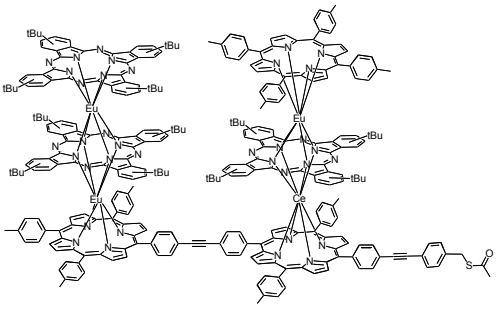

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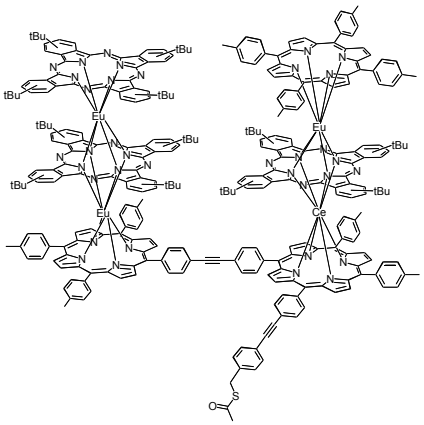
Figure 16. Structures of porphyrin metal sandwich complexes in Table 16



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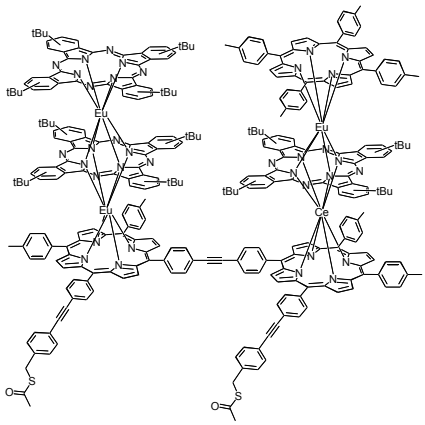

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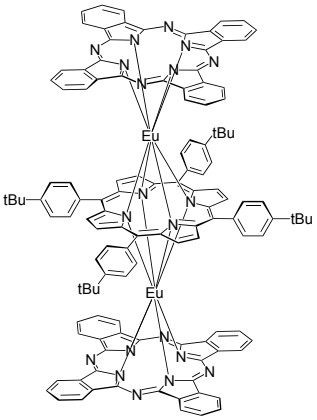

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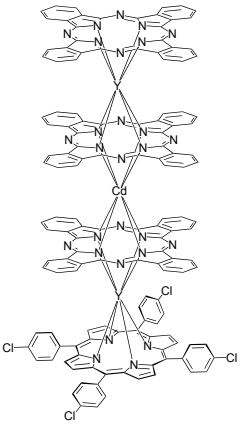

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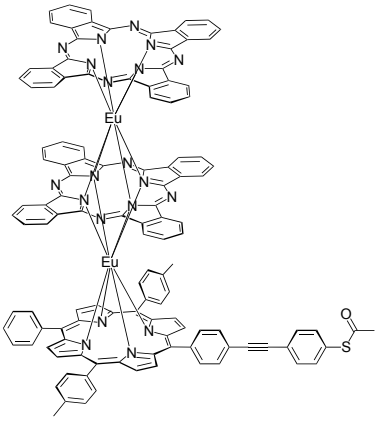

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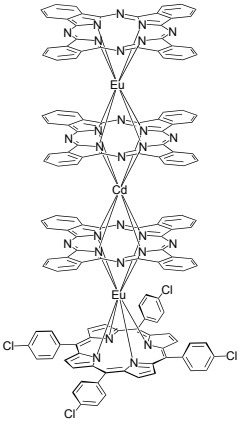

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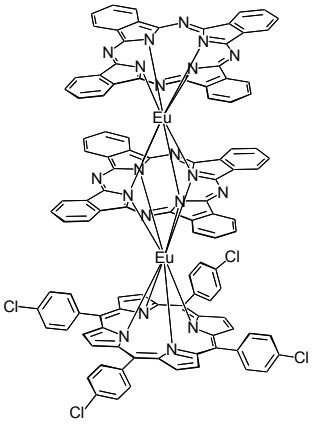
Figure 16. Structures of porphyrin metal sandwich complexes in Table 16



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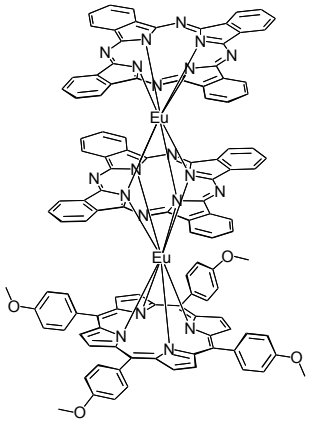

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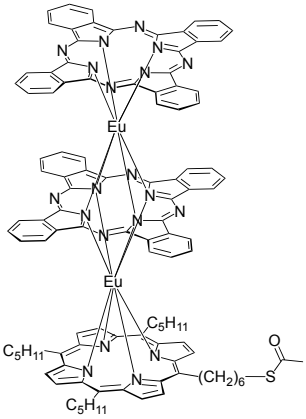

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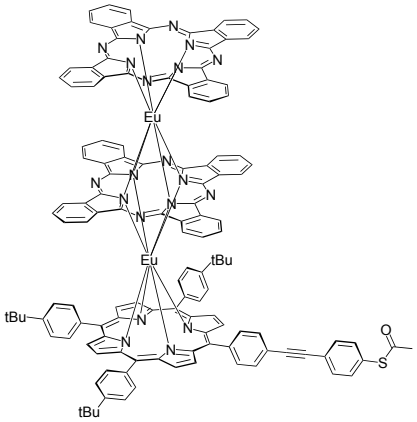

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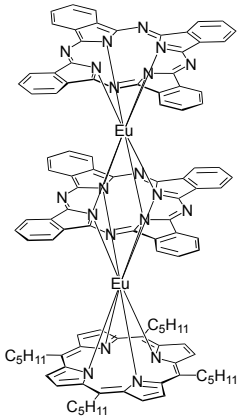

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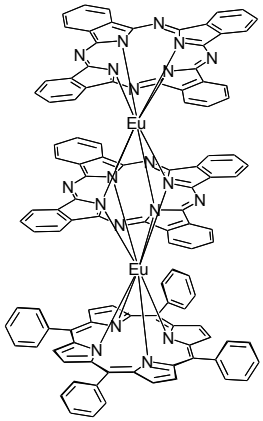

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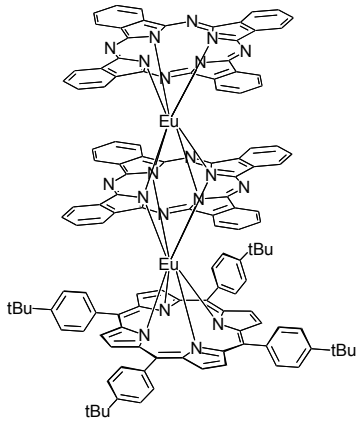
Figure 16. Structures of porphyrin metal sandwich complexes in Table 16



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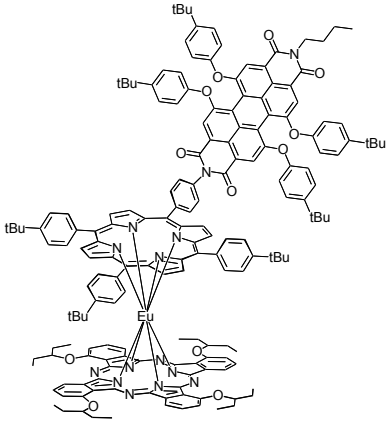

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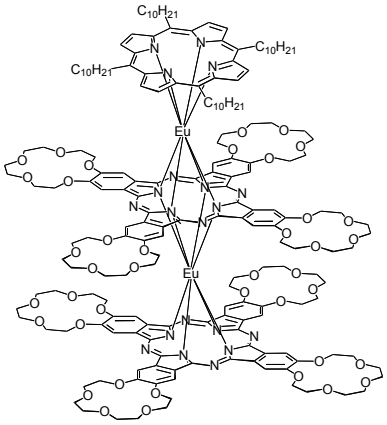

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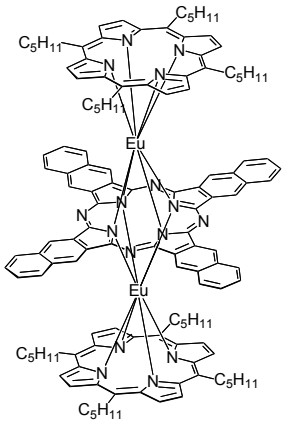

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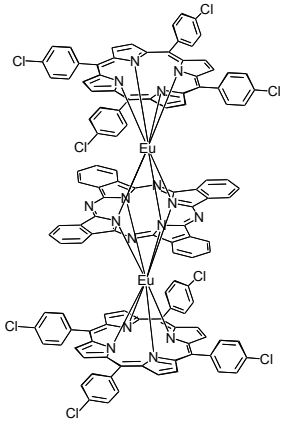

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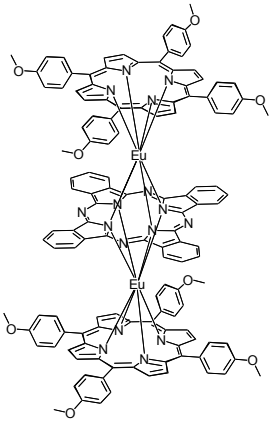

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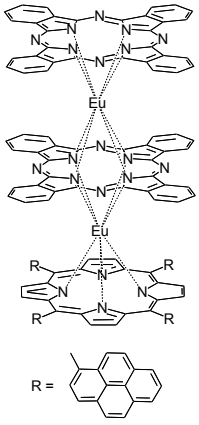
Figure 16. Structures of porphyrin metal sandwich complexes in Table 16



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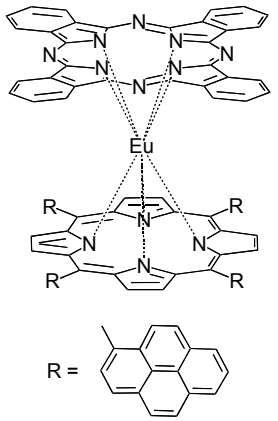

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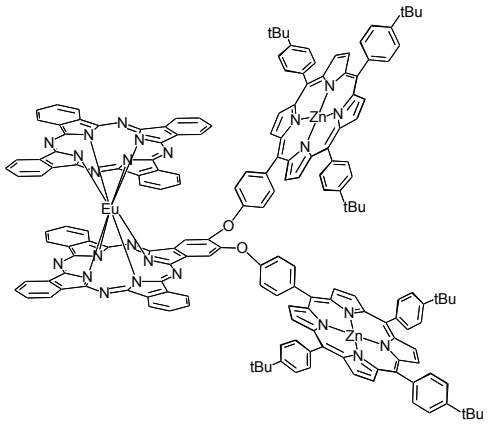

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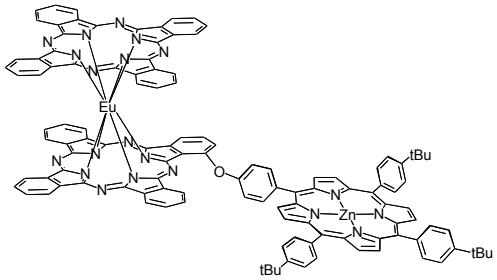

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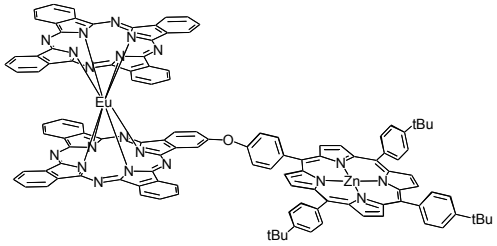

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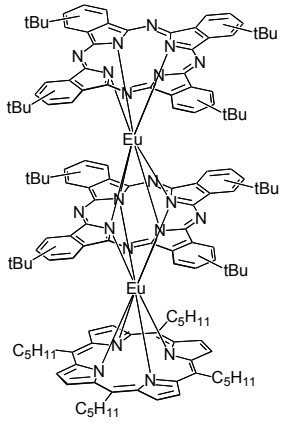

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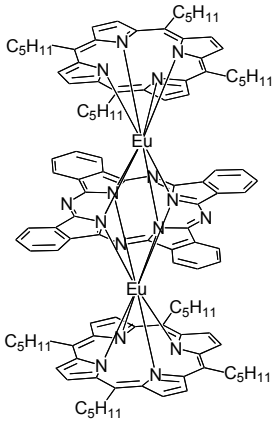
Figure 16. Structures of porphyrin metal sandwich complexes in Table 16



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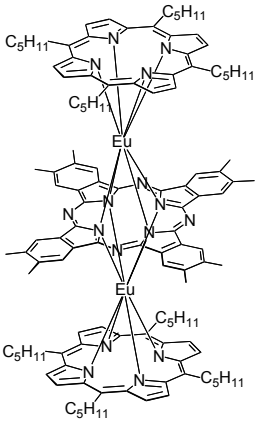

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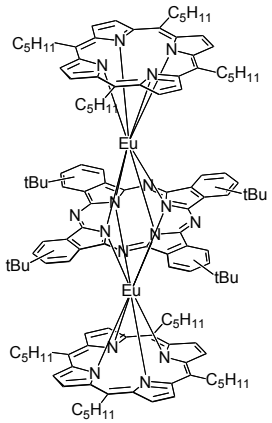

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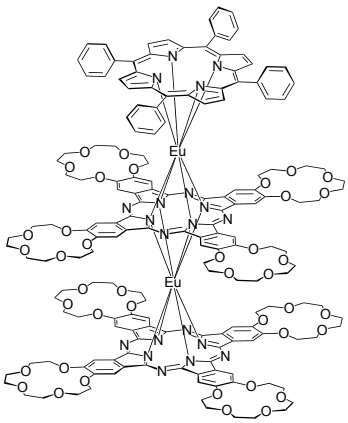

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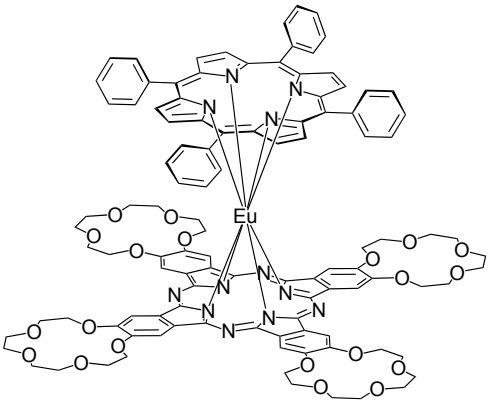

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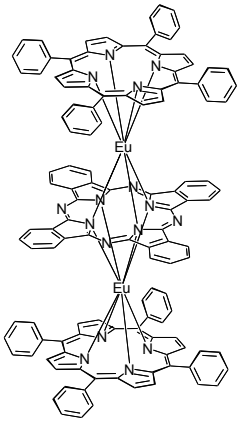

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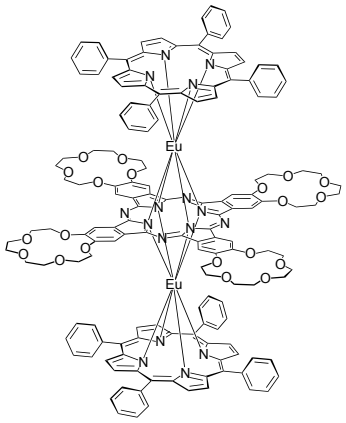
Figure 16. Structures of porphyrin metal sandwich complexes in Table 16



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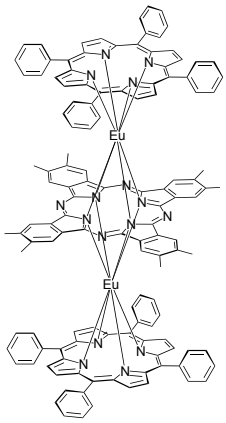

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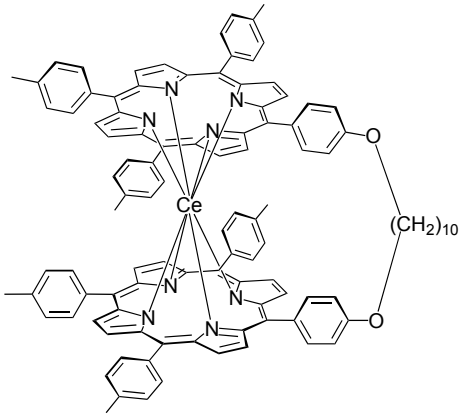

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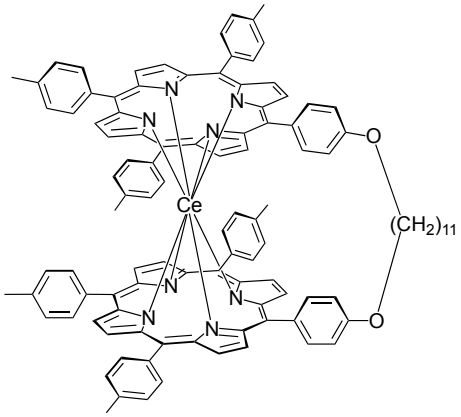

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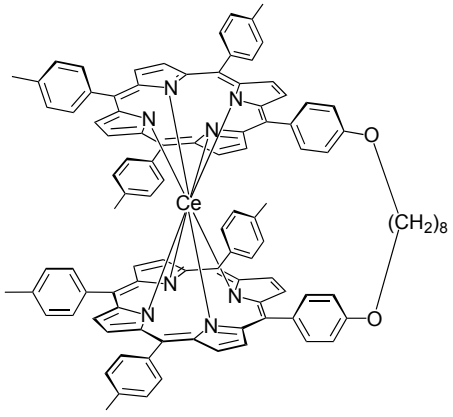

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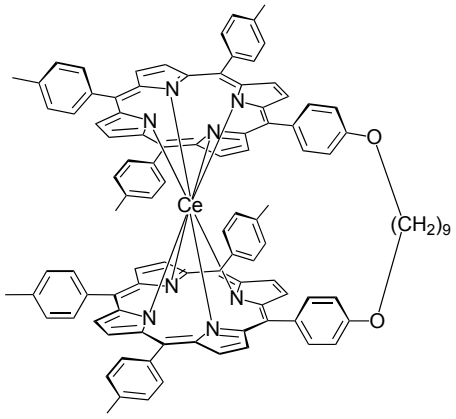

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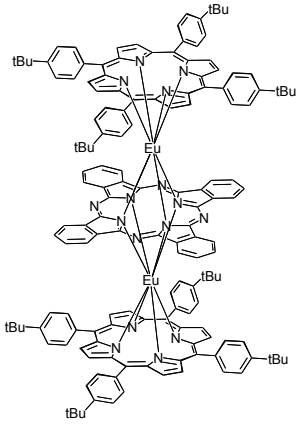
Figure 16. Structures of porphyrin metal sandwich complexes in Table 16



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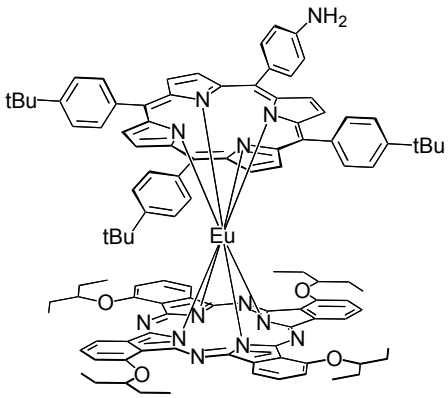

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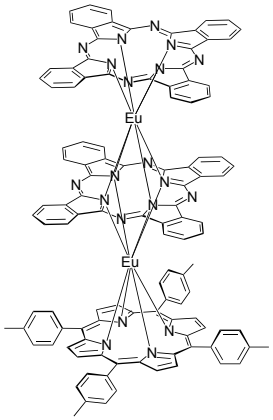

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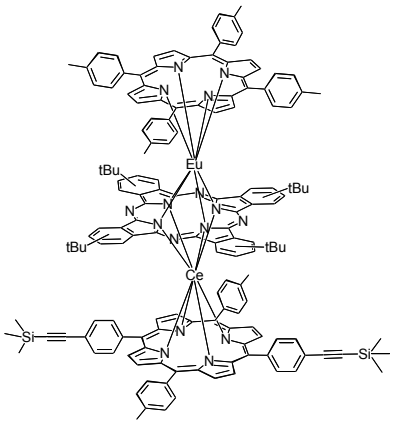

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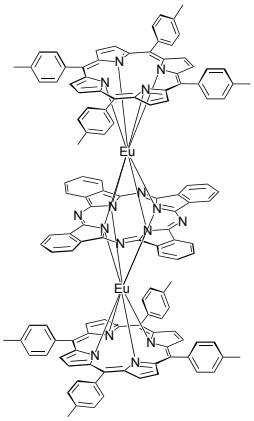

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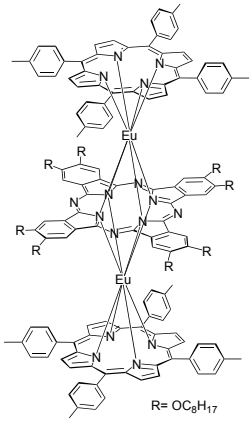

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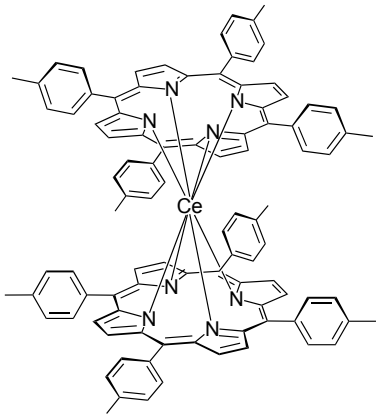
Figure 16. Structures of porphyrin metal sandwich complexes in Table 16



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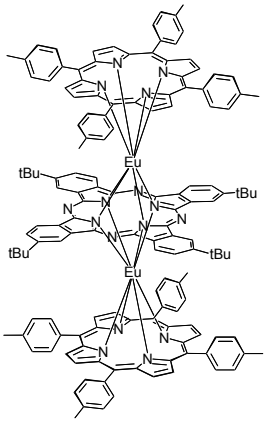

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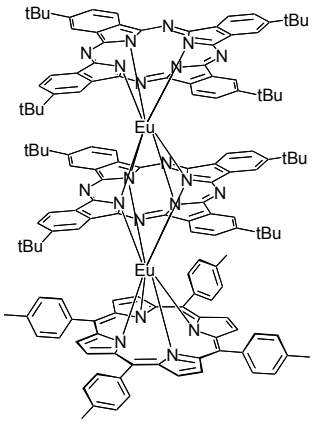

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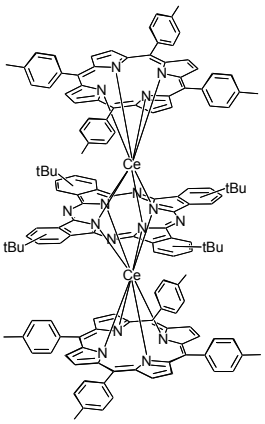

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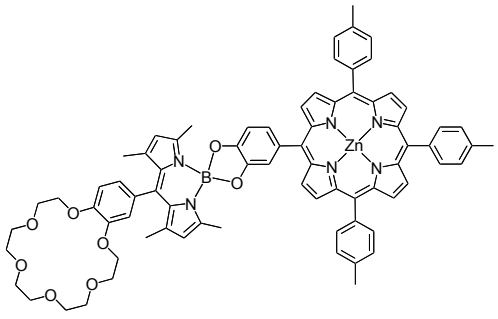
Figure 17a. Structures of A_3B *meso*-substituted porphyrins in Table 17a



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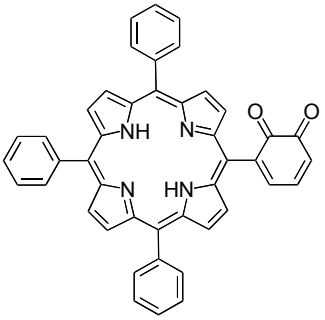

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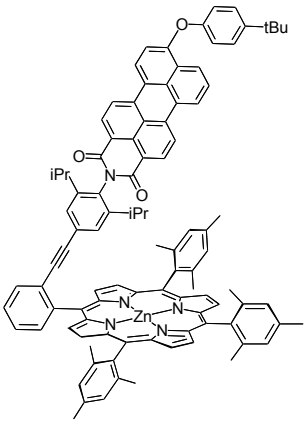

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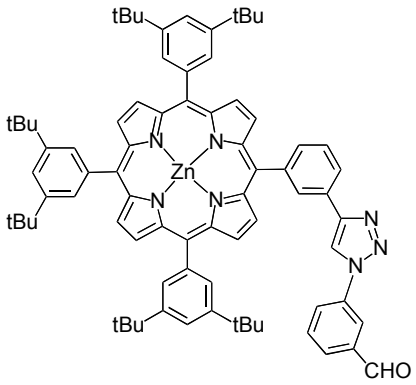

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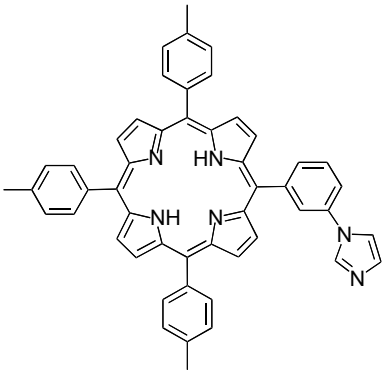

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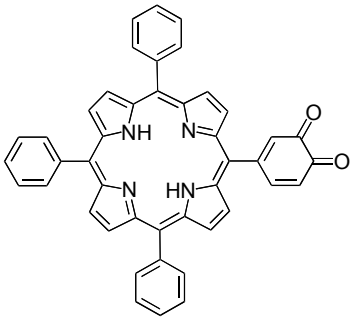

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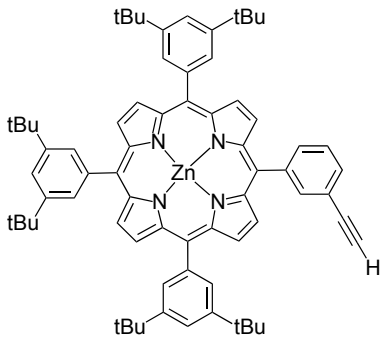
Figure 17a. Structures of A_3B *meso*-substituted porphyrins in Table 17a



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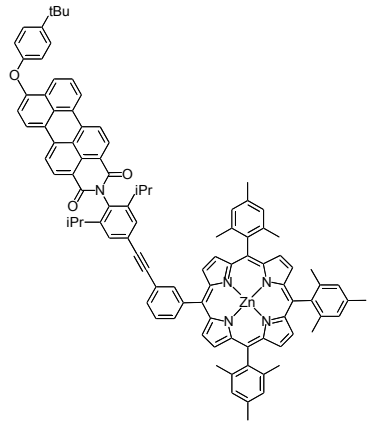

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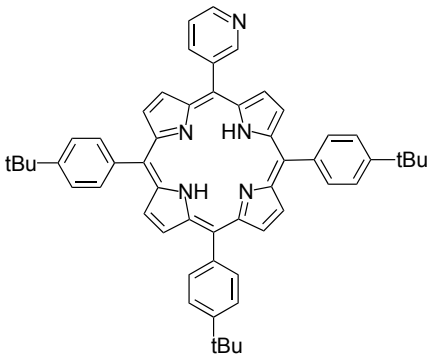

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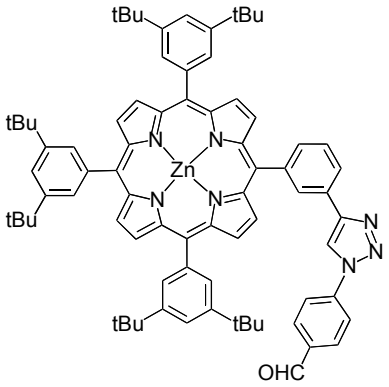

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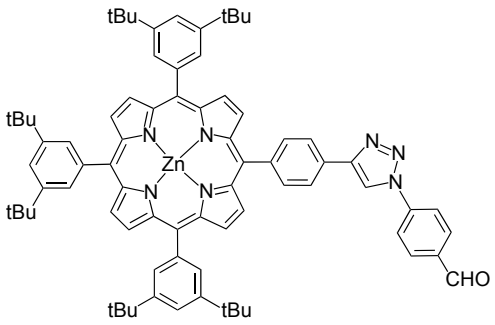

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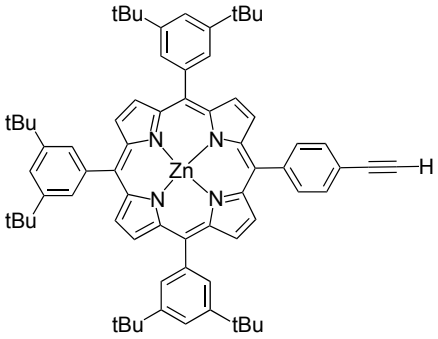

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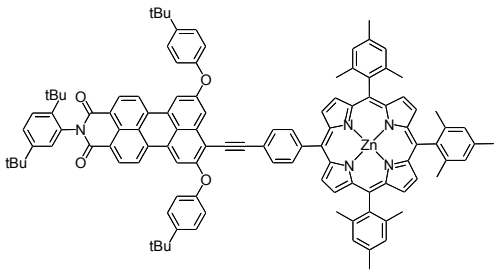
Figure 17a. Structures of A_3B *meso*-substituted porphyrins in Table 17a



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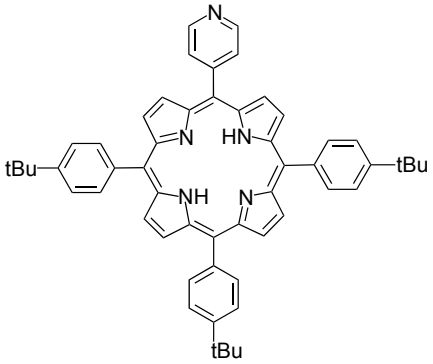

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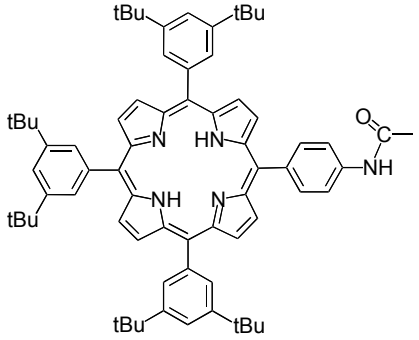

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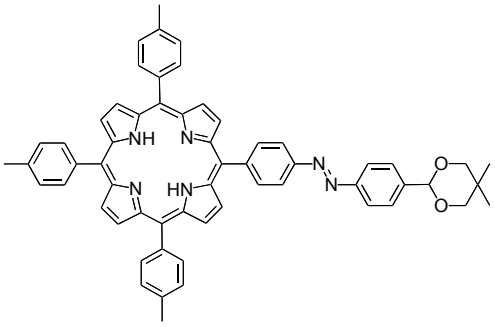

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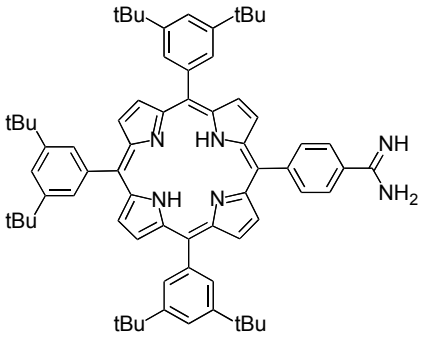

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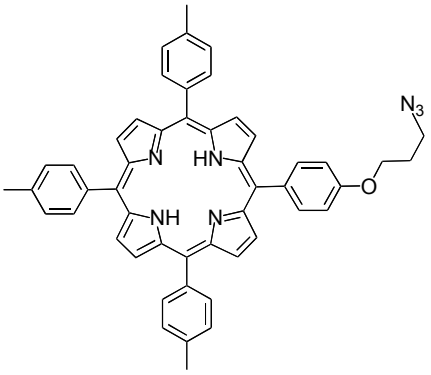

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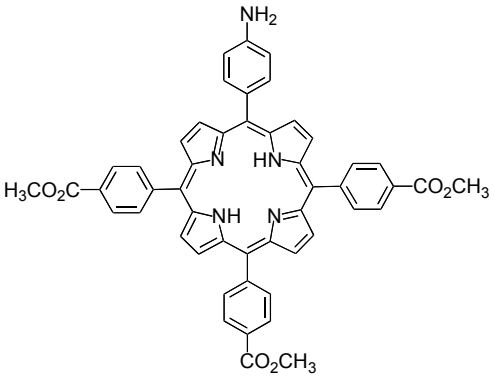
Figure 17a. Structures of A_3B *meso*-substituted porphyrins in Table 17a



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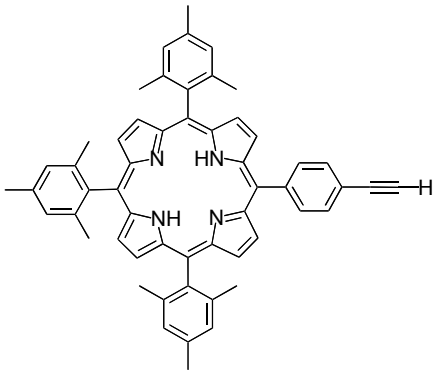

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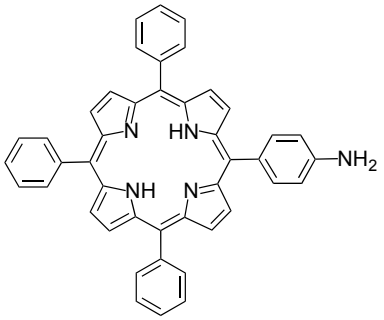

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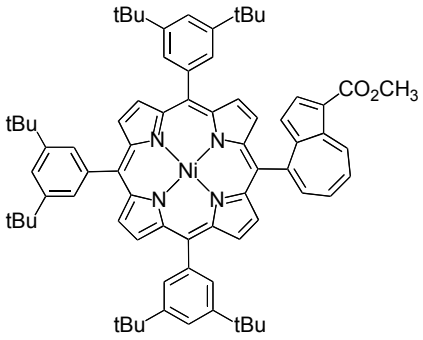

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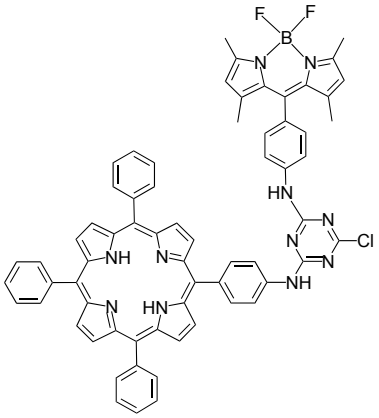

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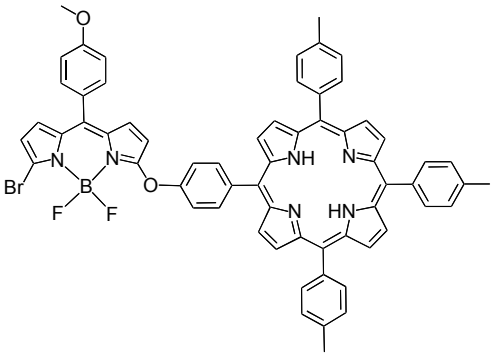

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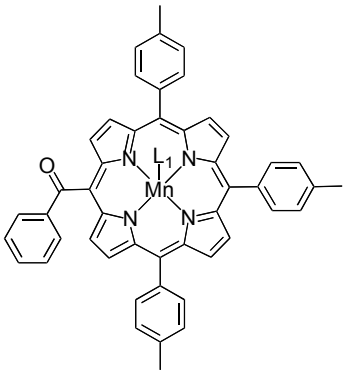
Figure 17a. Structures of A_3B *meso*-substituted porphyrins in Table 17a



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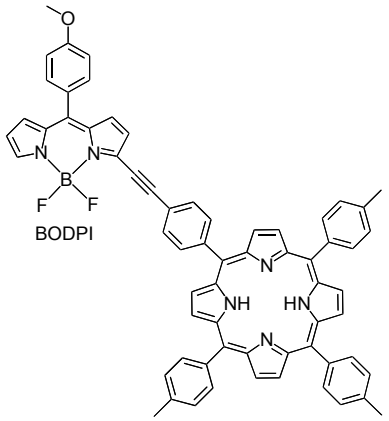

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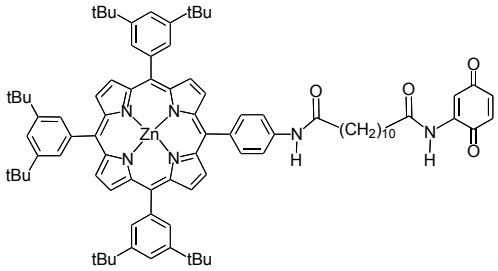

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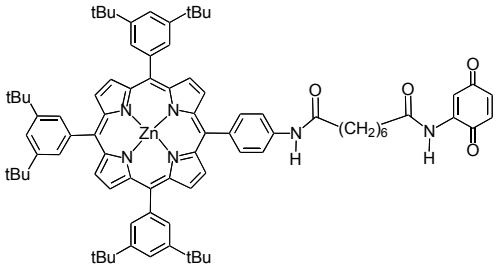

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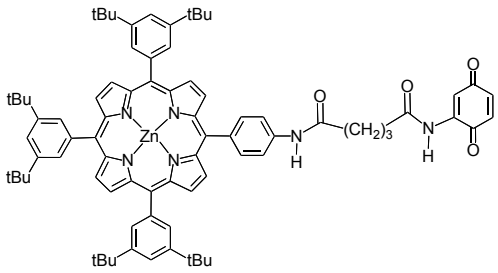

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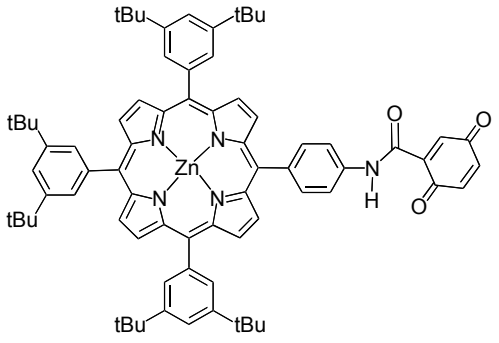

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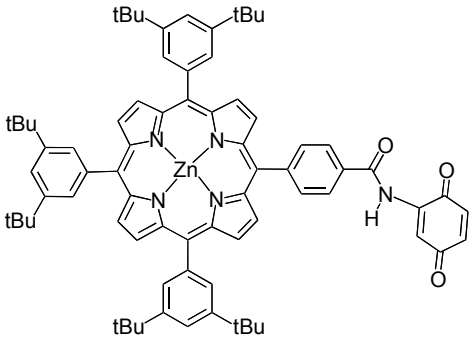
Figure 17a. Structures of A_3B *meso*-substituted porphyrins in Table 17a



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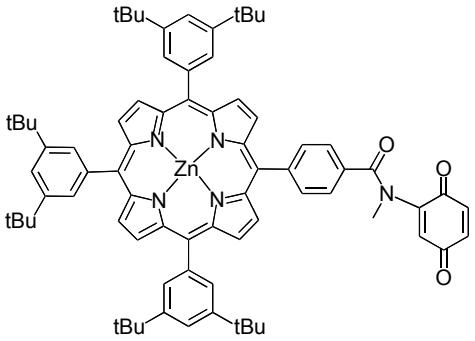

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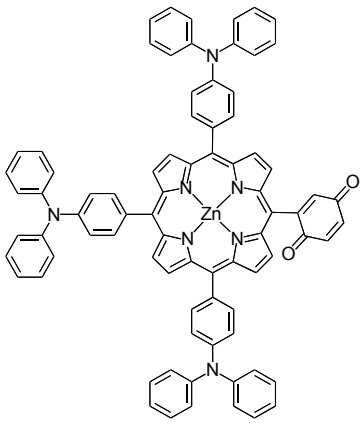

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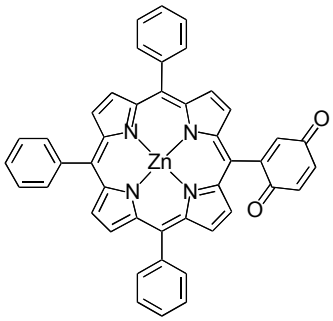

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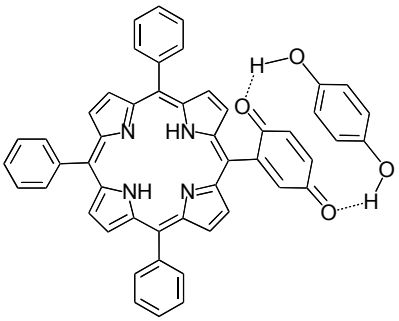

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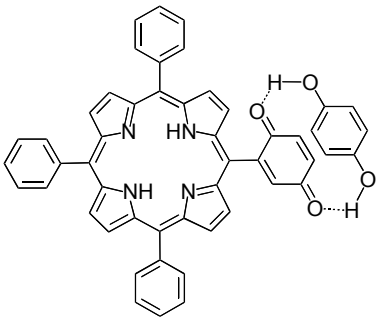

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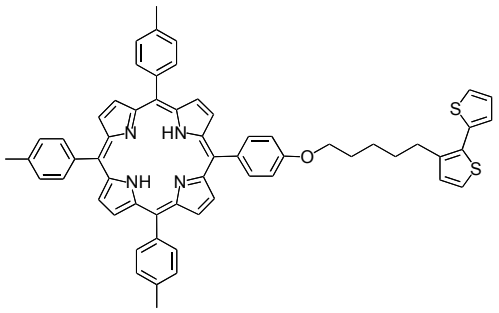
Figure 17a. Structures of A_3B *meso*-substituted porphyrins in Table 17a



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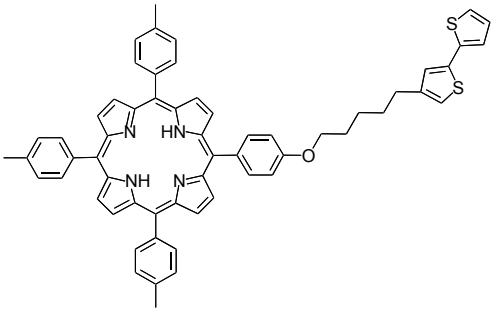

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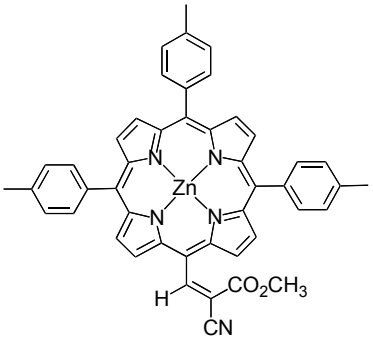

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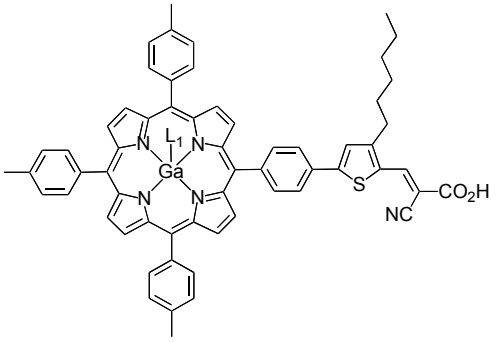

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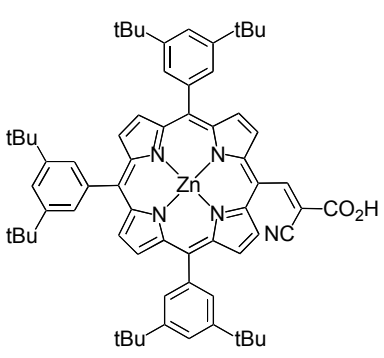

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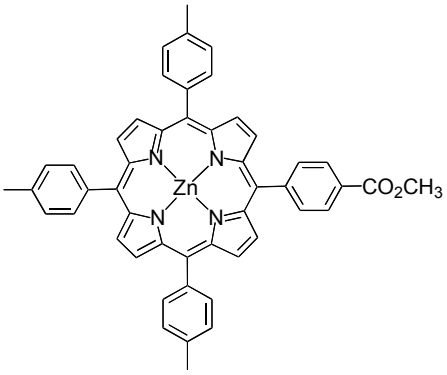

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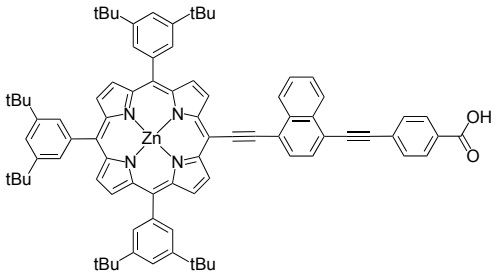
Figure 17a. Structures of A_3B *meso*-substituted porphyrins in Table 17a



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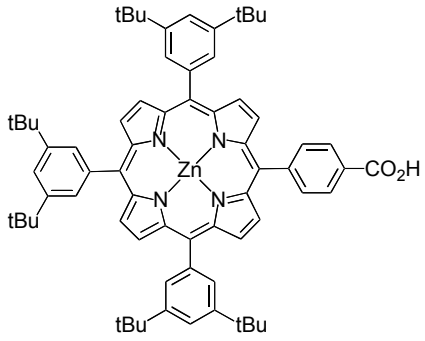

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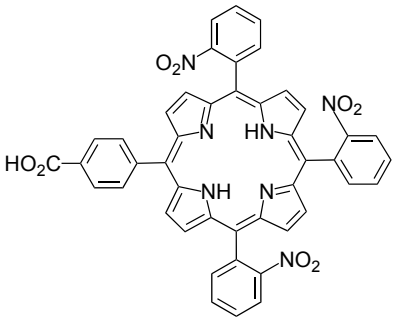

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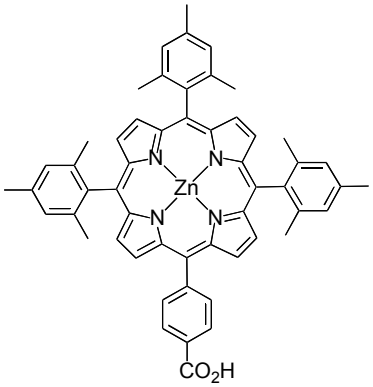

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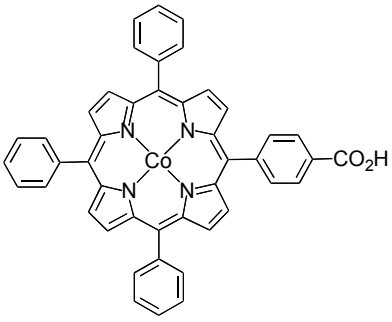

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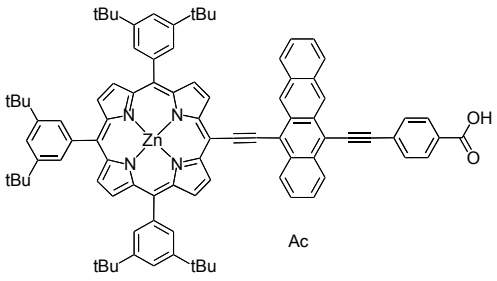

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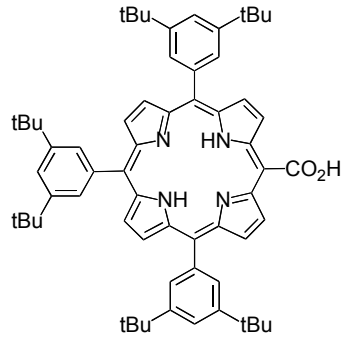
Figure 17a. Structures of A_3B *meso*-substituted porphyrins in Table 17a



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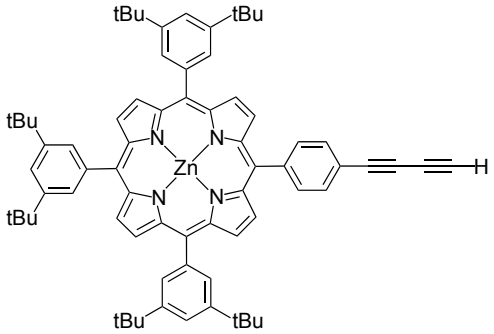

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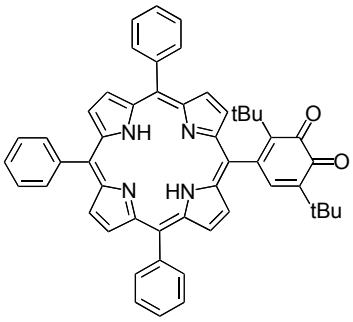

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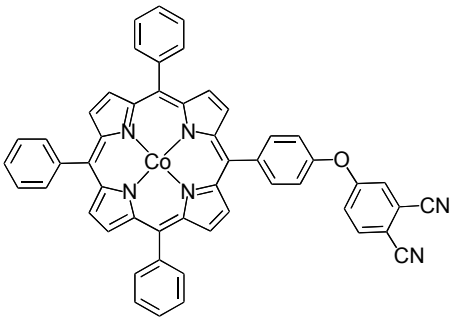

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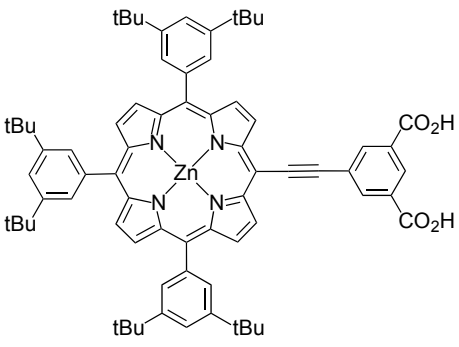

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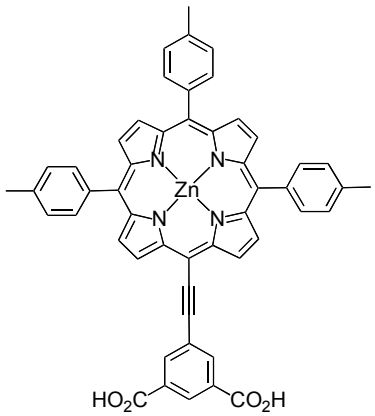

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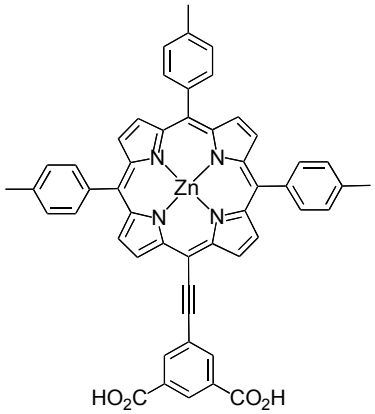
Figure 17a. Structures of A_3B *meso*-substituted porphyrins in Table 17a



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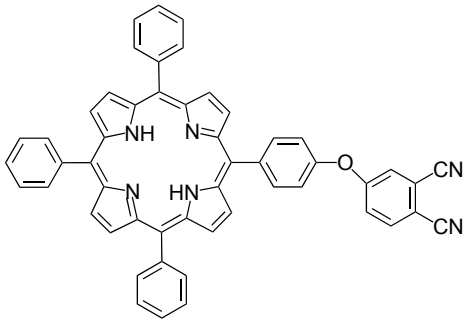

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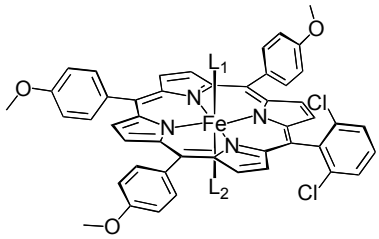

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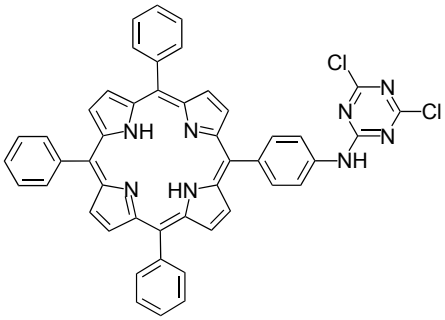

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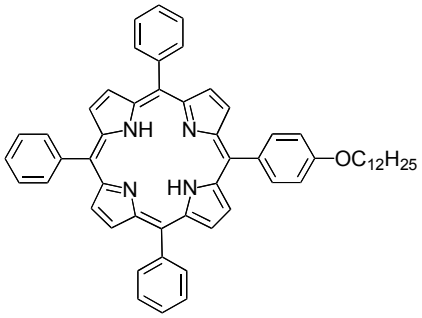

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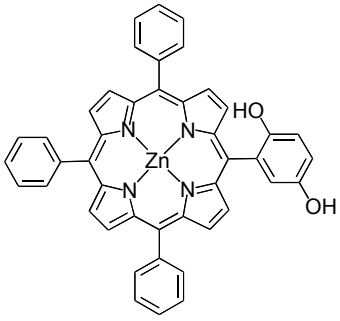

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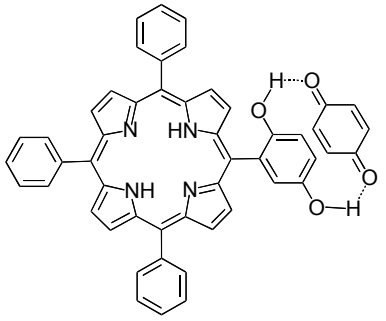
Figure 17a. Structures of A_3B *meso*-substituted porphyrins in Table 17a



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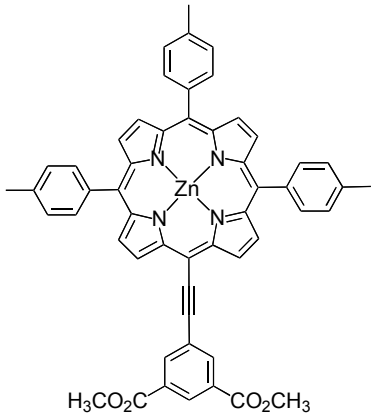

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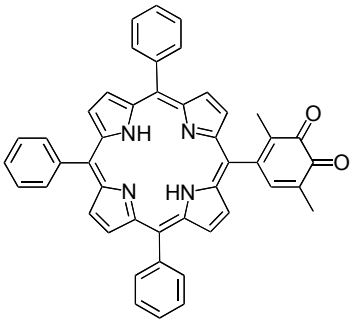

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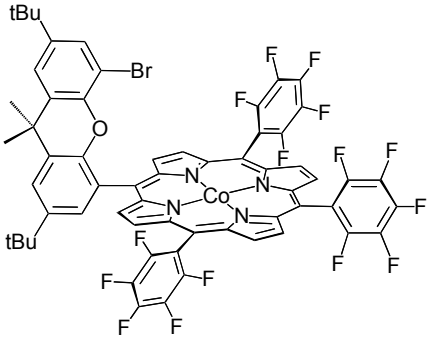

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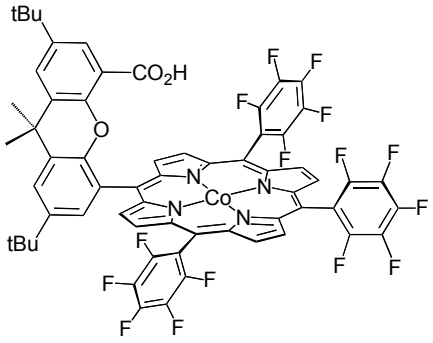

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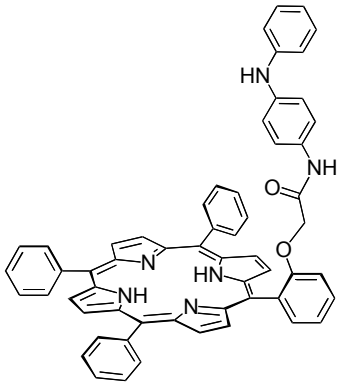

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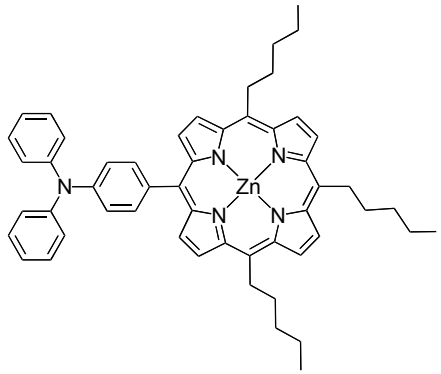
Figure 17a. Structures of A_3B *meso*-substituted porphyrins in Table 17a



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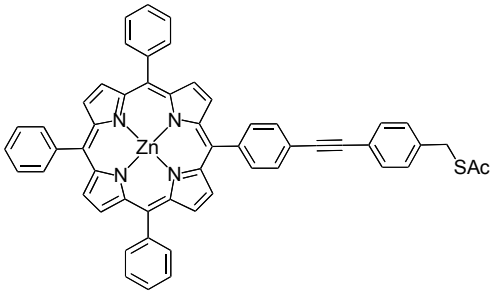

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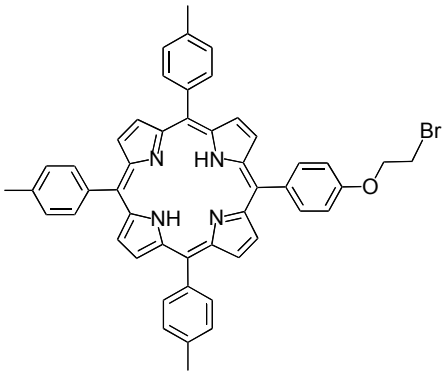

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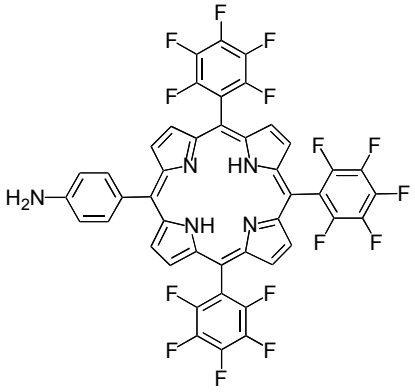

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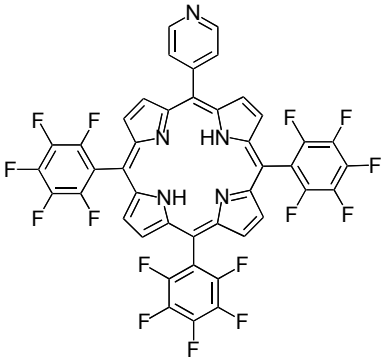

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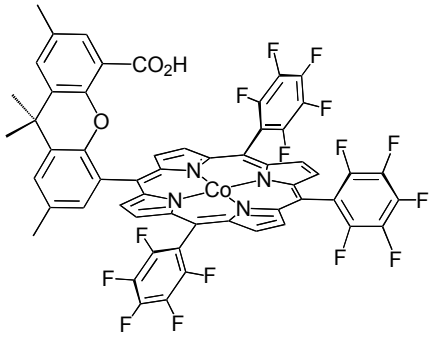

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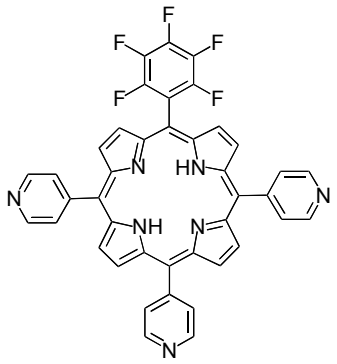
Figure 17a. Structures of A_3B *meso*-substituted porphyrins in Table 17a



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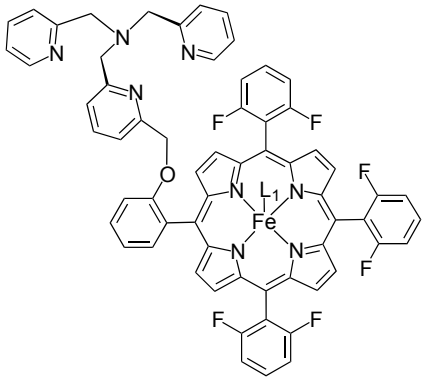

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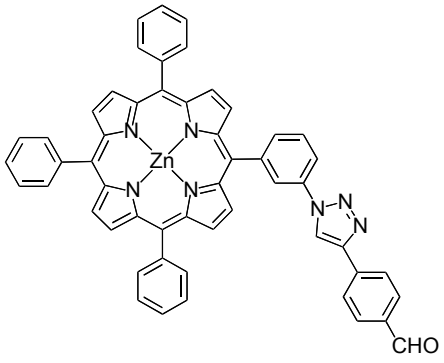

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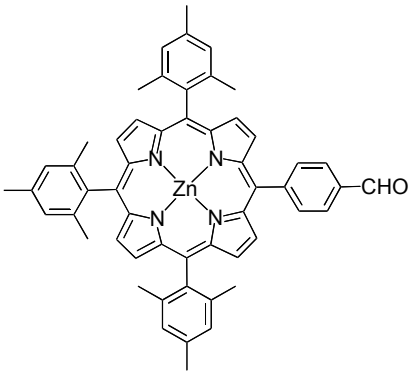

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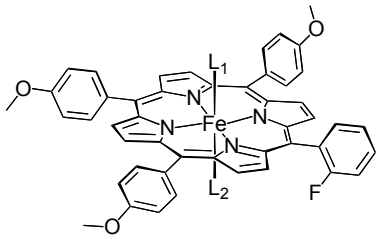

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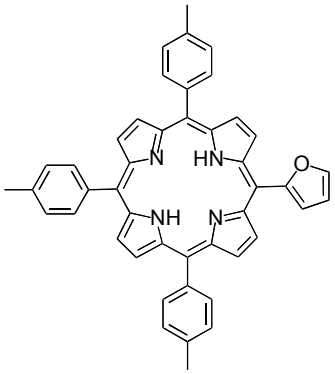

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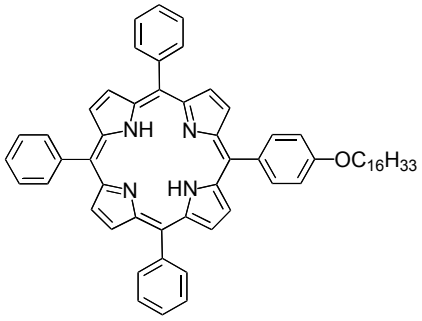
Figure 17a. Structures of A_3B *meso*-substituted porphyrins in Table 17a



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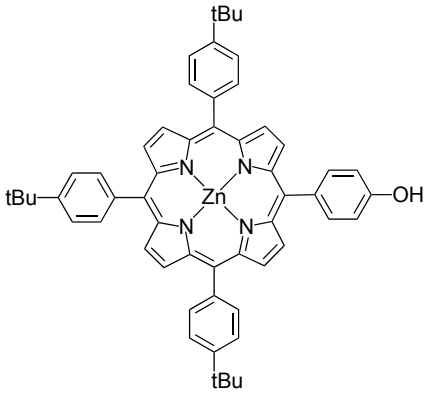

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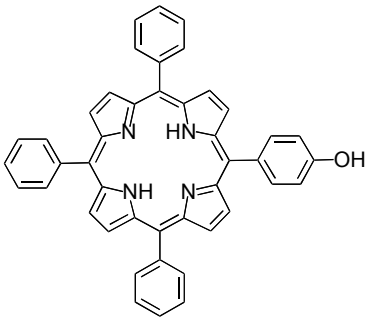

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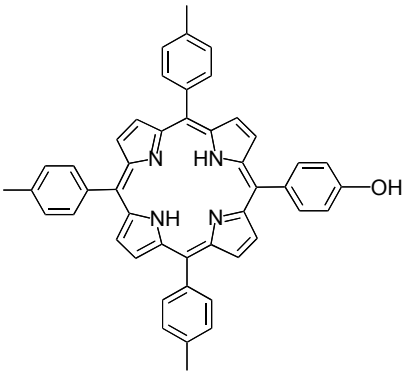

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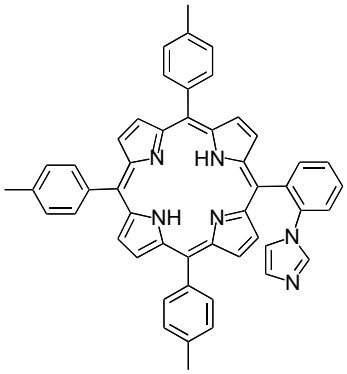

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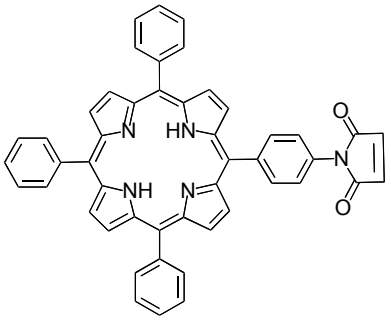

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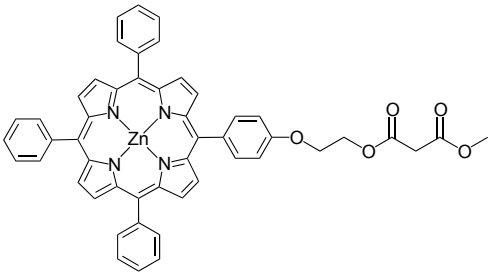
Figure 17a. Structures of A_3B *meso*-substituted porphyrins in Table 17a



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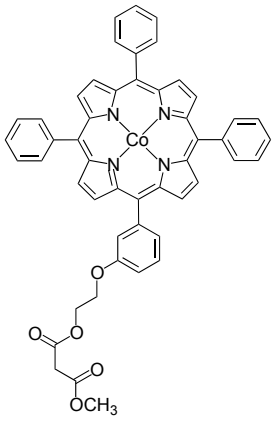

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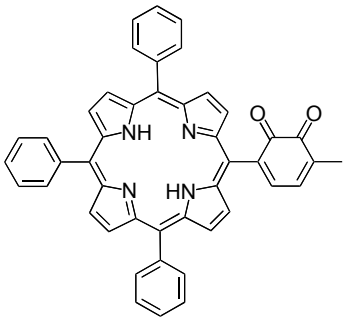

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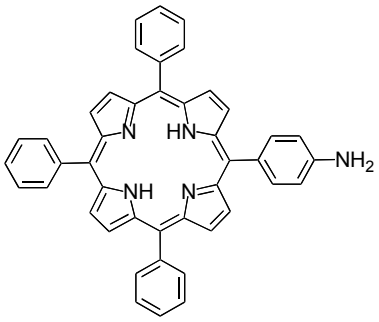

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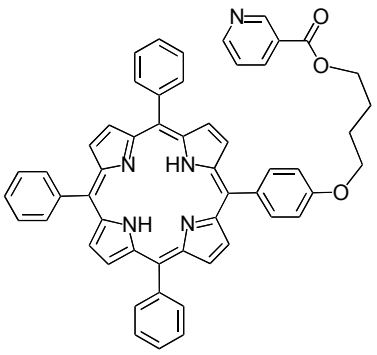

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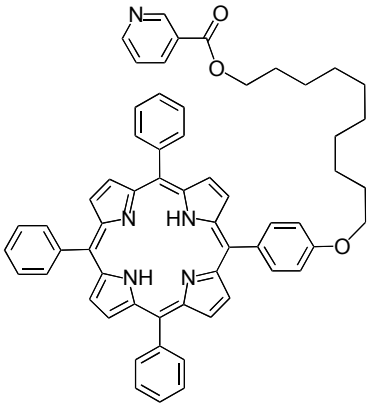

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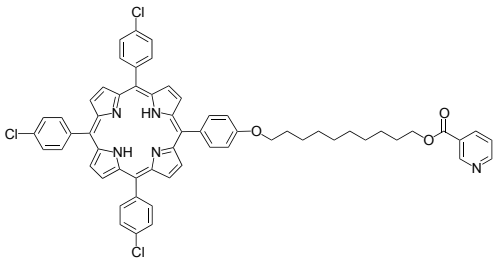
Figure 17a. Structures of A_3B *meso*-substituted porphyrins in Table 17a



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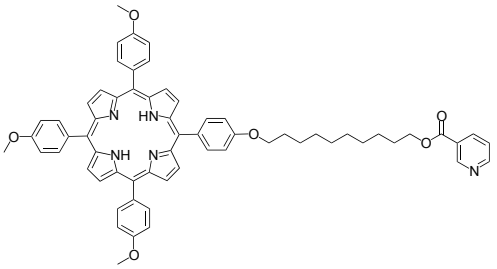

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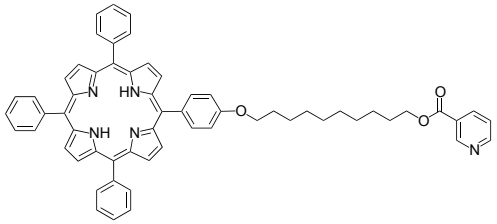

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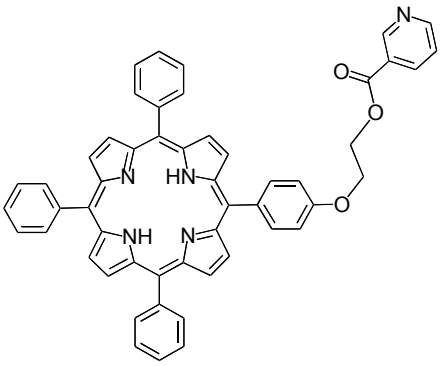

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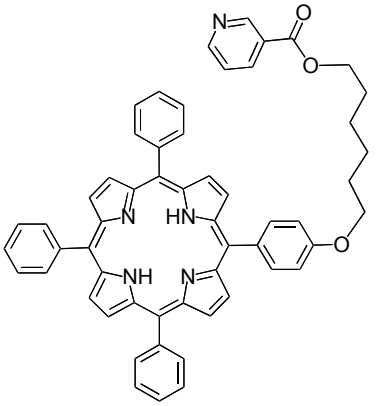

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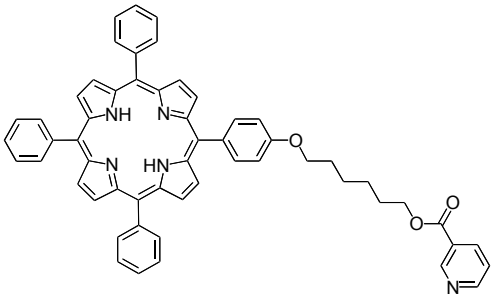

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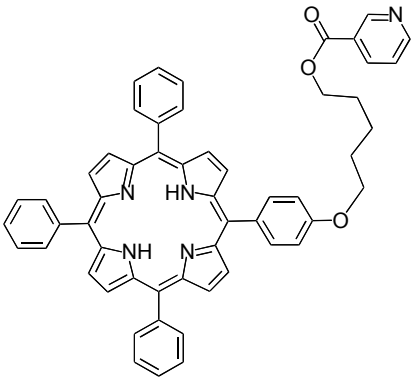
Figure 17a. Structures of A_3B *meso*-substituted porphyrins in Table 17a



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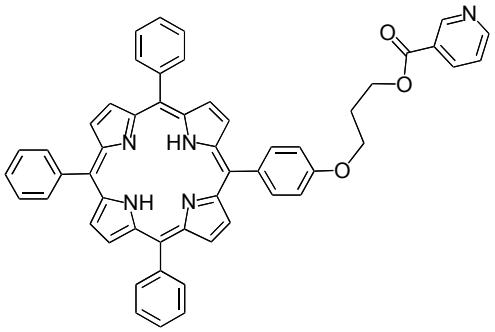

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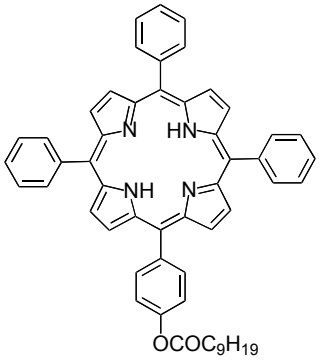

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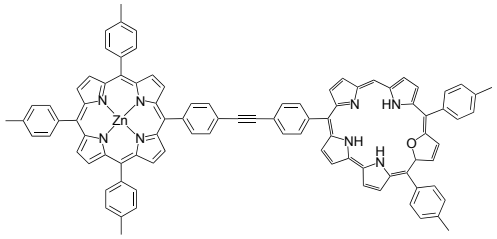

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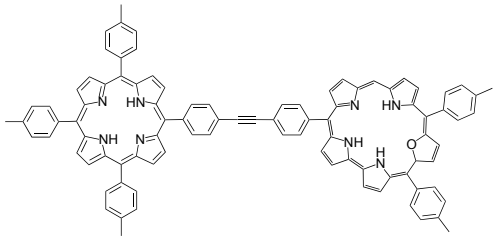

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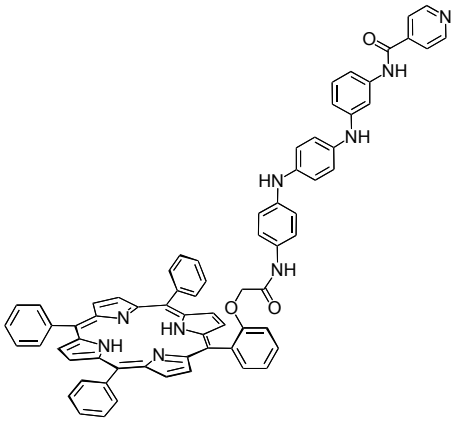

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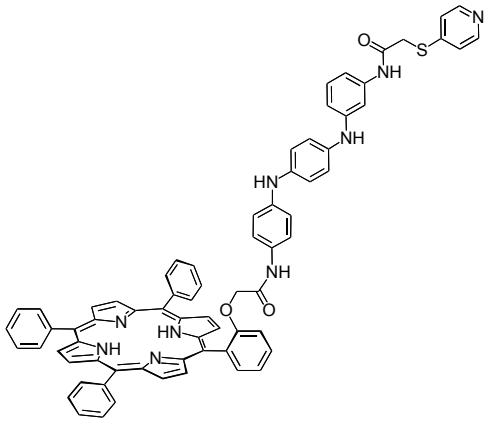
Figure 17a. Structures of A_3B *meso*-substituted porphyrins in Table 17a



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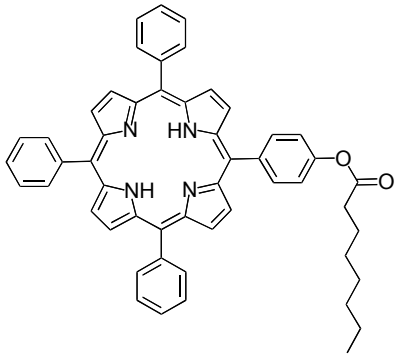

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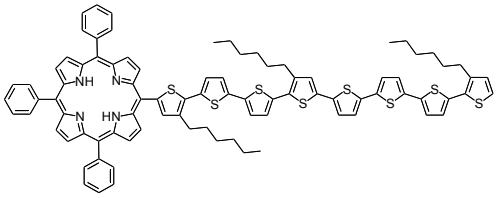

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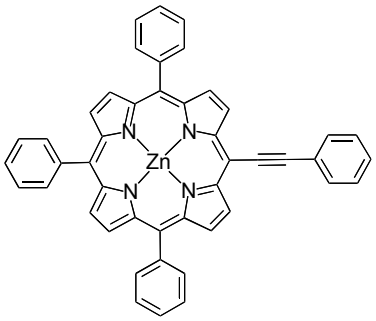

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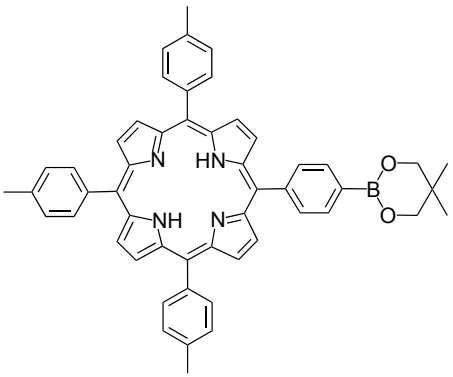

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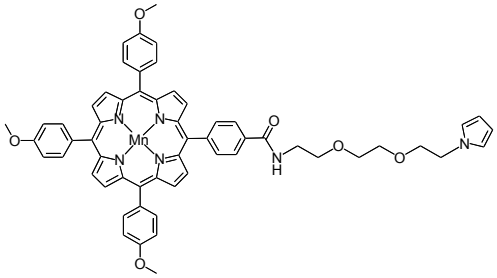

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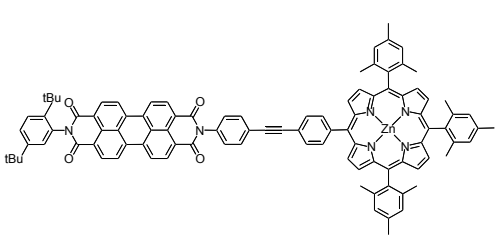
Figure 17a. Structures of A_3B *meso*-substituted porphyrins in Table 17a



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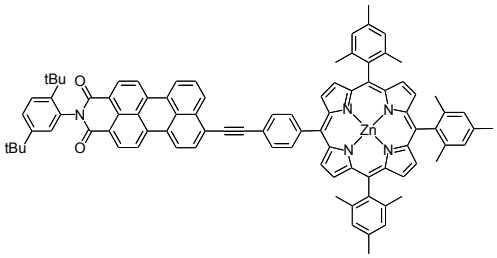

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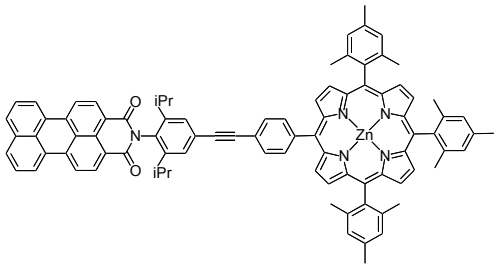

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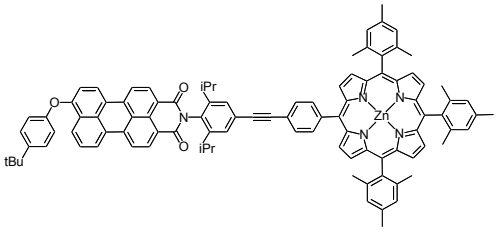

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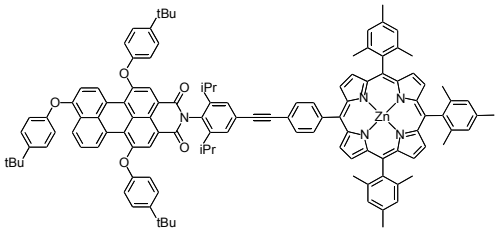

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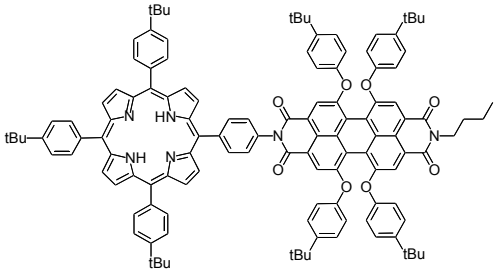

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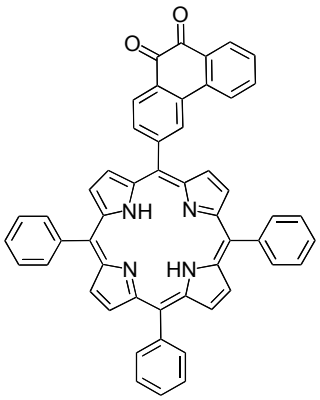
Figure 17a. Structures of A_3B *meso*-substituted porphyrins in Table 17a



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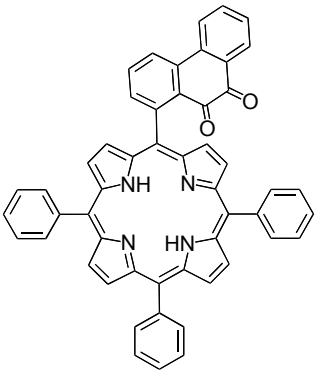

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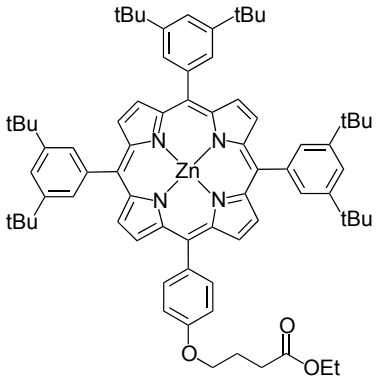

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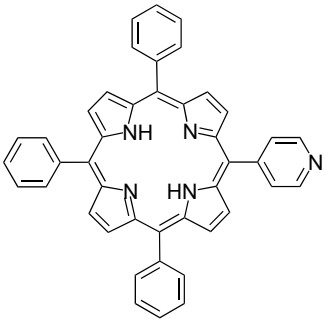

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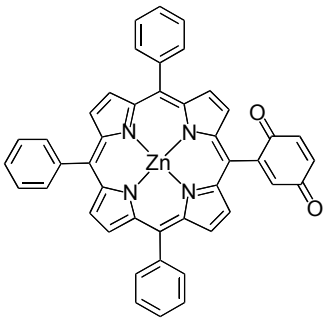

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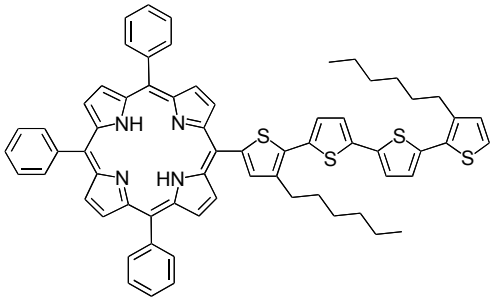

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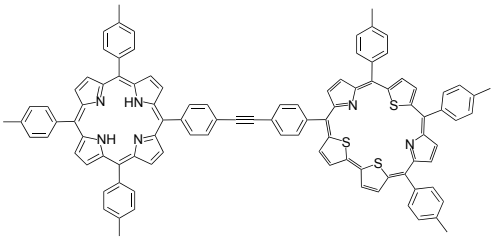
Figure 17a. Structures of A_3B *meso*-substituted porphyrins in Table 17a



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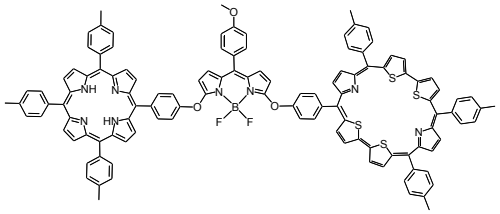

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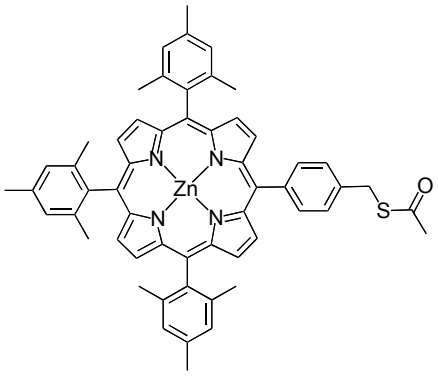

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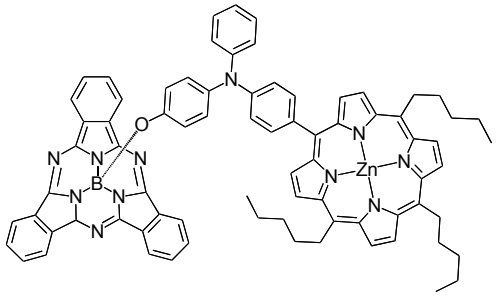

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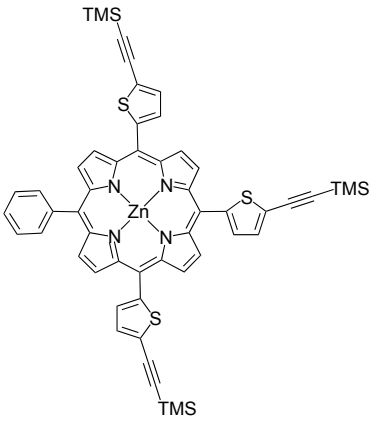

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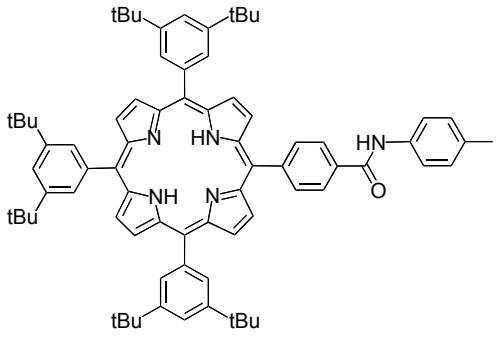

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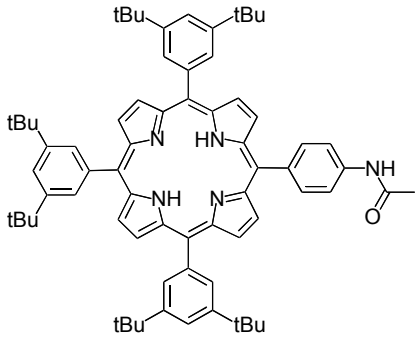
Figure 17a. Structures of A_3B *meso*-substituted porphyrins in Table 17a



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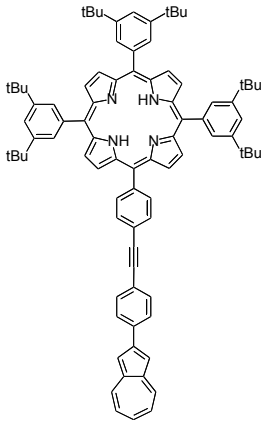

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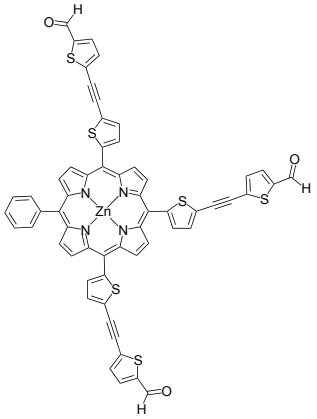

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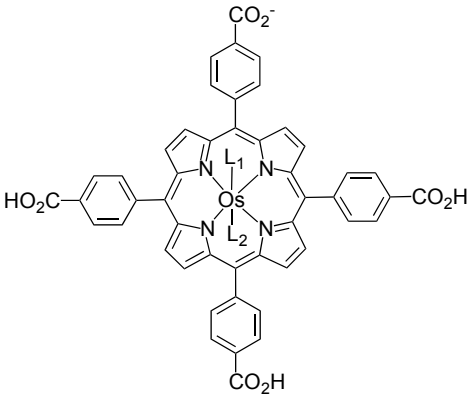

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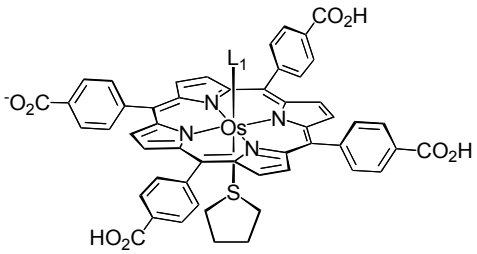

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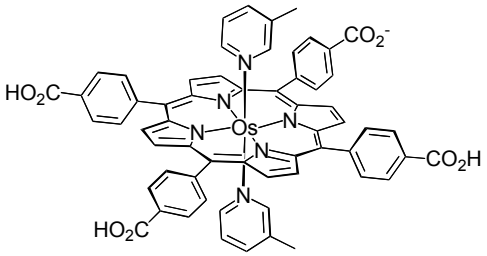

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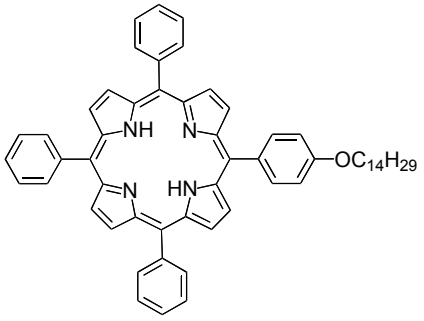
Figure 17a. Structures of A_3B *meso*-substituted porphyrins in Table 17a



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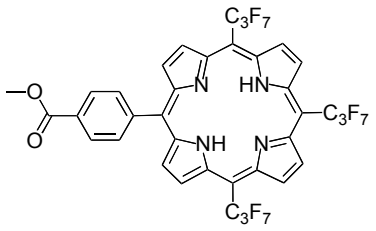

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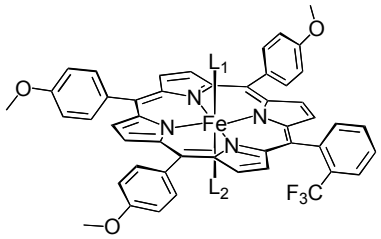

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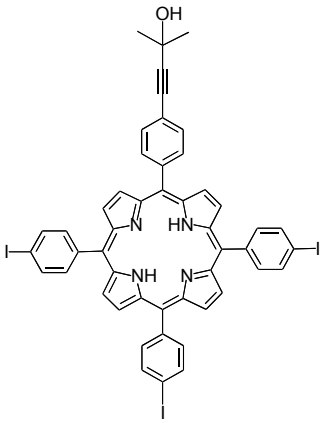

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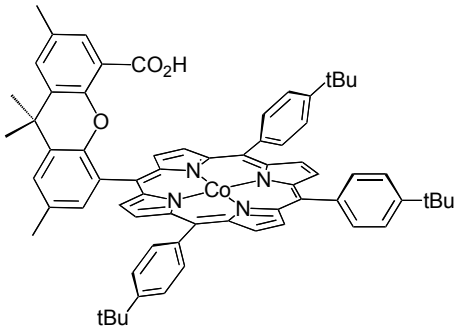

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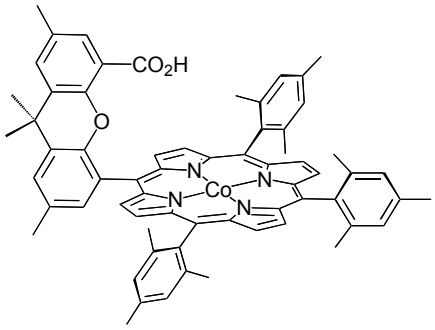

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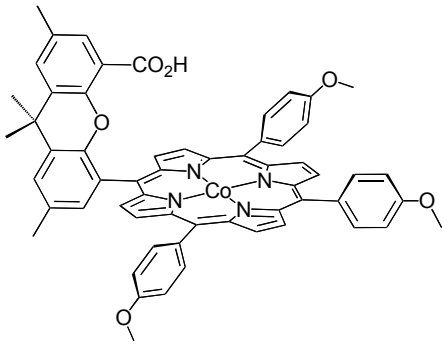
Figure 17a. Structures of A_3B *meso*-substituted porphyrins in Table 17a



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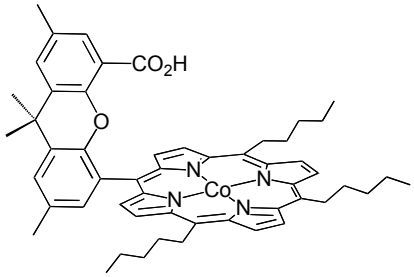

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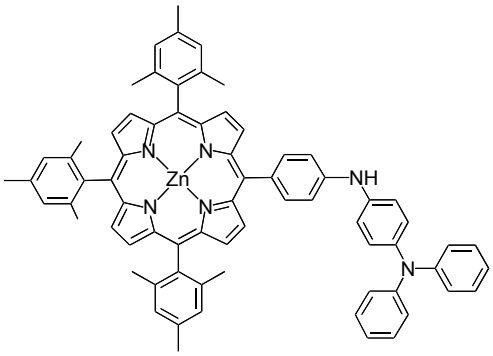

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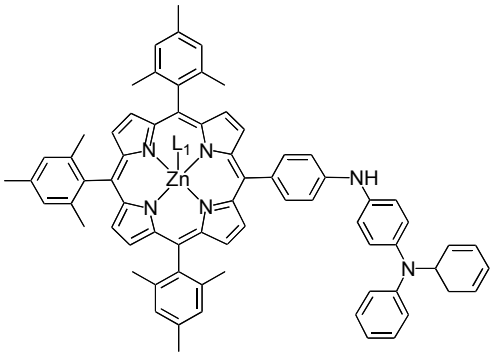

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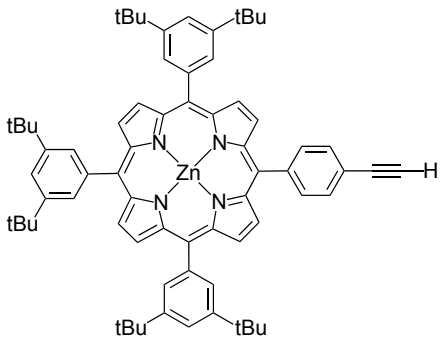

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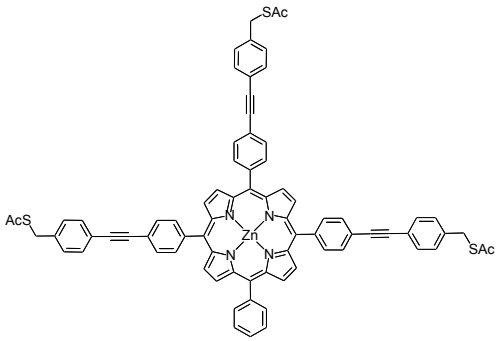

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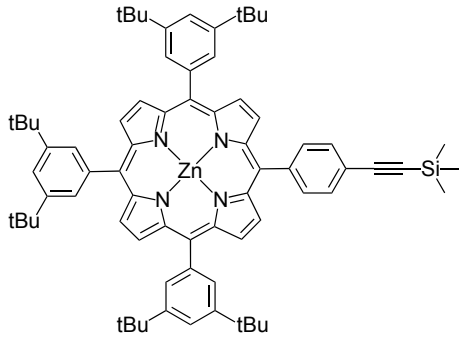
Figure 17a. Structures of A_3B *meso*-substituted porphyrins in Table 17a



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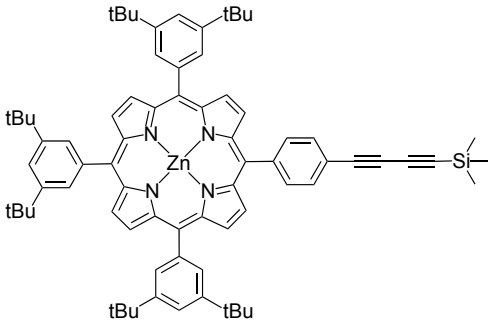

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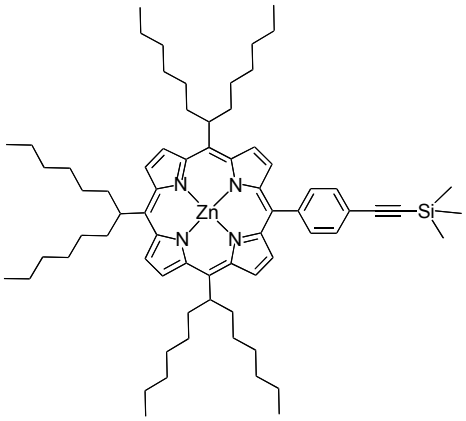

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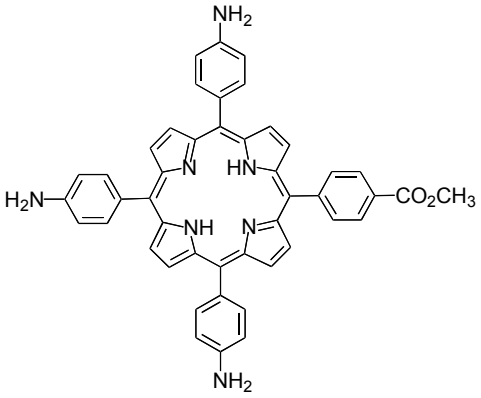

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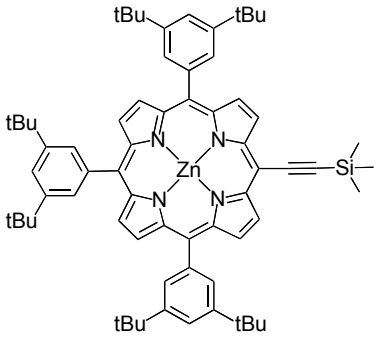

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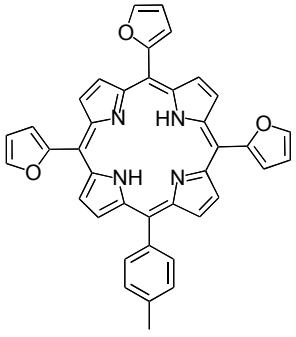

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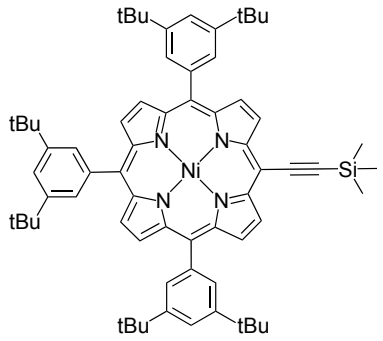
Figure 17a. Structures of A_3B *meso*-substituted porphyrins in Table 17a



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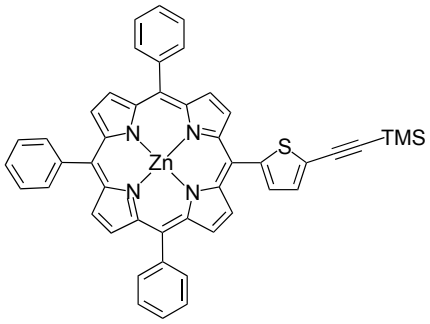

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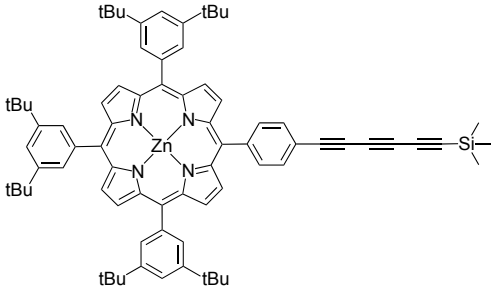

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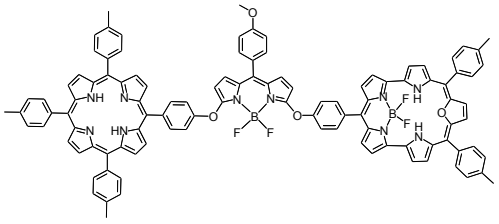

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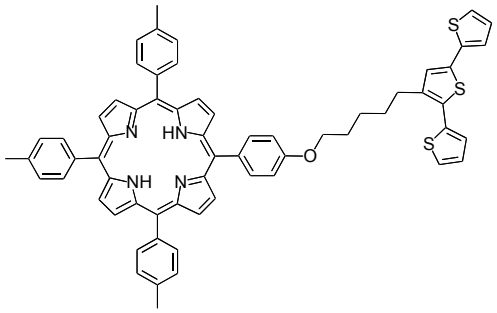

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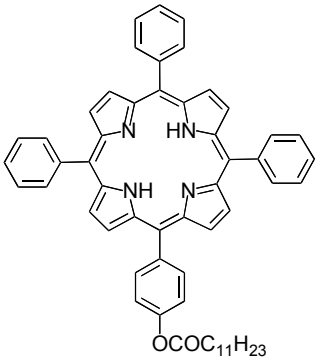

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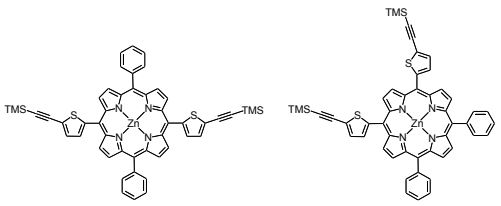
Figure 17b. Structures of *cis* and *trans*-A_2B_2 *meso*-substituted porphyrins in Table 17b



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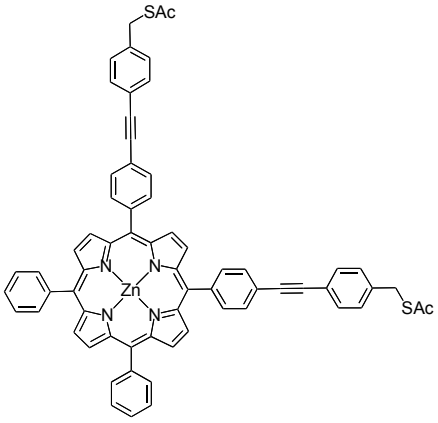

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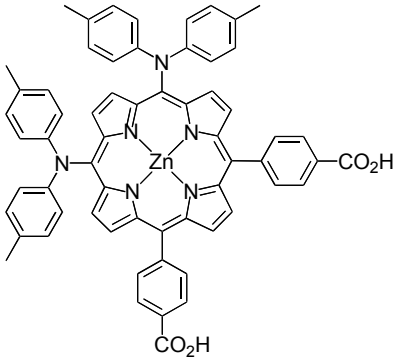

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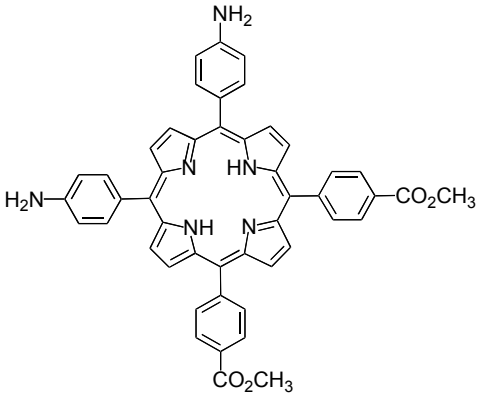

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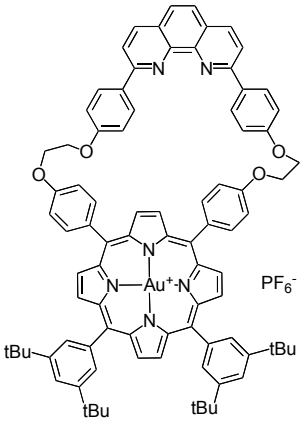

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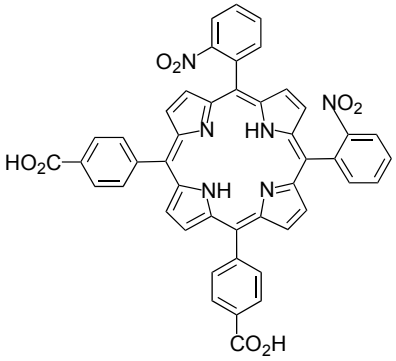

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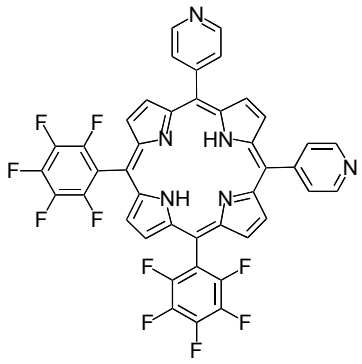
Figure 17b. Structures of *cis* and *trans*-A_2B_2 *meso*-substituted porphyrins in Table 17b



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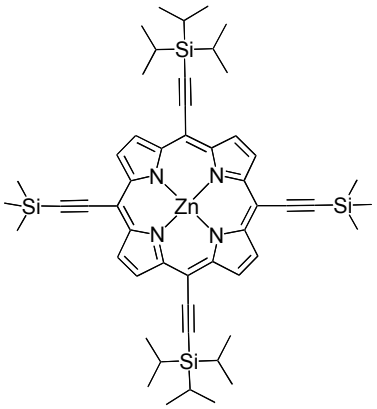

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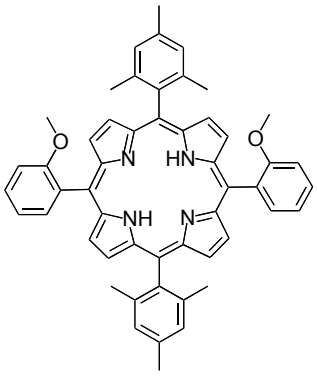

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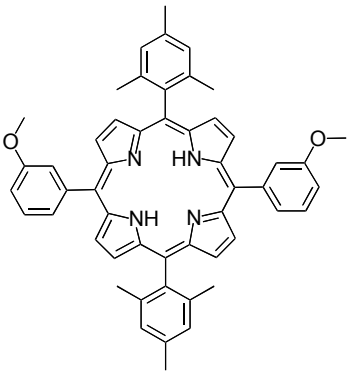

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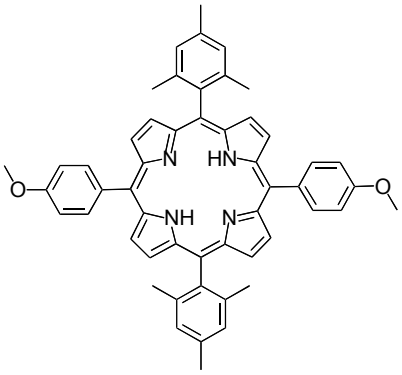

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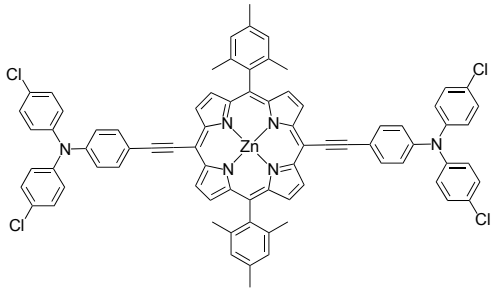

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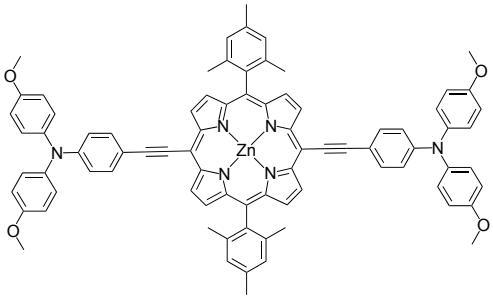
Figure 17b. Structures of *cis* and *trans*-A_2B_2 *meso*-substituted porphyrins in Table 17b



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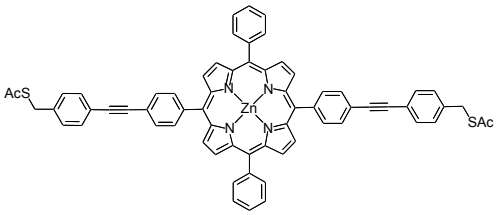

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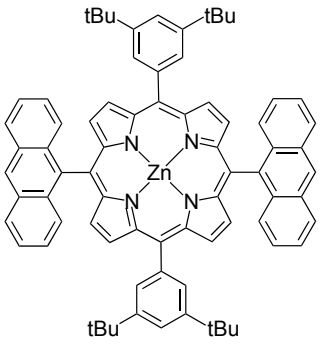

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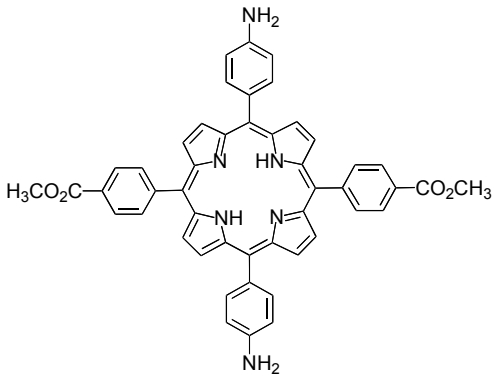

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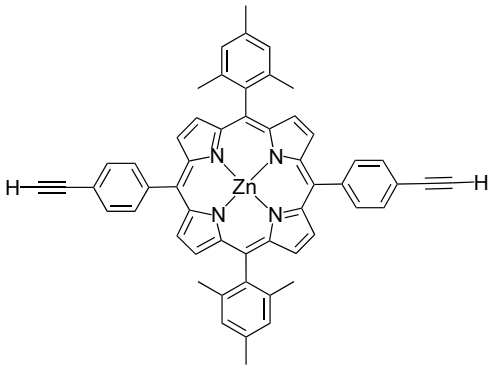

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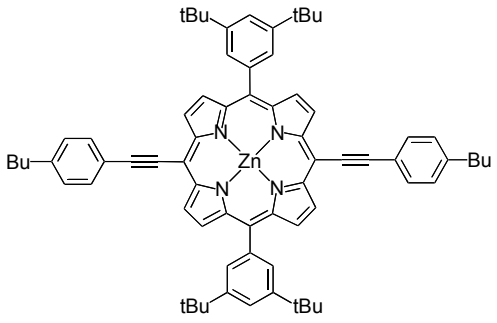

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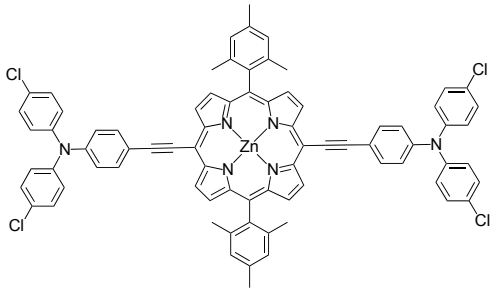
Figure 17b. Structures of *cis* and *trans*-A_2B_2 *meso*-substituted porphyrins in Table 17b



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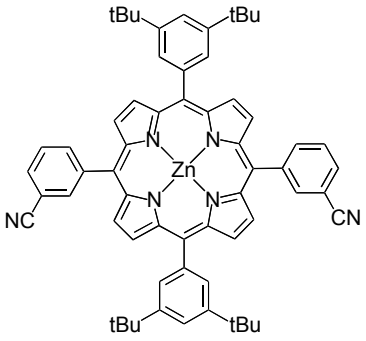

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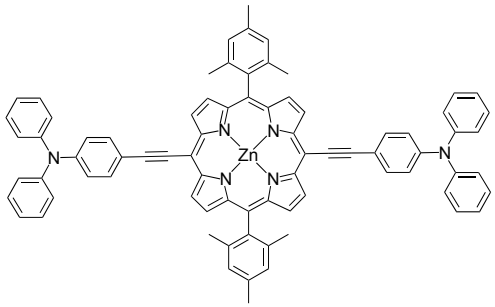

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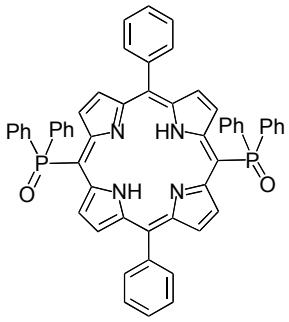

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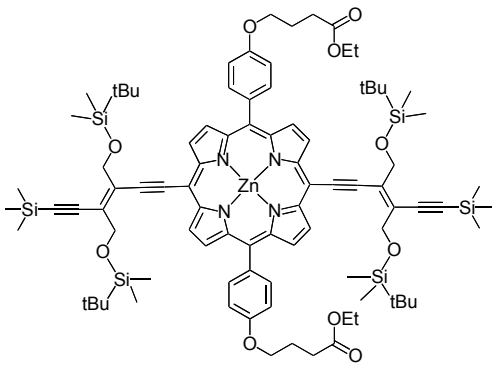

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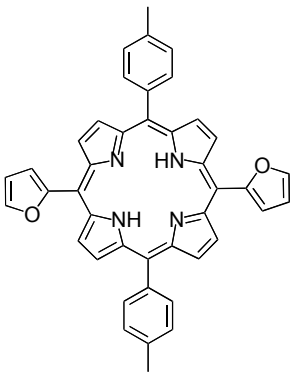

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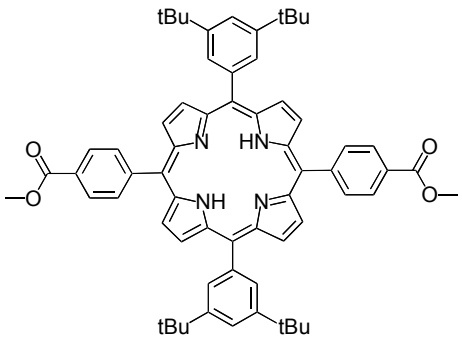
Figure 17b. Structures of|*cis* and *trans*-A_2B_2 *meso*-substituted porphyrins in Table 17b



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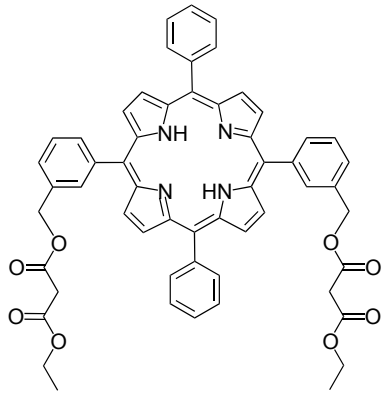

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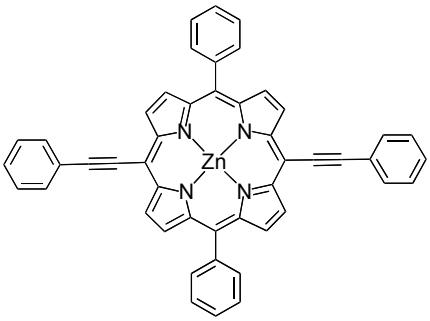

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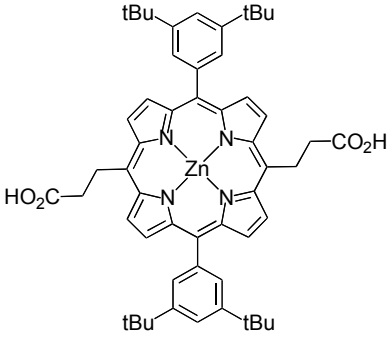

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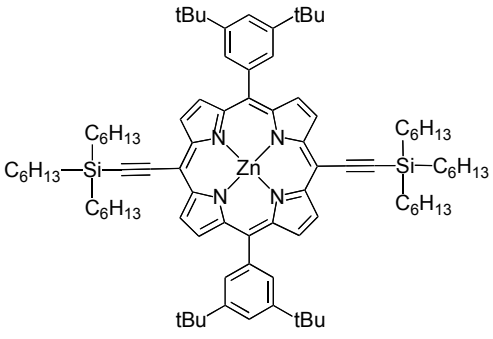

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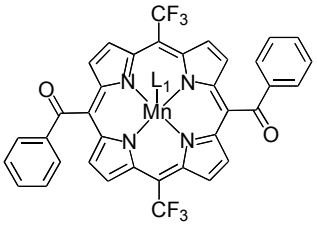

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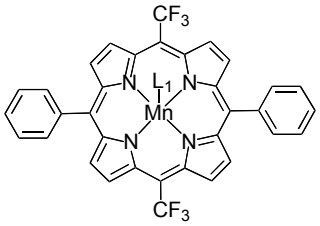
Figure 17b. Structures of *cis* and *trans*-A_2B_2 *meso*-substituted porphyrins in Table 17b



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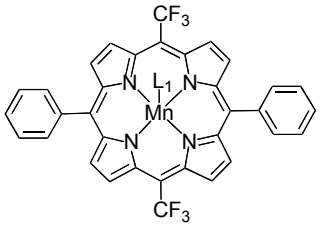

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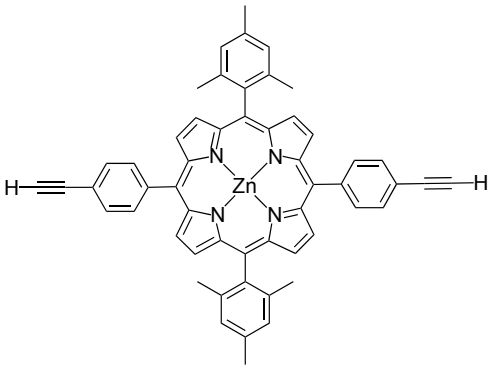

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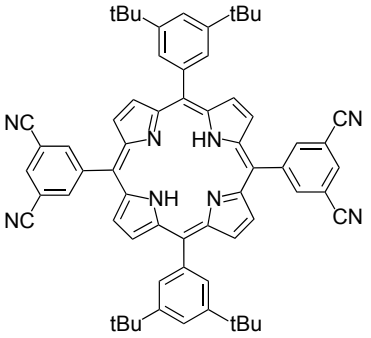

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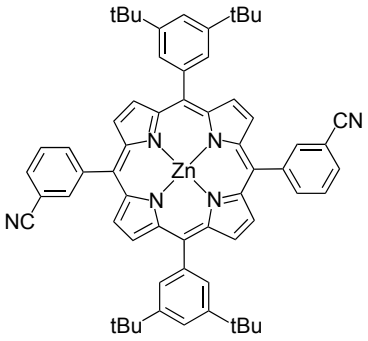

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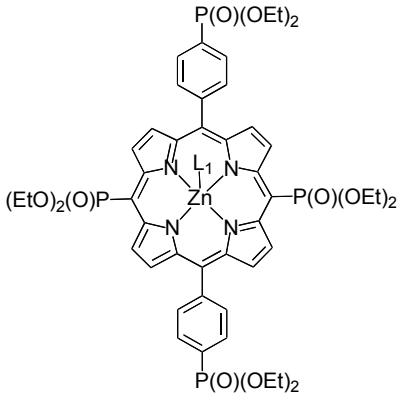

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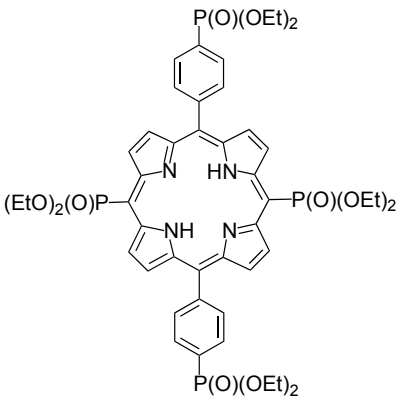
Figure 17b. Structures of *cis* and *trans*-A_2B_2 *meso*-substituted porphyrins in Table 17b



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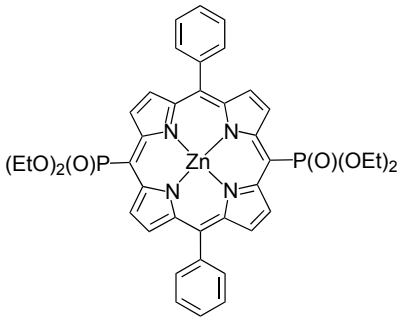

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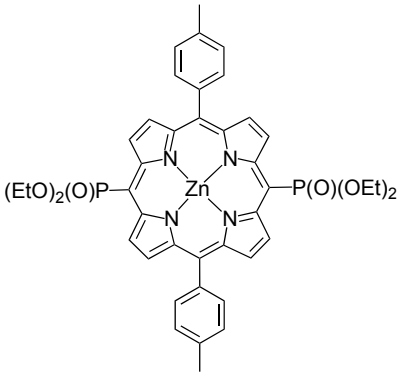

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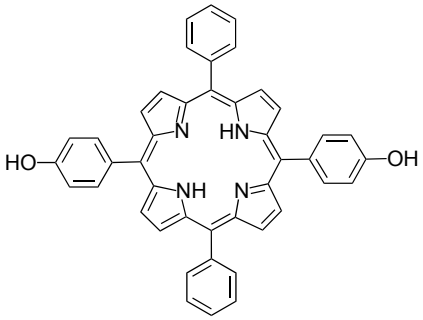

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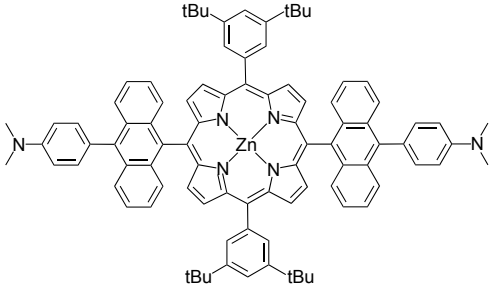

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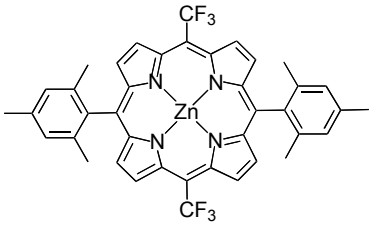

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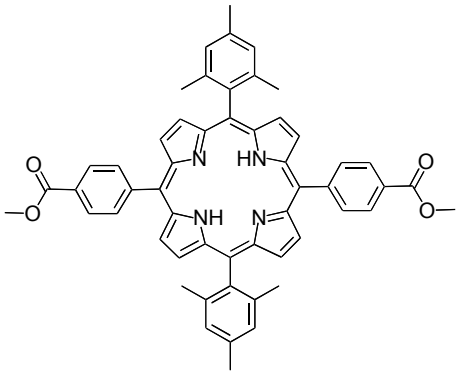
Figure 17b. Structures of *cis* and *trans*-A_2B_2 *meso*-substituted porphyrins in Table 17b



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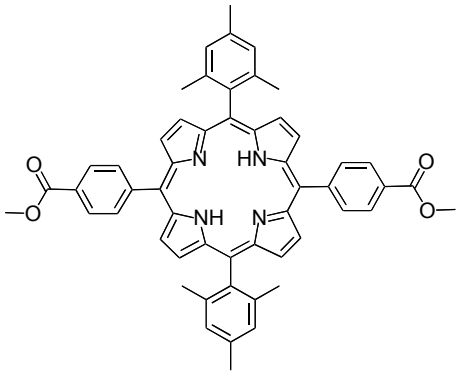

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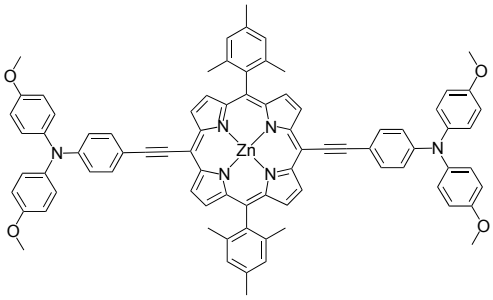

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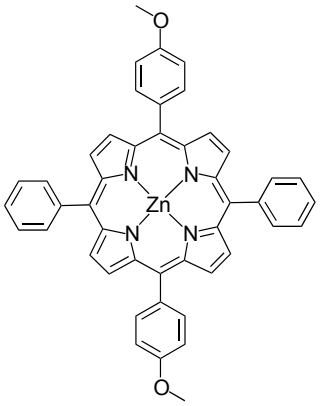

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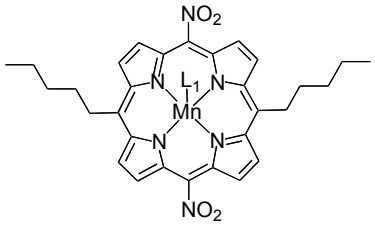

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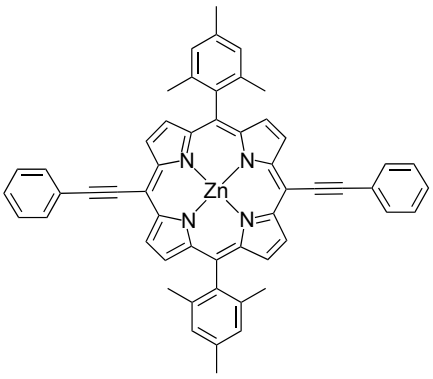

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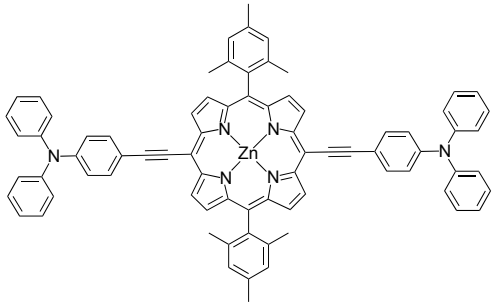
Figure 17b. Structures of *cis* and *trans*-A_2B_2 *meso*-substituted porphyrins in Table 17b



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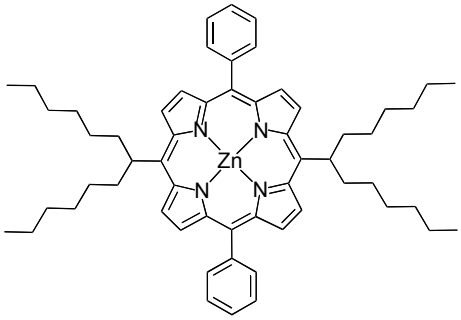

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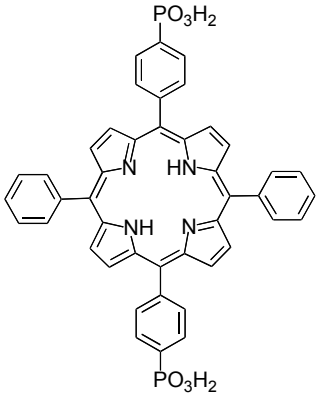

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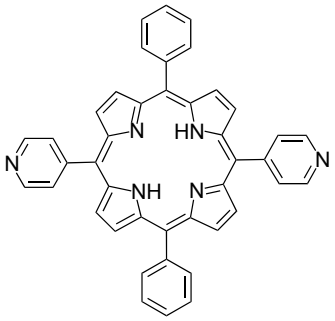

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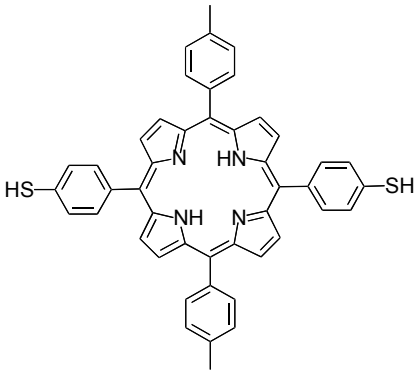

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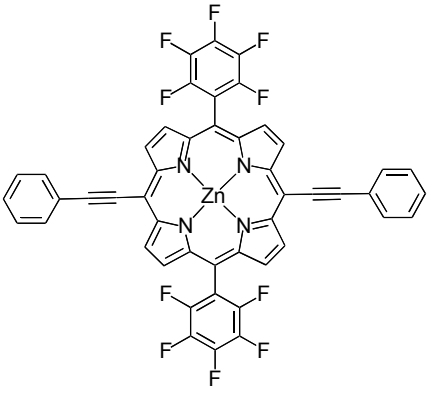

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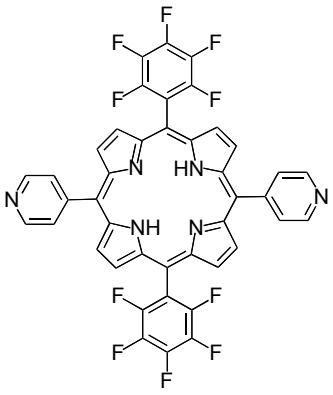
Figure 17b. Structures of *cis* and *trans*-A_2B_2 *meso*-substituted porphyrins in Table 17b



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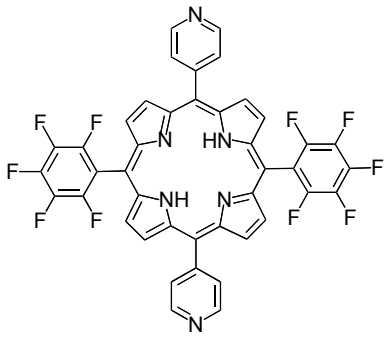

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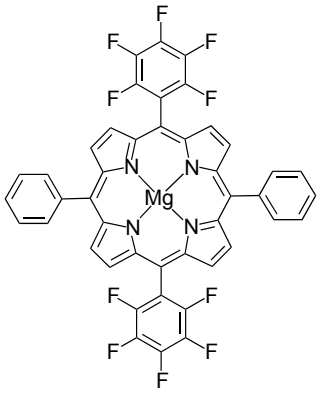

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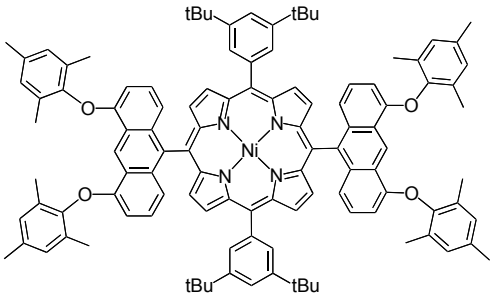

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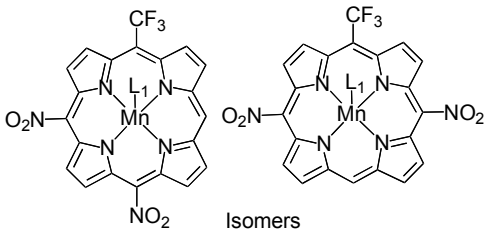
Figure 17c. Structures of *cis* and *trans*-A_2B *meso*-substituted porphyrins in Table 17c



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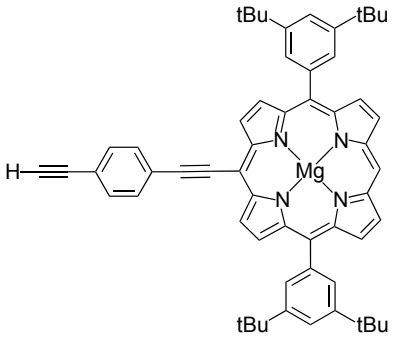

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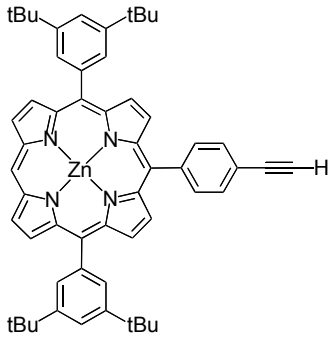

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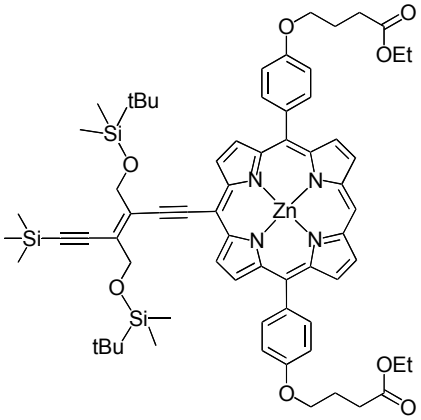

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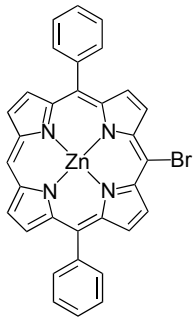

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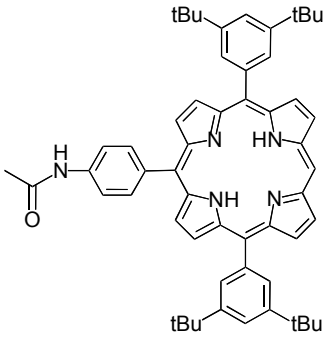

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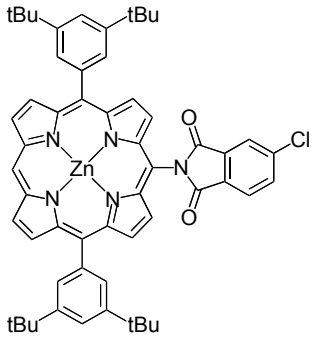
Figure 17c. Structures of *cis* and *trans*-A_2B *meso*-substituted porphyrins in Table 17c



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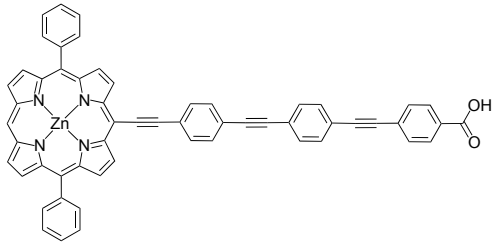

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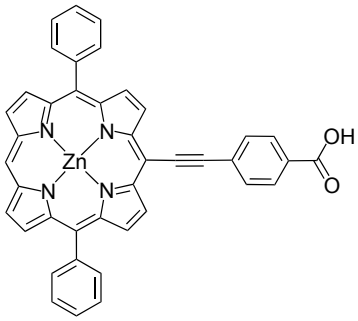

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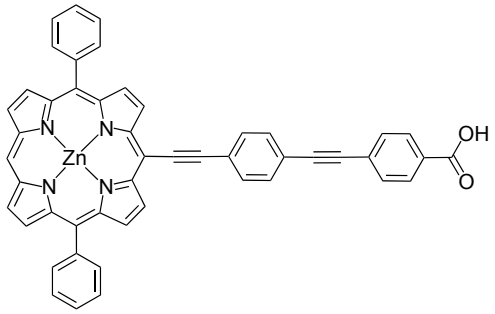

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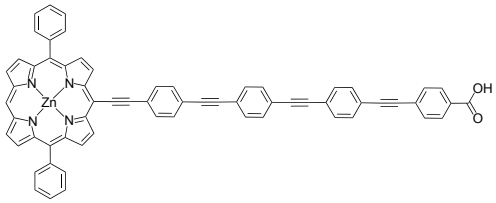

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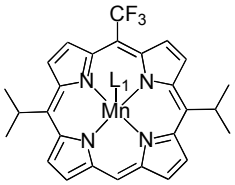

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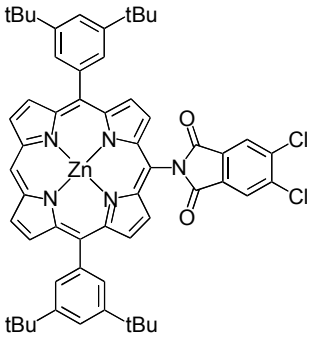
Figure 17c. Structures of *cis* and *trans*-A_2B *meso*-substituted porphyrins in Table 17c



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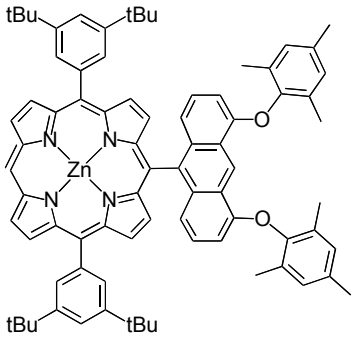

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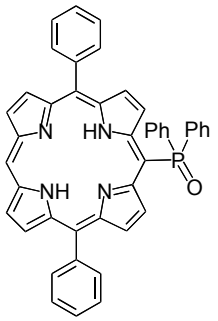

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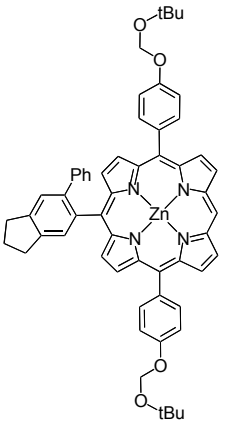

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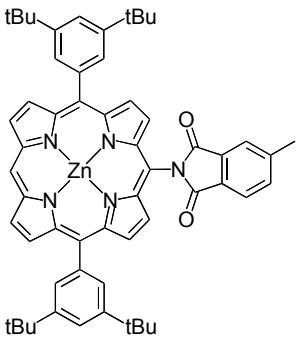

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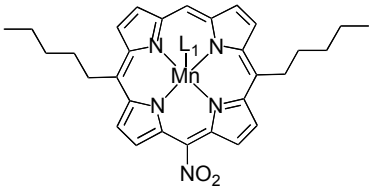

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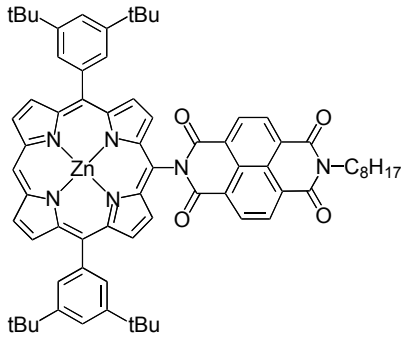
Figure 17c. Structures of *cis* and *trans*-A_2B *meso*-substituted porphyrins in Table 17c



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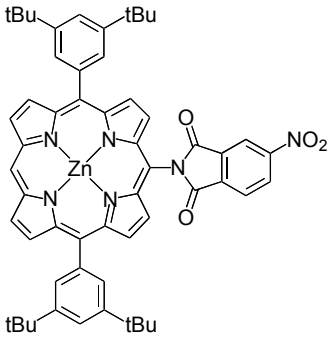

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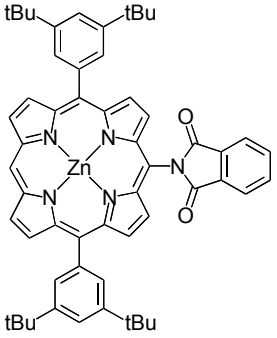

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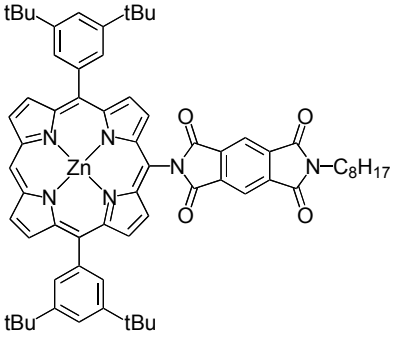

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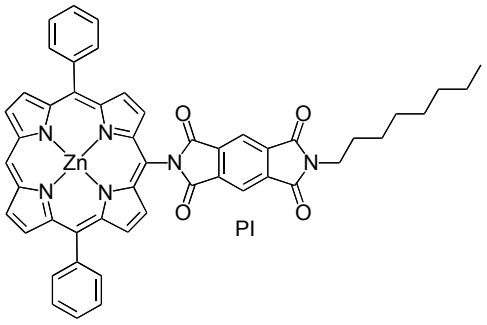

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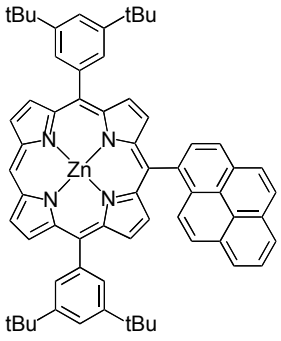

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Figure 17c. Structures of *cis* and *trans*-A_2B *meso*-substituted porphyrins in Table 17c

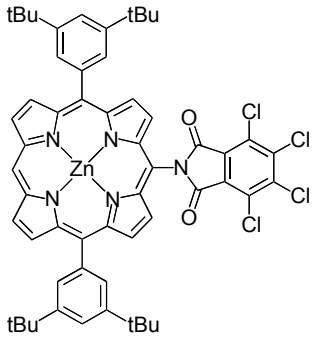

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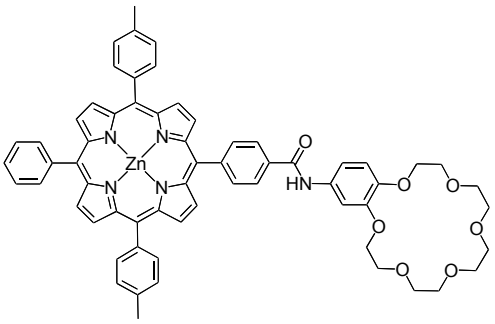
Figure 17d. Structures of *trans*-A_2BC *meso*-substituted porphyrins in Table 17d



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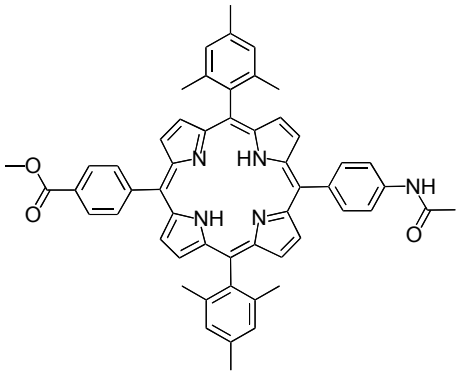

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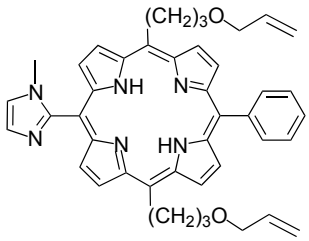

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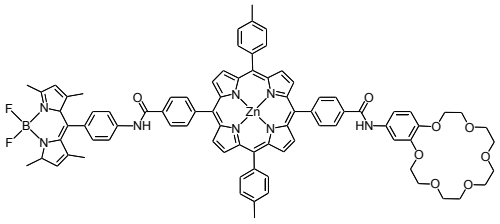

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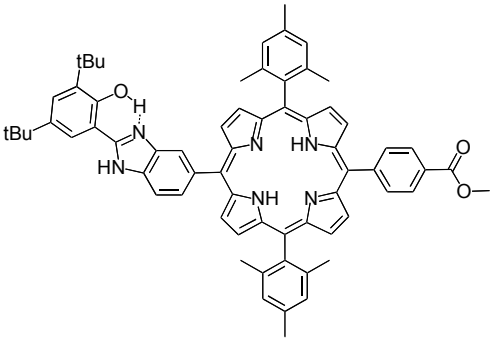

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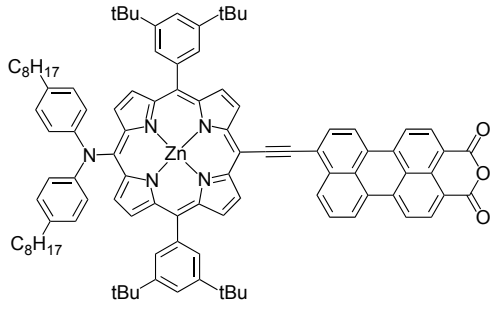

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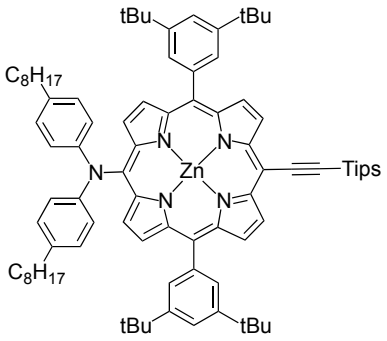
Figure 17d. Structures of *trans*-A_2BC *meso*-substituted porphyrins in Table 17d



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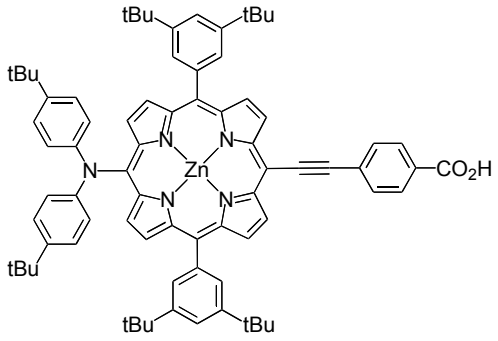

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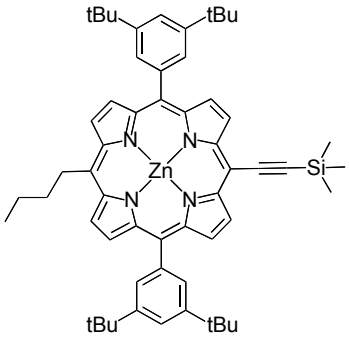

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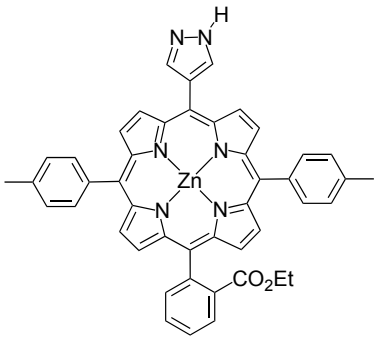

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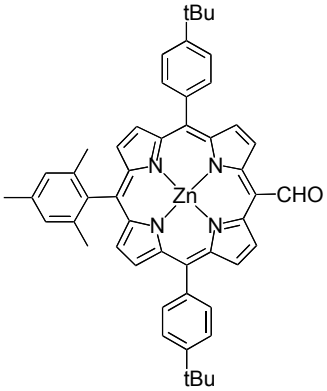

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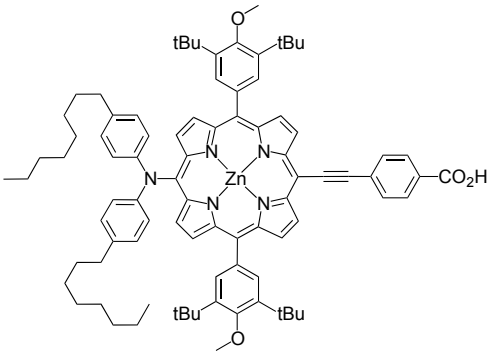

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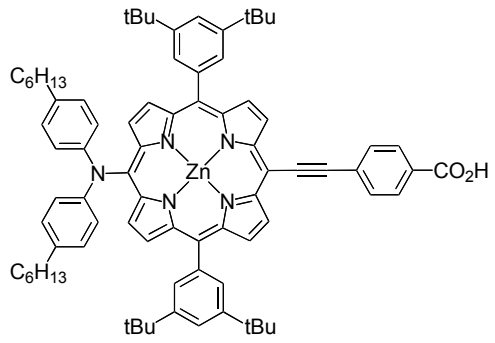
Figure 17d. Structures of *trans*-A_2BC *meso*-substituted porphyrins in Table 17d



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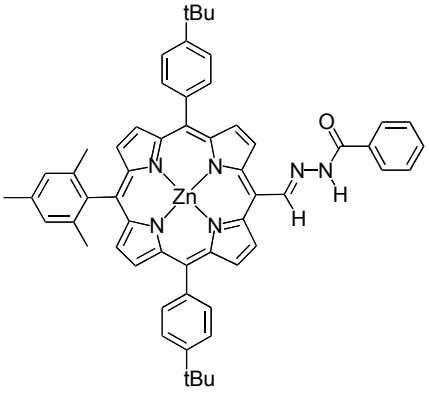

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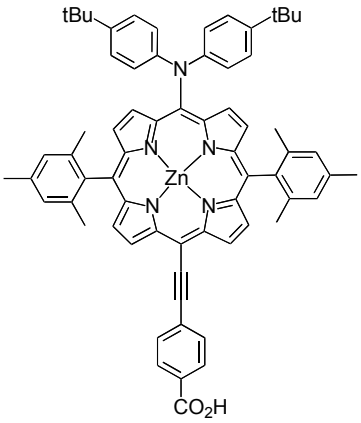

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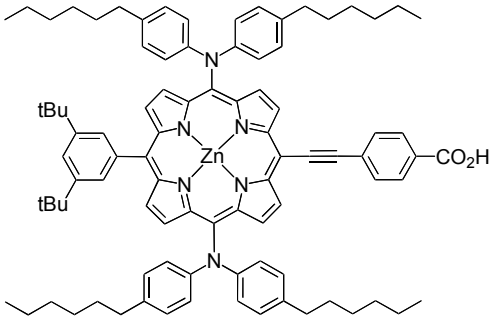

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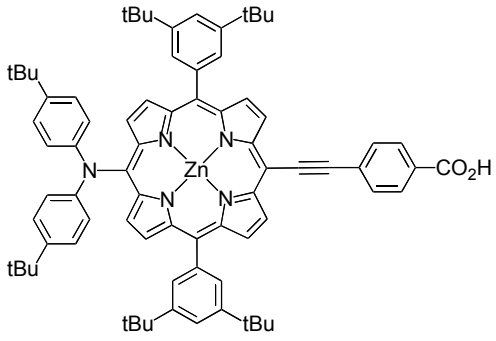

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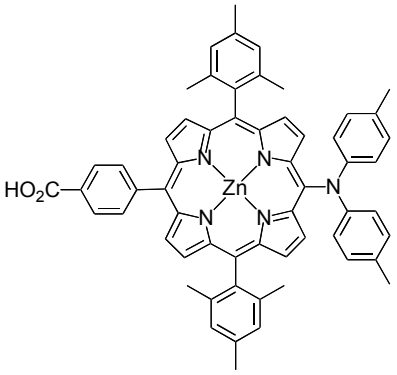

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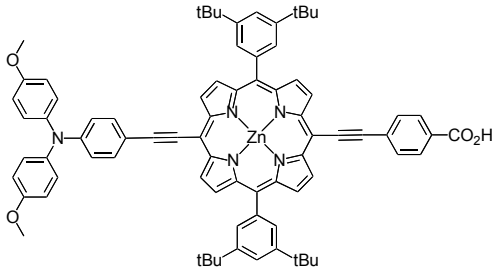
Figure 17d. Structures of *trans*-A_2BC *meso*-substituted porphyrins in Table 17d



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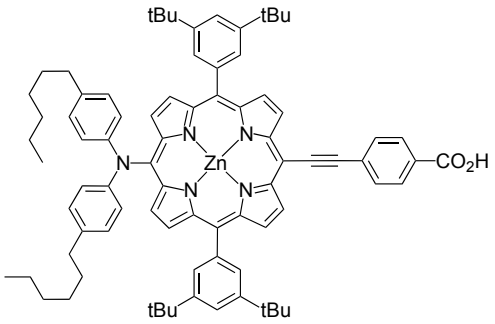

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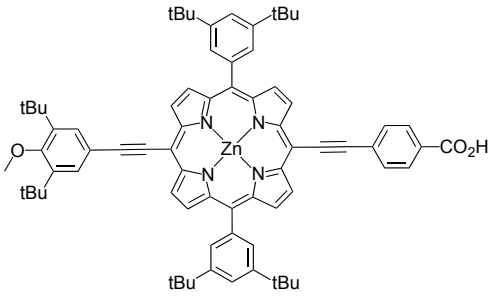

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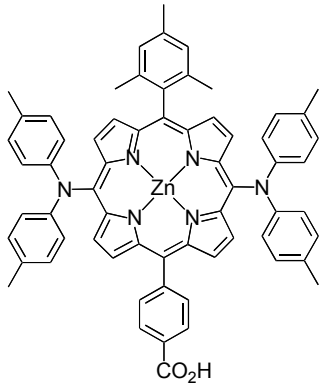

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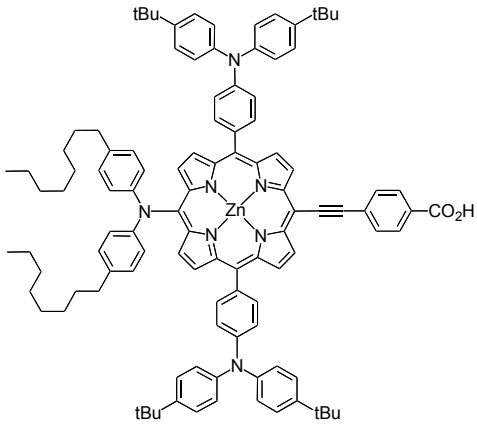

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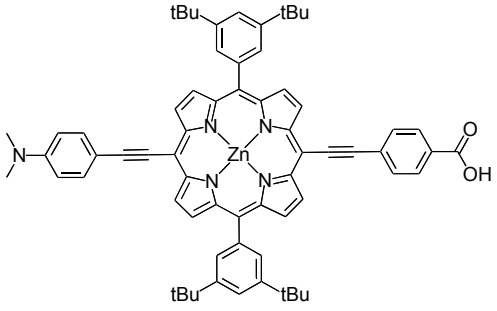

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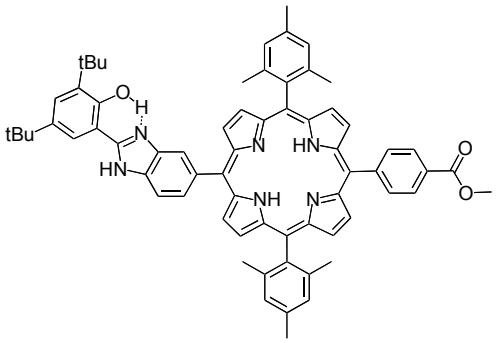
Figure 17d. Structures of|*trans*-A_2BC *meso*-substituted porphyrins in Table 17d



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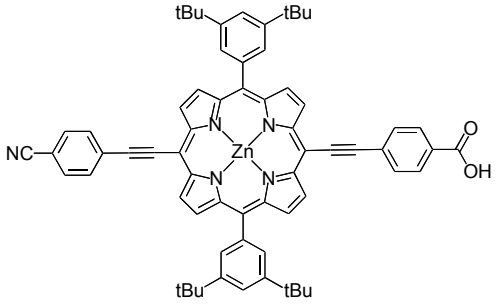

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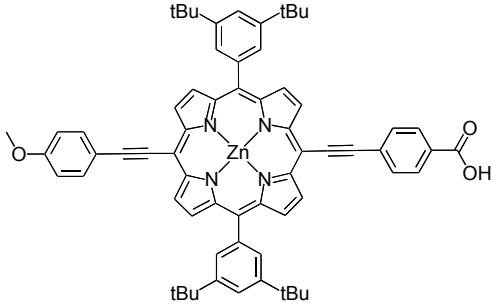

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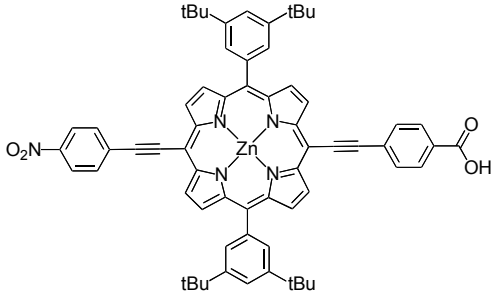

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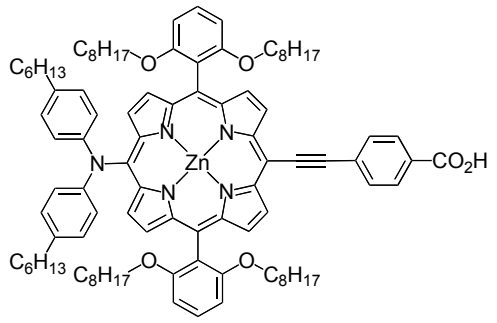

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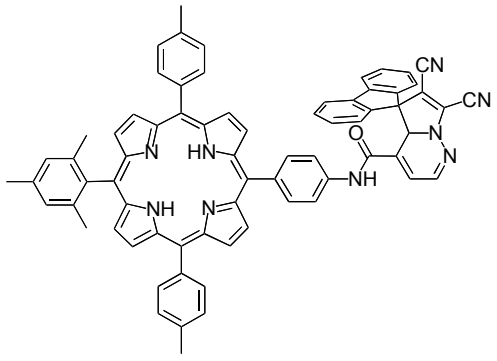

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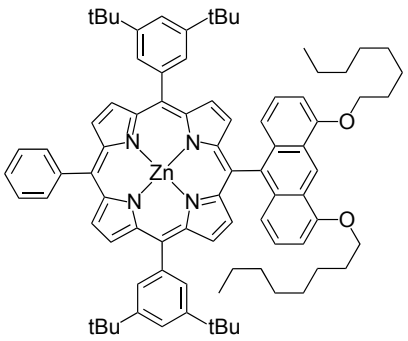
Figure 17d. Structures of *trans*-A_2BC *meso*-substituted porphyrins in Table 17d



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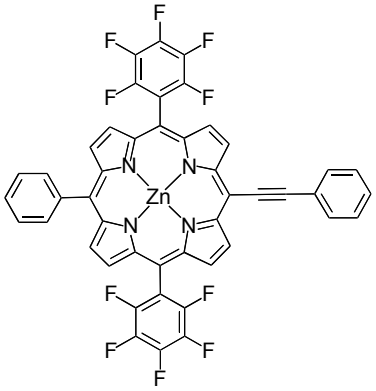

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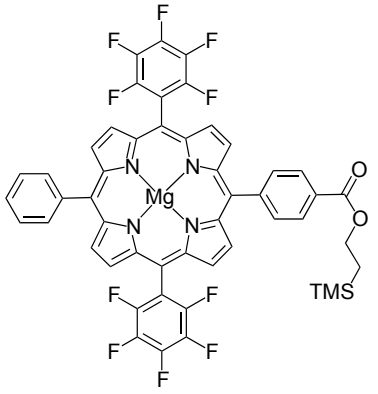

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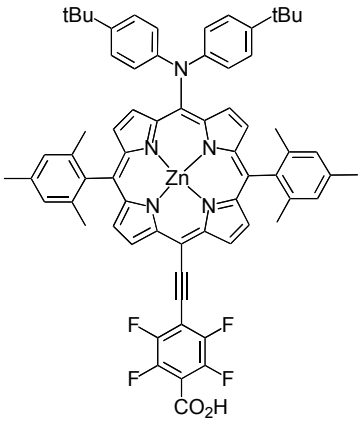

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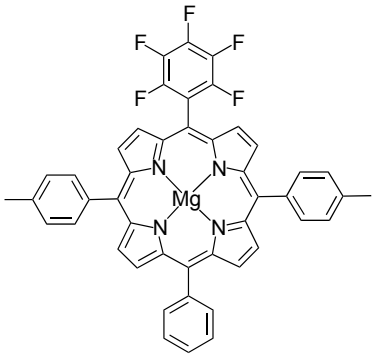

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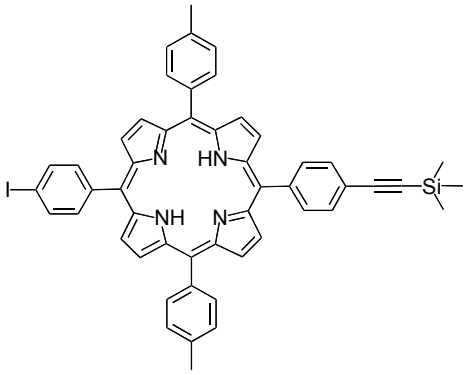

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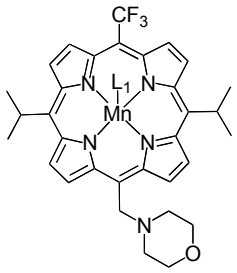
Figure 17d. Structures of *trans*-A_2BC *meso*-substituted porphyrins in Table 17d



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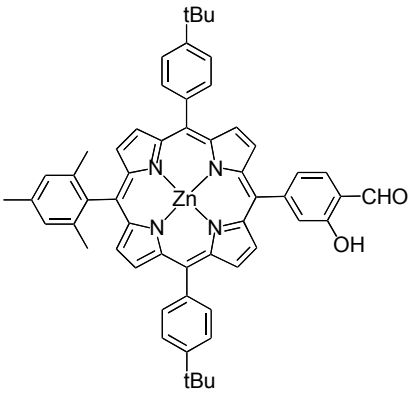

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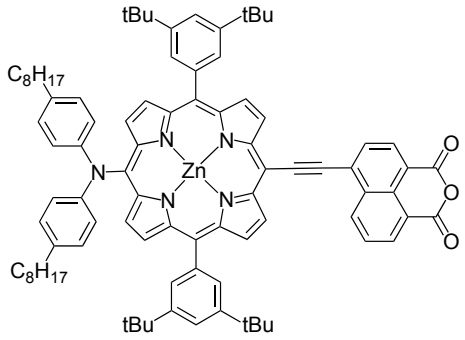

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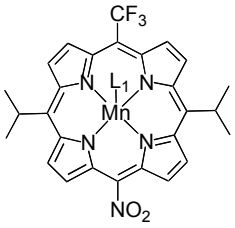

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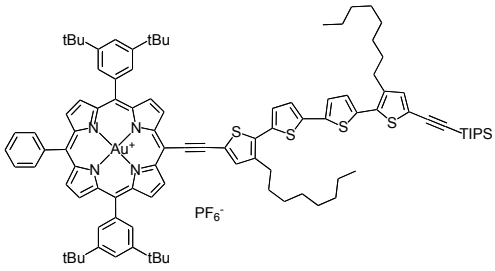

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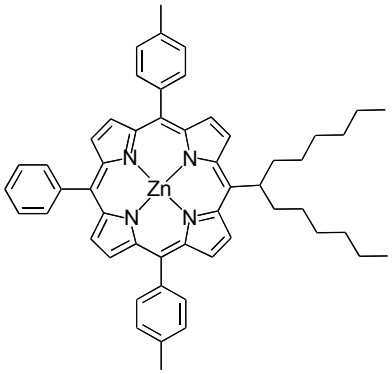

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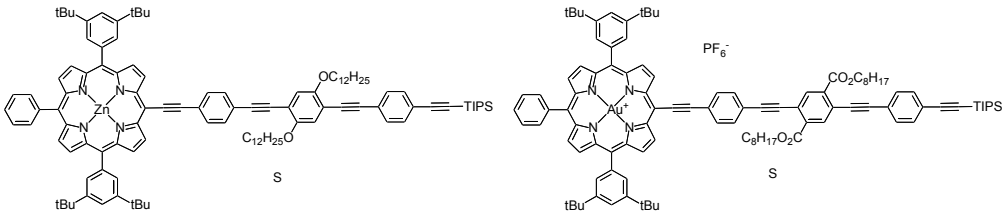
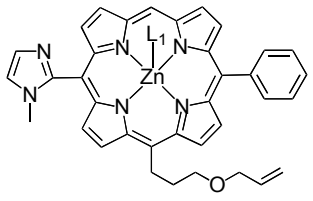
Figure 17d. Structures of *trans*-A_2BC *meso*-substituted porphyrins in Table 17d



1329 **1330**

Figure 17e. Structures of A_2 *meso*-substituted porphyrins in Table 17e



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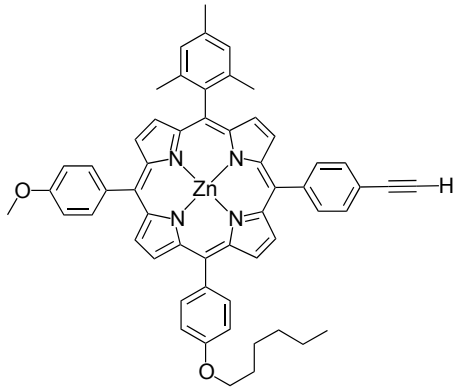

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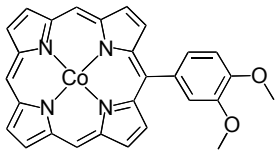

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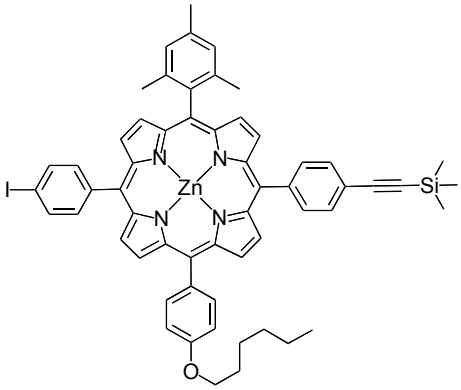

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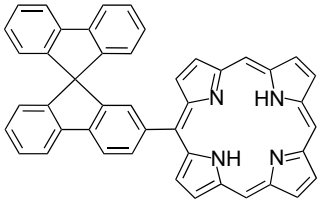

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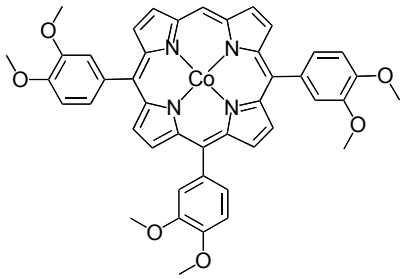

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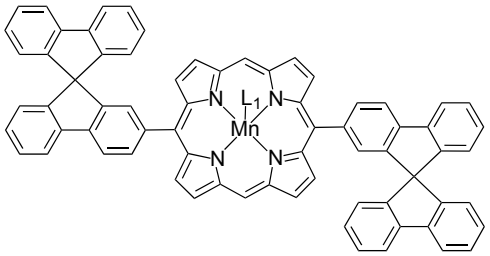
Figure 17e. Structures of A_2 *meso*-substituted porphyrins in Table 17e



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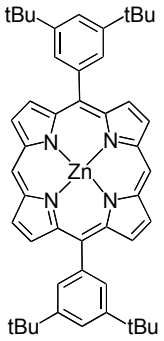

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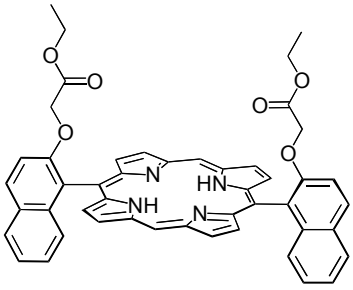

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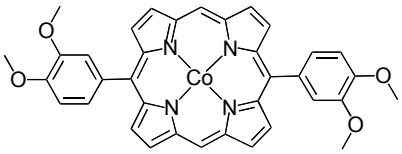

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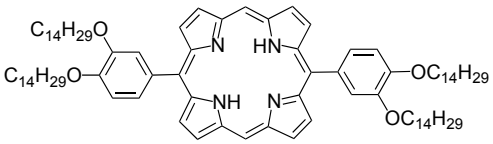

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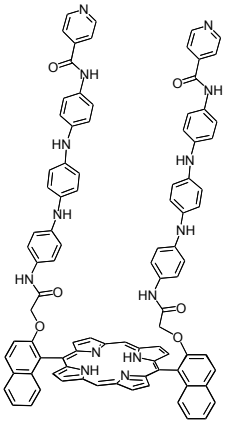

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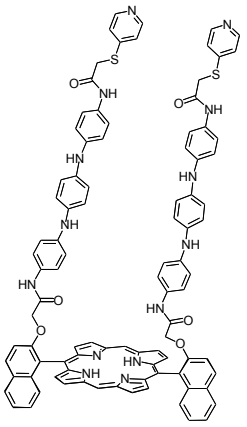
Figure 17e. Structures of A_2 *meso*-substituted porphyrins in Table 17e



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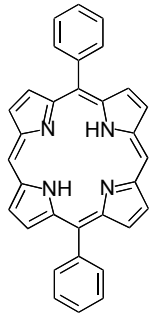

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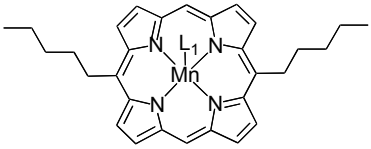

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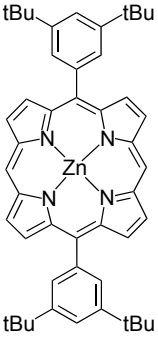

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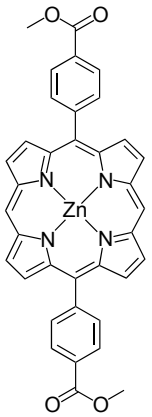

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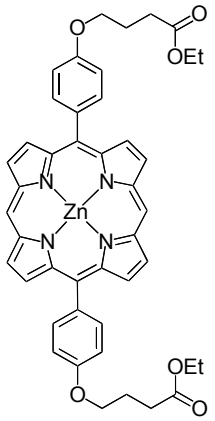

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Figure 17e. Structures of A_2 *meso*-substituted porphyrins in Table 17e

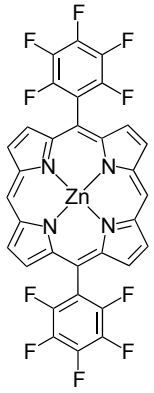

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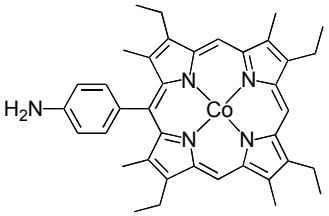
Figure 17f. Structures of β-pyrrole substitued porphyrins with less than four *meso*-substituents in Table 17f



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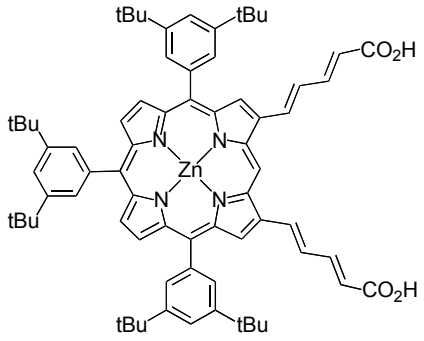

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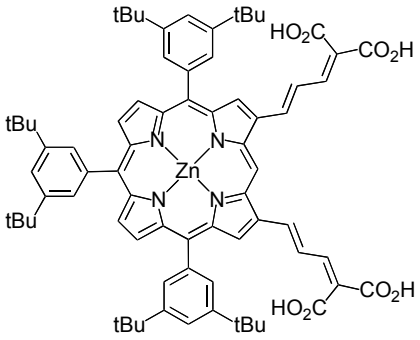

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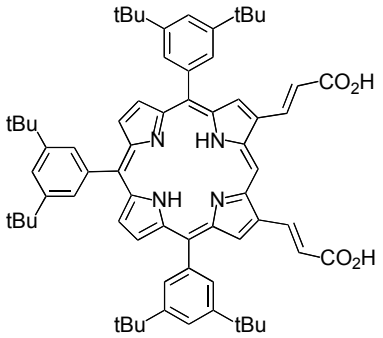

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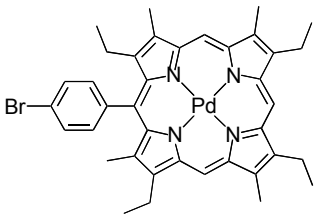

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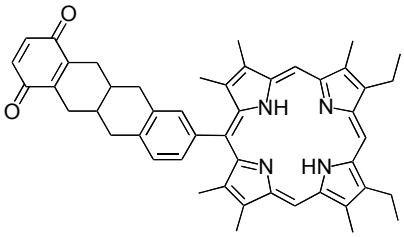

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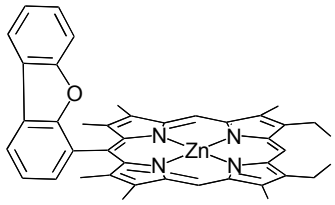
Figure 17f. Structures of β-pyrrole substitued porphyrins with less than four *meso*-substituents in Table 17f



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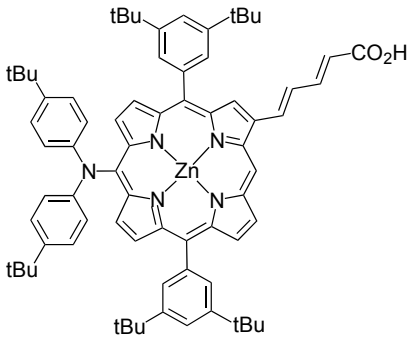

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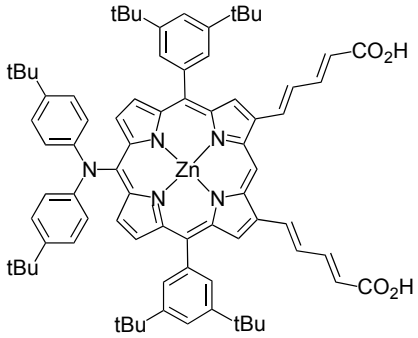

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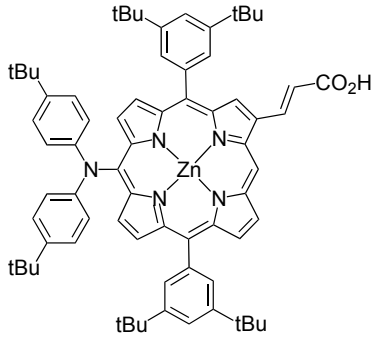

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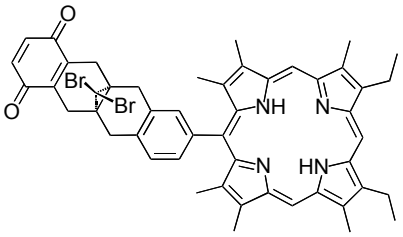

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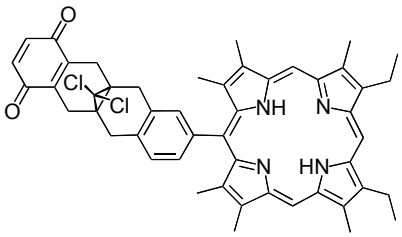

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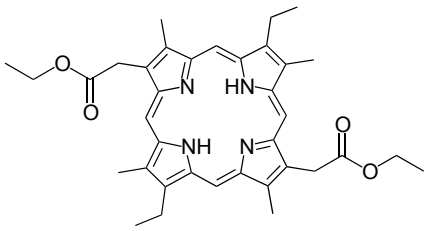
Figure 17f. Structures of β-pyrrole substitued porphyrins with less than four *meso*-substituents in Table 17f



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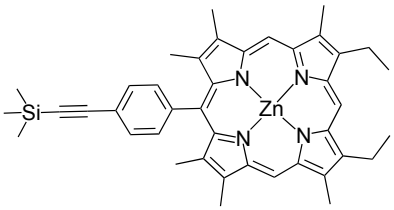

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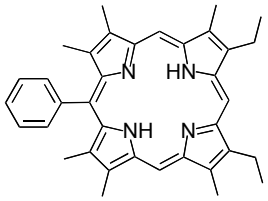

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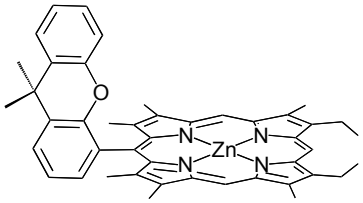

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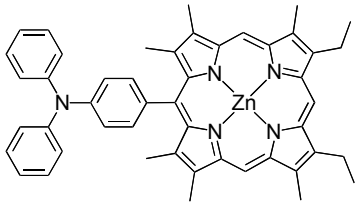

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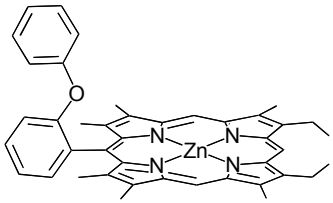

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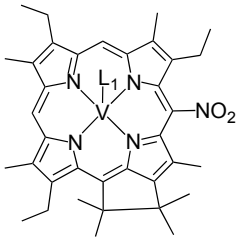
Figure 17f. Structures of β-pyrrole substitued porphyrins with less than four *meso*-substituents in Table 17f



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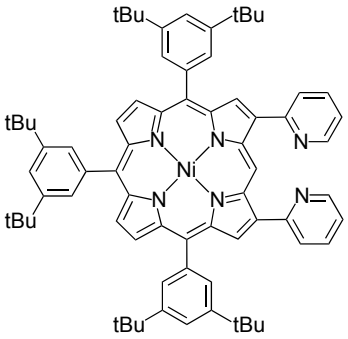

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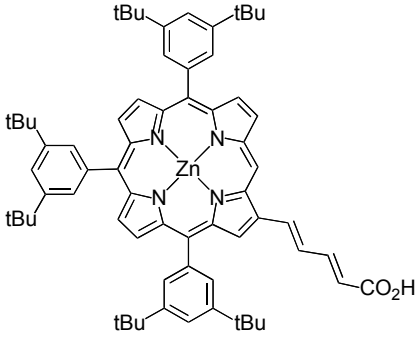

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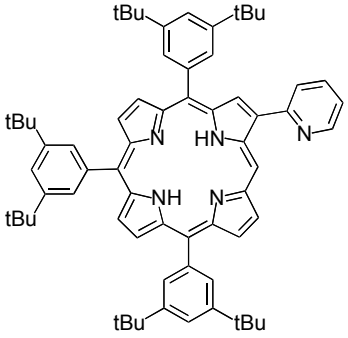

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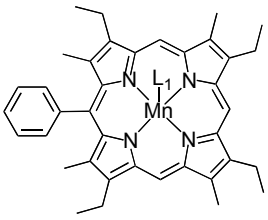

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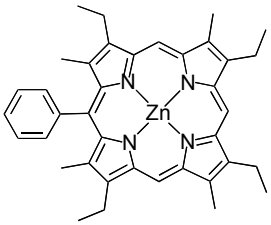

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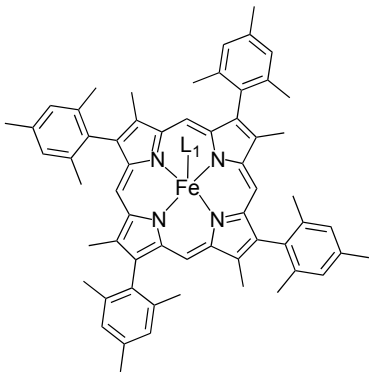
Figure 17f. Structures of β-pyrrole substitued porphyrins with less than four *meso*-substituents in Table 17f



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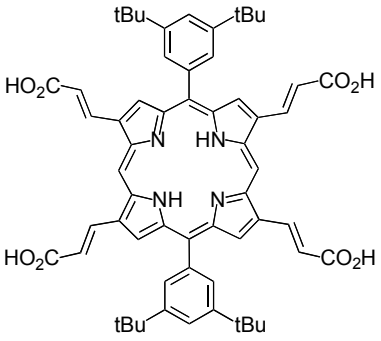

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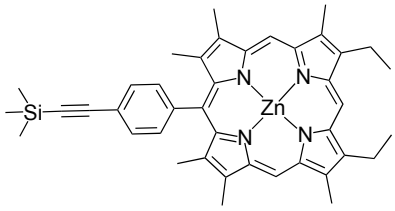

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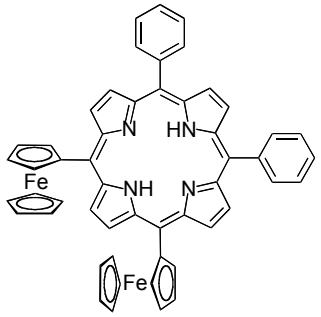
Figure 18. Structures of porphyrin-ferrocene conjugates in Table 18



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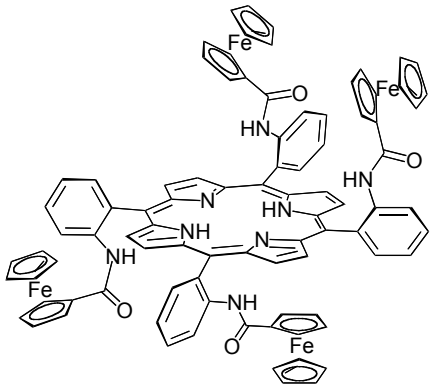

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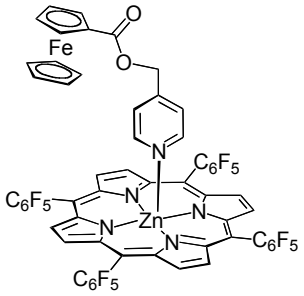

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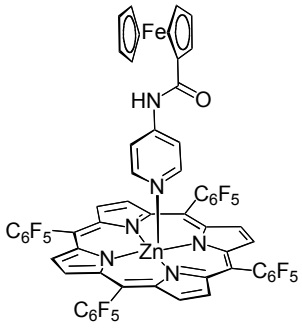

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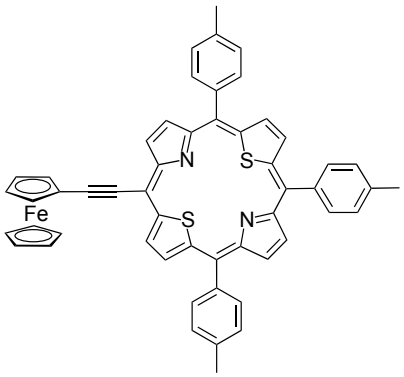

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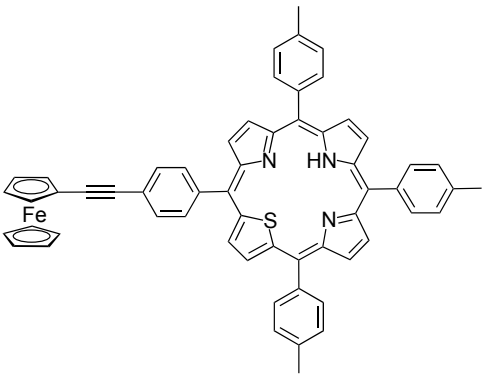

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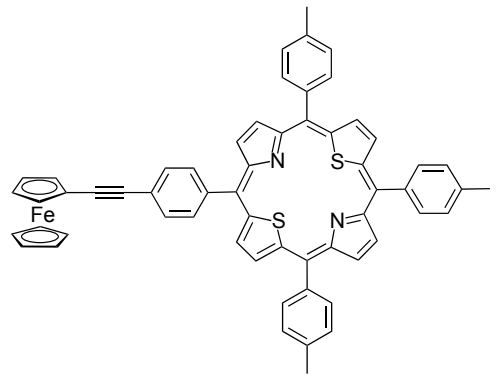
Figure 18. Structures of porphyrin-ferrocene conjugates in Table 18



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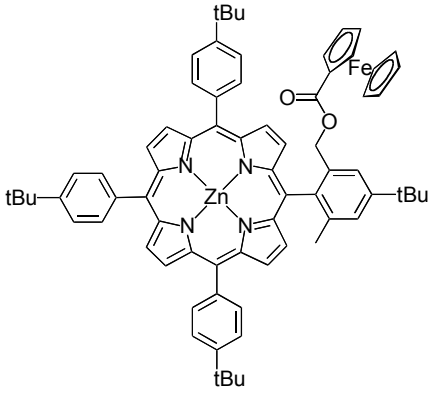

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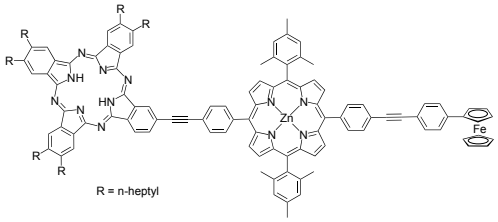

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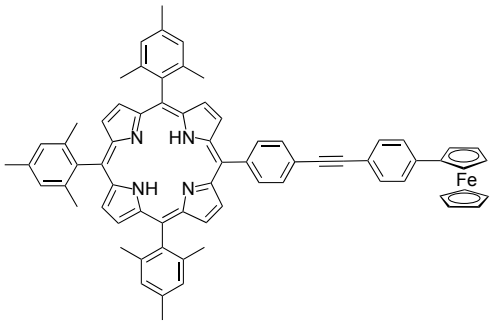

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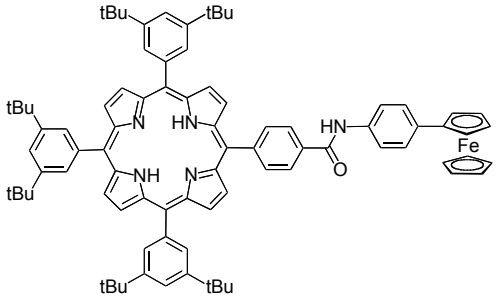

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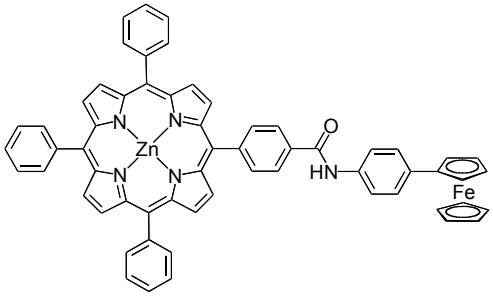

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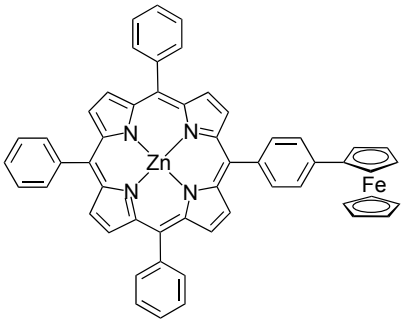
Figure 18. Structures of porphyrin-ferrocene conjugates in Table 18



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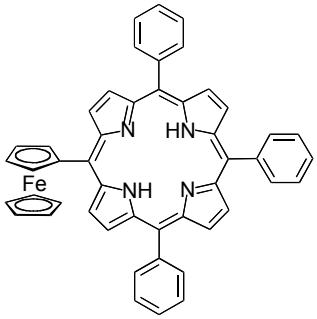

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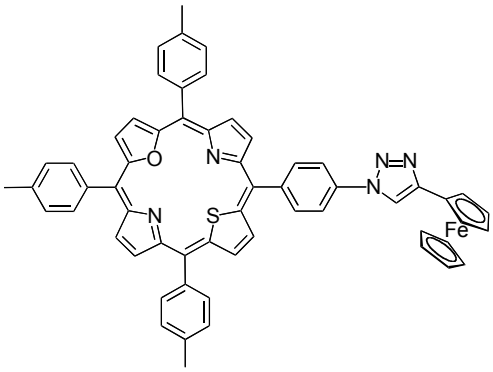

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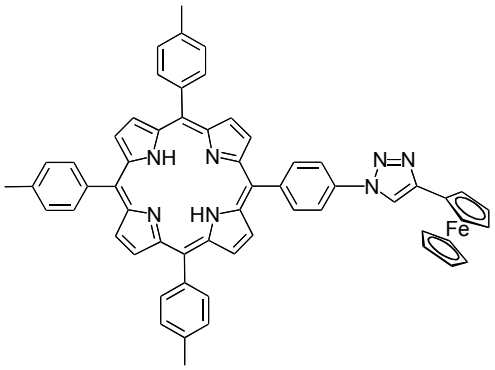

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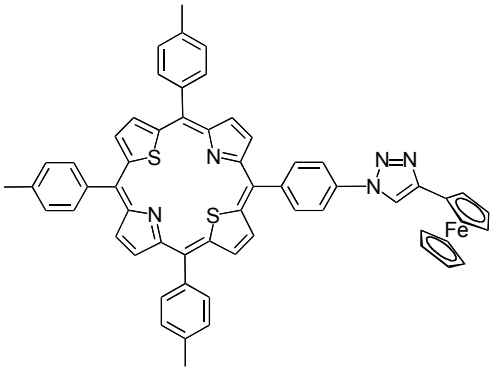

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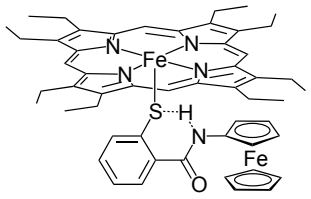

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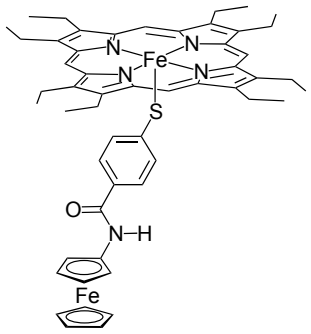
Figure 18. Structures of porphyrin-ferrocene conjugates in Table 18



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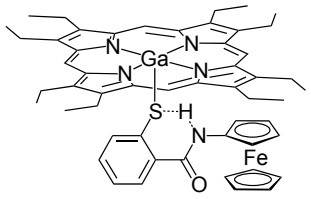

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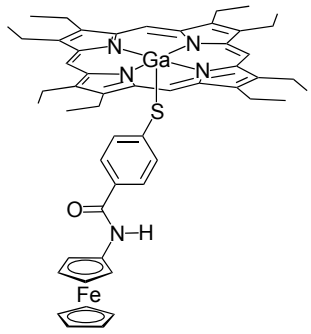

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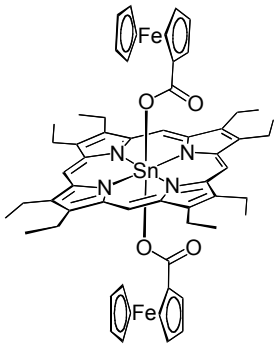

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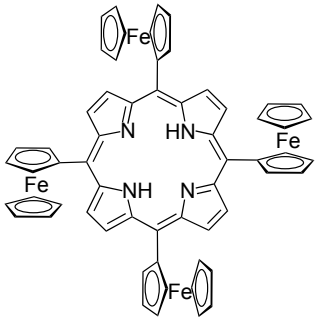

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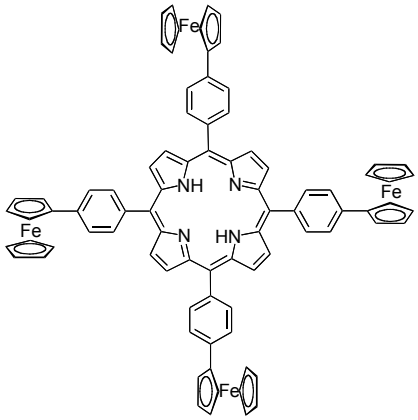

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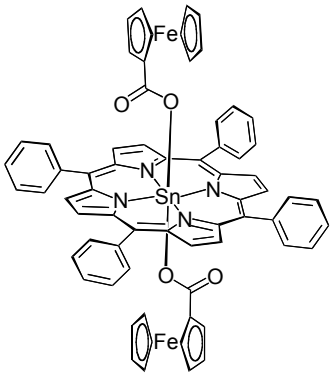
Figure 18. Structures of porphyrin-ferrocene conjugates in Table 18



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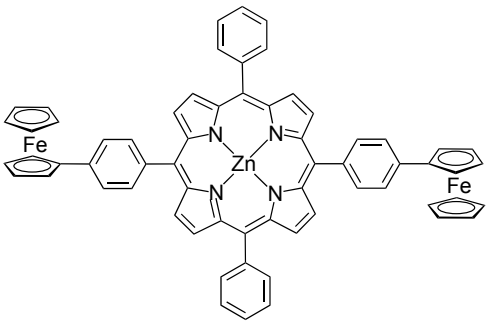

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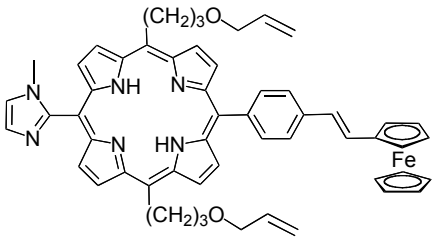

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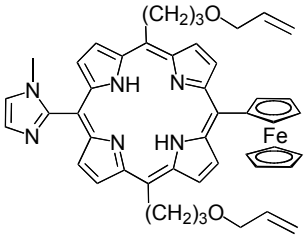

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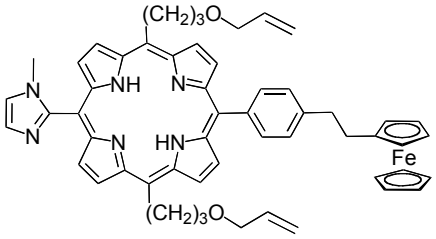

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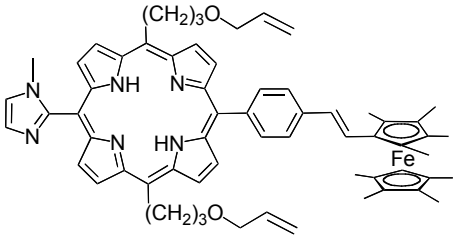

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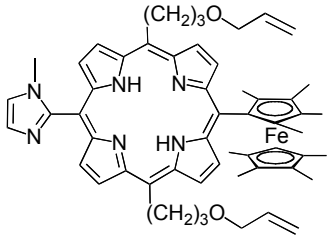
Figure 18. Structures of porphyrin-ferrocene conjugates in Table 18



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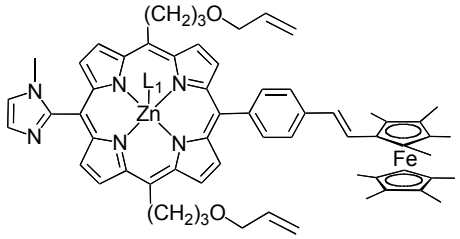

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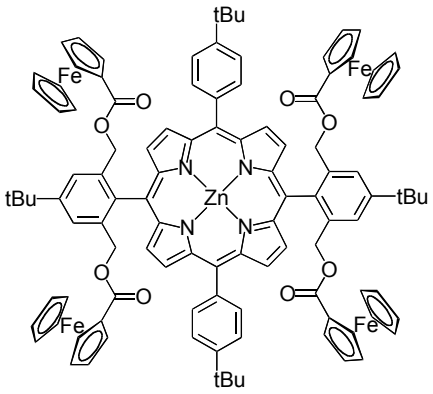

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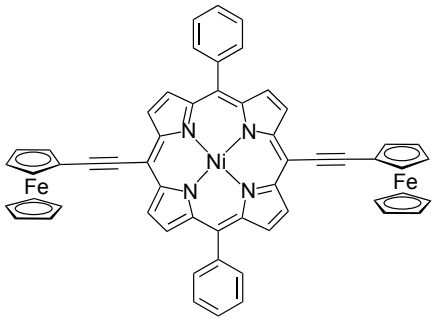

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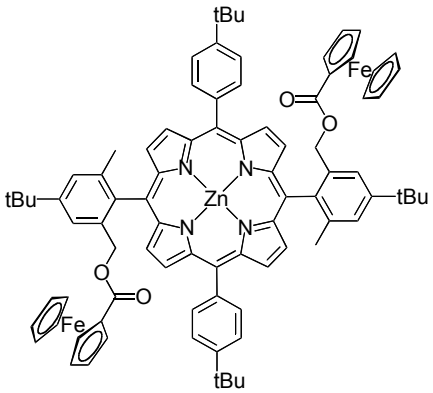

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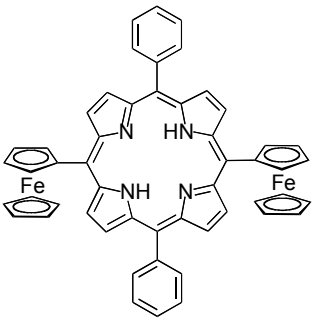

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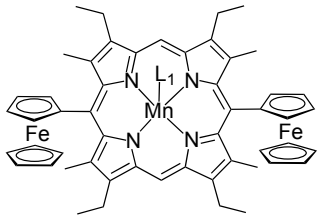
Figure 18. Structures of porphyrin-ferrocene conjugates in Table 18



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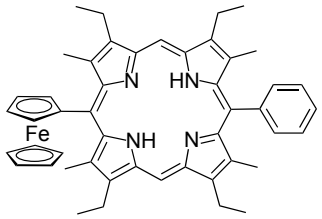

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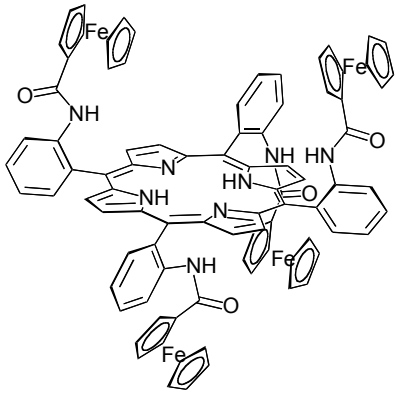

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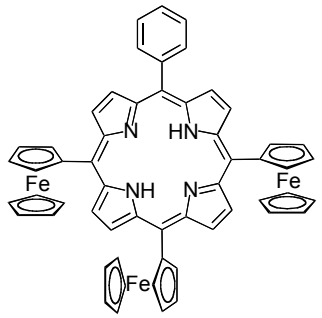

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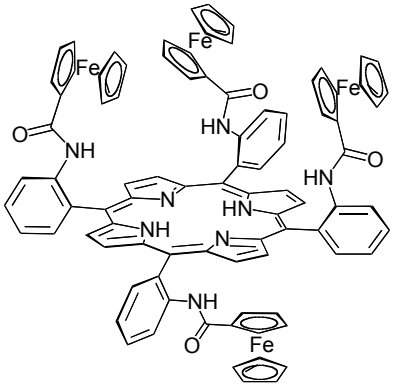

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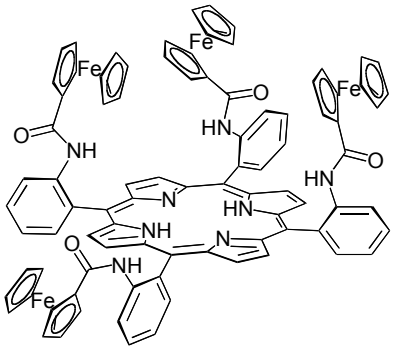

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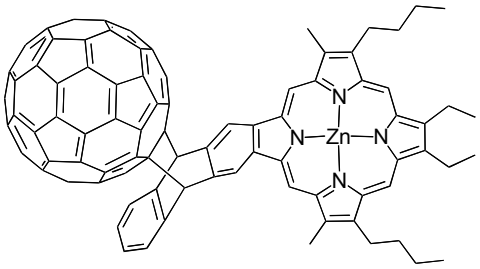
Figure 19. Structures of porphyrin-fullerene conjugates and porphyrin-fullerene complexes in Table 19



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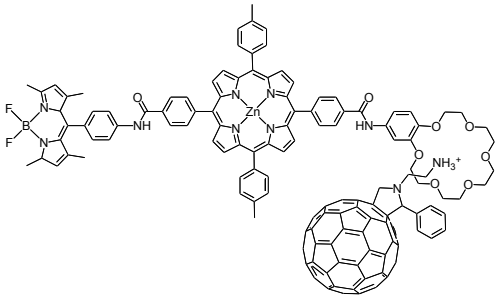

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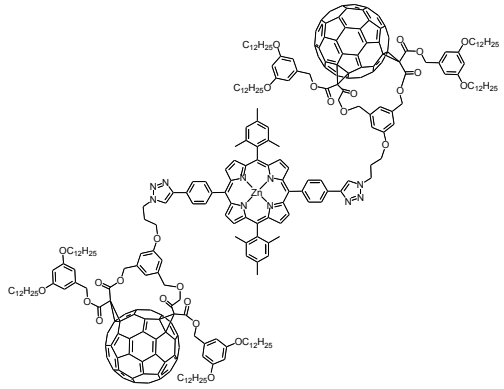

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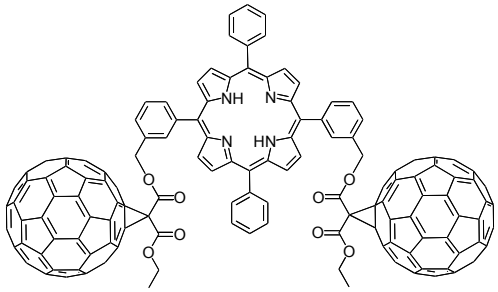

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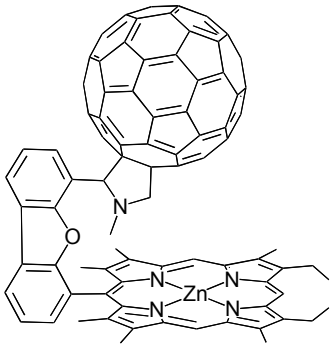

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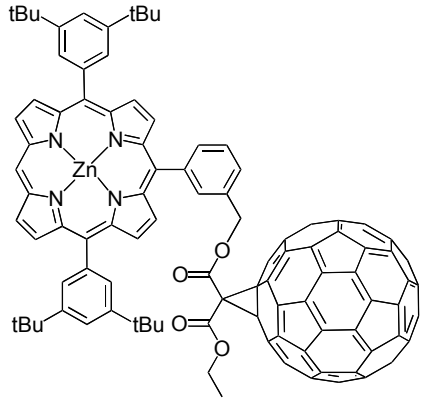

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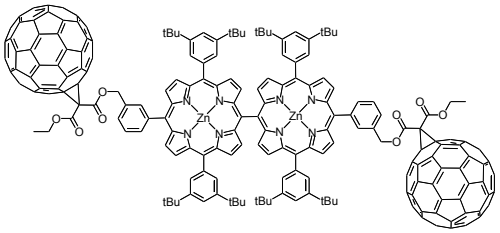
Figure 19. Structures of porphyrin-fullerene conjugates and porphyrin-fullerene complexes in Table 19



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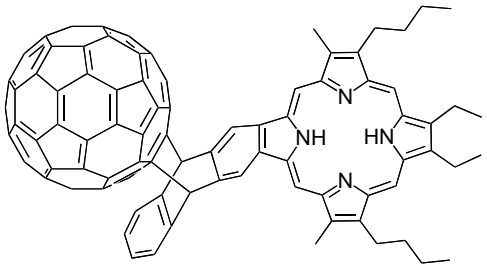

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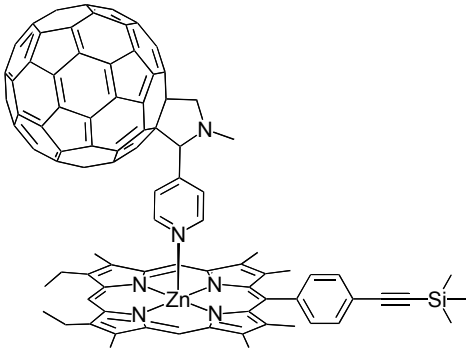

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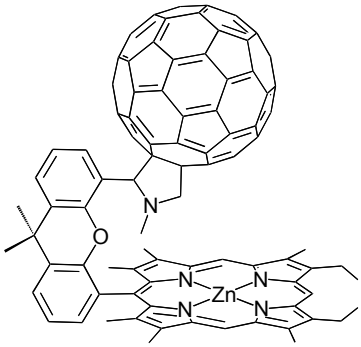

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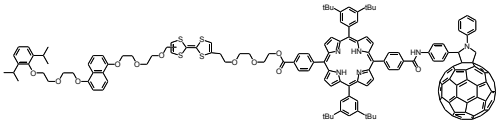

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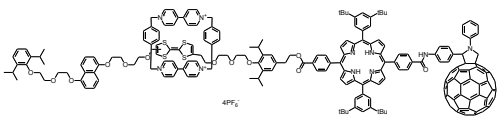

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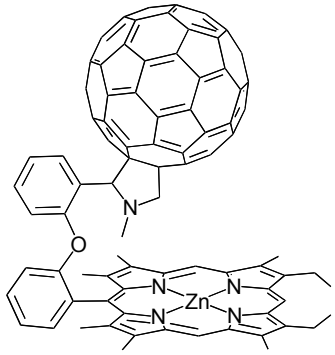
Figure 19. Structures of porphyrin-fullerene conjugates and porphyrin-fullerene complexes in Table 19



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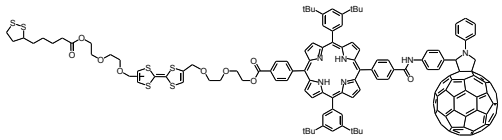

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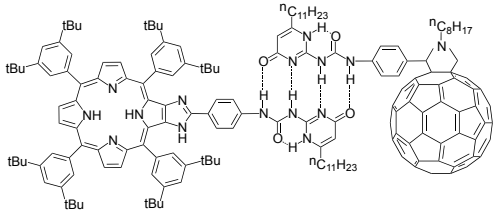

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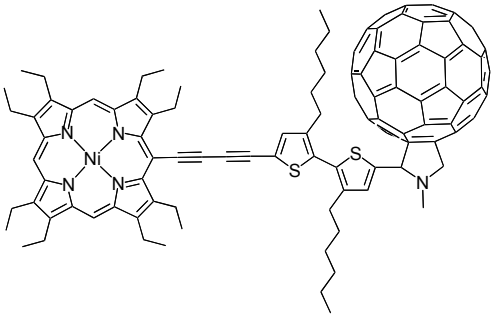

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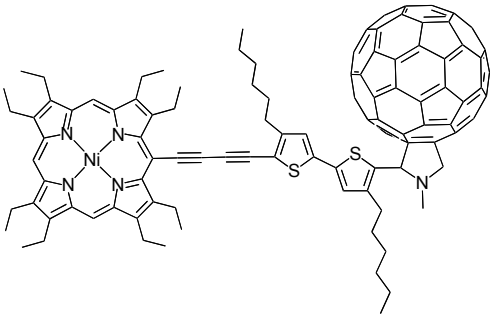

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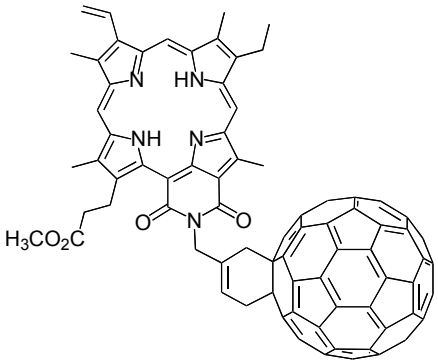

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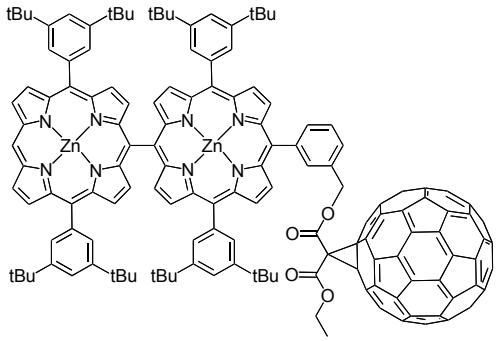
Figure 19. Structures of porphyrin-fullerene conjugates and porphyrin-fullerene complexes in Table 19



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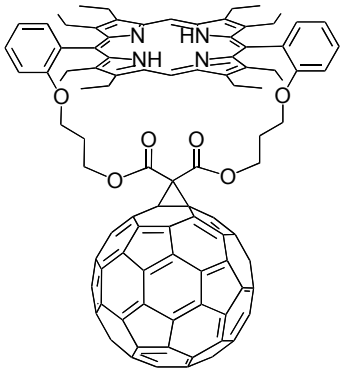

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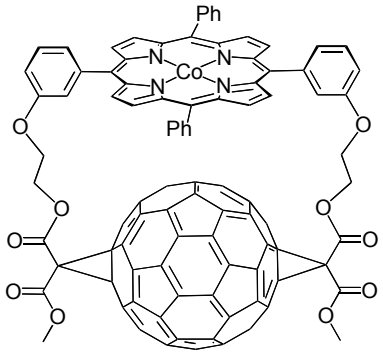

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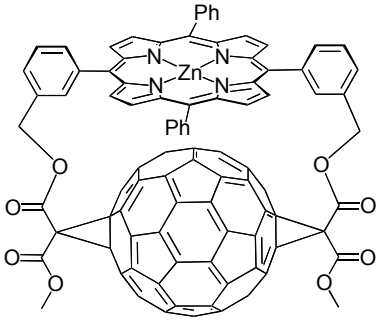

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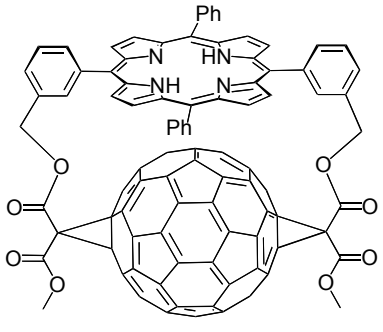

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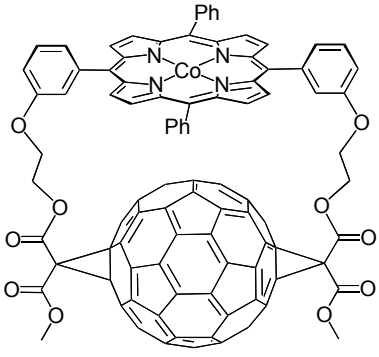

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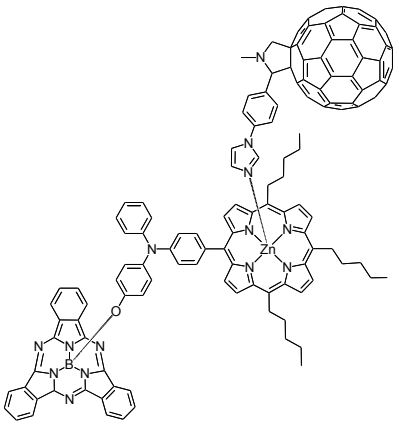
Figure 19. Structures of porphyrin-fullerene conjugates and porphyrin-fullerene complexes in Table 19



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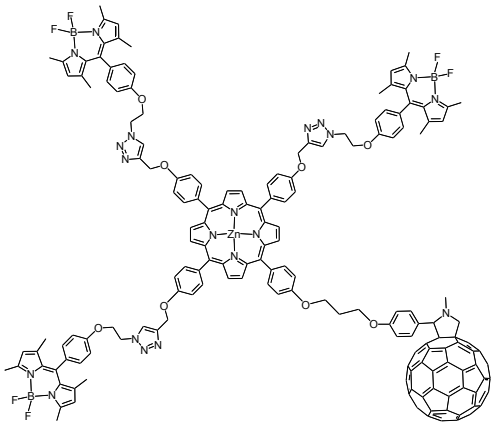

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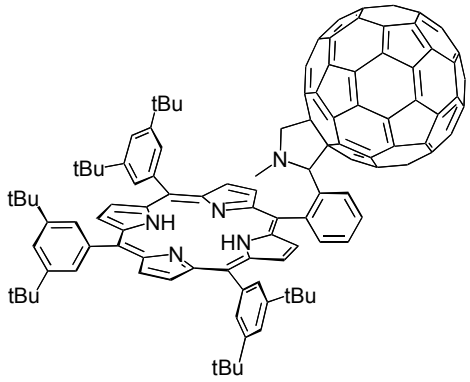

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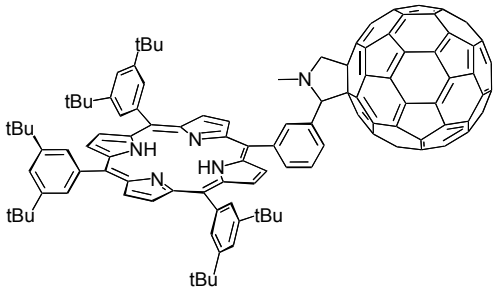

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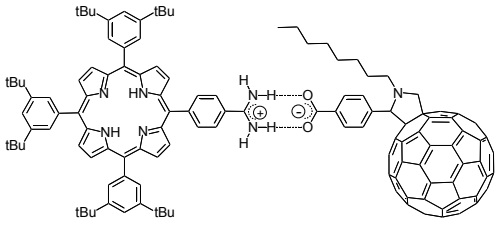

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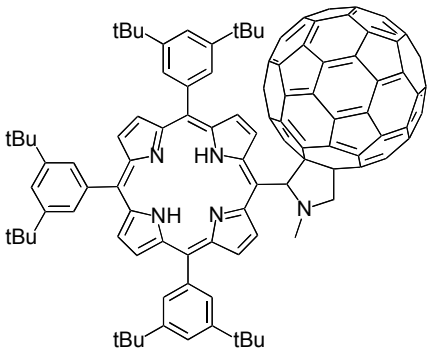

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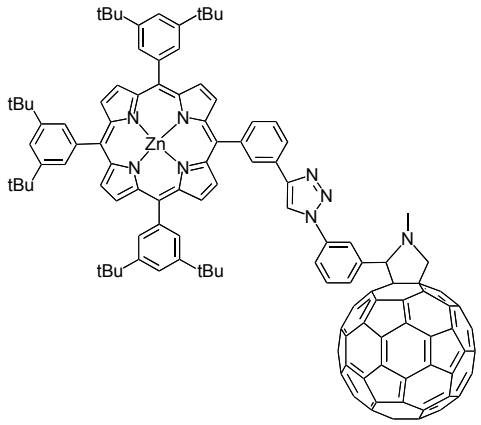
Figure 19. Structures of porphyrin-fullerene conjugates and porphyrin-fullerene complexes in Table 19



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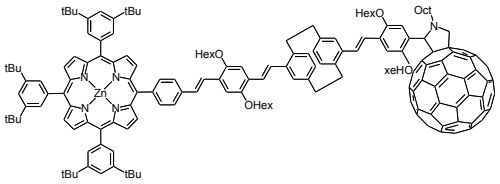

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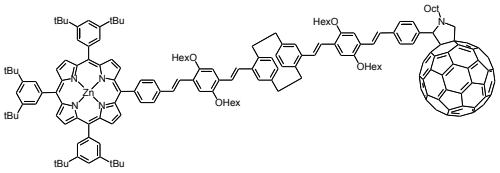

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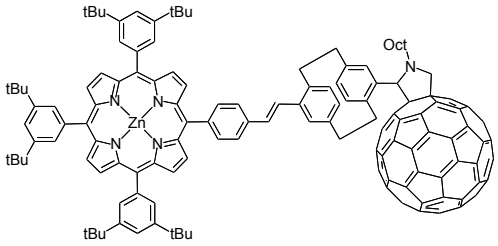

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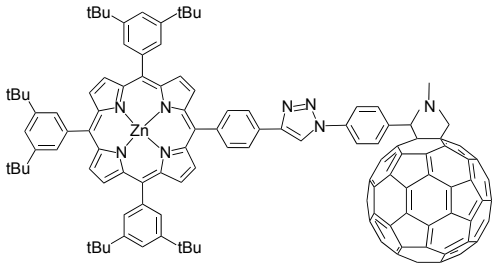

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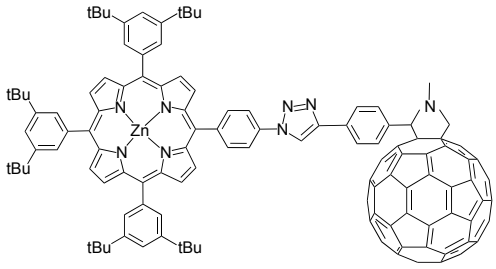

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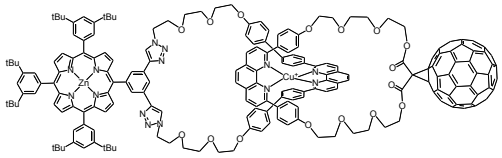
Figure 19. Structures of porphyrin-fullerene conjugates and porphyrin-fullerene complexes in Table 19



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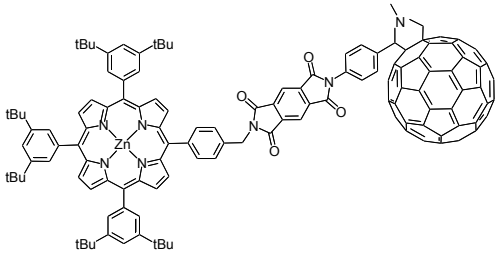

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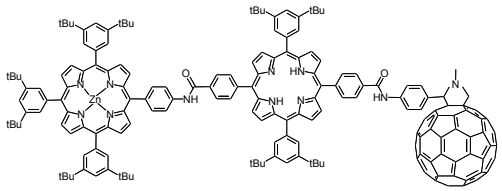

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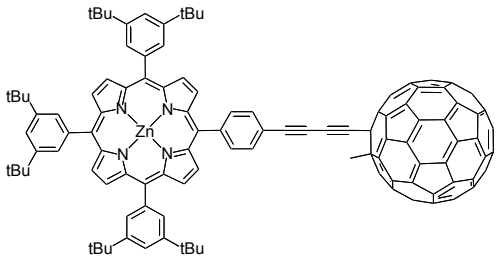

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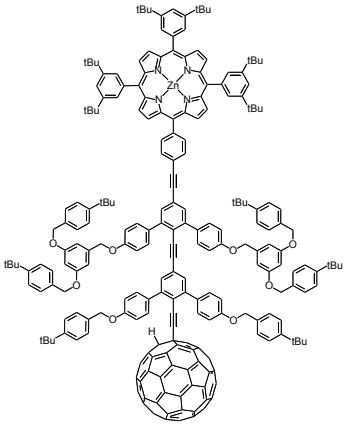

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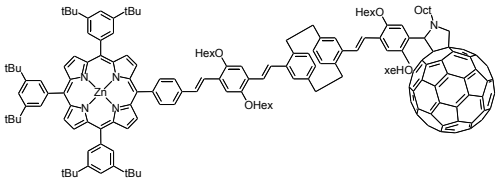

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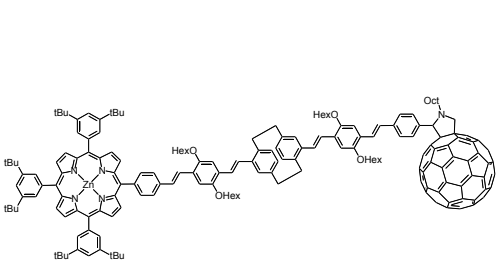
Figure 19. Structures of porphyrin-fullerene conjugates and porphyrin-fullerene complexes in Table 19



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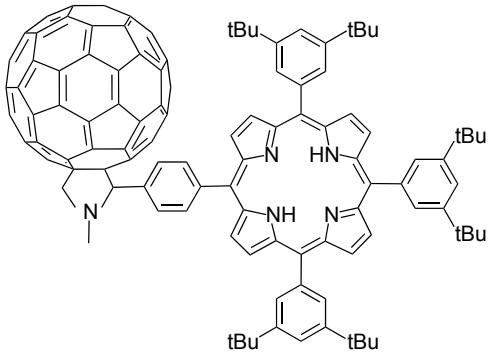

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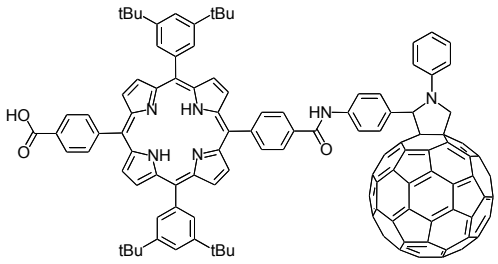

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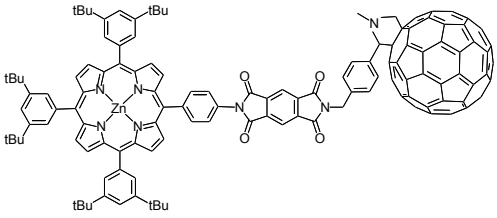

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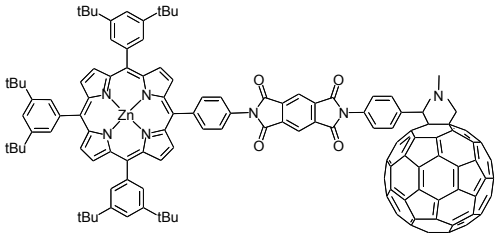

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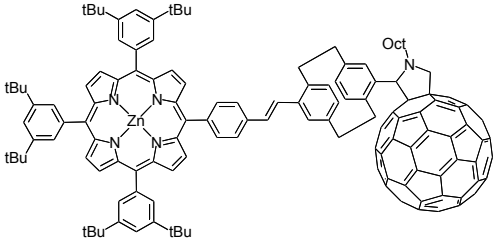

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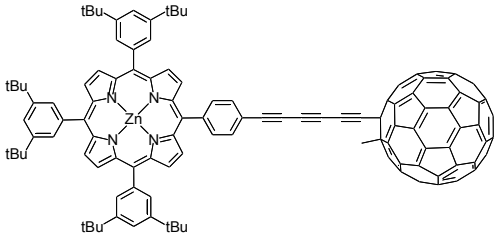
Figure 19. Structures of porphyrin-fullerene conjugates and porphyrin-fullerene complexes in Table 19



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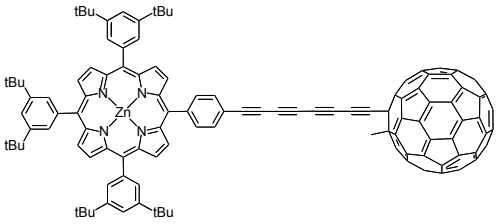

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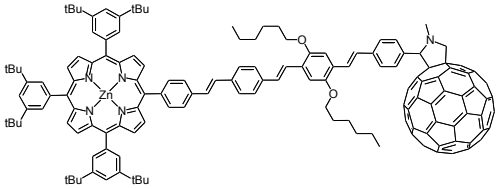

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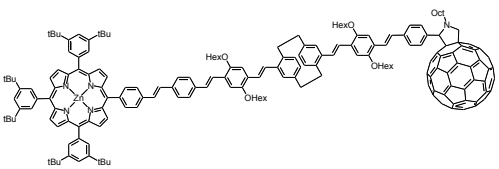

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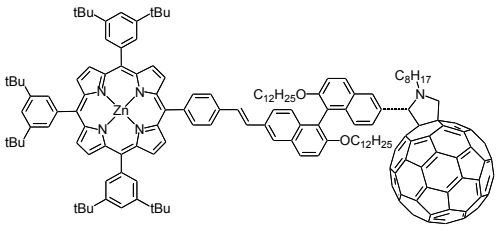

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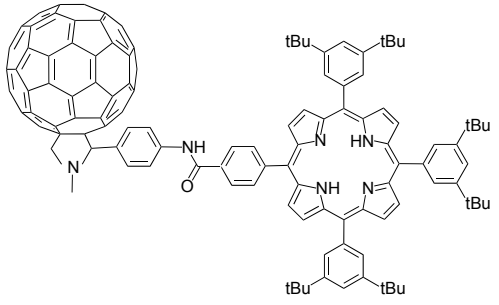

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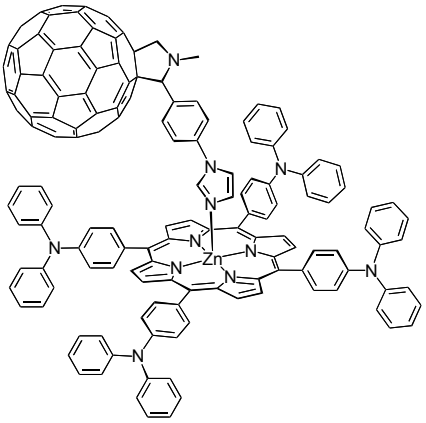
Figure 19. Structures of porphyrin-fullerene conjugates and porphyrin-fullerene complexes in Table 19



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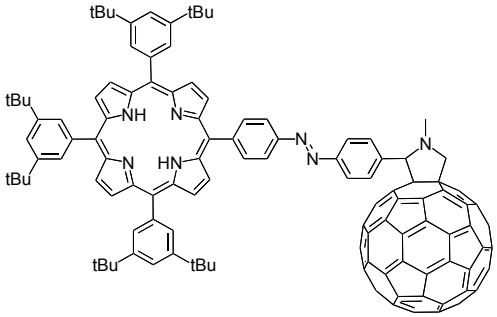

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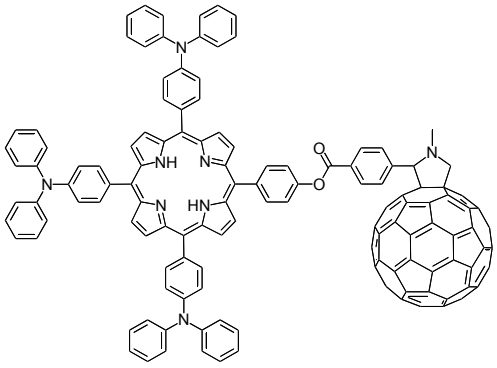

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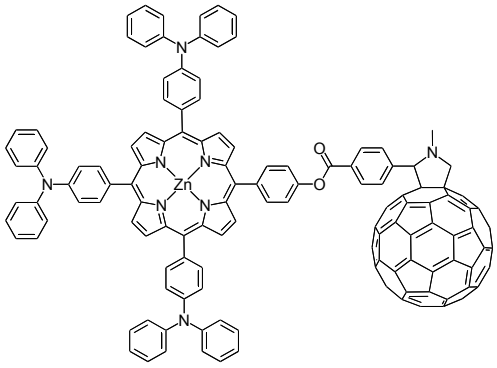

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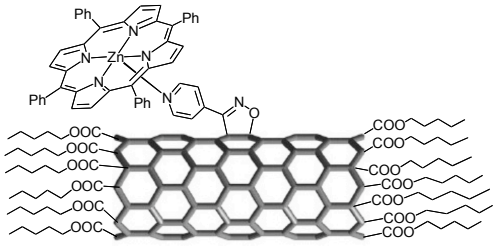

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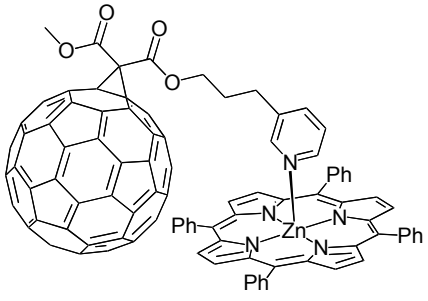

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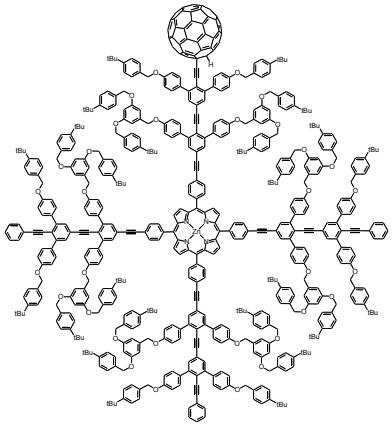
Figure 19. Structures of porphyrin-fullerene conjugates and porphyrin-fullerene complexes in Table 19



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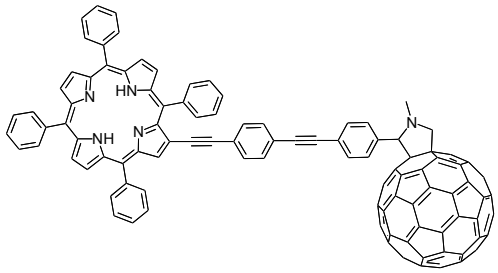

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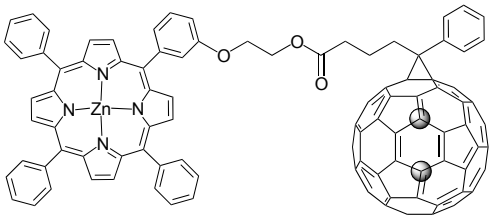

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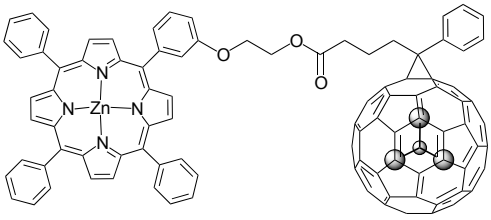

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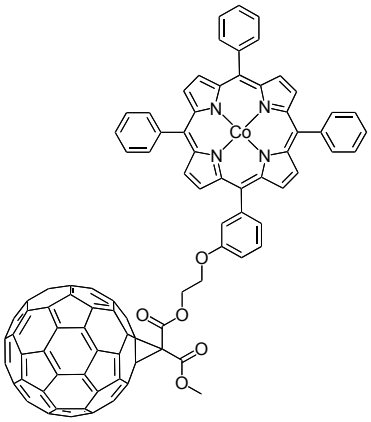

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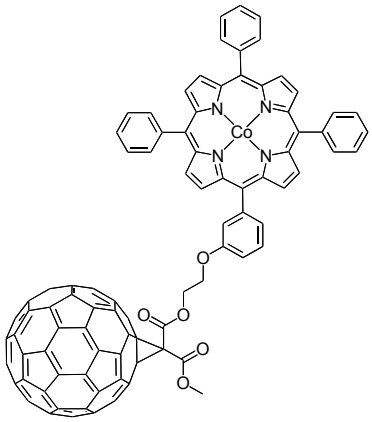

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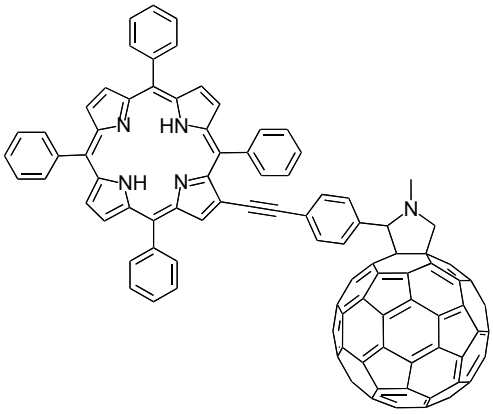
Figure 19. Structures of porphyrin-fullerene conjugates and porphyrin-fullerene complexes in Table 19



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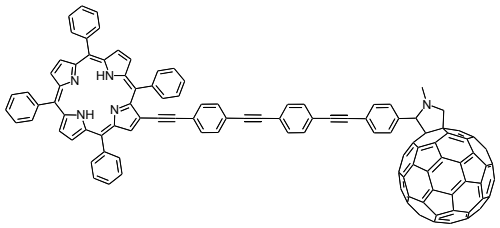

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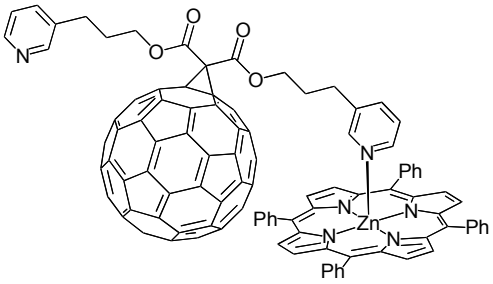

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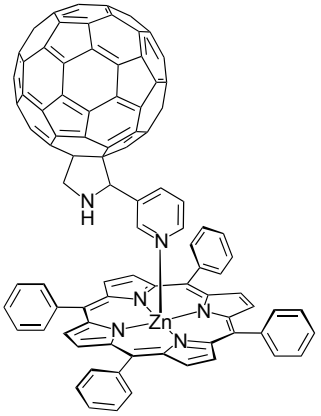

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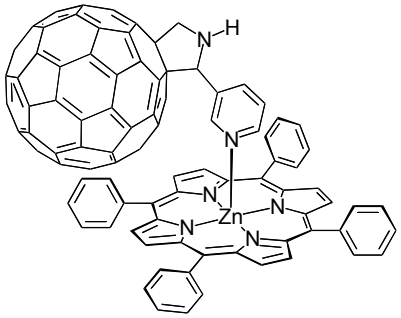

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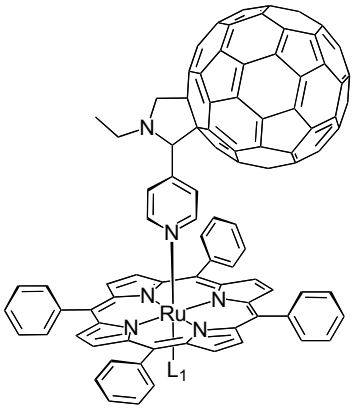

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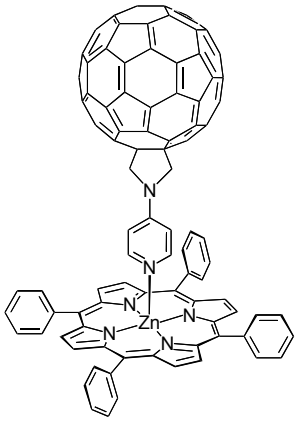
Figure 19. Structures of porphyrin-fullerene conjugates and porphyrin-fullerene complexes in Table 19



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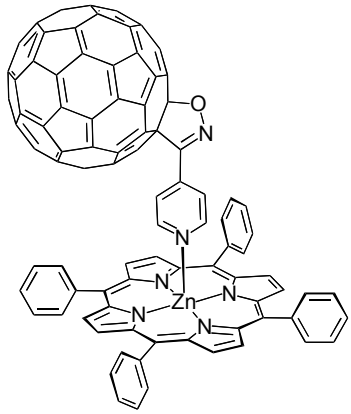

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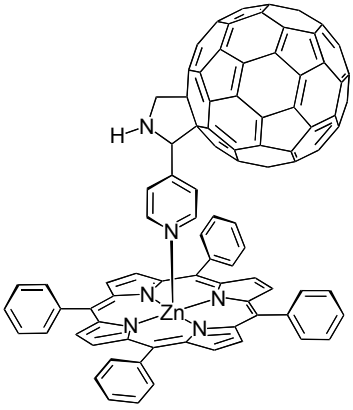

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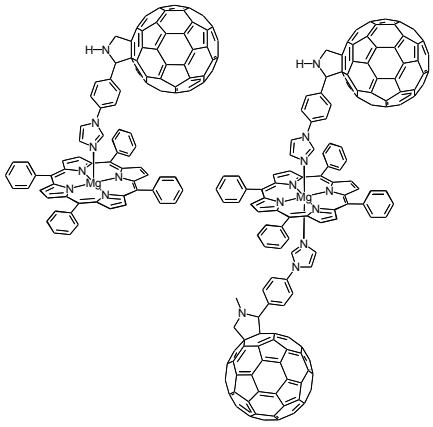

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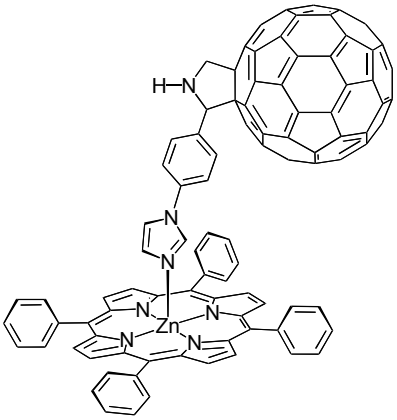

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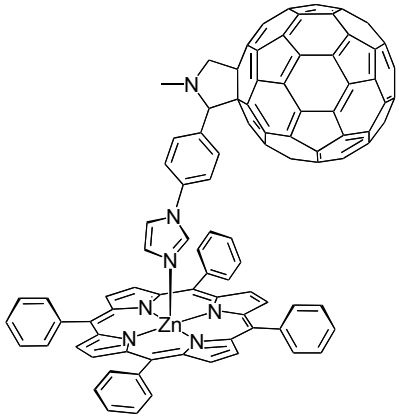

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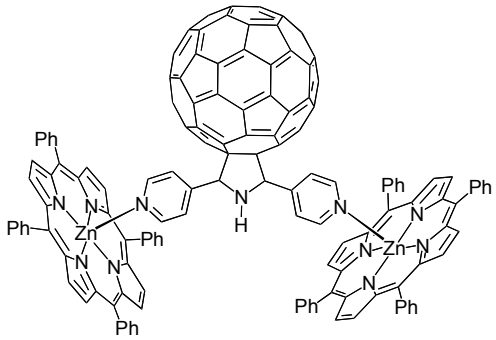
Figure 19. Structures of porphyrin-fullerene conjugates and porphyrin-fullerene complexes in Table 19



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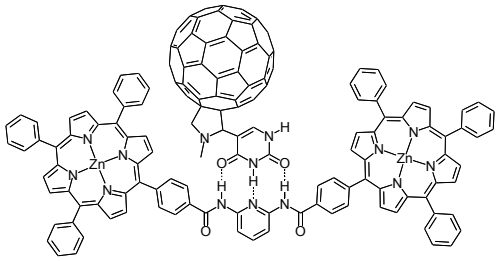

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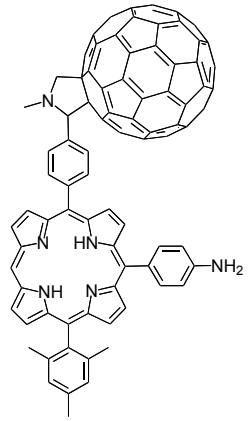

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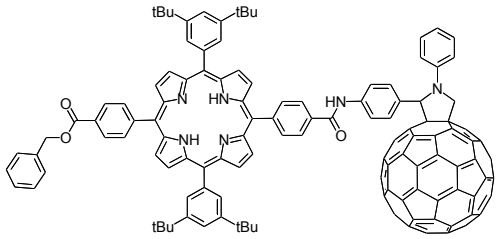

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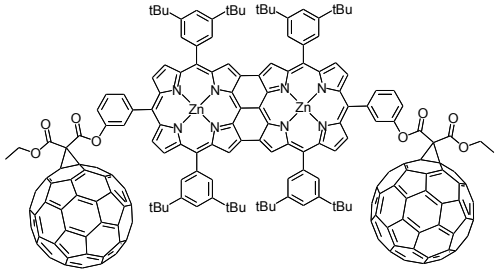

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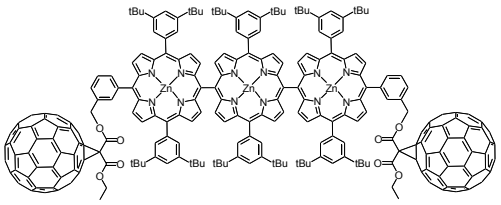

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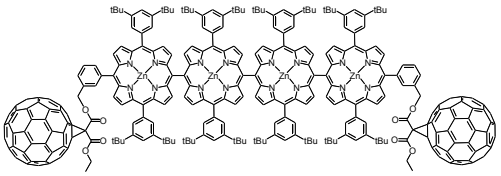
Figure 19. Structures of porphyrin-fullerene conjugates and porphyrin-fullerene complexes in Table 19



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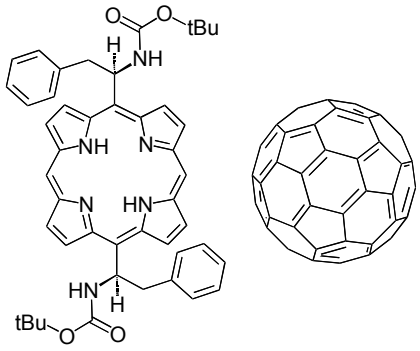

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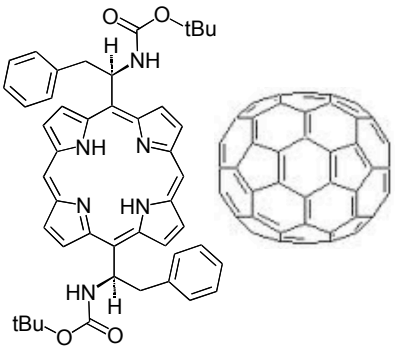

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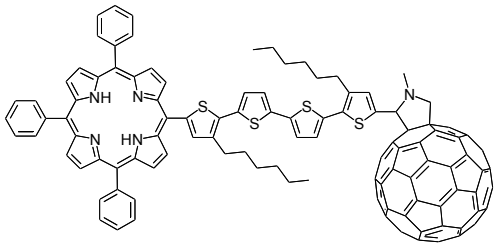

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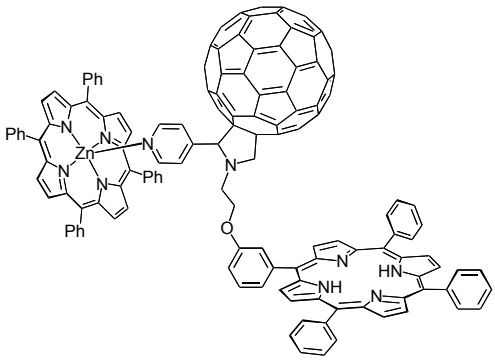

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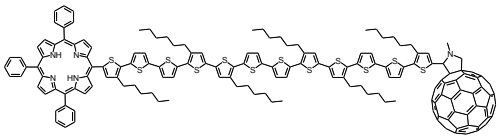

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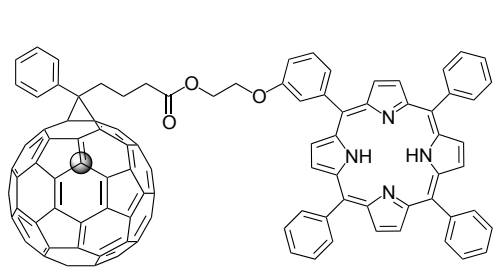
Figure 19. Structures of porphyrin-fullerene conjugates and porphyrin-fullerene complexes in Table 19



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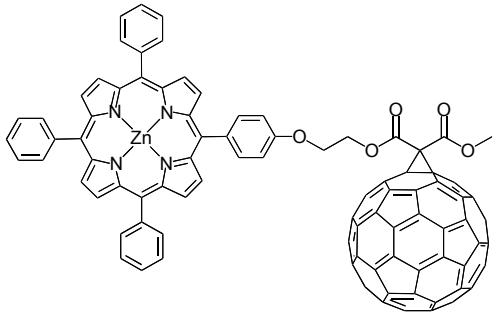

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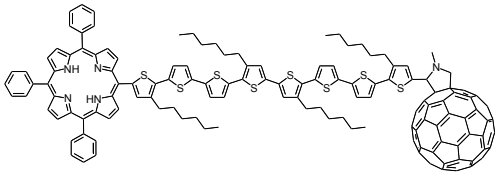

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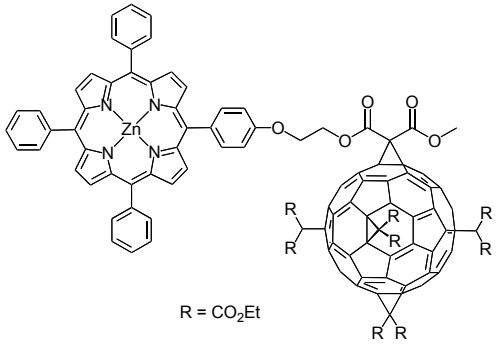

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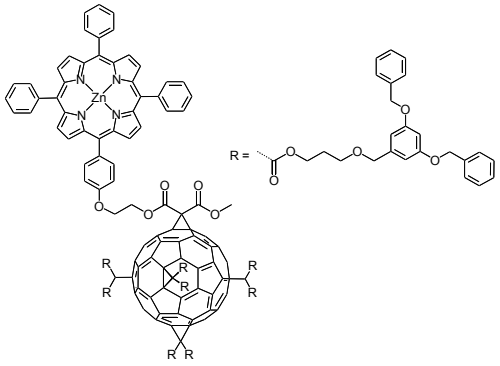

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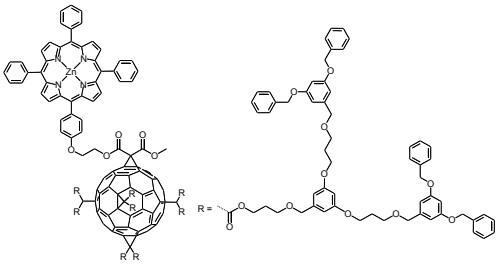

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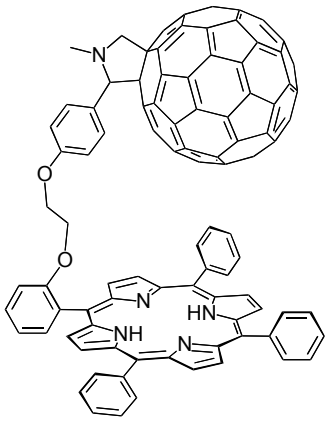
Figure 19. Structures of porphyrin-fullerene conjugates and porphyrin-fullerene complexes in Table 19



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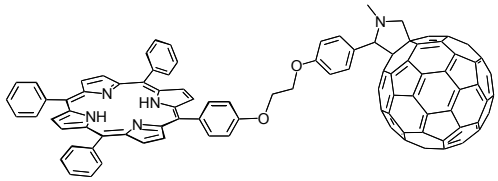

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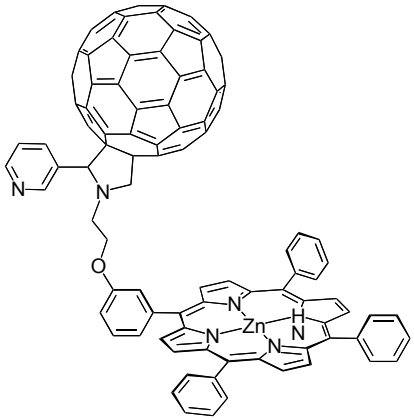

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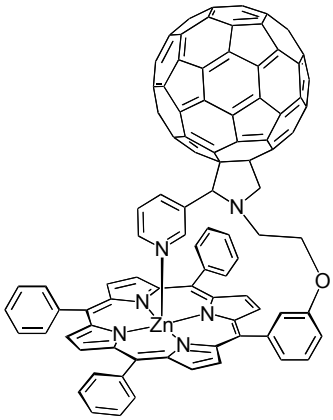

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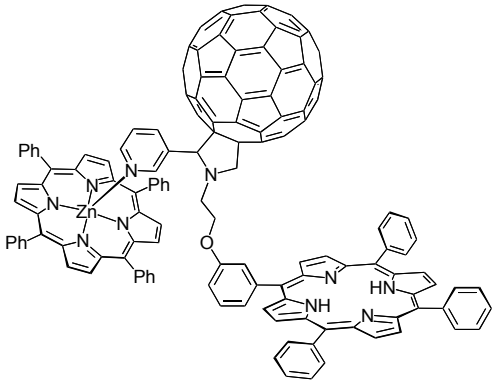

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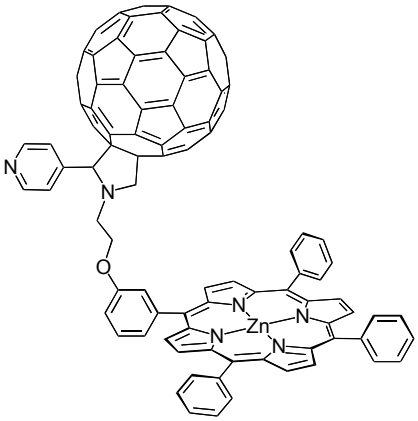

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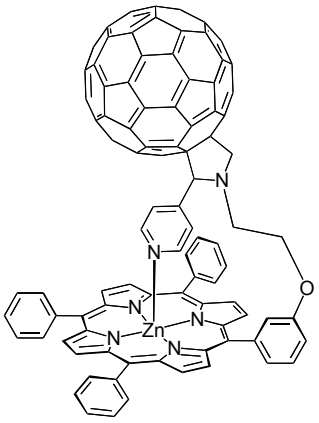
Figure 19. Structures of porphyrin-fullerene conjugates and porphyrin-fullerene complexes in Table 19



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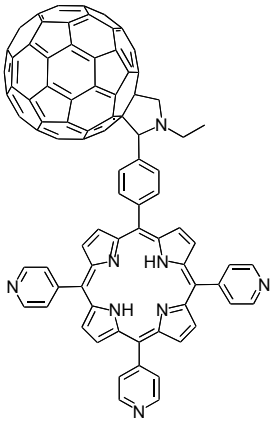

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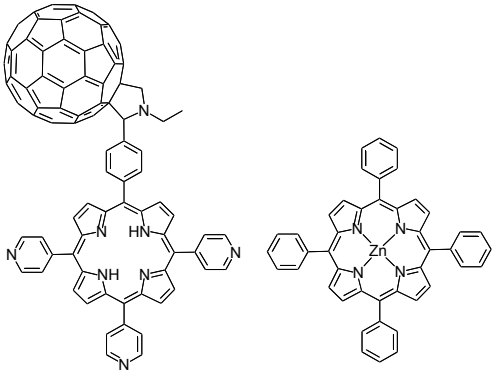

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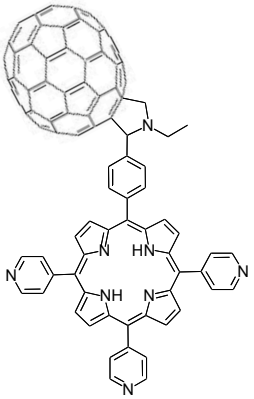

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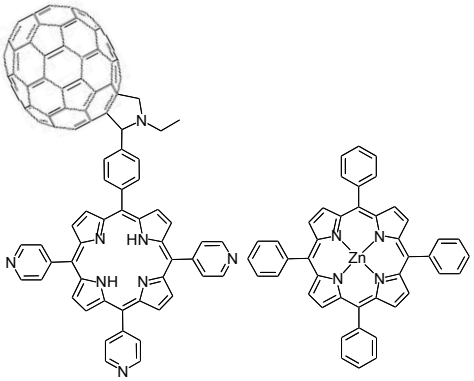

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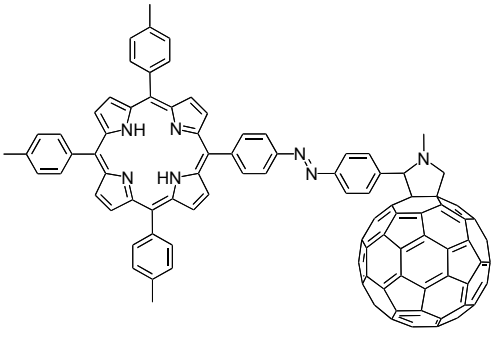

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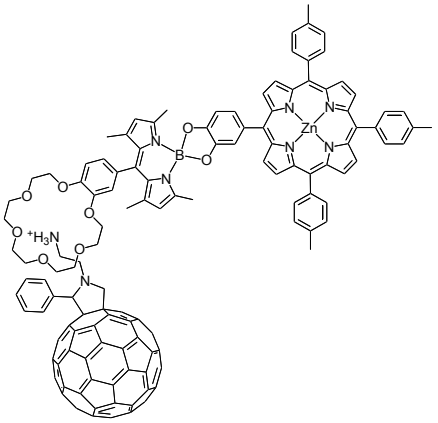
Figure 19. Structures of porphyrin-fullerene conjugates and porphyrin-fullerene complexes in Table 19



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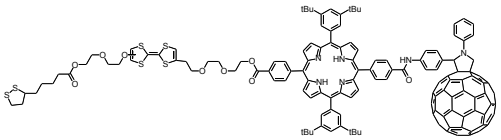

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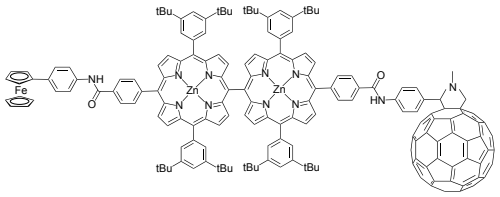
Figure 20. Structures of porphyrin-C_{60}-ferrocene triads in Table 20



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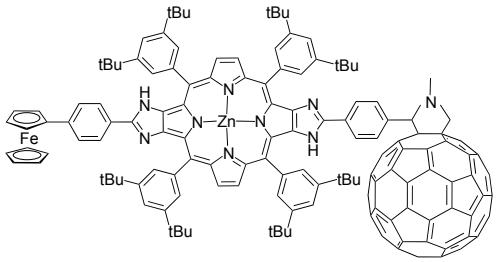

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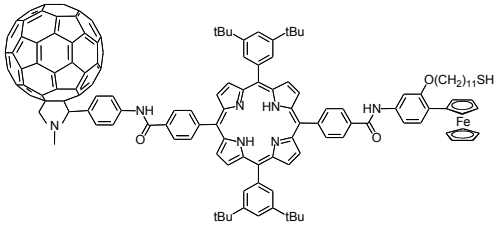

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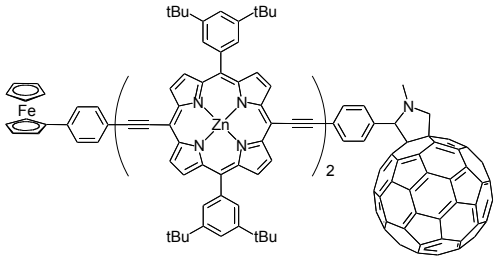

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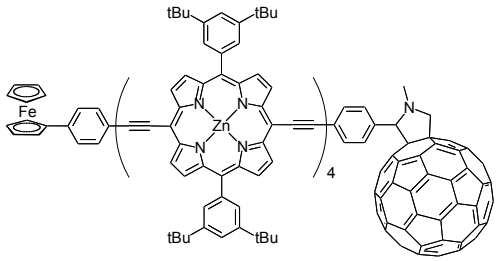

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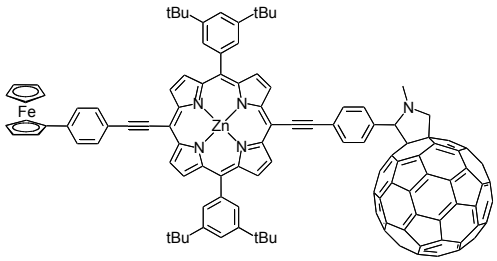

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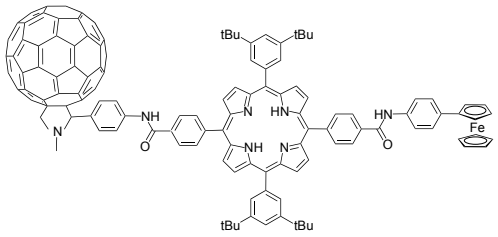
Figure 20. Structures of porphyrin-C_{60}-ferrocene triads in Table 20



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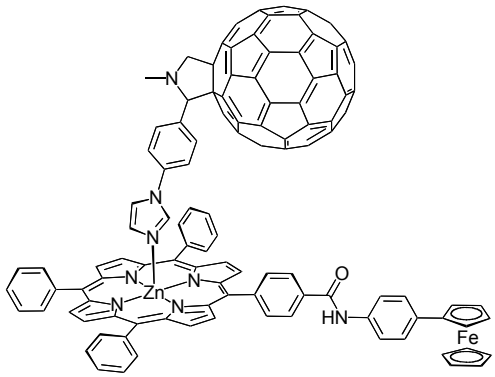

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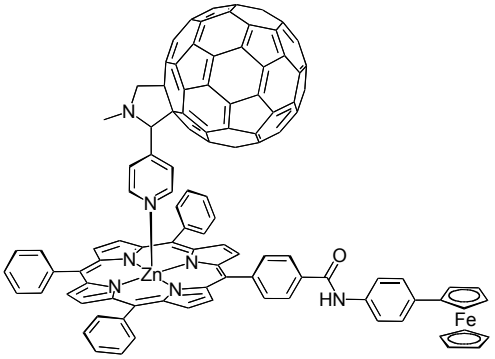

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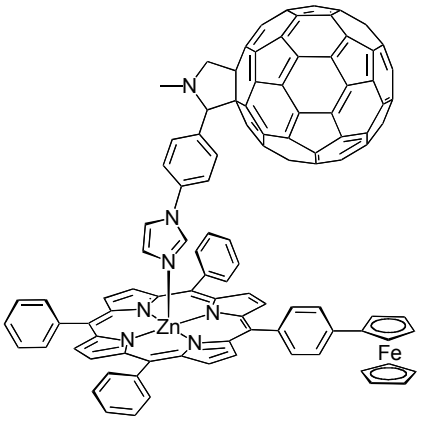

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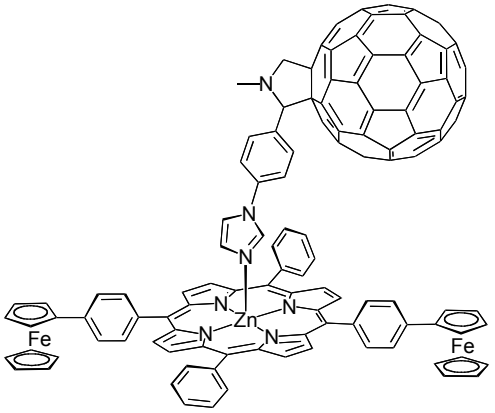

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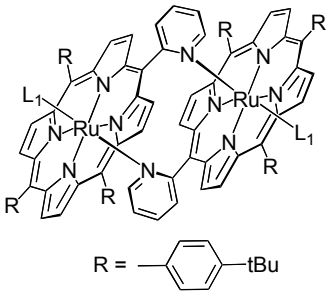
Figure 21. Structures of supramolecular porphyrin assemblies in Table 21



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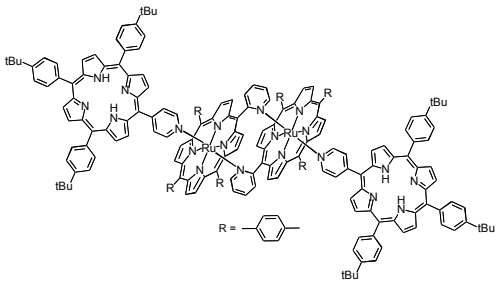

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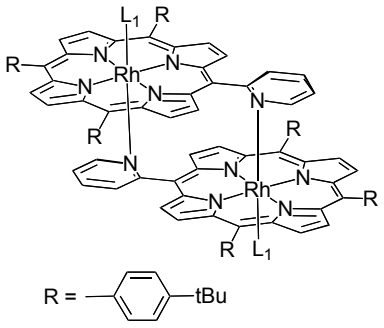

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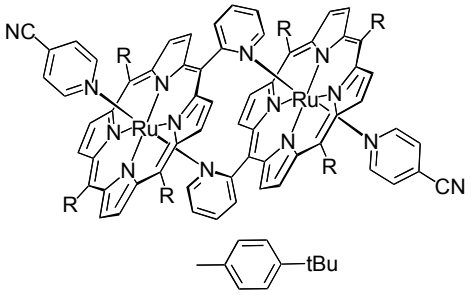

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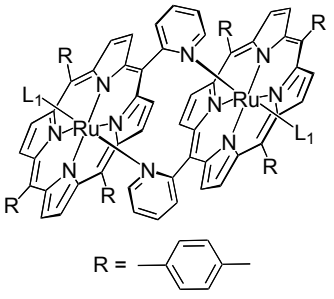

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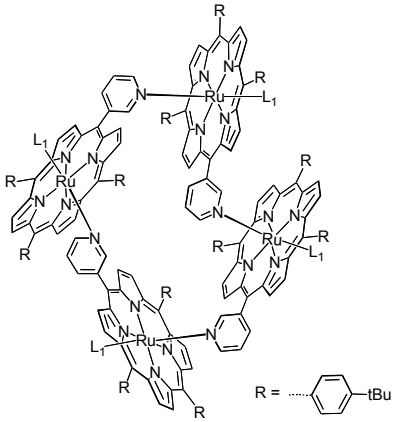

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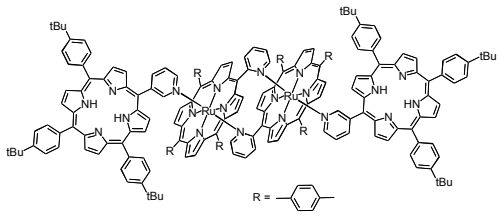
Figure 21. Structures of supramolecular porphyrin assemblies in Table 21



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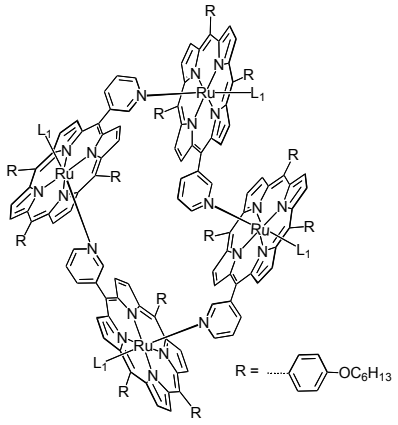

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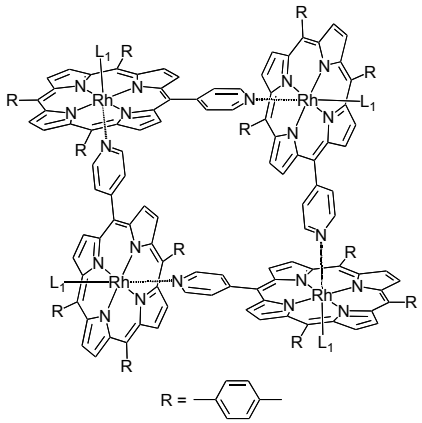

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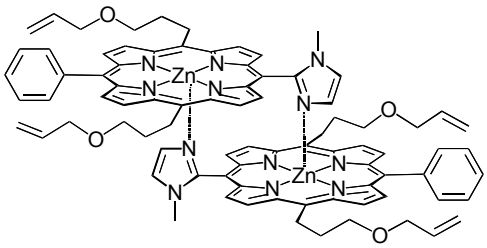

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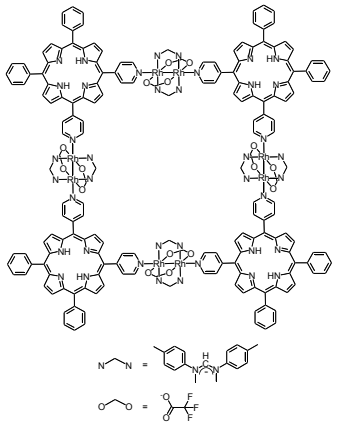

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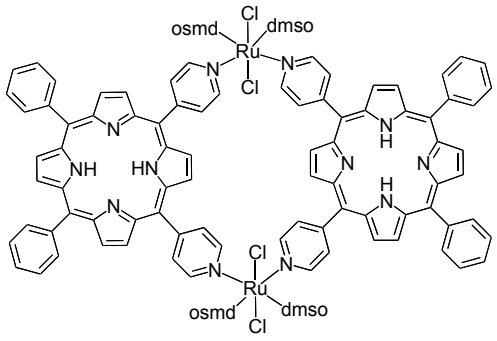

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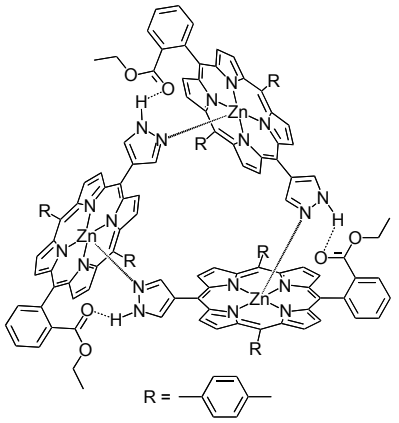
Figure 21. Structures of supramolecular porphyrin assemblies in Table 21



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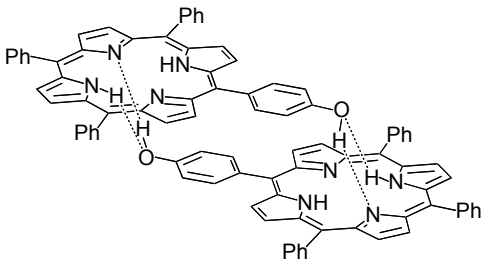

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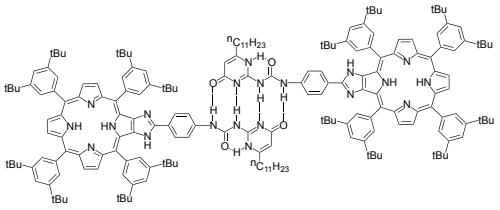

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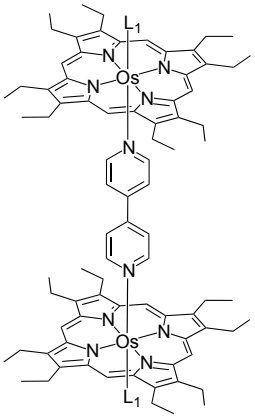

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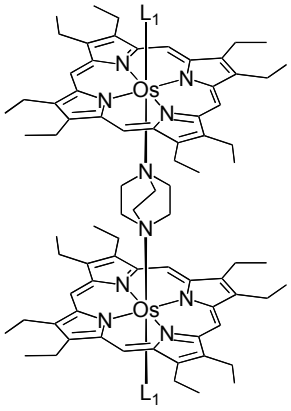

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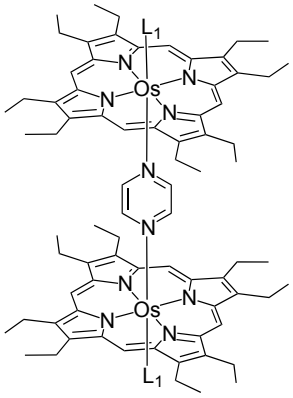

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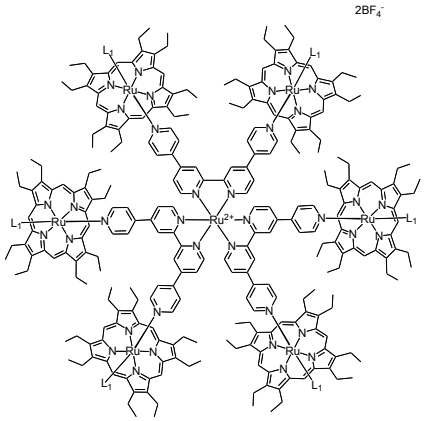
Figure 21. Structures of supramolecular porphyrin assemblies in Table 21



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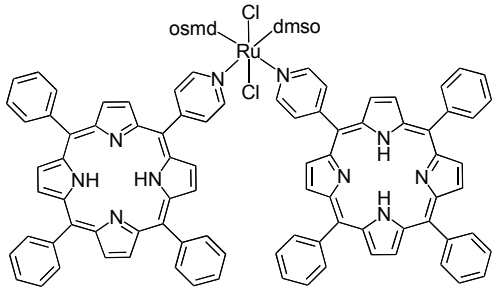

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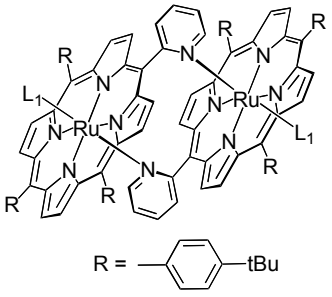

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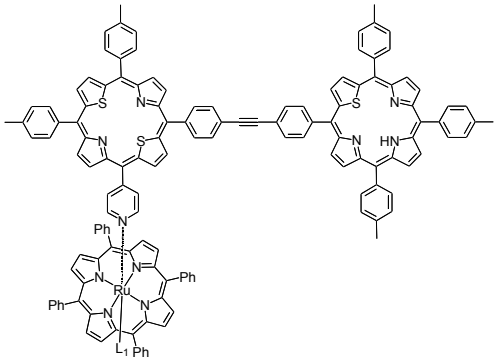

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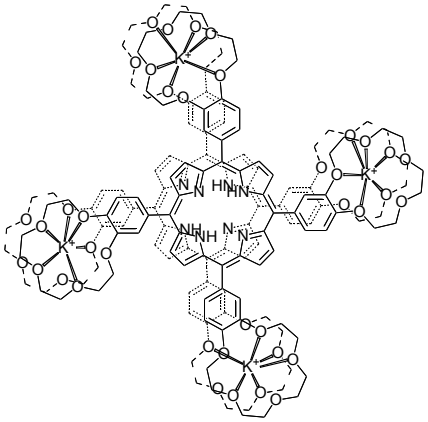

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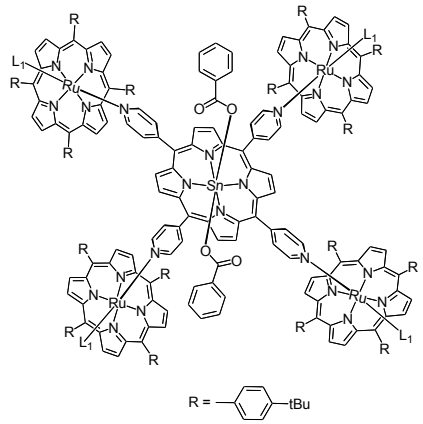

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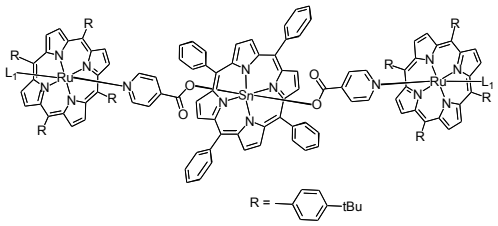
Figure 21. Structures of supramolecular porphyrin assemblies in Table 21



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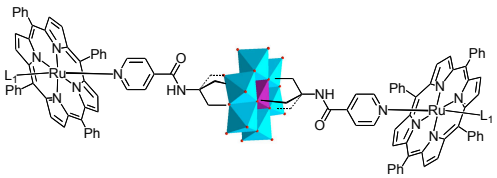

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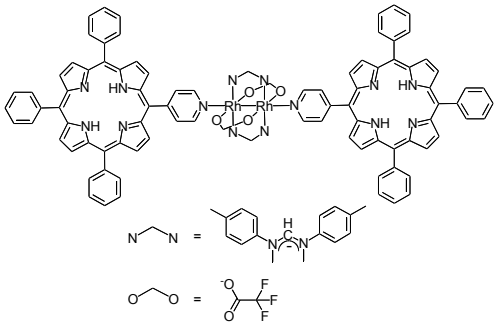

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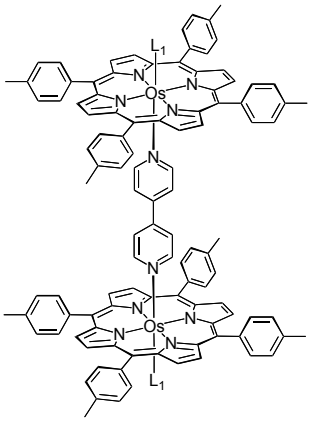

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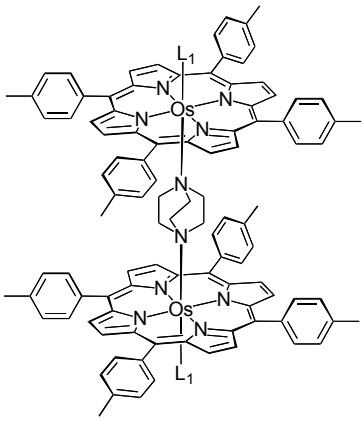

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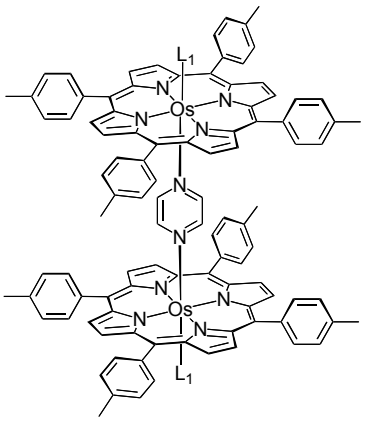
Figure 21. Structures of supramolecular porphyrin assemblies in Table 21



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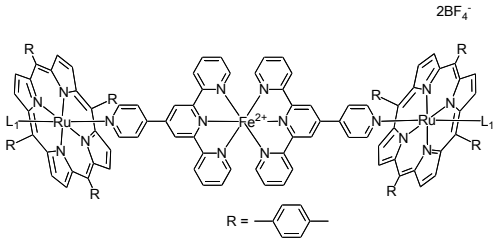

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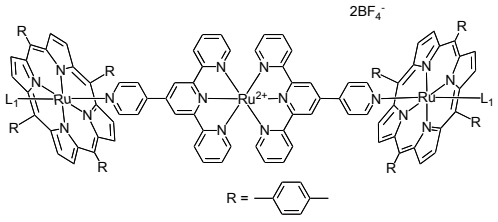

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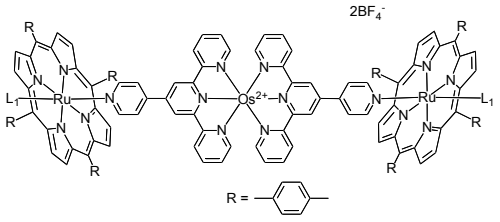

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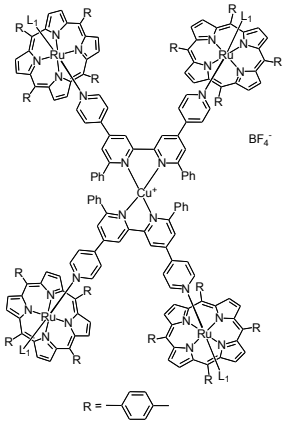

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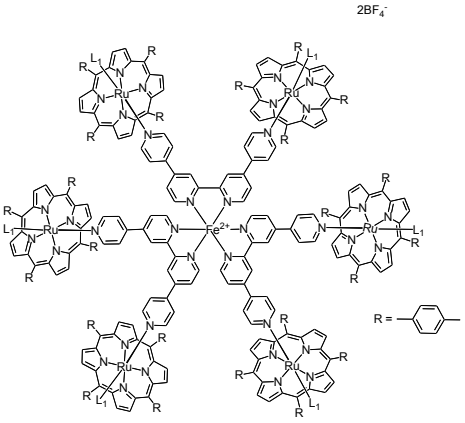

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Figure 21. Structures of supramolecular porphyrin assemblies in Table 21

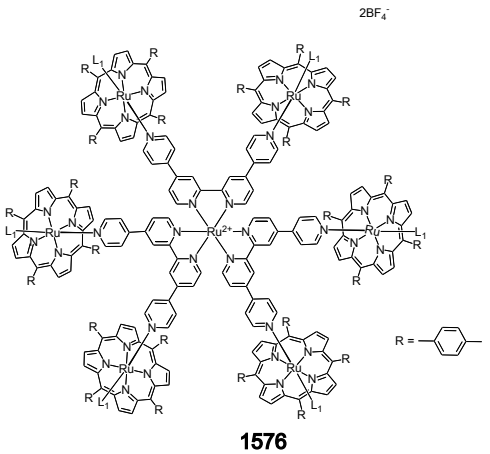

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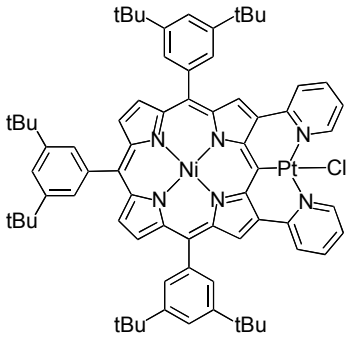
Figure 22a. Structures of porphyrins with covalently bonded peripheral metal complexes in Table 22a



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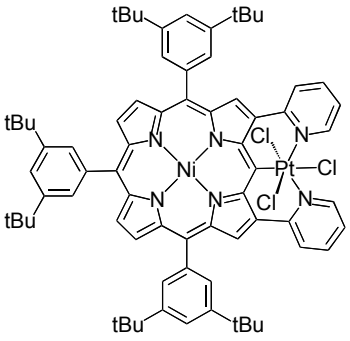

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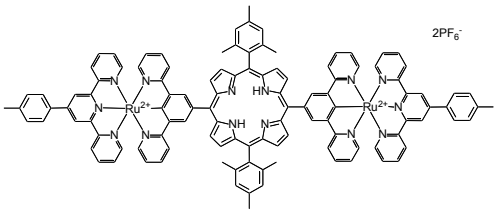

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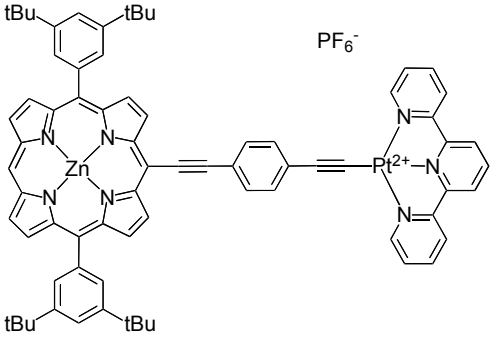

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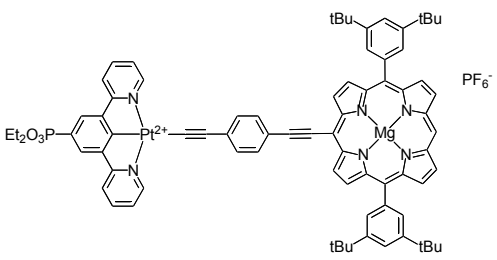

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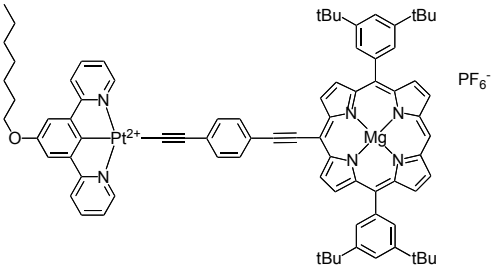

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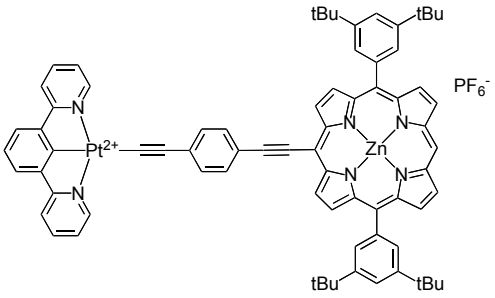
Figure 22a. Structures of porphyrins with covalently bonded peripheral metal complexes in Table 22a



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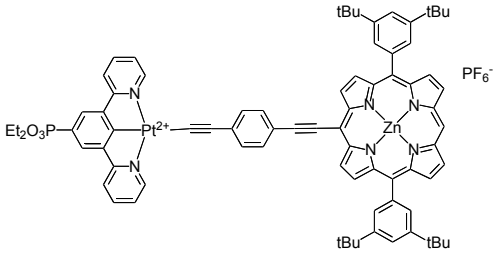

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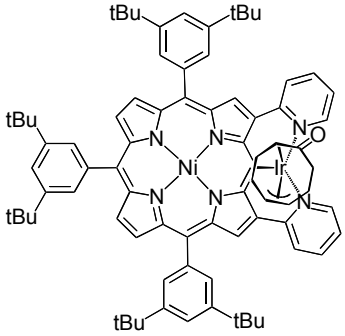

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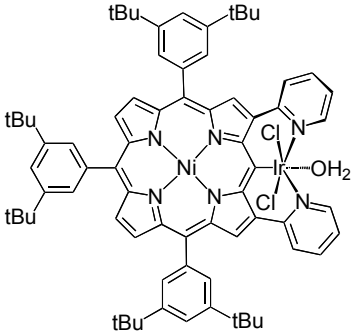

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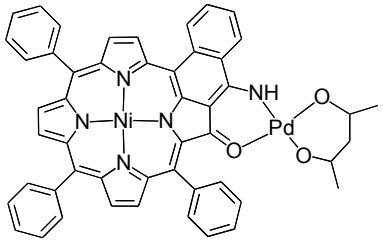

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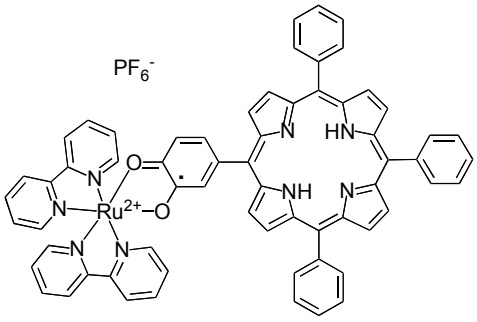

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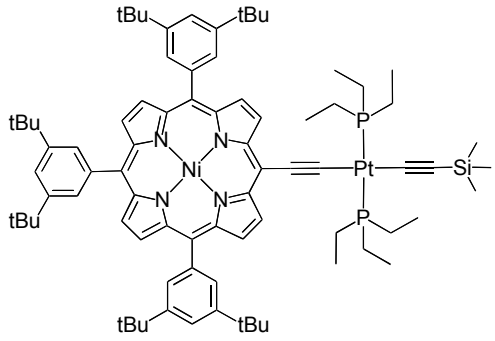
Figure 22a. Structures of porphyrins with covalently bonded peripheral metal complexes in Table 22a



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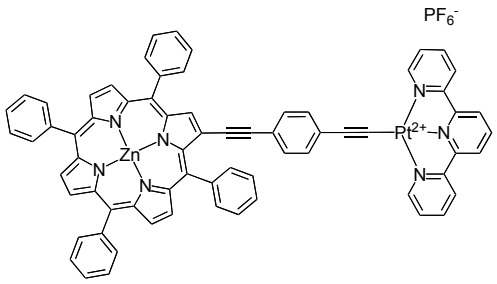

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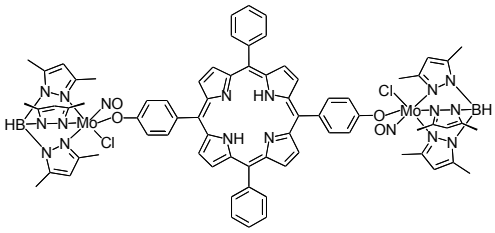

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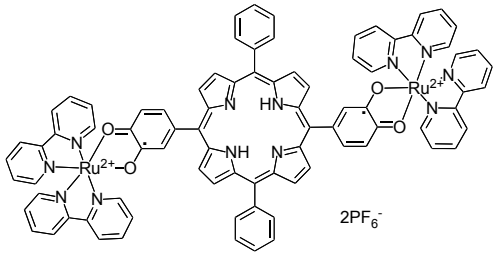

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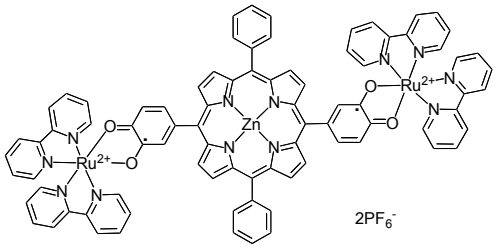

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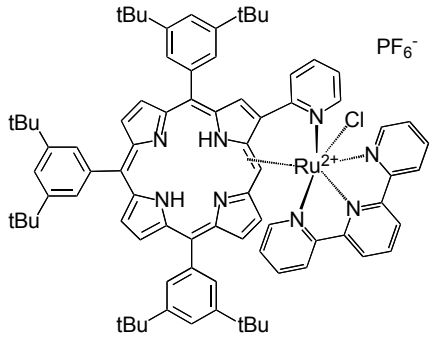
Figure 22b. Structures of porphyrins with non-covalently bonded peripheral metal complexes in Table 22b



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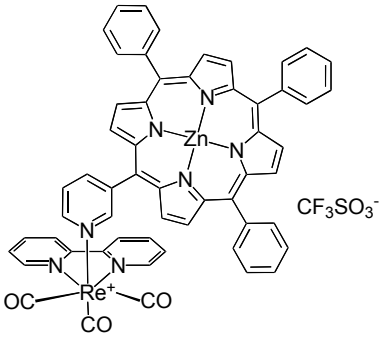

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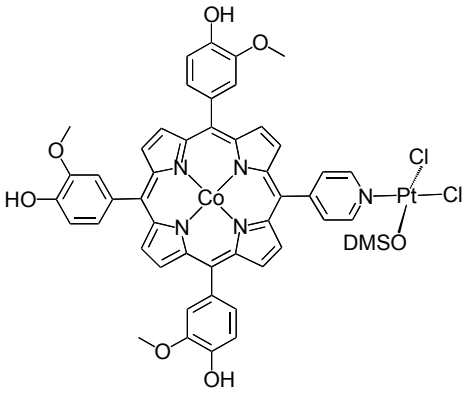

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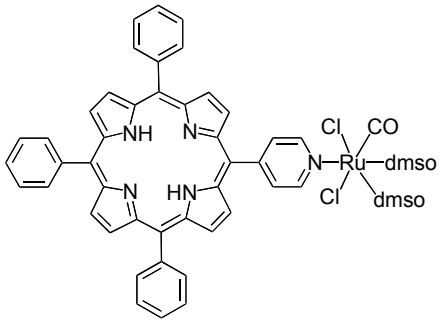

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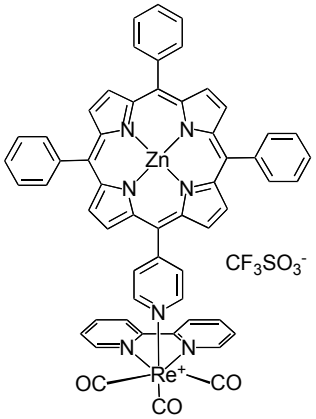

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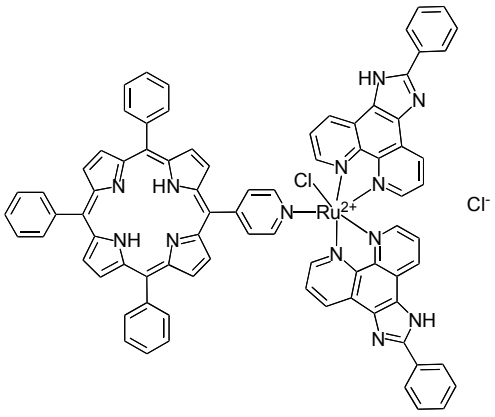

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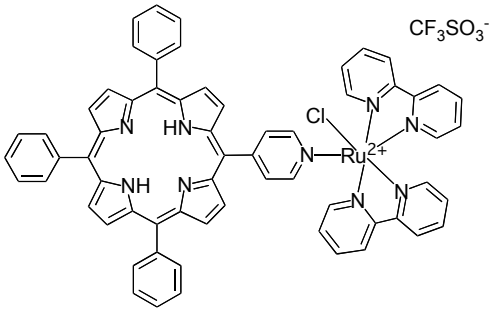
Figure 22b. Structures of porphyrins with non-covalently bonded peripheral metal complexes in Table 22b



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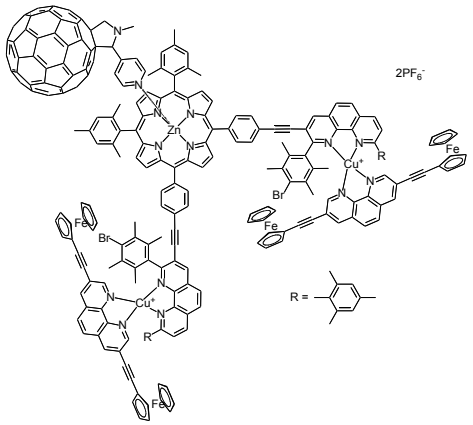

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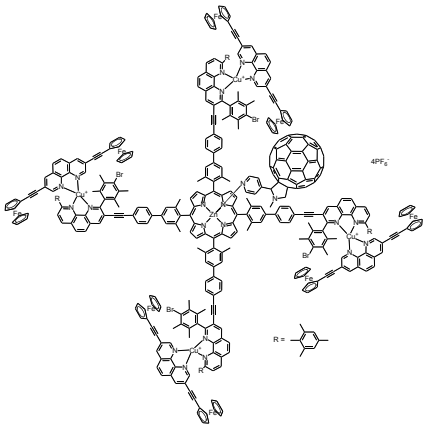

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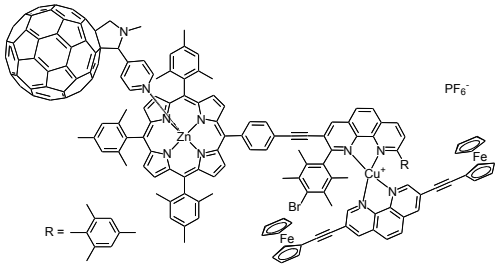

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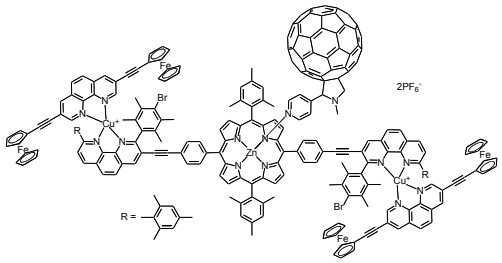

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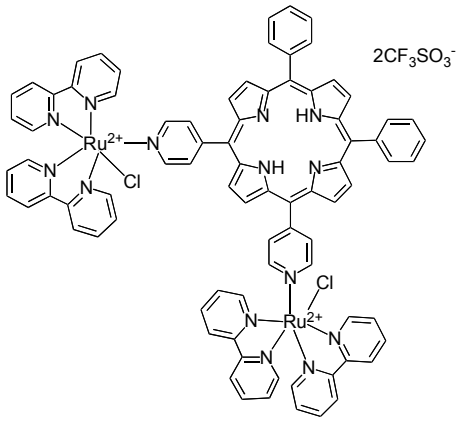

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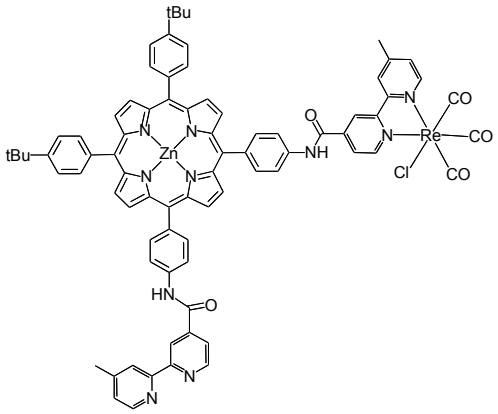
Figure 22b. Structures of porphyrins with non-covalently bonded peripheral metal complexes in Table 22b



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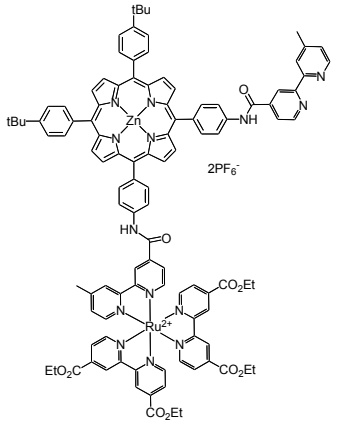

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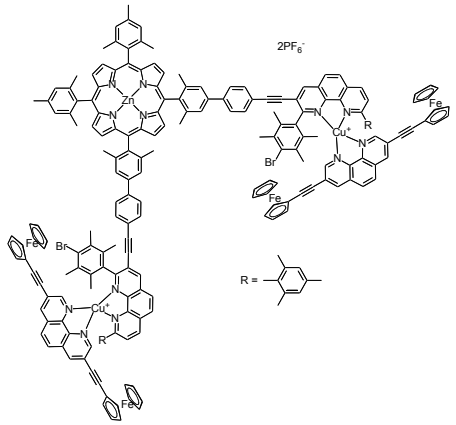

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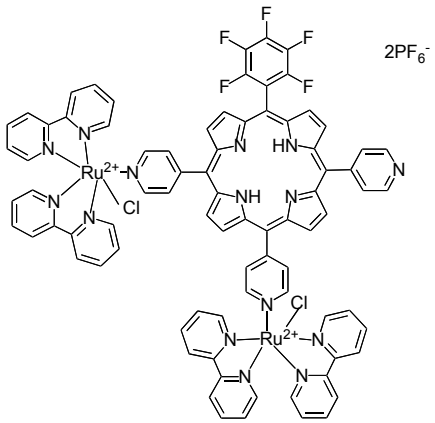

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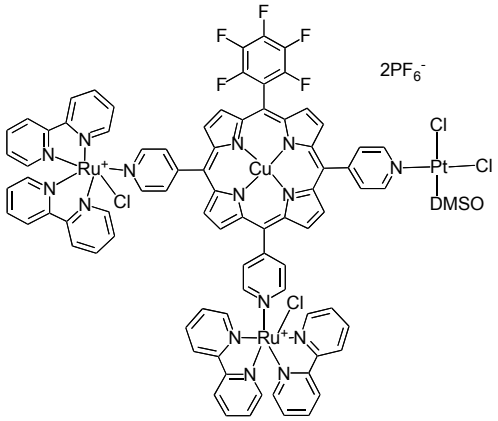

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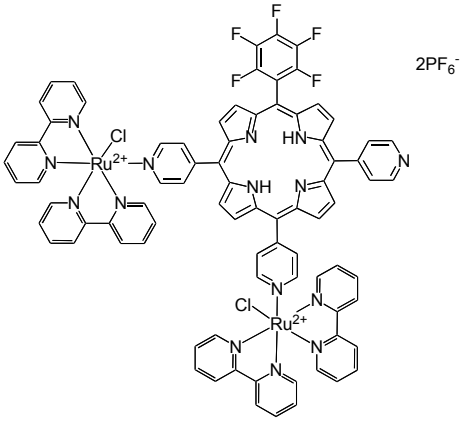

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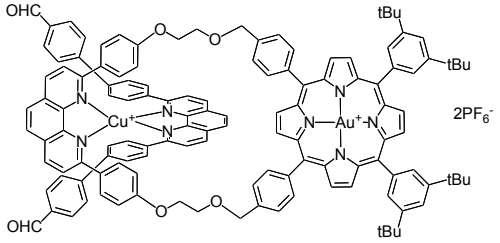
Figure 22b. Structures of porphyrins with non-covalently bonded peripheral metal complexes in Table 22b



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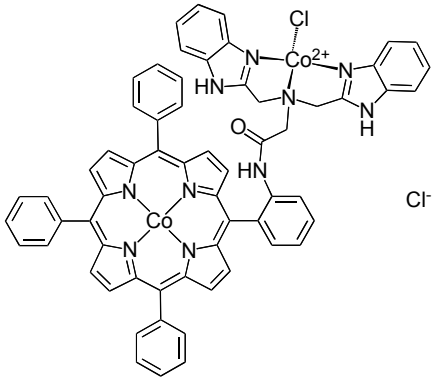

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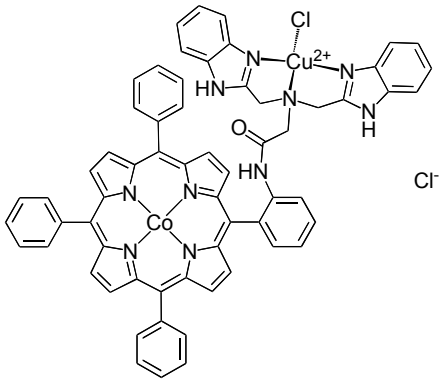

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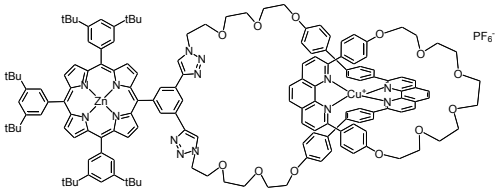

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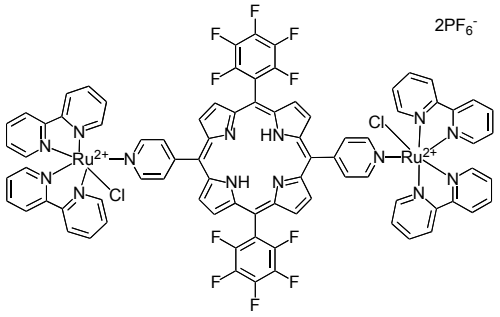

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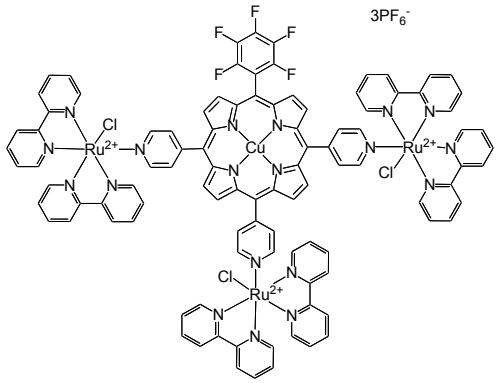

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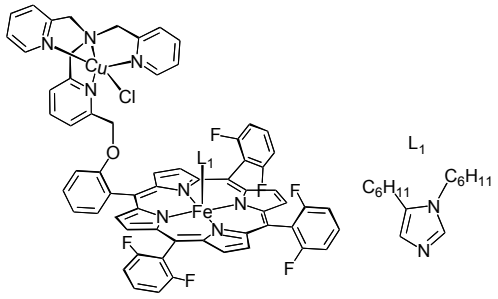
Figure 22b. Structures of porphyrins with non-covalently bonded peripheral metal complexes in Table 22b



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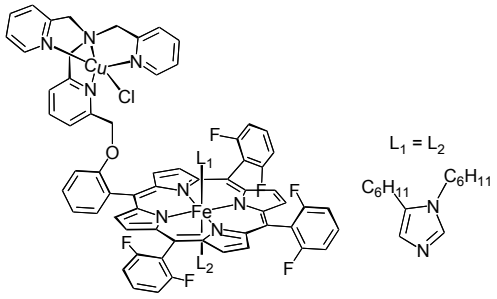

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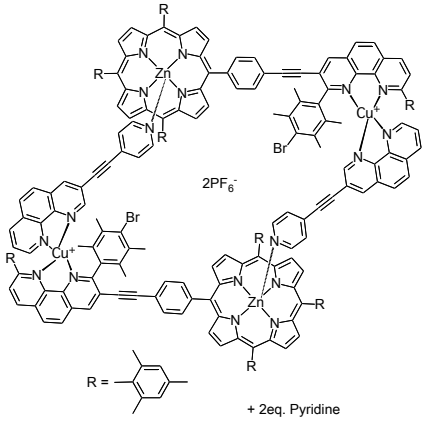

+ 2eq. Pyridine

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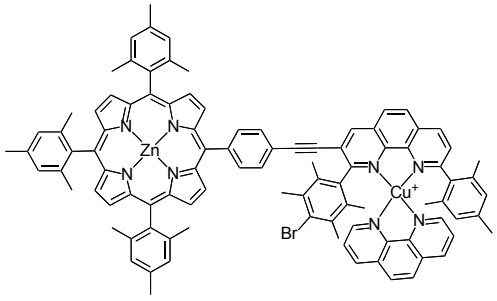

+ 1eq. Pyridine

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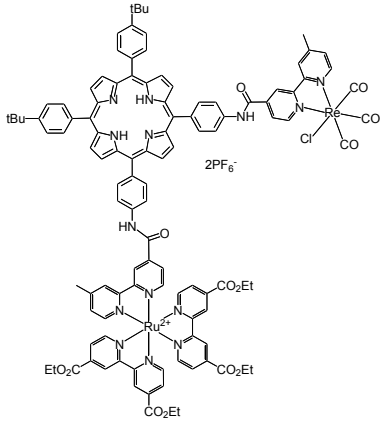

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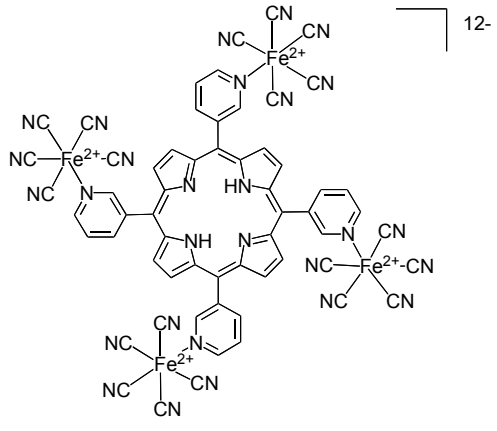

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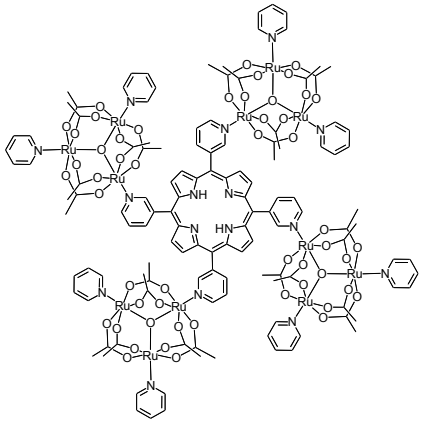
Figure 22b. Structures of porphyrins with non-covalently bonded peripheral metal complexes in Table 22b



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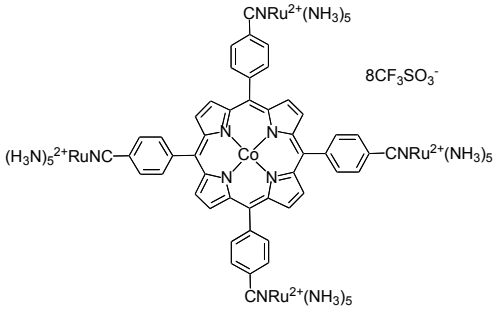

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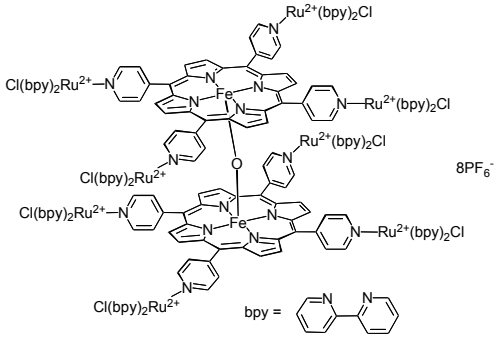

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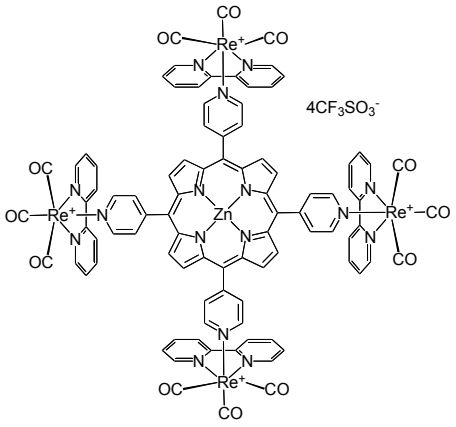

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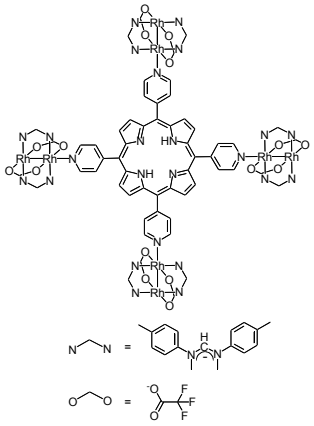

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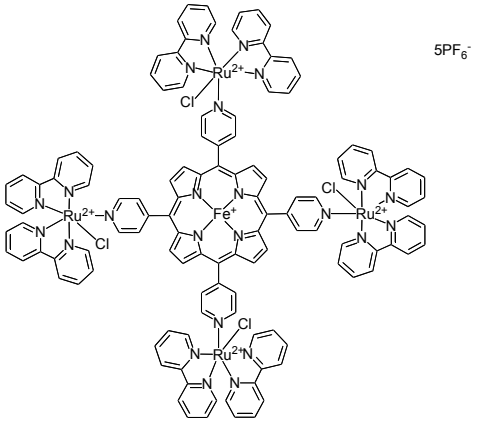

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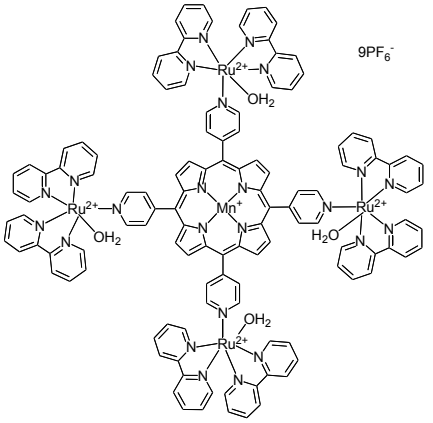
Figure 22b. Structures of porphyrins with non-covalently bonded peripheral metal complexes in Table 22b



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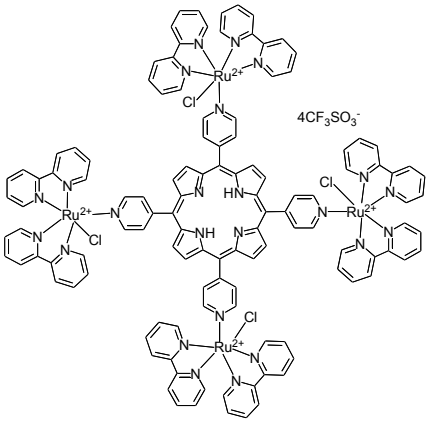

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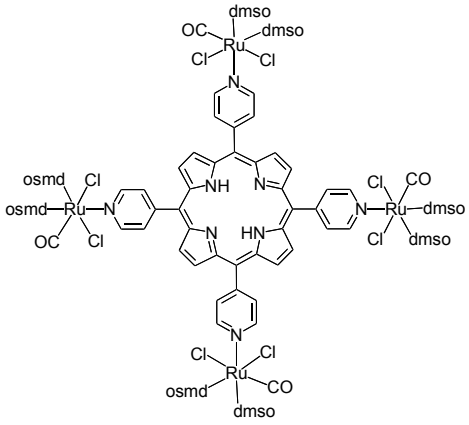

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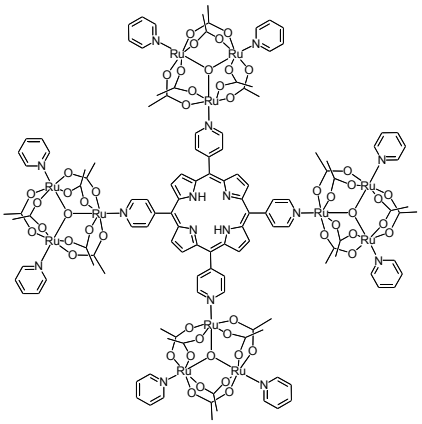

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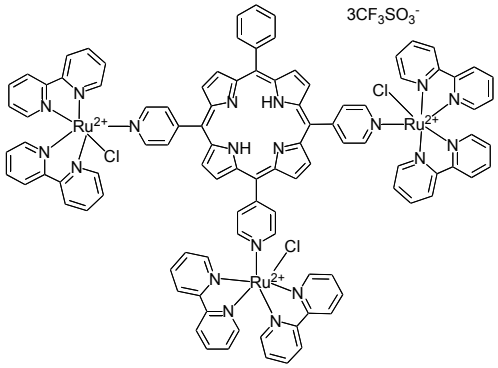

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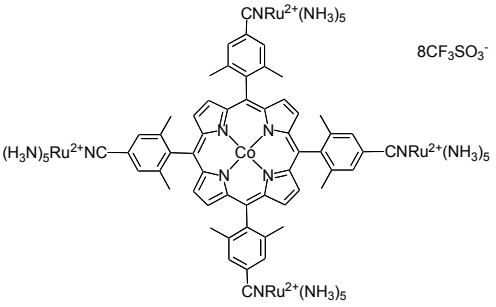

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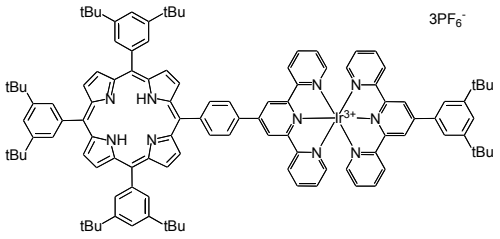
Figure 22b. Structures of porphyrins with non-covalently bonded peripheral metal complexes in Table 22b



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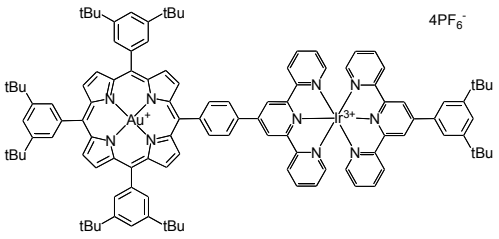

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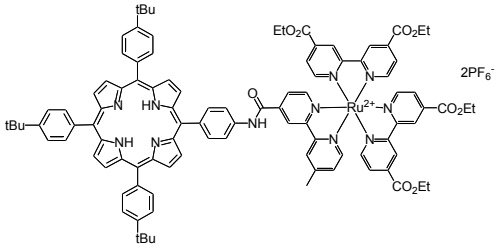

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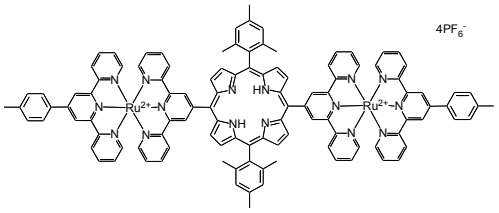

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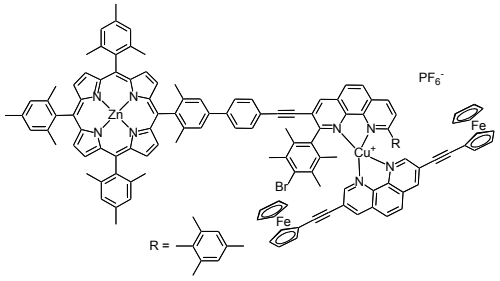

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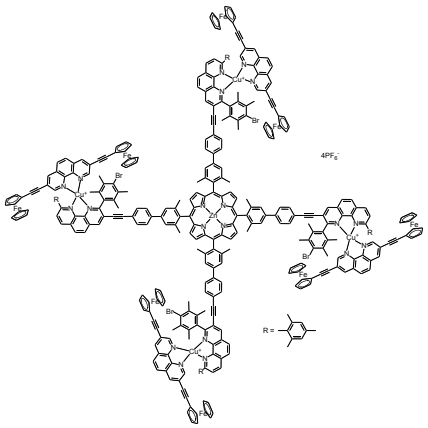

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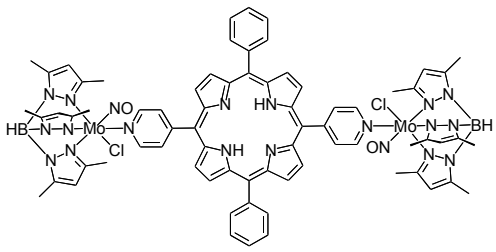
Figure 22b. Structures of porphyrins with non-covalently bonded peripheral metal complexes in Table 22b



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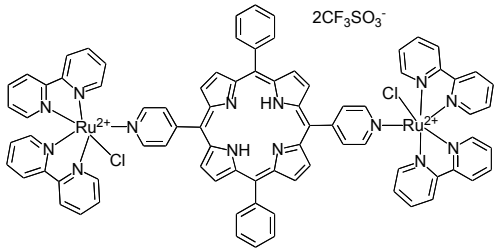

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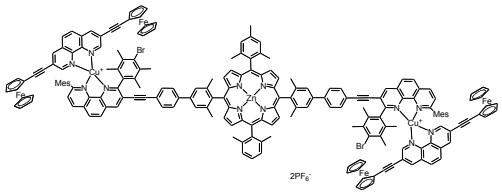

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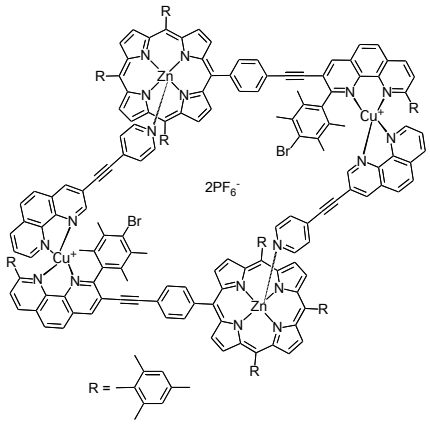

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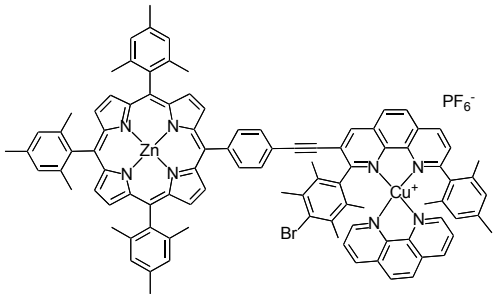

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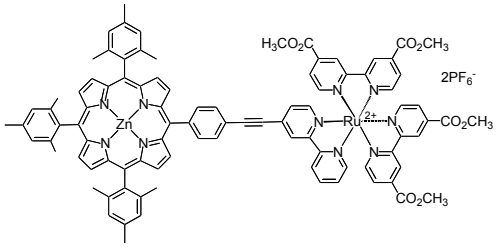

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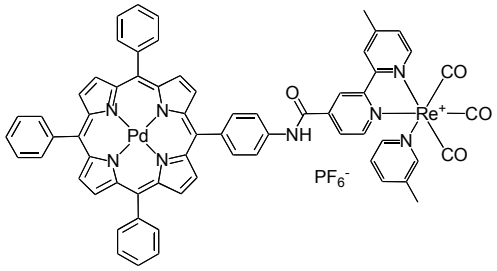
Figure 22b. Structures of porphyrins with non-covalently bonded peripheral metal complexes in Table 22b



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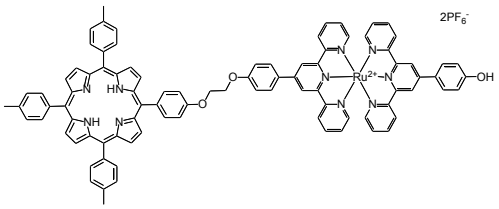

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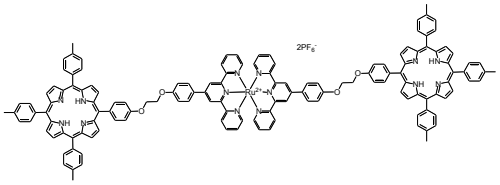

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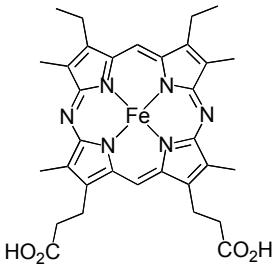
Figure 23a. Structures of heme and related macrocycles in Table 23a



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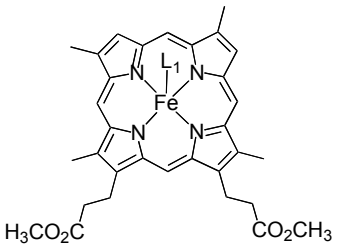

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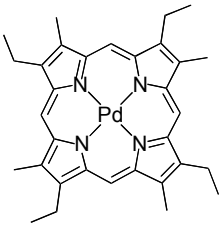

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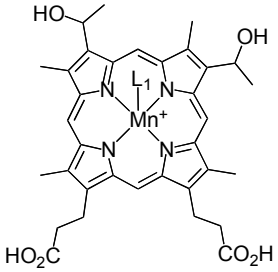

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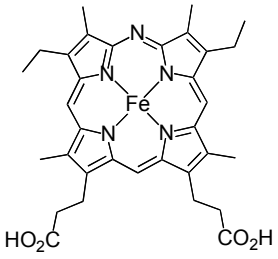

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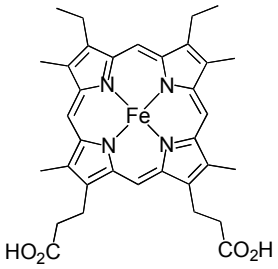

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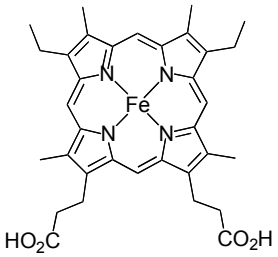
Figure 23a. Structures of heme and related macrocycles in Table 23a



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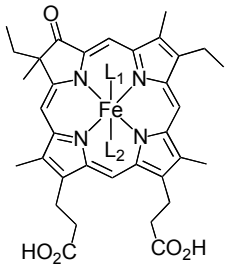

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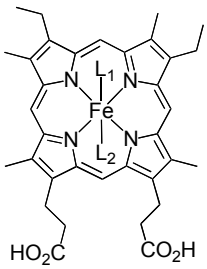

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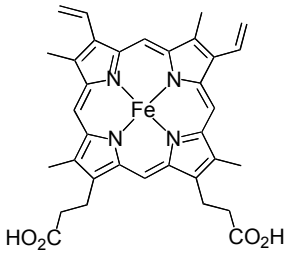

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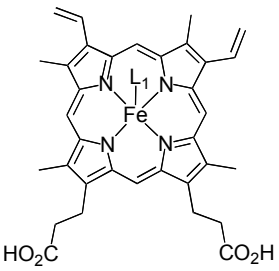

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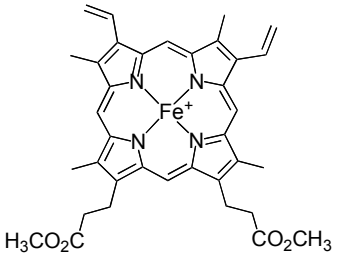

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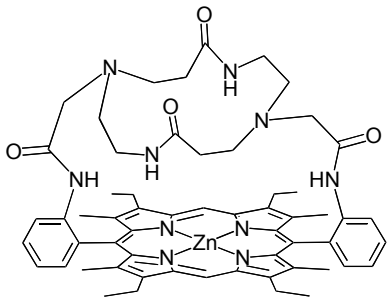
Figure 23b. Structures of *meso*-Substituted etioporphyrin II macrocycles in Table 23b



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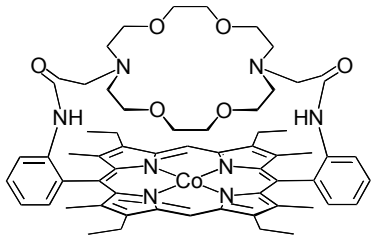

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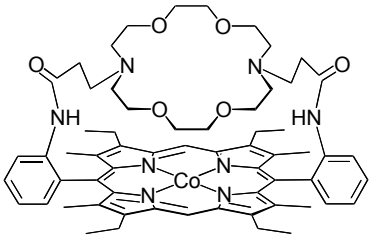

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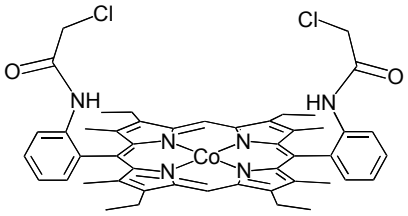

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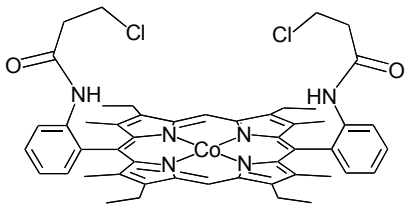

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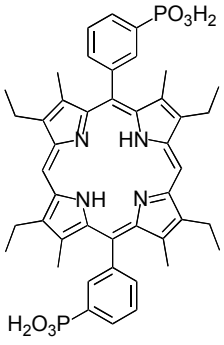

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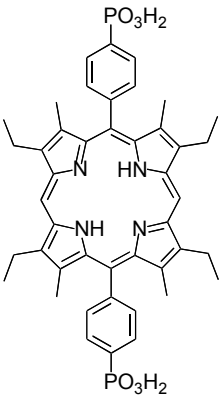
Figure 23b. Structures of *meso*-Substituted etioporphyrin II macrocycles in Table 23b



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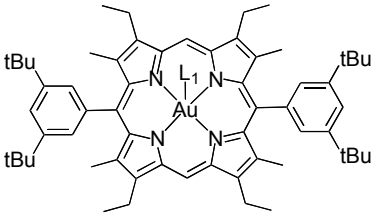

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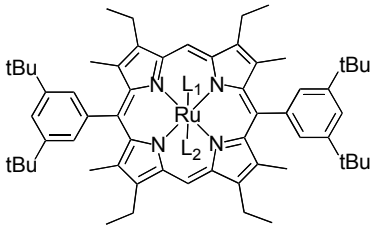

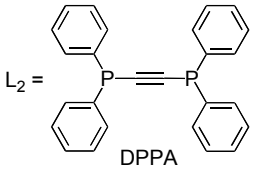

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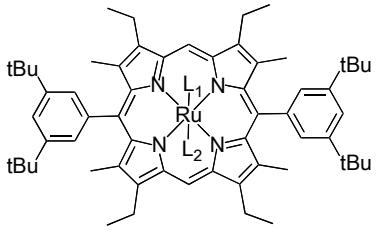

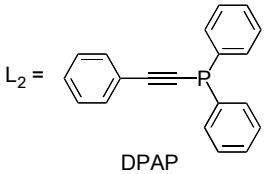

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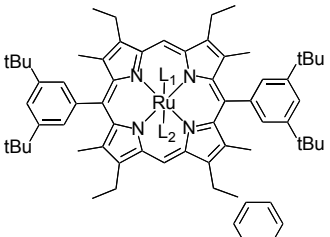

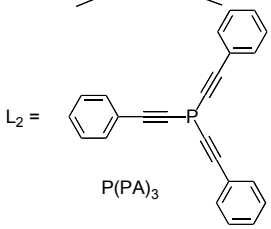

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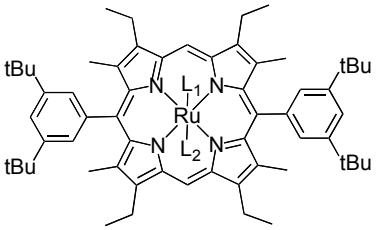

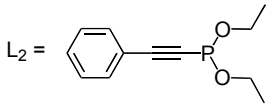

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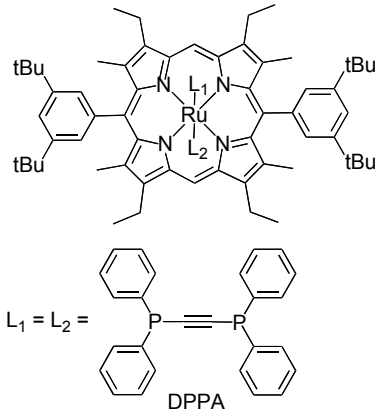
Figure 23b. Structures of *meso*-Substituted etioporphyrin II macrocycles in Table 23b



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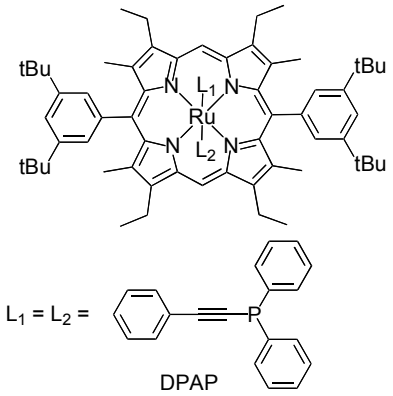

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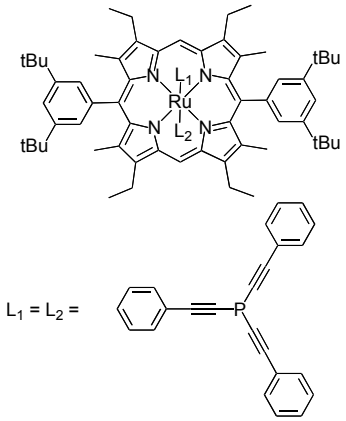

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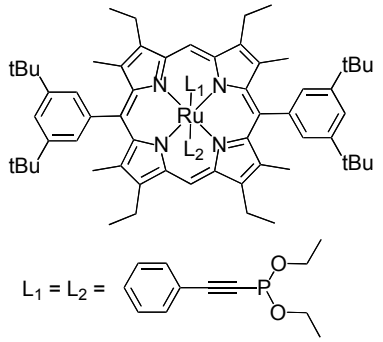

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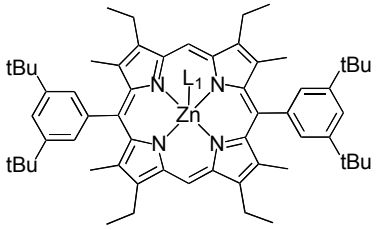

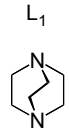

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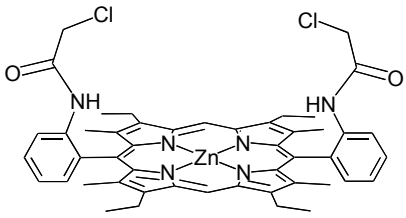

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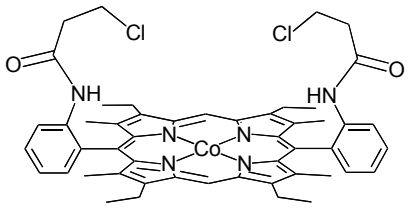
Figure 23b. Structures of *meso*-Substituted etioporphyrin II macrocycles in Table 23b



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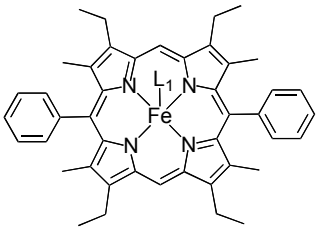

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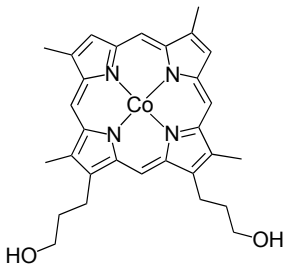
Figure 23c. Structures of β-alkyl and *meso*-substituted porphyrins in Table 23c



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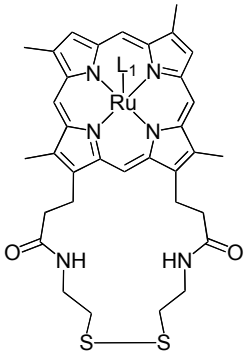

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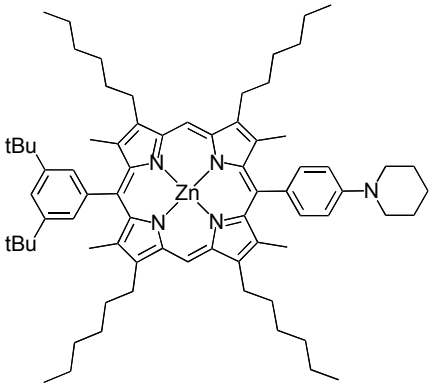

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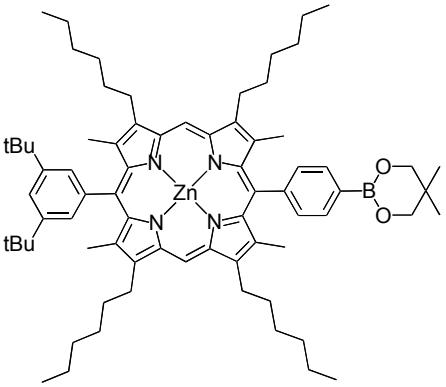

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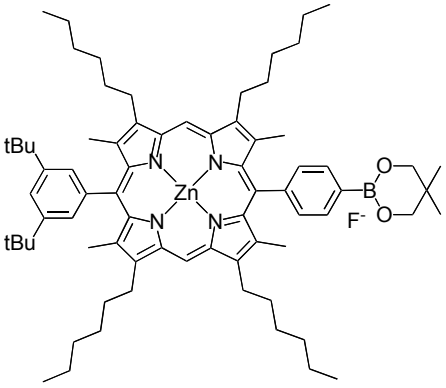

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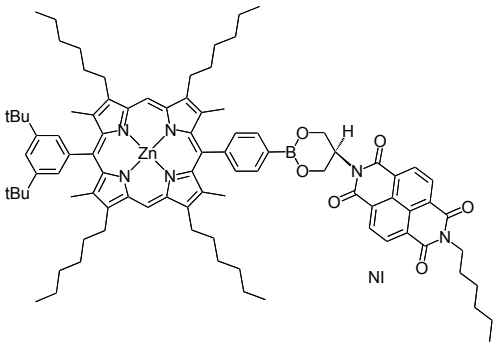

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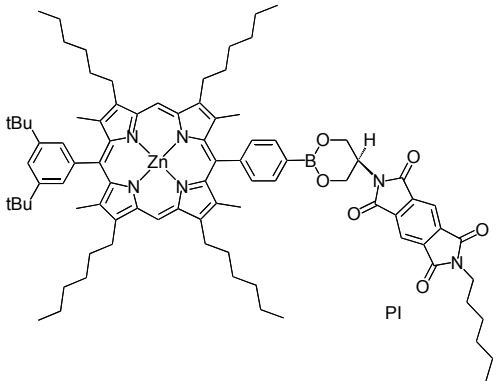
Figure 23c. Structures of β-alkyl and *meso*-substituted porphyrins in Table 23c



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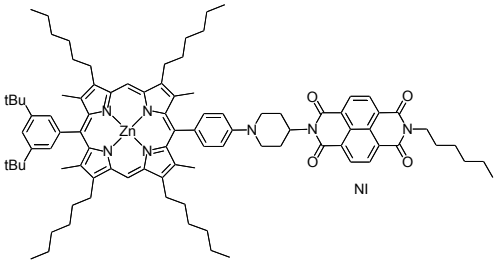

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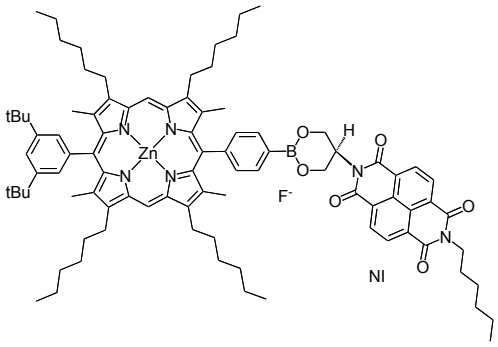

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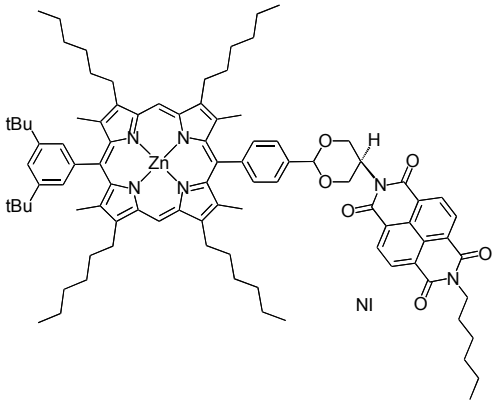

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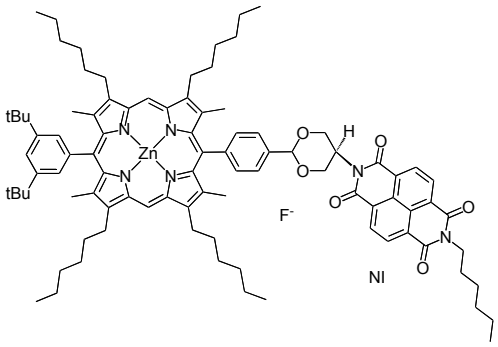

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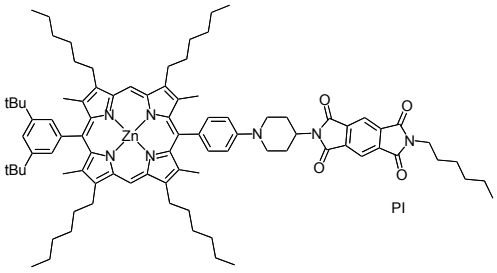

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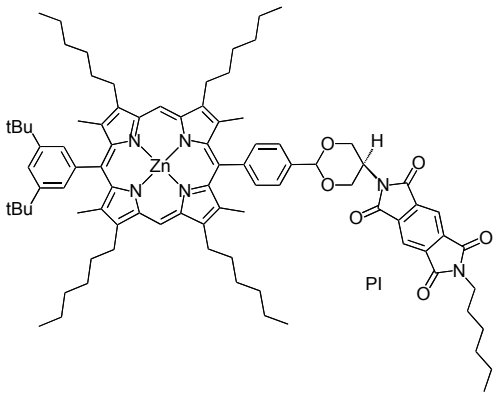
Figure 23c. Structures of β-alkyl and *meso*-substituted porphyrins in Table 23c



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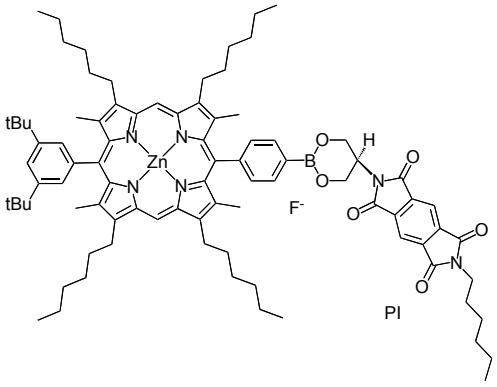

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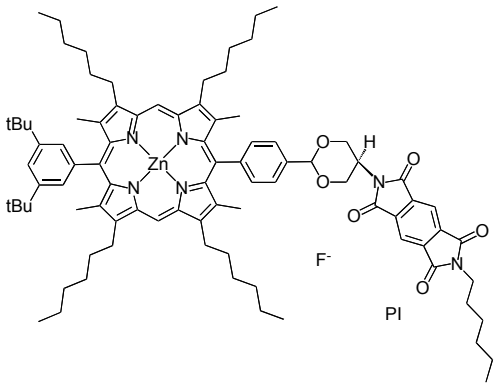

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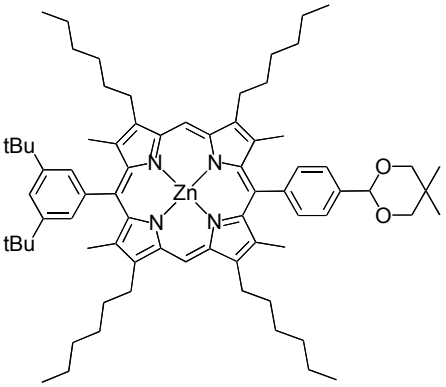

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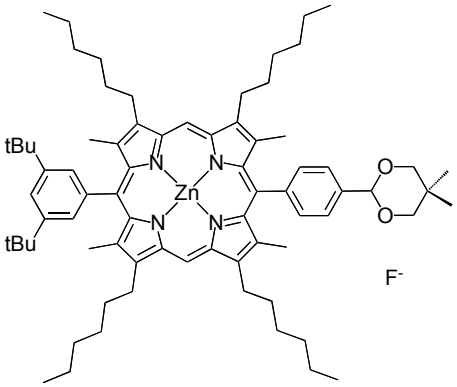

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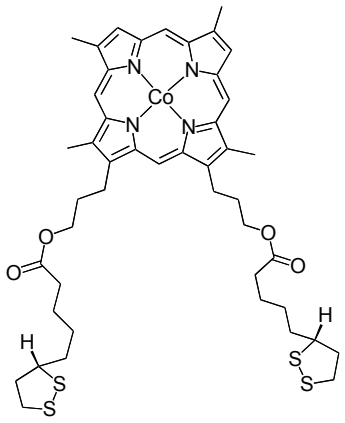
Figure 24. Structures of porphyrins and porphyin-C_{60} conjugates adsorbed on electrode surfaces in Table 24



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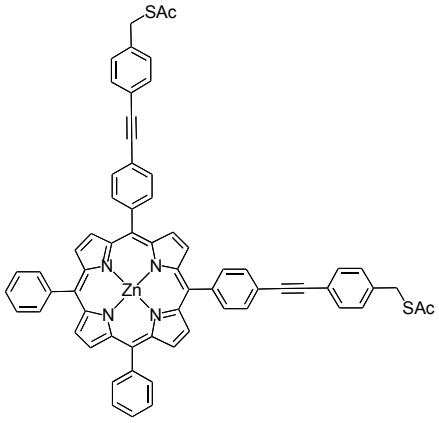

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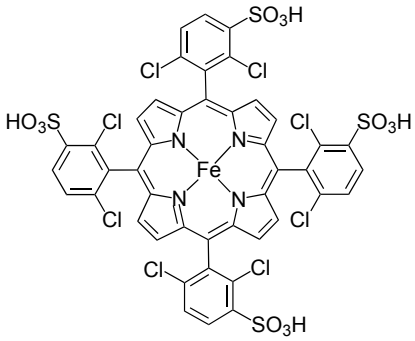

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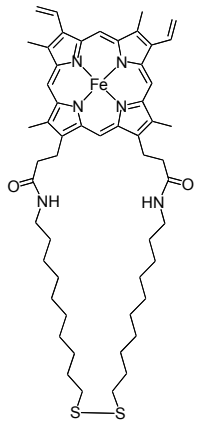

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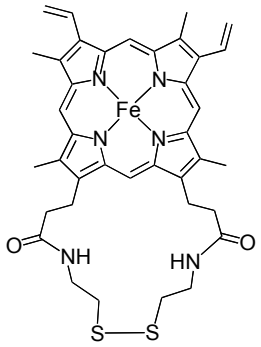

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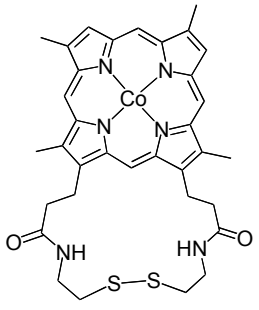

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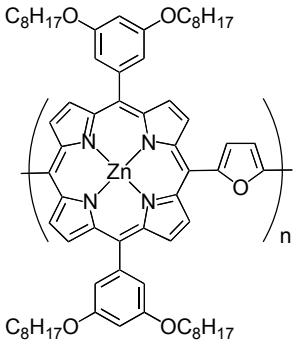
Figure 24. Structures of porphyrins and porphyin-C_{60} conjugates adsorbed on electrode surfaces in Table 24



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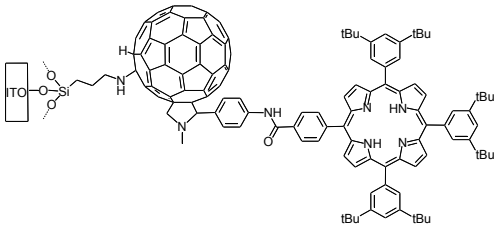

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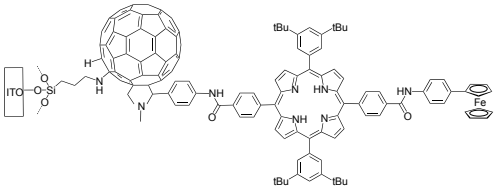

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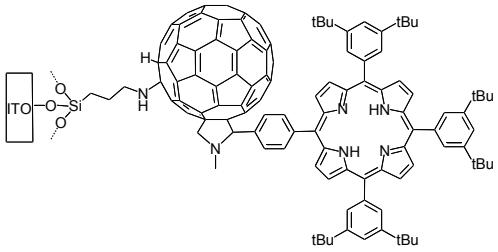

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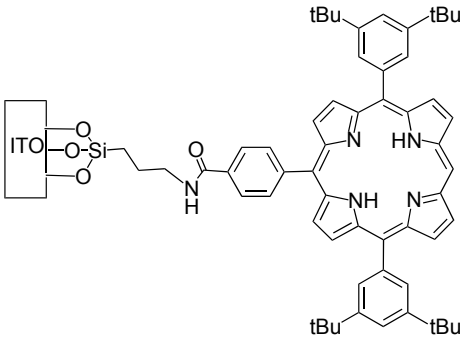

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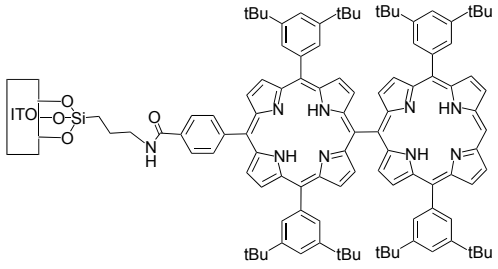

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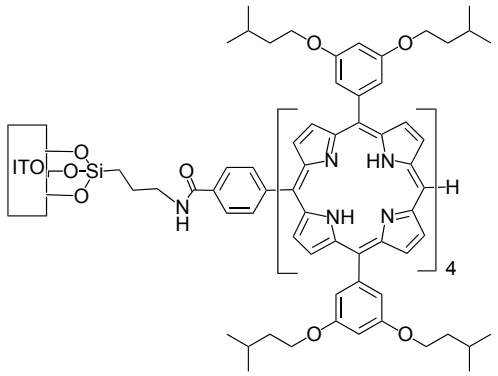
Figure 24. Structures of porphyrins and porphyin-C_{60} conjugates adsorbed on electrode surfaces in Table 24



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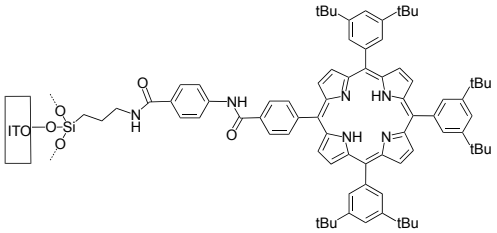

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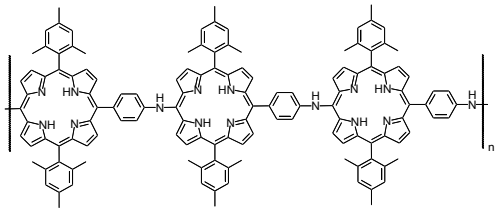

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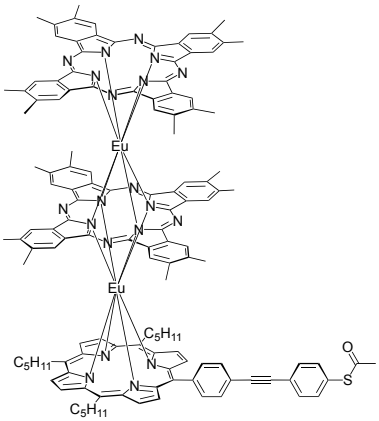

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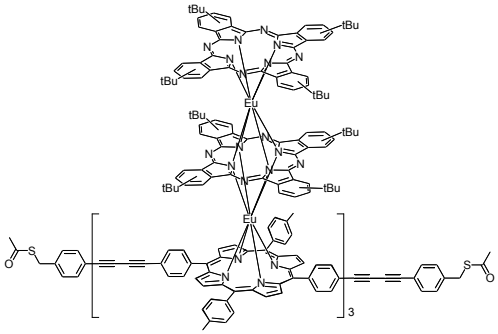

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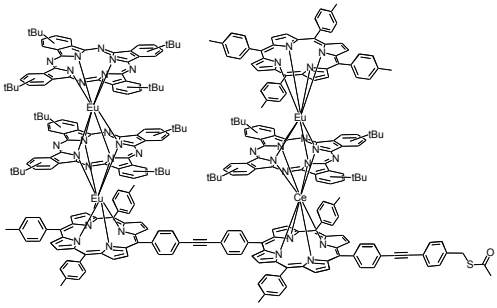

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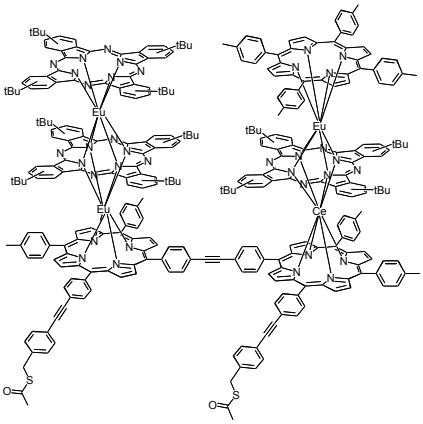
Figure 24. Structures of porphyrins and porphyin-C_{60} conjugates adsorbed on electrode surfaces in Table 24



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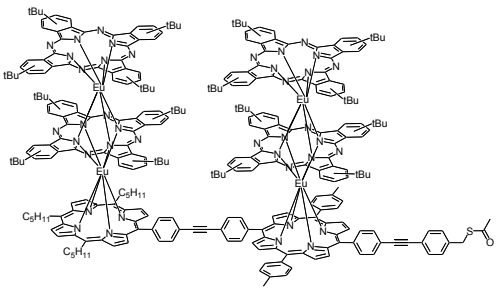

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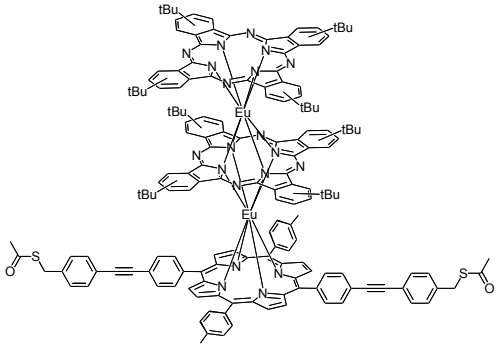

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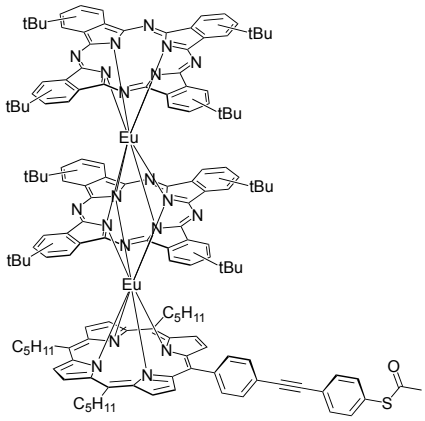

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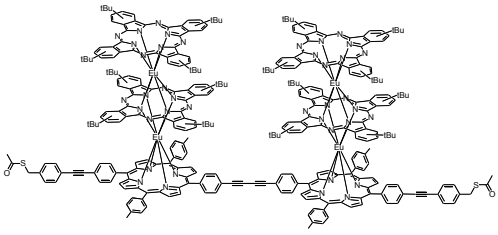

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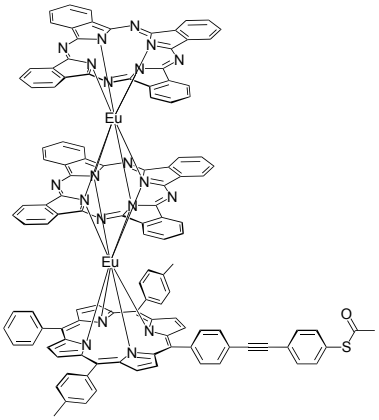

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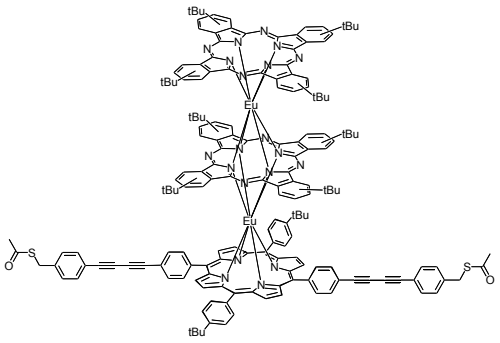
Figure 24. Structures of porphyrins and porphyin-C_{60} conjugates adsorbed on electrode surfaces in Table 24



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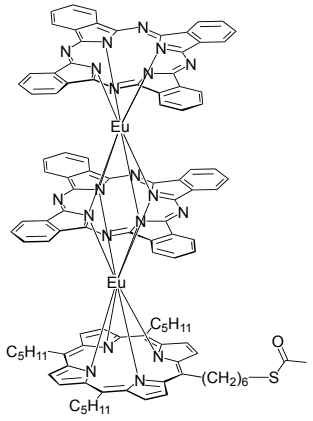

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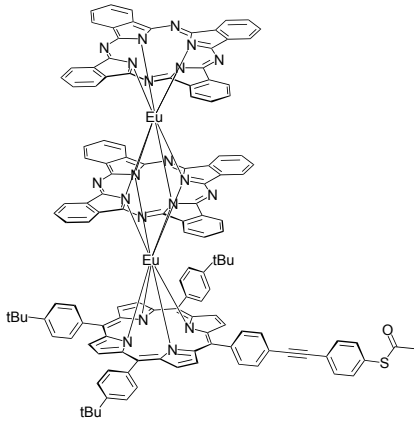

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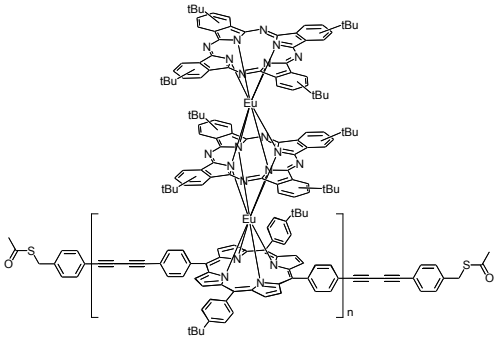

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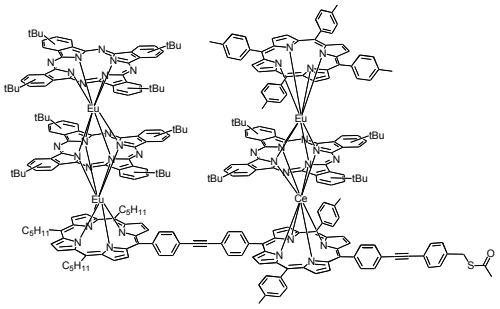

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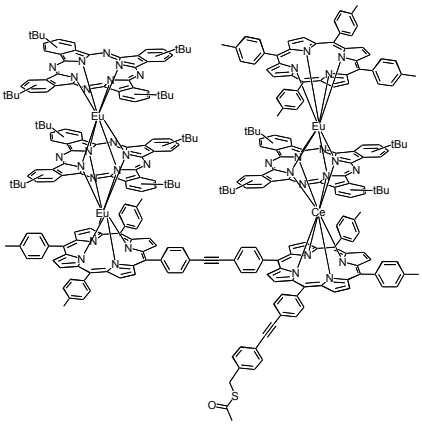

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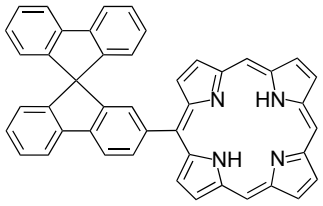
Figure 24. Structures of porphyrins and porphyin-C_{60} conjugates adsorbed on electrode surfaces in Table 24



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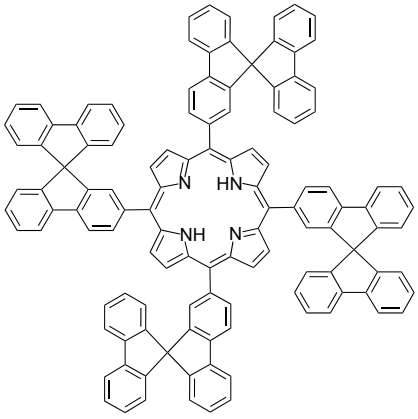

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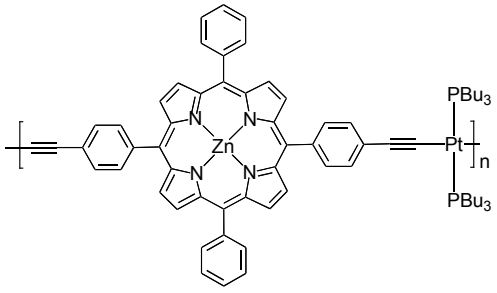

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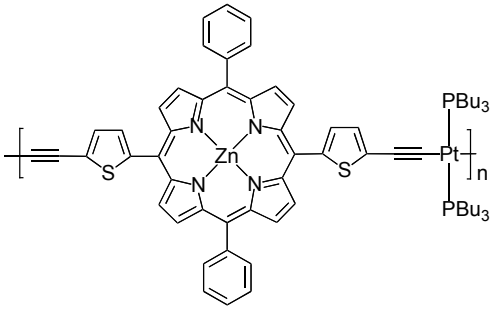

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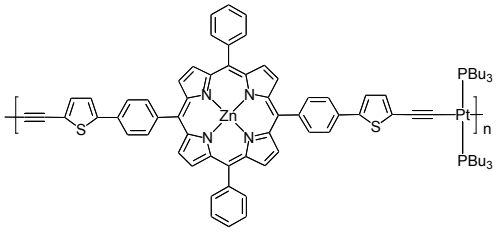

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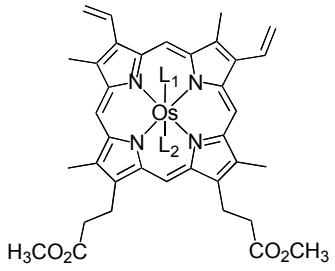

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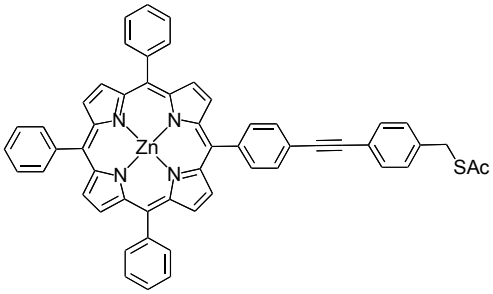
Figure 24. Structures of porphyrins and porphyin-C_{60} conjugates adsorbed on electrode surfaces in Table 24



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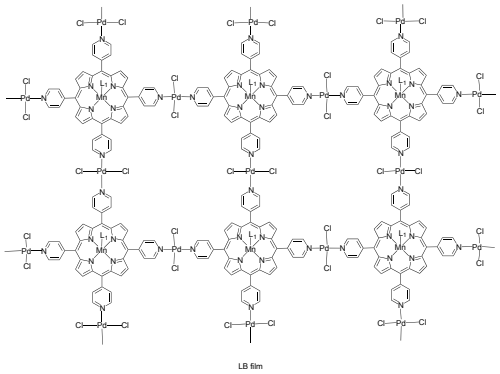

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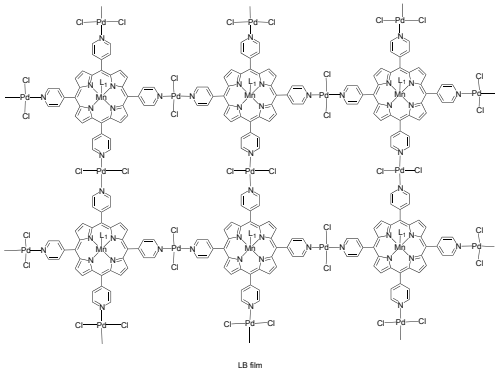

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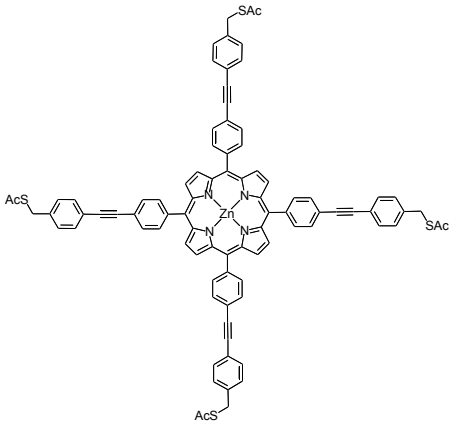

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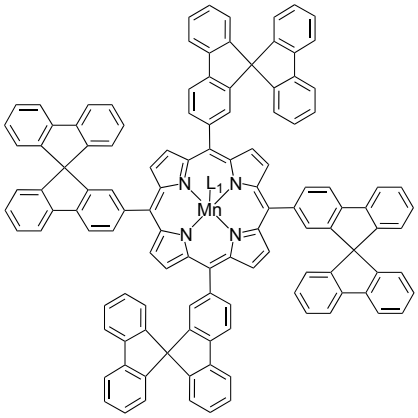

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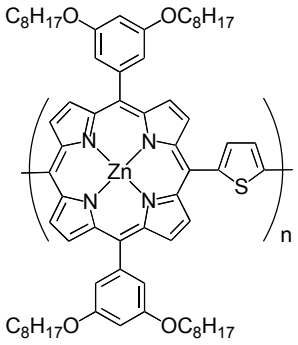

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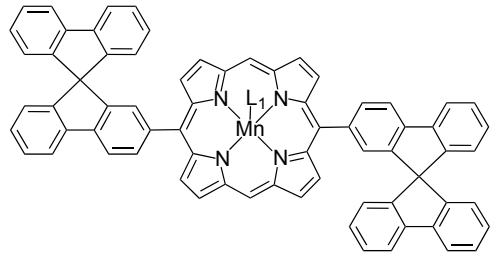
Figure 24. Structures of porphyrins and porphyin-C_{60} conjugates adsorbed on electrode surfaces in Table 24



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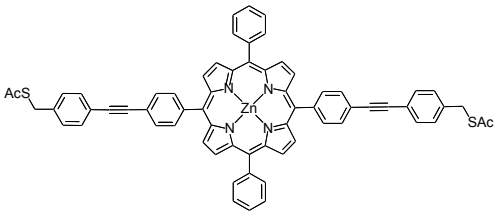

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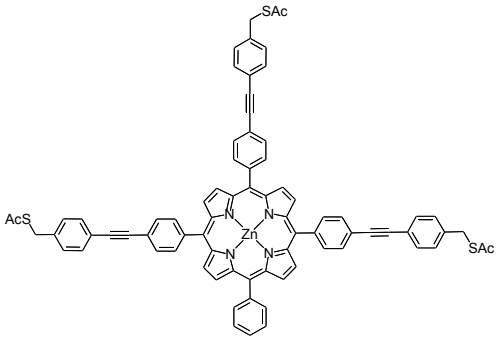

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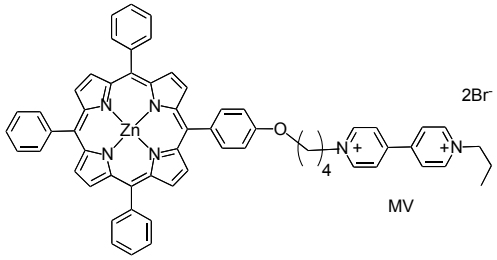

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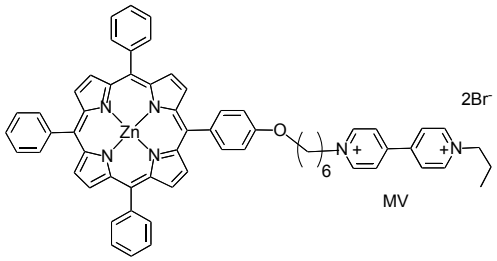

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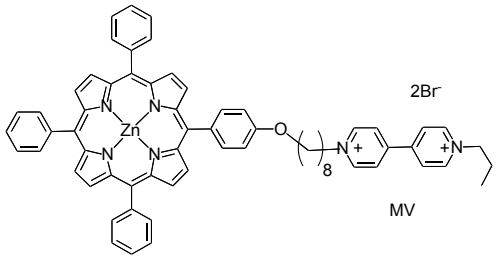

1747

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