



Handbook  
of Reagents for  
Organic Synthesis

**Chiral Reagents for  
Asymmetric Synthesis**

*Edited by*  
**Leo A. Paquette**

To see the complete collection of organic reagents online visit:  
[www.mrw.interscience.wiley.com/eros/](http://www.mrw.interscience.wiley.com/eros/)

# Contents

<b>Preface</b>	xii	( <i>R</i> )-1,1'-Bi-2,2'-naphthotitanium Diisopropoxide	94
<b>Introduction</b>	xiii	( <i>S</i> )-2,2'Binaphthoyl( <i>R,R</i> )-di(1-phenylethyl)aminoyl-phosphine	95
<b>Recent Review Articles and Monographs</b>	1	1,1'-Binaphthyl-2,2'-dityl Hydrogen Phosphate	97
<b>Organic Synthesis Procedures Featuring Chiral, Non-Racemic Reagent Preparation</b>	7	Bis( $\alpha$ -camphorquinone dioximato)cobalt( <i>R,R</i> )-1,2-Bis(aminocarbonylphenyl-2'-diphenylphosphino)cyclohexane	98
( <i>S</i> )-Aceto(carbonyl)(cyclopentadienyl)-(triphenylphosphine)iron	21	Bis(bicyclo[2.2.1]hepta-2,5-diene)-rhodium Perchlorate-( <i>R</i> )-1-( <i>S</i> )-1',2-Bis(diphenylphosphino)ferrocenylethanol	99
Allylcyclopentadienyl[(4 <i>R,trans</i> )- and (4 <i>S,trans</i> )- $\alpha,\alpha',\alpha'$ -tetraphenyl-1,3-dioxolane-4,5-dimethanolato- <i>O,O'</i> ]titanium [Cp( <i>R,R</i> )-Ti[All] and Cp( <i>S,S</i> )-Ti[All]]	23	(1S,9 <i>S</i> )-1,9-Bis{[( <i>t</i> -butyl)dimethylsilyloxy]methyl}-5-cyanosemicorrin	104
<i>B</i> -Allyldiisocaranylborane	26	( <i>R,R</i> )-Bis( <i>tert</i> -butylmethylphosphino)methane	105
(1 <i>R,2S</i> )-1-Amino-2,3-dihydro-1 <i>H</i> -inden-2-ol	27	2,2-Bis{[2-[4( <i>S</i> )- <i>tert</i> -butyl-1,3-oxazolinyl]}propane	107
( <i>S</i> )-1-Amino-2-hydroxymethylindoline	30	Bis(cyclohexyl isocyanide)gold(I) Tetrafluoroborate-( <i>R</i> )-N-[2-( <i>N,N</i> -Dimethylamino)ethyl]- <i>N</i> -methyl-	108
( <i>S</i> )-1-Amino-2-methoxymethylpyrrolidine	32	1-( <i>S</i> )-1',2-bis(diphenylphosphino)ferrocenyl]ethylamine	115
2-Amino-3-methyl-1,1-diphenyl-1-butanol	36	Bis(1,5-cyclooctadiene)rhodium Tetrafluoroborate-( <i>R</i> )-2,2'Bis(diphenylphosphino)-1,1'-binaphthyl	118
3-Amino-2,6,6-trimethylbicyclo[3.1.1]heptan-2-ol	40	( <i>S,S</i> )-1,2-Bis(2,5-diethylphospholano)benzene	119
( <i>S</i> )-4-Anilino-3-methylamino-1-butanol	41	1,2-Bis((2 <i>S,5S</i> )-2,5-dimethylphospholano)benzene	
( <i>S</i> )-2-(Anilinomethyl)pyrrolidine	42	( <i>S,S</i> )-Me-DuPhos, 1,2-Bis((2 <i>R,5R</i> )2,5-dimethylphospholano)benzene ( <i>R,R</i> )-Me-DuPhos	123
L-Aspartic Acid	44	[Bis(4 <i>R,5S</i> )-4,5-diphenyl-1,3-oxazolin-2-yl]methane	
2-Azabicyclo[2.2.1]hept-5-en-3-one	45	[Bis(4 <i>S,5R</i> )-4,5-diphenyl-1,3-oxazolin-2-yl]methane	126
Baker's Yeast	48	( <i>R</i> )- & ( <i>S</i> )-2,2'-Bis(diphenylphosphino)-1,1'-binaphthyl	128
(1 <i>R,5R</i> )-2 <i>H</i> -1,5-Benzodithiepin-3( <i>4H</i> )-one 1,5-Dioxide	50	(2 <i>R,3R</i> )-2,3-Bis(diphenylphosphino)butane	132
1-Benzoyl-2- <i>t</i> -butyl-3,5-dimethyl-4-imidazolidinone	51	( <i>R</i> )-7,7'-Bis(diphenylphosphinomethyl)-2,2'-dimethoxy-1,1'-binaphthyl	133
(2 <i>S,4S</i> )-3-Benzoyl-2- <i>t</i> -butyl-4-methyl-1,3-oxazolidin-5-one	53	( $\eta^5,\eta^5$ -1 <i>S,2R,4S,5R</i> -1,4-Bis(indenyl)-2,5-diisopropylcyclohexane)titanium Dichloride	134
1-Benzoyl-2( <i>S</i> )- <i>tert</i> -butyl-3-methylperhydro-pyrimidin-4-one	56	2,6-Bis[(4 <i>S</i> )-4-isopropylloxazolin-2-yl]pyridine	135
Benzyl(methoxymethyl)methylamine	57	2,6-Bis[( <i>S</i> )-4'-isopropylloxazolin-2'-yl](pyridine)-rhodium Trichloride	136
( <i>S</i> )-4-Benzyl-2-oxazolidinone	68	trans-2,5-Bis(methoxymethyl)pyrrolidine	138
N-Benzyloxycarbonyl-L-serine $\beta$ -Lactone	70	Bis[(4 <i>S</i> )-(1-methylethyl)oxazolin-2-yl]methane	140
2-[2-[(Benzylxy)ethyl]-6,6-dimethylbicyclo[3.3.1]-3-nonyl]-9-borabicyclo[3.3.1]nonane	71	( <i>R</i> )-3,3'-Bis(triphenylsilyl)binaphthomethylaluminum	144
( <i>R,R</i> )-1-(2'-Benzyloxymethylphenyl)-2,5-dimethylphospholane	72	( $\text{--}endo$ )-Bornyltriazolinedione	145
N-Benzylquininium Chloride	73	(4 <i>R,5R</i> )-2-Bromo-1,3-bis[(4-methylphenyl)sulfonyl]-4,5-diphenyl-1,3,2-diazaborolidine	147
( <i>S</i> )-4-Benzyl-2,2,5,5-tetramethyloxazolidine	74	3-Bromocamphor-8-sulfonic Acid	151
(Bicyclo[2.2.1]hepta-2,5-diene)[(2 <i>S,3S</i> )-bis(diphenylphosphino)butane]rhodium Perchlorate	76	3-Bromo-5,6-diphenyl-2,3,5,6-tetrahydro-4 <i>H</i> -oxazin-2-one	152
(Bicyclo[2.2.1]hepta-2,5-diene)[1,4-bis(diphenylphosphino)butane]rhodium(I)Tetrafluoroborate	81	Brucine	155
(1 <i>R,1'R,2R,2'R</i> )-1,1'-Bicyclopentyl-2,2'-ditylbis-diphenylphosphine]	83	4- <i>t</i> -Butoxycarbonyl-5,6-diphenyl-2,3,5,6-tetrahydro-4 <i>H</i> -oxazin-2-one	158
1,1'-Binaphthalene-2,2'-dithiol	86	( <i>R,R</i> )-2-Butyl-4,5-bis(dimethylaminocarbonyl)-1,3-dioxaborolane	
( <i>R</i> )-1,1'-Bi-2,2'-naphthol	91		159
( <i>R</i> )-1,1'-Bi-2,2'-naphthotitanium Dichloride			

<i>t</i> -Butyl 2- <i>t</i> -Butyl-3-methyl-4-oxo-1-imidazolidine-carboxylate	162	(1 <i>R</i> ,2 <i>S</i> ,3 <i>R</i> ,4 <i>S</i> )-3-Dimethylamino-1,7,7-trimethylbicyclo[2.2.1]heptan-2-ol[(-)DAIB]	243
( <i>R</i> )-2- <i>t</i> -Butyl-6-methyl-4 <i>H</i> -1,3-dioxin-4-one	164	(4 <i>R</i> ,5 <i>R</i> )-2,2-Dimethyl-4,5-bis(hydroxydiphenylmethyl)-1,3-dioxolane-Titanium(IV) Chloride	245
( <i>R</i> , <i>R</i> )-2- <i>t</i> -Butyl-5-methyl-1,3-dioxolan-4-one	166	( <i>R</i> , <i>R</i> )-2,5-Dimethylborolane	249
( <i>R</i> )-(+) - <i>t</i> -Butyl 2-( <i>p</i> -Tolylsulfinyl)acetate	168	( <i>S</i> )- <i>N,N</i> -Dimethyl- <i>N'</i> -(1- <i>t</i> -butoxy-3-methyl-2-butyl)formamidine	251
( <i>R</i> )-(+) - <i>t</i> -Butyl 2-( <i>p</i> -Tolylsulfinyl)propionate	169	(-)-( <i>S</i> , <i>S</i> )- $\alpha$ , $\alpha'$ -Dimethyldibenzylamine	252
(-)-(1 <i>S</i> ,4 <i>R</i> )-Camphanic Acid	171	(4 <i>S</i> )-2,2-Dimethyl-1,3-dioxolane-4-carboxaldehyde	255
10-Camphorsulfonic Acid	172	(4 <i>R</i> )-2,2-Dimethyl-1,3-dioxolane-4-carboxaldehyde	258
10-Camphorsulfonyl Chloride	176	( <i>R</i> )- <i>N,N</i> -Dimethyl-1-[ <i>(S</i> )-2(diphenylphosphino)-ferrocenyl]ethylamine	264
10,2-Camphorsultam	178	2-[(4 <i>S</i> )-4-(1,1-Dimethylethyl)-4,5-dihydro-2-oxazolyl]-6-methylpyridine	265
(Camphorylsulfonyl)oxaziridine	184	(4 <i>S</i> )-4-(1,1-Dimethylethyl)-2-{1-[(11 <i>b</i> <i>S</i> )-dinaphtho[2,1- <i>d</i> :1',2'- <i>f</i> ]-[1,3,2]dioxaphosphhepin-4-yloxy]-1-methylethyl}-4,5-dihydrooxazole	266
( <i>R</i> , <i>S</i> )-CAMPHOS	188	Dimethyl L-Tartrate	268
Chloro(cyclopentadienyl)bis[3- <i>O</i> -(1,2;5,6-di- <i>O</i> -isopropylidene- $\alpha$ -D-glucofuranosyl)]titanium	189	( <i>S</i> , <i>S</i> )-2,2'-(Dimethylmethylenes)bis(4- <i>t</i> -butyl-2-oxazoline)	269
Chloro( $\eta^5$ -cyclopentadienyl)[(4 <i>R</i> , <i>trans</i> )-2,2-dimethyl- $\alpha$ , $\alpha$ , $\alpha'$ , $\alpha'$ -tetraphenyl-1,3-dioxolane-4,5-dimethanolato(2-)- <i>O</i> <sup>a</sup> , <i>O</i> <sup>a</sup> ]titanium	191	[4 <i>S</i> -(4 $\alpha$ ,5 $\beta$ )]-1-(1,3-Dimethyl-2-oxido-4,5-diphenyl-1,3,2-diazaphospholidine-2-yl)piperidine	273
(+)- <i>B</i> -Chlorodiisopinocampheylborane	193	<i>cis</i> -3-[ <i>N</i> -(3,5-Dimethylphenyl)benzenesulfonamido]-borneol	278
<i>N,N'</i> -(1 <i>R</i> ,2 <i>R</i> )-1,2-Cyclohexanediylibis-2-pyridine-carboxamide	194	( <i>S</i> )-(+)-5,5-Dimethyl-4-phenyl-2-oxazolidinone	279
( <i>R</i> )-(+) -Cyclohexyl(2-anisyl)methylphosphine	196	(1 <i>R</i> ,2 <i>S</i> ,4 <i>R</i> ,5 <i>S</i> )-2,5-Dimethyl-7-phenyl-7-phosphabicyclo[2.2.1]heptane	282
(1,5-Cyclooctadiene)[1,4-bis(diphenylphosphino)butane]jiridium(I) Tetrafluoroborate	197	<i>N,S</i> -Dimethyl-S-phenylsulfoximine	283
(1,5-Cyclooctadiene)[(3 <i>R</i> ,4 <i>R</i> )-3,4-bis(diphenylphosphino)-1-methylpyrrolidine]rhodium Tetrafluoroborate	198	( <i>S</i> )-(-)-[ <i>N</i> -(2,2')-Dimethylpropionyl]-2-[(diphenylphosphino)methyl]pyrrolidine	284
Cyclopentadienyl(3,5-dimethoxybenzyl)-(nitrosyl)(triphenylphosphine)rhenum	200	<i>trans</i> -2,5-Dimethylpyrrolidine	286
(2 <i>R</i> ,3 <i>R</i> )-(Z)-cyclo-Phenylalanine	202	2,2-Dimethyl- $\alpha$ , $\alpha$ , $\alpha'$ , $\alpha'$ -tetraphenyl-1,3-dioxolane-4,5-dimethanolatotitanium Diisopropoxide	289
(1 <i>S</i> ,2 <i>S</i> )-1,2-Diaminocyclohexane	208	<i>S,S</i> -Dimethyl- <i>N</i> -( <i>p</i> -toluenesulfonyl)sulfilimine	293
( <i>R</i> , <i>R</i> )-1,2-Diamino-1,2-di- <i>tert</i> -butylethane	209	<i>S,S</i> -Dimethyl- <i>N</i> -( <i>p</i> -toluenesulfonyl)sulfoximine	294
Dibornacyclopentadienyltrichlorozirconium	210	Di-(-)-(1 <i>R</i> ,2 <i>S</i> )-2-Phenyl-1-cyclohexyl Diazenedicarboxylate	295
( <i>R</i> )-2,10-Dichloro-5 <i>H</i> -dinaphtho[2,1- <i>g</i> ;1,2- <i>i</i> ][1,5]-dioxacycloundecin-3,6,9(7 <i>H</i> )-trione	212	( <i>R</i> )-(-)-2,2-Diphenylcyclohexanol	297
(-)-Dichloro(ethylene)( $\alpha$ -methylbenzylamine)-platinum(II)	213	( <i>R</i> , <i>R</i> )-1,2-Diphenyl-1,2-diaminoethane <i>N,N'</i> -Bis[3,5-bis(trifluoromethyl)benzenesulfonamide]	300
Dichloro[2,3- <i>O</i> -isopropylidene-2,3-dihydroxy-1,4-bis(diphenylphosphino)butane]palladium (II)	214	( <i>R</i> , <i>R</i> )-1,2-Diphenyl-1,2-	
10-Dicyclohexylsulfonamidoisoborneol	216	[di(pentafluorophenyl)phosphanoxy]ethane	302
Dihydro-5-(hydroxymethyl)-2(3 <i>H</i> )-furanone	219	( <i>S</i> , <i>S</i> )-1,2-Diphenylethylenediamine	304
(2 <i>S</i> )-(+) -2,5-Dihydro-2-isopropyl-3,6-dimethoxypyrazine	221	( <i>S</i> )-Diphenyl(1-methylpyrrolidin-2-yl)methanol	308
Dihydroquinidine Acetate	224	2'- (Diphenylphosphino)- <i>N,N</i> -dimethyl[1,1'-binaphthalen]-2-amine	310
Dihydroquinine Acetate	225	( <i>S</i> )-2-[2-(Diphenylphosphino)phenyl]-4-phenyloxazoline	311
Diisopinocamphenylborane	228	$\alpha$ , $\alpha$ -Diphenyl-2-pyrrolidinemethanol	313
Diisopinocamphenylboron Trifluoromethanesulfonate	230	( <i>S</i> )-3,3-Diphenyl-1-[trimethylsilylmethyl]tetrahydro-1 <i>H</i> ,3 <i>H</i> -pyrrolo[1,2- <i>c</i> ][1,3,2]oxazaborole	316
( <i>R</i> <sup>*</sup> , <i>R</i> <sup>*</sup> )- $\alpha$ -(2,6-Diisopropoxybenzoyloxy)-5-oxo-1,3,2-dioxaborolane-4-acetic Acid	232	(2 <i>R</i> ,3 <i>R</i> )-Dipivaloyltartaric Acid	317
Diisopropyl 2-Allyl-1,3,2-dioxaborolane-4,5-dicarboxylate	234	Dirhodium(II) Tetrakis(methyl 2-pyrrolidone-5( <i>S</i> )-carboxylate)	320
Diisopropyl 2-Crotyl-1,3,2-dioxaborolane-4,5-dicarboxylate	236	(1 <i>R</i> ,2 <i>S</i> )-Ephedrine	323
9- <i>O</i> -(1,2;5,6-Di- <i>O</i> -isopropylidene- $\alpha$ -D-glucofuranosyl)-9-boratabicyclo[3.3.1]-nonane, Potassium Salt	237	Ephedrine-borane	326
Dilongifolylborane	238	Epichlorohydrin	328
( <i>R</i> )-2-[1-(Dimethylamino)ethyl]benzenethiol	240	Esterases	330
( <i>R</i> )- <i>N</i> -[2-( <i>N,N</i> -Dimethylamino)ethyl]- <i>N</i> -methyl-1-[ <i>(S</i> )-1',2-bis(diphenylphosphino)ferrocenyl]ethylamine		( <i>R</i> , <i>R</i> )-[Ethylene-1,2-bis( $\eta^5$ -4,5,6,7-tetrahydro-1-indenyl)]titanium ( <i>R</i> )-1,1'-Bi-2,2'-naphtholate	333

( <i>-</i> )-[Ethylene-1,2-bis( $\eta^5$ -4,5,6,7-tetrahydro-1-indenyl)]zirconium ( <i>R</i> )-1,1'-Bi-2,2'-naphtholate	334	2-( <i>S</i> )-[(4-Methylphenyl)sulfinyl]-2-cyclopenten-1-one (Ar = Tol), 2-( <i>S</i> )-[(4-Methoxyphenyl)sulfinyl]-2-cyclopenten-1-one (Ar = <i>p</i> -anisyl), 2-( <i>S</i> )-(1-Naphthylsulfinyl)-2-cyclopenten-1-one (Ar = 1-naphthyl), 2-( <i>S</i> )-[(2,4,6-Trimethylphenyl)sulfinyl]-2-cyclopenten-1-one (Ar = 2,4,6-trimethylphenyl), 2-( <i>S</i> )-[(2,4,6-Triisopropylphenyl)sulfinyl]-2-cyclopenten-1-one (Ar = 2,4,6-triisopropylphenyl)	425
( <i>S</i> )-Ethyl Lactate	335	( <i>S</i> )-1-Methyl-2-(piperidinomethyl)pyrrolidine	428
(3 <i>aR</i> ,7 <i>aR</i> )-2-Ethyloctahydro-1 <i>H</i> -1,3-dineopentyl-1,3,2-benzodiazaphosphole Oxide	338	$\beta$ -Methyl- $\beta$ -propiolactone	433
( <i>+</i> )-N-Fluoro-2,10-(3,3-dichlorocamphorsultam)	343	( <i>S</i> )-(—)-4-(2-Methylpropyl)-2-(2-pyridyl)-2-oxazoline	435
Glycidol	345	( <i>+</i> )-(S)- <i>N</i> -Methylsulfonylphenylalanyl Chloride	436
Glycidyl Tosylate	349	$\alpha$ -Methyltoluene-2, $\alpha$ -sultam	437
<i>N</i> -Glyoxyloyl-(2 <i>R</i> )-bornane-10,2-sultam	352	( <i>R</i> )-(+) -Methyl <i>p</i> -Tolyl Sulfoxide	439
(2 <i>S</i> )-(2 $\alpha$ ,3 $\beta$ ,8 $\alpha\beta$ )-Hexahydro-3-(hydroxymethyl)-8- $\alpha$ -methyl-2-phenyl-5 <i>H</i> -oxazolo[3,2- <i>a</i> ]pyridin-5-one	353	( <i>R</i> )- <i>B</i> -Methyl-4,5,5-triphenyl-1,3,2-oxazaborolidine	443
(4 <i>aR</i> )-(4 $\alpha\alpha$ ,7 $\alpha$ ,8 $\alpha\beta$ )-Hexahydro-4,4,7-trimethyl-4 <i>H</i> -1,3-benzoxathiin	354	Monoisopinocampheylborane	445
( <i>S</i> )-(2-Hydroxy- <i>N,N</i> -dimethylpropanamide- <i>O,O'</i> -oxodiperoxymolybdenum(VI))	356	[ <i>(R</i> )- $\alpha$ -(2-Naphthyl)aminomethyl]ferrocene	448
3-Hydroxyisoborneol	357	1-(1-Naphthyl)ethylamine	450
( <i>S</i> )-3-Hydroxy-5-methyl-2,4-imidazolidinedione	360	( <i>R</i> )-1-(1-Naphthyl)ethyl Isocyanate	452
(2 <i>S</i> ,2 <i>S</i> )-2-Hydroxymethyl-1-[(1-methylpyrrolidin-2-yl)methyl]pyrrolidine	361	Norephedrine-Borane	454
(1 <i>S</i> ,2 <i>S</i> ,5 <i>S</i> )-2-Hydroxypinan-3-one	362	( <i>R,R</i> )-(—)-NORPHOS, ( <i>S,S</i> )-NORPHOS	455
2-Hydroxy-1,2,2-triphenylethyl Acetate	363	[ <i>(2S</i> )-(2 $\alpha$ ,3 $\alpha\alpha$ ,4 $\alpha$ ,7 $\alpha$ ,7 <i>a</i> $\alpha$ ]-2,3,3 <i>a</i> ,4,5,6,7,7 <i>a</i> -Octahydro-7,8,8-trimethyl-4,7-methanobenzofuran-2-ol	462
( <i>R</i> )-2-Hydroxy-2'-methoxy-1,1'-binaphthyl	365	S-(1-Oxido-2-pyridinyl)-1,1,3,3-tetramethylthiouronium Hexafluorophosphate (HOTT)	463
(2,3- <i>O</i> -Isopropylidene)-2,3-dihydroxy-1,4-bis(diphenylphosphino)butane	371	( <i>R</i> )-Pantolactone	466
Lanthanum(III)-Lithium-BINOL Complex [ <i>(R</i> )-LLB and ( <i>S</i> )-LLB]	373	(2 <i>R,4R</i> )-2,4-Pentanediol	468
<i>t</i> -Leucine <i>t</i> -Butyl Ester	375	<i>N</i> -Phenylcampholylhydroxamic Acid	469
Lipases	377	( <i>S</i> )-(—)-5-( $\alpha$ -Phenylethyl)semioxamazide	470
(1 <i>R,2S</i> )-1-Lithio-1-phenylsulfonyl-2-[( <i>tert</i> -butyl-diphenyl)silyl]oxymethyl	382	(—)-8-Phenylmenthol	471
Oxirane	385	8-Phenylmenthyl Acrylate	472
Lithium Aluminum Hydride-2,2'-Dihydroxy-1,1'-binaphthyl	390	8-Phenylmenthyl Crotonate	473
(—)-( <i>1R,2S,5R</i> )-Menthyl ( <i>S</i> )- <i>p</i> -Toluenesulfinate	393	8-Phenylmenthyl Glyoxylate	474
( <i>R,S,R,S</i> )-Me-PennPhos	395	8-Phenylmenthyl Pyruvate	475
( <i>R,R</i> )-1,2-(Methanesulfonamido)cyclohexane	398	( <i>S</i> )-(+)-1-Phenyl-2-propylamine	476
<i>B</i> -Methoxydiisopinocampheylborane	398	( <i>R</i> )-(+)-Phenyl ( <i>p</i> -Toluenesulfinyl)acetate	477
( <i>R</i> )- <i>N</i> -[2-(2-Methoxyethoxy)ethyl]- $\alpha$ -phenyl-1-piperidineethanamine	398	<i>B</i> -3-Pinanyl-9-borabicyclo[3.3.1]nonane	478
(4 <i>S,5S</i> )-4-Methoxymethyl-2-methyl-5-phenyl-2-oxazoline	398	( <i>S</i> )-Proline	479
( <i>S</i> )-2-Methoxymethylpyrrolidine	399	<i>N</i> -Propenoyl Camphor-10,2-sultam	484
( <i>S</i> )-(—)- $\alpha$ -Methoxy- $\alpha$ -(trifluoromethyl)phenylacetic Acid	401	Pseudoephedrine	485
( <i>S</i> )- $\alpha$ -Methylbenzylamine	403	(1 <i>R,2S</i> )- <i>N</i> -Pyrrolidinylnorephedrine	496
( <i>R</i> )-Methyl 2- <i>t</i> -Butyl-3(2 <i>H</i> )-oxazolecarboxylate	406	Quinine	498
( <i>R</i> )-4-Methylcyclohexylidenemethylcopper	410	Sodium Hypochlorite- <i>N,N'</i> -Bis(3,5-di- <i>t</i> -butylsalicylidene)-1,2-cyclohexanediaminomanganese(III) Chloride	501
( <i>S</i> )-1-Methyl-2-[(dihydroisoindol-2-yl)methyl]pyrrolidine	411	(—)-Sparteine	502
Methyl (4 <i>R,5R</i> )-(E)-3-(1,3-Dimethyl-4,5-diphenyl-2-imidazolidinyl)propenoate	412	(1 <i>R,5R,6R</i> )-Spiro[4.4]nonane-1,6-diyldiphenylphosphinous acid Ester ( <i>R</i> -SpirOP)	504
(1 <i>R,2S</i> )- <i>N</i> -methyleneephedrine	413	(3 <i>S,cis</i> )-Tetrahydro-3-isopropyl-7 <i>a</i> -methylpyrrolol-[2,1- <i>b</i> ]oxazol-5(6 <i>H</i> )-one	507
[2,2'-(1-Methylethylidene)][(4 <i>S</i> )-4-(1,1-dimethylethyl)-4,5-dihydrooxazole- <i>N</i> <sup>3</sup> ]copper (2+) bis[hexafluorophosphate], [2,2'-(1-Methylethylidene)][(4 <i>S</i> )-4-(1,1-dimethylethyl)-4,5-dihydrooxazole- <i>N</i> <sup>3</sup> ]-copper(2+) bis(triflate)	414	Tetrahydro-1-methyl-3,3-diphenyl-1 <i>H,3H</i> -pyrrolo-[1,2- <i>c</i> ][1,3,2]oxazaborole	509
( <i>R</i> )-(—)-2-(1-Methylhydrazino)butan-1-ol	419	( <i>S</i> )-(+)-2-(2,4,5,7-Tetranitro-9-fluorenylideneaminoxy)propionic Acid	513
	423	( <i>R</i> )-(+)- <i>p</i> -Tolylsulfinylacetic Acid	514
		( <i>R</i> )-(+)- $\alpha$ -( <i>p</i> -Tolylsulfinyl)- <i>N,N</i> -dimethylacetamide	515
		(3 <i>R</i> )-( <i>p</i> -Tolylsulfinyl)- <i>N</i> -methoxyacetimidic Acid Ethyl Ester	516

## X CONTENTS

---

( <i>R</i> )-(+)-3-( <i>p</i> -Tolylsulfinyl)propionic Acid	517	L-Tyrosine Hydrazide	525
<i>N</i> -[4-(Trifluoromethyl)benzyl]cinchoninium Bromide	518	Vitamin B <sub>12</sub>	527
<i>N,N,N'</i> -Trimethyl- <i>N'</i> -(2-[(1 <i>R</i> )-1-phenyl-2-(1-piperidinyl)ethyl]amino}ethyl)1,2-ethanediamine	519	<b>List of Contributors</b>	531
1,1,2-Triphenyl-1,2-ethanediol	523	<b>Reagent Formula Index</b>	547
Tris(acetylacetonato)cobalt-Diethylaluminum Chloride-NORPHOS	524	<b>Subject Index</b>	555