

## LIST OF ABBREVIATIONS

acac <sub>2</sub> enH <sub>2</sub>	<i>N,N'</i> -ethylenebis(acetylacetimine)
acacH	pentane-2,4-dione
adipH <sub>2</sub>	adipic acid
alaH	alanine
Am	amyl
5'-AMP	adenosine 5'-monophosphate
ampy	2-(aminomethyl)pyridine
amq	8-aminoquinoline
[9]aneN <sub>3</sub>	1,4,7-triazacyclononane
[15]aneN <sub>4</sub>	1,4,8,12-tetraazacyclopentadecane
[16]aneN <sub>4</sub>	1,5,9,13-tetraazacyclohexadecane
[13]aneS <sub>4</sub>	1,4,7,10-tetrathiacyclotridecane
[14]aneS <sub>4</sub>	1,4,8,11-tetrathiacyclotetradecane
APW	augmented plane wave
argH	arginine
asp	aspartate
ATP	adenosine 5'-triphosphate, disodium salt
au	<i>N'</i> -amidinoisourea
bchd	bicyclo[2.2.1]hepta-2,5-diene; norbornadiene
bg	biguanidine
biimH	2,2'-biimidazole
bipy	2,2'-bipyridine
4,4'-bipy	4,4'-bipyridine
bipyam	di(2-pyridyl)amine
biquin	2,2'-biquinoline
bot	benzoxazole-2-thione
b.p.	boiling point
bpdo	2,2'-bipyridine <i>N,N'</i> -dioxide
bpz	2,2'-bipyrazine
BPz <sub>4</sub>	tetrakis(pyrazol-1-yl)borate
bq	1,2-benzoquinone
bqd	benzoquinone dioximate
bta	2,2'-bi-2-thiazoline
Bu	butyl
<sup>t</sup> Bu	<i>t</i> -butyl (CMe <sub>3</sub> )
Bz	benzyl

bzacH	1-phenylbutane-1,3-dione (benzoylacetone)
bzd	benzidine
bzimidH	benzimidazole
bzo[15]eneS <sub>4</sub>	3,6,10,13-tetrathiabicyclo[13.4.0]nonadec-1,16,18-triene
catH	catechol (1,2-dihydroxybenzene)
CD	circular dichroism
CF	crystal field
chiraphos	2,3-bis(diphenylphosphino)butane
1,3-chxn	<i>cis</i> -1,3-cyclohexanediamine
citH <sub>3</sub>	citric acid
5-Clphen	5-chloro-1,10-phenanthroline
3-CNacacH	3-cyanopentane-2,4-dione
CNDO	complete neglect of differential overlap
cod	cycloocta-1,5-diene
cotr	cyclooctatriene
cp	<i>cis</i> -cyclopentadienyl
cpta	<i>trans</i> -1,2-diaminocyclopentane
CT	charge transfer
CV	cyclic voltammetry
cych	cyclohexyl
cyclam	1,4,8,11-tetraazacyclotetradecane
cyclen	1,4,7,10-tetraazacyclododecane
cyclops	difluoro{3,3'-(trimethylenedinitrilo)bis(2-butanone-oximate)}borate
cysH	cysteine
dac	1,2-diaminocyclohexane
dadn	1,9-diamino-3,7-diazanonane
dadd	1,10-diamino-4,7-diazadecane
dap	2,6-diethanoylpyridine
dba	1,5-diphenylpenta-1,4 diene-3-one (dibenzylideneacetone)
dbp	5-phenyl-5- <i>H</i> -dibenzophosphole
dbpdiop	<i>R,R-trans</i> -4,5-bis(dibenzophospholomethyl)-2,2-dimethyl-
-1,3-dioxolan	
dbzmH	1,3-diphenylpropane-1,3-dione (dibenzoylmethane)
dcpzH <sub>2</sub>	2,5-pyrazine dicarboxylic acid
dea	diethylacetamide
debg	diethylbiguanidine
def	1,1'-diethanoylferrocene

dehpH	di-(2-ethylhexyl)phosphonic acid
deoa	diethanolamine
dhaqH <sub>2</sub>	1,4-dihydroxyanthraquinone
diars	1,2-phenylenebis(dimethylarsine)
dien	1,4,7-triazaheptane (diethylenetriamine; bis(2-aminoethyl)amine)
dik	β-diketonate
dim	2,3-Me <sub>2</sub> -[14]-1,3-diene-1,4,8,11-N <sub>4</sub> {Me <sub>2</sub> [14]dieneN <sub>4</sub> }
(-)-diop	(+)-2,3-O-diisopropylidene 2,3-dihydroxy-1,4-bis-(diphenylphosphino)butane
diox	1,4-dioxan
dipicH <sub>2</sub>	pyridine-2,6-dicarboxylic acid
dma	dimethylethanamide
dmbg	dimethylbiguanidine
dmbpdo	3,3'-dimethyl-2,2'-bipyridine N,N'-dioxide
dme	1,2-dimethoxyethane
dmen	N,N'-dimethyl-1,2-diaminoethane
dmf	dimethylmethanamide
dmg	dimethylglyoximate
dmgH <sub>2</sub>	dimethylglyoxime
dmhH	5,5-dimethylhexane-2,4-dione
dmhpH	2,4-dimethyl-6-hydroxypyrimidine
dmpe	1,2-bis(dimethylphosphino)ethane
dmppl	3,4-dimethyl-1-phenylphosphole
dmpz1H	3,5-dimethylpyrazole
dmsc	dimethylsulfoxide
dnu	N,N'-dimethylurea
DNA	deoxyribonucleic acid
dpae	1,2-bis(diphenylarsino)ethane
dpam	bis(diphenylarsino)methane
dpaq	8-(diphenylarsino)quinoline
dpen	N,N'-diphenyl-1,2-diaminoethane
dpg	diphenylglyoximate
dpmH	2,2,6,6-tetramethylheptane-3,5-dione (dipivaloylmethane)
dppa	2-(diphenylphosphino)anisole
dppb	1,4-bis(diphenylphosphino)butane
dppba	2-(diphenylphosphino)benzaldehyde
dppe	1,2-bis(diphenylphosphino)ethane
dppee	cis-1,2-bis(diphenylphosphino)ethene
dppf	1,1'-bis(diphenylphosphino)ferrocene

dpphe	1,6-bis(diphenylphosphino)hex-3-ene
dppm	bis(diphenylphosphino)methane
dppp	1,3-bis(diphenylphosphino)propane
dppq	8-(diphenylphosphino)quinoline
dpt	bis(3-aminopropyl)amine
DSC	differential scanning calorimetry
DTA	differential thermal analysis
1,2-dta	1,2-dithiane
dtbiH	2,4-dithiobiuret
dtbH	dithiobenzoic acid
dte	dithiocarbamate
DTGA	differential thermogravimetric analysis
2,5-dth	2,5-dithiohexane
dto <sub>x</sub> H <sub>2</sub>	1,2 dithiooxalic acid
dttf	dibenzotetrathiafulvalene
DV	discrete variational
DVM	discrete variational method
ebg	ethylbiguanidine
ECL	electrochemiluminescence
eddaH <sub>2</sub>	<i>N,N'</i> -ethylenediaminediacetic acid
edmaH	<i>N</i> -ethylenediamineacetic acid
edptaH <sub>4</sub>	ethylenediphosphinetetraacetic acid
edtaH <sub>4</sub>	ethylenediaminetetraacetic acid
cdtp	<i>N,N,N',N'</i> -tetrakis(2'-benzimidazolylmethyl)-1,2-diaminoethane
EELS	electron energy loss spectroscopy
EHMO	extended Hückel molecular orbital
EHT	extended Hückel theory
en	1,2-diaminoethane
ENDOR	electron-nuclear double resonance
eo	ethanolamine
EPR	electron paramagnetic resonance
epyden	2,6-bis{5-(1,4-diazahexyl)}pyridine
Et	ethyl
etdp	2-ethyltetraphenoxodiphosphazine
EXAFS	extended X-ray absorption fine structure

fbts	1-( $\alpha$ )-furyl-4-benzylamidothiosemicarbazone
fodH	2,2-dimethyl-6,6,7,7,8,8,8-heptafluorooctane-3,5-dione
FT	Fourier transform
glyH	glycine
5'-GMP	guanosine 5'-monophosphate
Hb	haemoglobin
HBPz <sub>3</sub>	hydrotris(pyrazol-1-yl)borate
hedpH <sub>4</sub>	1-hydroxyethane-1,2-diphosphonic acid
hedtaH <sub>3</sub>	<i>N</i> -(hydroxyethyl)ethylenediaminetriacetic acid
hfacacH	1,1,1,5,5,5-hexafluoropentane-2,4-dione
HFS	Hartree-Fock-Slater
hisH	histidine
hmpa	tris(dimethylamino)phosphine oxide (hexamethylphosphoramide)
hmta	hexamethylenetetraamine
HOMO	highest occupied molecular orbital
HO-8-quin	8-hydroxyquinoline
HPLC	high pressure liquid chromatography
hyp	hypoxanthine; purine-6-one
ileH	isoleucine
imdaH	iminodiethanoic acid
imdien	1,9-bis(4-imidazolyl)-2,5,8-triazanonane
imdpt	1,11-bis(4-imidazolyl)-2,6,10-triazaundecane
imidH	imidazole
5'-IMP	inosine 5'-monophosphate
INDO	intermediate neglect of differential overlap
IR	infrared
ishq	7-iodo-8-hydroxyquinoline-4 sulfonic acid
isonic	isonicotinamide
IT	intervalence transition
LCAO	linear combination of atomic orbitals
leuH	leucine
LMCT	ligand-to-metal charge transfer
LUMO	lowest unoccupied molecular orbital
lysH	lysine

malH <sub>2</sub>	malonic acid
mbg	methylbiguanidine
MbH <sub>2</sub>	myoglobin
mbth	mercaptobenzothiazole
Me	methyl
3-MeacacH	3-methylpentane-2,4-dione
Me <sub>6</sub> [14]aneN <sub>4</sub>	5,5,7,12,12,14-hexamethyl-1,4,8,11-tetraaza-cyclotetradecane
4,4'-Me <sub>2</sub> bipy	4,4'-dimethyl-2,2'-bipyridine
5,5'-Me <sub>2</sub> bipy	5,5'-dimethyl-2,2'-bipyridine
6,6'-Me <sub>2</sub> bipy	6,6'-dimethyl-2,2'-bipyridine
Meccp	methylcyclopentadienyl
1-Mecyt	1-methylcytosine
medien	4-methyl-1,4,7-triazasheptane
Meen	N-methyl-1,2-diaminoethane
Me <sub>2</sub> en	N,N-dimethyl-1,2-diaminoethane
7-Mehyp	7-methylhypoxanthine
Meialo	10-methylisoalloxazine
Me <sub>2</sub> ialo	3,10-dimethylisoalloxazine
1-Meimid	1-methylimidazole
2,9-Me <sub>2</sub> phen	2,9-dimethyl-1,10-phenanthroline
4,7-Me <sub>2</sub> phen	4,7-dimethyl-1,10-phenanthroline
3,4,7,8-Me <sub>4</sub> phen	3,4,7,8-tetramethyl-1,10-phenanthroline
2-Mepy	2-methylpyridine
3-Mepy	3-methylpyridine
4-Mepy	4-methylpyridine
meth	methionine
Me <sub>2</sub> violH	1,3-dimethylvioluric acid
mhpH	6-methyl-2-hydroxypyridine
MLCT	metal-to-ligand charge transfer
mntH <sub>2</sub>	cis-1,2-dicyanoethene-1,2-dithiol
MO	molecular orbital
m.p.	melting point
MPiXH <sub>2</sub>	meso-porphyrin-IX
MPiXDMEH <sub>2</sub>	meso-porphyrin-IX-dimethyl ester
mppl	3-methyl-1-phenylphosphole
[MV] <sup>2+</sup>	1,1'-dimethyl-4,4'-bipyridinium dication (methyl viologen or Paraquat)

$[N(2\text{amet})\text{pipzH}_3]^{3+}$	<i>N</i> -(2-ammoniumethyl)piperazinium trication
nbd	[2.2.1]-bicyclohepta-1,3-diene
nic	nicotinamide
nmp	<i>N</i> -methyl-2-pyrrolidine
NMR	nuclear magnetic resonance
<i>N,N</i> -Et <sub>2</sub> en	<i>N,N</i> -diethyl-1,2-diaminoethane
5-NO <sub>2</sub> -phen	5-nitro-1,10-phenanthroline
np	2-naphthyl
NQR	nuclear quadrupole resonance
ntaH <sub>3</sub>	nitrioloethanoic acid
ntbt	tris(2-benzothiazolylmethyl)amine
OAc	ethanoate
0-en-N-tnH <sub>4</sub>	3,4:9,10-dibenzo-1,12-diaza-5,8-dioxacyclopentadecane
OEPH <sub>2</sub>	octaethylporphyrin
ompha	octamethylpyrophosphoramidate
8-O-quin	8-hydroxyquinoline anion
ORD	optical rotary dispersion
ornH	ornithine
OTTLE	optically transparent thin layer electrode
ox	oxalate
paz	pyridazine
PCH <sub>2</sub>	phthalocyanine
pdtaH <sub>4</sub>	propylenediaminetetraacetic acid
pdth <sub>2</sub>	2-pyrrolidone-1,3-bis(carbodithioic acid)
penH	penicillamine
PES	photoelectron spectroscopy
Ph	phenyl
pheH	phenylalanine
phen	1,10-phenanthroline
4,7-Ph <sub>2</sub> -phen	4,7-diphenyl-1,10-phenanthroline
pip	piperidine
pmbzph	1-phenyl-3-methyl-4-benzoylpyrazole-5-one
pmdt	1,1,4,7,7-pentamethyl-1,4,7-triazaheptane (pentamethyl-diethylenetriamine)
pmdtcH	pentamethylene dithiocarbamic acid, HS <sub>2</sub> CN(CH <sub>2</sub> ) <sub>5</sub>
pmtfpH	1-phenyl-3-methyl-4-etrifluoroethanoylpyrazole-5-one
1,2-pn	1,2-diaminopropane
1,3-pn	1,3-diaminopropane

PPIXDBE	protoporphyrin-IX-dibutyl ester
PPIXDME	protoporphyrin-IX-dimethyl ester
ppl	1-phenylphosphole
PPP	Pariser Parr-Pople
P(py),	tris(2-pyridyl)phosphine
pq	2-(2-pyridyl)quinoline
Pr	propyl
<sup>i</sup> Pr	iso-propyl (CMe <sub>2</sub> H)
proH	proline
ptaH <sub>3</sub>	phosphinetriacetic acid
purH	purine
PVP	poly(4-vinylpyridine)
py	pyridine
py 2,6 (COOH) <sub>2</sub>	pyridine 2,6-dicarboxylic acid
pydien	1,9 bis(2 pyridyl)-2,5,8-triazanonane
pydpt	1,11 bis(2-pyridyl)-2,6,10-triazaundecane
py-4-NH <sub>2</sub>	4-aminopyridine
py-4-NMe <sub>2</sub>	4-( <i>N,N</i> -dimethylamino)pyridine
pyNO	pyridine <i>N</i> -oxide
py-2 OH	2-hydroxypyridine
pysalH	<i>N</i> -(2-pyridyl)salicylaldehyde
py-3-SO <sub>3</sub> H	pyridine 3 sulfonic acid
pz	pyrazine
pziH	pyrazole
[pzMe] <sup>+</sup>	<i>N</i> -methylpyrazinium cation
ϕ	quantum yield
quin	quinoline
quin 8 OH	8-hydroxyquinoline
<i>r</i>	bond length
RDS	Raman difference spectroscopy
sulH <sub>2</sub>	salicylic acid
sal <sub>2</sub> enH <sub>2</sub>	<i>N,N'</i> ethylenebis(salicylideneimine)
sal <sub>2</sub> phenH <sub>2</sub>	<i>N,N'</i> - <i>o</i> -phenylenebis(salicylideneimine)
sal <sub>2</sub> propH <sub>2</sub>	<i>N,N'</i> -trimethylenebis(salicylideneimine)
sbtS	1-salicyl-4-benzylamidothiosemicarbazone
SCE	saturated calomel electrode
SCF	self-consistent field



SCMP	self-consistent Madelung potential
SDS	sodium dodecyl sulfate
serH	serine
SERS	surface enhanced Raman spectroscopy
SHE	standard hydrogen electrode
sq	1,2-benzoemiquinone
sq <sub>u</sub> H <sub>2</sub>	squaric acid
SW	scattered wave
$T_C$	Curie temperature
$T_N$	Neel temperature
taaH <sub>2</sub>	1,8-dihydrodibenzo[ <i>b</i> , <i>i</i> ][1,4,8,11]tetraazaannulene
tacd	1,4,7-triazacyclodecane
tach	<i>cis,cis</i> -1,3,5-triaminocyclohexane
tactd	1,4,8,11-tetraazacyclotetradecane
tacpd	1,4,8,12-tetraazacyclopentadecane
tame	1,1,1-tris(aminomethyl)ethane
tarH <sub>2</sub>	4-(2-thiazolylazo)resorcinol
tartH <sub>2</sub>	tartaric acid
tbcyclen	1,4,7,10-Bz <sub>4</sub> -[12]ane-1,4,7,10-N <sub>4</sub>
TBPH <sub>2</sub>	tetrabenzoporphyrin
TCDD	2,3,7,8-tetrachlorodibenzo- <i>p</i> -dioxin
tcne	tetracyanoethene
TCNQ	7,7,8,8-tetracyanoquinodimethane (2,5-cyclohexadiene- $\Delta$ 1 $\alpha$ ,4 $\alpha'$ -dimalonitrile)
tddx	<i>P,P,P',P'</i> -tetrakis(2-diphenylphosphinoethyl)- $\alpha,\alpha'$ -diphospha-1,4-xylene
tedtaH <sub>4</sub>	thiobis(ethylenenitrilo)tetraacetic acid
teen	<i>N,N,N',N'</i> -tetraethyl-1,2-diaminoethane
teoa	triethanolamine
terpy	2,2':6',2"-terpyridine
2,3,2-tet	1,4,8,11-tetraazaundecane
3,2,3-tet	1,5,8,12-tetraazadodecane
3,3,3-tet	1,5,9,13-tetraazatridecane
tetraphos	1,1,4,7,10,10 hexaphenyl-1,4,7,10-tetraphosphadecane
tetren	1,11-diamino-3,6,9-triazaundecane
tfa	trifluoroethanoate
tfacacH	1,1,1-trifluoropentane-2,4-dione
TGA	thermogravimetric analysis
thH	thiamine

thf	tetrahydrofuran
thrH	threonine
tht	tetrahydrothiophene
thtfacH	2-thenoyltrifluoropropanone
tim	2,3,9,10 Me <sub>4</sub> -[14]-1,3,8,10-tetraene-1,4,8,11-N <sub>4</sub> (Me <sub>4</sub> [14]tetraeneN <sub>4</sub> )
tipp	tri(isopropyl)phosphate
TIPPPH <sub>2</sub>	<i>meso</i> -tetra(isopropyl-4-phenyl)porphyrin
TLC	thin layer chromatography
tmc	tetramethylcyclam
tmen	<i>N,N,N',N'</i> -tetramethyl-1,2-diaminoethane
tmH <sub>3</sub>	thiomalic acid
tmp	trimethylphosphate
tmsO	tetramethylenesulfoxide
tntu	tetramethylthiourea
tmu	tetramethylurea
tp	tris{2-(diphenylphosphino)ethyl}phosphine
TPPH <sub>2</sub>	<i>meso</i> -tetraphenylporphyrin
TPPSH <sub>6</sub>	<i>meso</i> -tetrakis(phenyl-4-sulfonic acid)porphyrin
tpt	2,4,6-tri(2-pyridyl)-1,3,5-triazine
tren	2,2',2''-triaminotriethylamine
trenMe <sub>6</sub>	2,2',2''-tris(dimethylamino)triethylamine
trien	1,8-diamino-3,6-diazaoctane (triethylenetetraamine)
triphos	1,1,1-tris(diphenylphosphinomethyl)ethane
Ts	4-toluenesulfonyl (MeC <sub>6</sub> H <sub>4</sub> -4-SO <sub>2</sub> )
ttp	tri-4-tolylphosphate
TTPH <sub>2</sub>	<i>meso</i> -tetra(4-tolyl)porphyrin
tu	thiourea
tyr	tyrosine
5'-UMP	uridine 5' monophosphate
UV	ultraviolet
UVPES	ultraviolet photoelectron spectroscopy
UV-VIS	ultraviolet-visible
UV VIS-NIR	ultraviolet visible-near infrared
ΔV <sup>‡</sup>	activation volume
valH	valine
violH <sub>3</sub>	violuric acid
VT	variable temperature

xan	xanthate, $[\text{S}_2\text{C}(\text{OR})]^-$
XPES	X-ray photoelectron spectroscopy
ZFS	zero field splitting