
Abbreviations

Chemical

Name Used in Text	Abbreviation Used in Tables and on Arrow in Schemes	Abbreviation Used in Experimental Procedures
(<i>R</i>)-1-amino-2-(methoxymethyl)pyrrolidine	RAMP	RAMP
(<i>S</i>)-1-amino-2-(methoxymethyl)pyrrolidine	SAMP	SAMP
ammonium cerium(IV) nitrate	CAN	CAN
2,2'-azobisisobutyronitrile	AIBN	AIBN
barbituric acid	BBA	BBA
benzyltriethylammonium bromide	TEBAB	TEBAB
benzyltriethylammonium chloride	TEBAC	TEBAC
<i>N,O</i> -bis(trimethylsilyl)acetamide	BSA	BSA
9-borabicyclo[3.3.1]nonane	9-BBNH	9-BBNH
borane–methyl sulfide complex	BMS	BMS
<i>N</i> -bromosuccinimide	NBS	NBS
<i>tert</i> -butyldimethylsilyl chloride	TBDMSCI	TBDMSCI
<i>tert</i> -butyl peroxybenzoate	TBPB	<i>tert</i> -butyl peroxybenzoate
10-camphorsulfonic acid	CSA	CSA
chlorosulfonyl isocyanate	CSI	chlorosulfonyl isocyanate
3-chloroperoxybenzoic acid	MCPBA	MCPBA
<i>N</i> -chlorosuccinimide	NCS	NCS
chlorotrimethylsilane	TMSCI	TMSCI
1,4-diazabicyclo[2.2.2]octane	DABCO	DABCO
1,5-diazabicyclo[4.3.0]non-5-ene	DBN	DBN
1,8-diazabicyclo[5.4.0]undec-7-ene	DBU	DBU
dibenzoyl peroxide	DBPO	dibenzoyl peroxide
dibenzylideneacetone	dba	dba
di- <i>tert</i> -butyl azodicarboxylate	DBAD	di- <i>tert</i> -butyl azo-dicarboxylate
di- <i>tert</i> -butyl peroxide	DTBP	DTBP
2,3-dichloro-5,6-dicyanobenzo-1,4-quinone	DDQ	DDQ
dichloromethyl methyl ether	DCME	DCME
dicyclohexylcarbodiimide	DCC	DCC
<i>N,N</i> -diethylaminosulfur trifluoride	DAST	DAST
diethyl azodicarboxylate	DEAD	DEAD
diethyl tartrate	DET	DET
2,2'-dihydroxy-1,1'-binaphthyllithium	BINAL-H	BINAL-H
aluminum hydride		
diisobutylaluminum hydride	DIBAL-H	DIBAL-H
diisopropyl tartrate	DIPT	DIPT

Abbreviations

Chemical (cont.)

Name Used in Text	Abbreviation Used in Tables and on Arrow in Schemes	Abbreviation Used in Experimental Procedures
1,2-dimethoxyethane	DME	DME
dimethylacetamide	DMA	DMA
dimethyl acetylenedicarboxylate	DMAD	DMAD
2-(dimethylamino)ethanol	Me ₂ N(CH ₂) ₂ OH	2-(dimethylamino)ethanol
4-(dimethylamino)pyridine	DMAP	DMAP
dimethylformamide	DMF	DMF
dimethyl sulfide	DMS	DMS
dimethyl sulfoxide	DMSO	DMSO
1,3-dimethyl-3,4,5,6-tetrahydro-pyrimidin-2(1 <i>H</i>)-one	DMPU	DMPU
ethyl diazoacetate	EDA	EDA
ethylenediaminetetraacetic acid	edta	edta
hexamethylphosphoric triamide	HMPA	HMPA
hexamethylphosphorous triamide	HMPT	HMPT
iodomethane	MeI	MeI
<i>N</i> -iodosuccinimide	NIS	NIS
lithium diisopropylamide	LDA	LDA
lithium hexamethyldisilazane	LiHMDS	LiHMDS
lithium isopropylcyclohexylamide	LICA	LICA
lithium 2,2,6,6-tetramethylpiperidide	LTMP	LTMP
lutidine	lut	lut
methylaluminum bis(2,6-di- <i>tert</i> -butyl-4-methylphenoxide)	MAD	MAD
methyl ethyl ketone	MEK	methyl ethyl ketone
methylmaleimide	NMM	NMM
4-methylmorpholine <i>N</i> -oxide	NMO	NMO
1-methylpyrrolidin-2-one	NMP	NMP
methyl vinyl ketone	MVK	methyl vinyl ketone
petroleum ether	PE ^a	petroleum ether
<i>N</i> -phenylmaleimide	NPM	NPM
polyphosphoric acid	PPA	PPA
polyphosphate ester	PPE	polyphosphate ester
potassium hexamethyldisilazane	KHMDS	KHMDS
pyridine	pyridine ^b	pyridine
pyridinium chlorochromate	PCC	PCC
pyridinium dichromate	PDC	PDC
pyridinium 4-toluenesulfonate	PPTS	PPTS
sodium bis(2-methoxyethoxy)aluminum hydride	Red-Al	Red-Al
tetrabutylammonium bromide	TBAB	TBAB

^a Used to save space; abbreviation must be defined in a footnote.

^b py used on arrow in schemes.

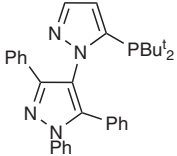
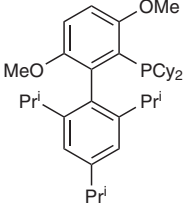
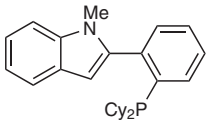
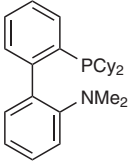
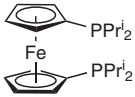
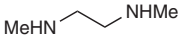
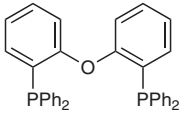

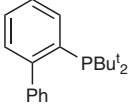
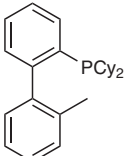
Chemical (cont.)

Name Used in Text	Abbreviation Used in Tables and on Arrow in Schemes	Abbreviation Used in Experimental Procedures
tetrabutylammonium chloride	TBACl	TBACl
tetrabutylammonium fluoride	TBAF	TBAF
tetrabutylammonium iodide	TBAI	TBAI
tetracyanoethene	TCNE	tetracyanoethene
tetrahydrofuran	THF	THF
tetrahydropyran	THP	THP
2,2,6,6-tetramethylpiperidine	TMP	TMP
trimethylamine <i>N</i> -oxide	TMANO	trimethylamine <i>N</i> -oxide
<i>N,N,N',N'</i> -tetramethylethylenediamine	TMEDA	TMEDA
tosylmethyl isocyanide	TosMIC	TosMIC
trifluoroacetic acid	TFA	TFA
trifluoroacetic anhydride	TFAA	TFAA
trimethylsilyl cyanide	TMSCN	TMSCN

Ligands

acetylacetonato	acac
2,2'-bipyridyl	bipy
1,2-bis(dimethylphosphino)ethane	DMPE
2,3-bis(diphenylphosphino)bicyclo[2.2.1]hept-5-ene	NORPHOS
2,2'-bis(diphenylphosphino)-1,1'-binaphthyl	BINAP
1,2-bis(diphenylphosphino)ethane	dppe (not diphos)
1,1'-bis(diphenylphosphino)ferrocene	dppf
bis(diphenylphosphino)methane	dppm
1,3-bis(diphenylphosphino)propane	dppp
1,4-bis(diphenylphosphino)butane	dppb
2,3-bis(diphenylphosphino)butane	Chiraphos
bis(salicylidene)ethylenediamine	salen
cyclooctadiene	cod
cyclooctatetraene	cot
cyclooctatriene	cte
η^5 -cyclopentadienyl	Cp
dibenzylideneacetone	dba
6,6-dimethylcyclohexadienyl	dmch
2,4-dimethylpentadienyl	dmpd
ethylenediaminetetraacetic acid	edta
isopinocampheyl	lpc
2,3- <i>O</i> -isopropylidene-2,3-dihydroxy-1,4-bis(diphenylphosphino)butane	Diop
norbornadiene (bicyclo[2.2.1]hepta-2,5-diene)	nbd
η^5 -pentamethylcyclopentadienyl	Cp*

Additional Abbreviations of Ligands Commonly Used in Cross-Coupling Reactions

Abbreviation	Structure	Name
BippyPhos		5-(di- <i>tert</i> -butylphosphino)-1',3',5'-triphenyl-1' <i>H</i> -[1,4']-bipyrazole
BrettPhos		2-(dicyclohexylphosphino)-2',4',6'-triisopropyl-3,6-dimethoxybiphenyl
CM-Phos		2-[2-(dicyclohexylphosphino)phenyl]-1-methyl-1 <i>H</i> -indole
DavePhos		2-(dicyclohexylphosphino)-2'-(dimethylamino)biphenyl
dippf		[1,1'-bis(diisopropylphosphino)ferrocene]
DMEDA		<i>N,N'</i> -dimethylethylenediamine
DPEphos		bis[2-(diphenylphosphino)phenyl] ether
dpppe		1,5-bis(diphenylphosphino)pentane
JohnPhos		biphenyl-2-yl-di- <i>tert</i> -butylphosphine
MePhos		2-(dicyclohexylphosphino)-2'-methylbiphenyl

Additional Abbreviations of Ligands Commonly Used in Cross-Coupling Reactions (cont.)

Abbreviation	Structure	Name
RuPhos		2-(dicyclohexylphosphino)-2',6'-diisopropoxybiphenyl
SPhos		2-(dicyclohexylphosphino)-2',6'-dimethoxybiphenyl
Tedicyp		<i>cis,cis,cis</i> -1,2,3,4-tetrakis[(diphenylphosphino)methyl]cyclopentane
<i>t</i> -BuXPhos		2-di- <i>tert</i> -butylphosphino-2',4',6'-triisopropylbiphenyl
Tol-BINAP		2,2'-bis(di-4-tolylphosphino)-1,1'-binaphthyl
Xantphos		4,5-bis(diphenylphosphino)-9,9-dimethylxanthene
XPhos		2-(dicyclohexylphosphino)-2',4',6'-triisopropylbiphenyl

Radicals

acetyl	Ac
aryl	Ar
benzotriazol-1-yl	Bt
benzoyl	Bz
benzyl	Bn
benzyloxycarbonyl	Cbz
benzyloxymethyl	BOM
9-borabicyclo[3.3.1]nonyl	9-BBN
<i>tert</i> -butoxycarbonyl	Boc
butyl	Bu
<i>sec</i> -butyl	<i>s</i> -Bu
<i>tert</i> -butyl	<i>t</i> -Bu
<i>tert</i> -butyldimethylsilyl	TBDMS
<i>tert</i> -butyldiphenylsilyl	TBDPS
cyclohexyl	Cy
3,4-dimethoxybenzyl	DMB
ethyl	Et
ferrocenyl	Fc
9-fluorenylmethoxycarbonyl	Fmoc
isobutyl	iBu
mesityl	Mes
mesyl	Ms
4-methoxybenzyl	PMB
(2-methoxyethoxy)methyl	MEM
methoxymethyl	MOM
methyl	Me
4-nitrobenzyl	PNB
phenyl	Ph
phthaloyl	Phth
phthalimido	NPhth
propyl	Pr
isopropyl	iPr
tetrahydropyranyl	THP
tolyl	Tol
tosyl	Ts
triethylsilyl	TES
triflyl, trifluoromethanesulfonyl	Tf
triisopropylsilyl	TIPS
trimethylsilyl	TMS
2-(trimethylsilyl)ethoxymethyl	SEM
trityl [triphenylmethyl]	Tr

General

absolute	abs
anhydrous	anhyd
aqueous	aq
boiling point	bp
catalyst	no abbreviation
catalytic	cat.
chemical shift	δ
circular dichroism	CD
column chromatography	no abbreviation
concentrated	concd
configuration (in tables)	Config
coupling constant	<i>J</i>
day	<i>d</i>
density	<i>d</i>
decomposed	dec
degrees Celsius	°C
diastereomeric ratio	dr
dilute	dil
electron-donating group	EDG
electron-withdrawing group	EWG
electrophile	E ⁺
enantiomeric excess	ee
enantiomeric ratio	er
equation	eq
equivalent(s)	equiv
flash-vacuum pyrolysis	FVP
gas chromatography	GC
gas chromatography-mass spectrometry	GC/MS
gas-liquid chromatography	GLC
gram	g
highest occupied molecular orbital	HOMO
high-performance liquid chromatography	HPLC
hour(s)	h
infrared	IR
in situ	in situ
in vacuo	in vacuo
lethal dosage, e.g. to 50% of animals tested	LD ₅₀
liquid	liq
liter	L
lowest unoccupied molecular orbital	LUMO
mass spectrometry	MS
medium-pressure liquid chromatography	MPLC
melting point	mp
milliliter	mL
millimole(s)	mmol
millimoles per liter	mM
minute(s)	min
mole(s)	mol
nuclear magnetic resonance	NMR
nucleophile	Nu ⁻
optical purity	op
phase-transfer catalysis	PTC
proton NMR	¹ H NMR
reference (in tables)	Ref

General (cont.)

quantitative	quant
retention factor (for TLC)	R_f
retention time (chromatography)	t_R
room temperature	rt
saturated	sat.
solution	soln
temperature (in tables)	Temp (°C)
thin layer chromatography	TLC
ultraviolet	UV
volume (literature)	Vol.
via	via
vide infra	<i>vide infra</i>
vide supra	<i>vide supra</i>
yield (in tables)	Yield (%)

Additional Abbreviations Used in Biocatalysis in Organic Synthesis

Abbreviation	Definition
ABTS	2,2'-azinobis(3-ethyl-2,3-dihydrobenzothiazole-6-sulfonic acid)
ACP	acyl carrier protein
ADH	alcohol dehydrogenase
ADP	adenosine diphosphate
AMP	adenosine monophosphate
ATP	adenosine triphosphate
BSTR	batch stirred tank reactor
CALA	<i>Candida antarctica</i> lipase A
CALB	<i>Candida antarctica</i> lipase B
CDP	cytidine diphosphate
CFE	cell-free extract
CLEA	cross-linked enzyme aggregate
CLEC	cross-linked enzyme crystals
CMP	cytidine monophosphate
CoA	coenzyme A
CoM	coenzyme M
CPFR	continuous plug flow reactor
CSTR	continuous stirred tank reactor
CTP	cytidine triphosphate
CYP	cytochrome P450
DEPA	diethyl phosphoramidate
DHA	1,3-dihydroxyacetone
DHAP	1,3-dihydroxyacetone phosphate
DKR	dynamic kinetic resolution
DTT	dithiothreitol
FAD	flavin adenine dinucleotide

Additional Abbreviations Used in *Biocatalysis in Organic Synthesis* (cont.)

Abbreviation	Definition
FMN	flavin mononucleotide
GABA	γ -aminobutyric acid
GSSM	gene site saturation mutagenesis
HEPES	2-[4-(2-hydroxyethyl)piperazine-1-yl]ethanesulfonic acid
HHDH	halohydrin dehalogenase
HLADH	horse liver alcohol dehydrogenase
IDS	iminodisuccinate
IPTG	isopropyl β -D-1-thiogalactopyranoside
ISPR	in situ product removal
KRED	ketoreductase
MAO	monoamine oxidase
MOPS	3-morpholinopropanesulfonic acid
NAD ⁺	nicotinamide adenine dinucleotide
NADH	nicotinamide adenine dinucleotide (reduced form)
NADP ⁺	nicotinamide adenine dinucleotide phosphate
NADPH	nicotinamide adenine dinucleotide phosphate (reduced form)
NHase	nitrile hydratase
OD	optical density
PBR	packed-bed reactor
PBS	phosphate buffered saline
PCP	peptide carrier protein
PCR	polymerase chain reaction
PEP	phosphoenol pyruvate
P _i	inorganic phosphate
PLE	porcine liver esterase
PLP	pyridoxal 5'-phosphate
PMP	pyridoxamine 5'-phosphate
PP _i	inorganic pyrophosphate
PPL	porcine pancreatic lipase
PQQ	pyrroloquinoline quinone
SAH	S-adenosylhomocysteine
SAM	S-adenosyl-L-methionine
SDS	sodium dodecyl sulfate
SFPR	substrate feeding product removal
ω -TA	ω -transaminase
TCEP	tris(2-carboxyethyl)phosphine
ThDP	thiamine diphosphate
Tris	2-amino-2-(hydroxymethyl)propane-1,3-diol
UDP	uridine diphosphate
UMP	uridine monophosphate
UTP	uridine triphosphate

Abbreviations for Amino Acids

Name	Three-Letter Code	Single-Letter Code
alanine	Ala	A
arginine	Arg	R
asparagine	Asn	N
aspartic acid	Asp	D
cysteine	Cys	C
glutamic acid	Glu	E
glutamine	Gln	Q
glycine	Gly	G
histidine	His	H
isoleucine	Ile	I
leucine	Leu	L
lysine	Lys	K
methionine	Met	M
phenylalanine	Phe	F
proline	Pro	P
serine	Ser	S
threonine	Thr	T
tryptophan	Trp	W
tyrosine	Tyr	Y
valine	Val	V
