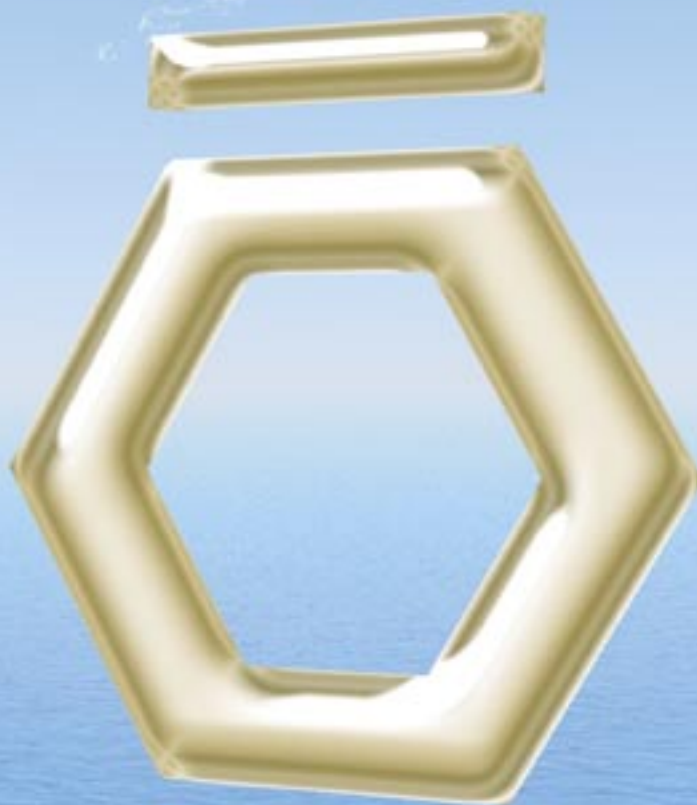


# PHOSPHINE LIGANDS



Архангельск (8182)63-90-72  
Астана (7172)727-132  
Астрахань (8512)99-46-04  
Барнаул (3852)73-04-60  
Белгород (4722)40-23-64  
Брянск (4832)59-03-52  
Владивосток (423)249-28-31  
Волгоград (844)278-03-48  
Вологда (8172)26-41-59  
Воронеж (473)204-51-73  
Екатеринбург (343)384-55-89  
Иваново (4932)77-34-06

Ижевск (3412)26-03-58  
Иркутск (395)279-98-46  
Казань (843)206-01-48  
Калининград (4012)72-03-81  
Калуга (4842)92-23-67  
Кемерово (3842)65-04-62  
Киров (8332)68-02-04  
Краснодар (861)203-40-90  
Красноярск (391)204-63-61  
Курск (4712)77-13-04  
Липецк (4742)52-20-81

Магнитогорск (3519)55-03-13  
Москва (495)268-04-70  
Мурманск (8152)59-64-93  
Набережные Челны (8552)20-53-41  
Нижегород (831)429-08-12  
Новокузнецк (3843)20-46-81  
Новосибирск (383)227-86-73  
Омск (3812)21-46-40  
Орел (4862)44-53-42  
Оренбург (3532)37-68-04  
Пенза (8412)22-31-16

Пермь (342)205-81-47  
Ростов-на-Дону (863)308-18-15  
Рязань (4912)46-61-64  
Самара (846)206-03-16  
Санкт-Петербург (812)309-46-40  
Саратов (845)249-38-78  
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Симферополь (3652)67-13-56  
Смоленск (4812)29-41-54  
Сочи (862)225-72-31  
Ставрополь (8652)20-65-13

Сургут (3462)77-98-35  
Тверь (4822)63-31-35  
Томск (3822)98-41-53  
Тула (4872)74-02-29  
Тюмень (3452)66-21-18  
Ульяновск (8422)24-23-59  
Уфа (347)229-48-12  
Хабаровск (4212)92-98-04  
Челябинск (351)202-03-61  
Череповец (8202)49-02-64  
Ярославль (4852)69-52-93

Киргизия (996)312-96-26-47

Россия (495)268-04-70

Казахстан (772)734-952-31

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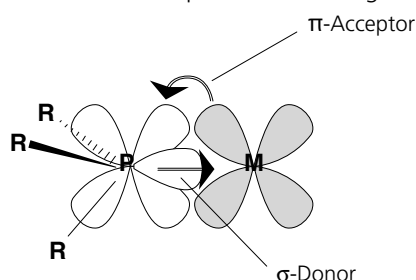
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The use of phosphine ligands is necessary for nearly all homogeneous catalysis with precious-metals<sup>1</sup>. The choice of the right ligand can influence

- the solubility of the active species
- the shielding and sterical properties of the catalyst
- the electron-density at the metal atom
- the reactivity of the catalyst in the catalytic cycle
- the lifetime and turnover-numbers of the catalyst
- the enantioselectivity of the reaction (with chiral ligands)

Phosphine ligands are usually strong  $\sigma$ -donor ligands and only weak  $\pi$ -acceptors, this effect can be increased with electron-donating groups in the rest R, while electron withdrawing groups in R favor the  $\pi$ -acceptor backbonding.



The size and steric demand of the phosphine ligand as approximately described by the cone-angle ( $\theta$ ) of the phosphine<sup>2</sup>.

A bulkier ligand (with large cone-angle) tends to have a higher dissociation rate than smaller ligands and electron-rich metal-centers tend to accelerate the "oxidative addition", a key-step in the catalytic cycle.

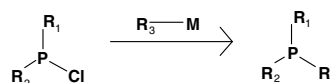
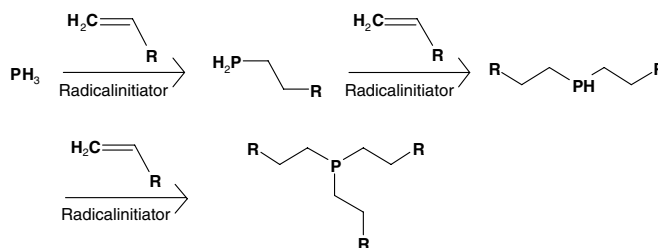


These catalysts are very successful for cross-coupling reactions like the Heck-, Stille- Suzuki<sup>3</sup> and Buchwald-Hartwig<sup>4</sup>-reaction.

## Some typical examples of commonly used phosphine ligands and their properties<sup>5</sup>:

Phosphine Ligands	Cone angle	$\sigma$ -donor	stability
Triphenylphosphine	145°	medium	air-stable
Tricyclohexylphosphine	170°	strong	air-sensitive
Tri-(tert-butyl)phosphine	182°	strong	air-sensitive
Trimesitylphosphine	212°	medium-strong	air-stable
Trimethylphosphine	118°	medium-strong	air-sensitive

Phosphine-ligands are mainly prepared by two routes, the radical addition of alkenes to phosphines, and the nucleophilic substitution of phosphine-halogenides with Grignard-reagents or organo-lithium compounds<sup>5</sup>:



This methods allow to produce a wide variety of phosphine-ligands with different properties.

Acros Organics offers a wide range of phosphine-halogenides and other ligand precursors, which are also a chapter in the following brochure.

An important improvement in organic synthesis in the last years was the rapid development of asymmetric catalytic reactions. The chiral information is mostly provided by the phosphine ligand together with the catalytic activity of a suitable precious metal. For the development of this successful principle Prof. Noyori and Prof. Knowles were awarded the Nobel-price in 2001. Acros Organics lists a wide range of successful chiral phosphine-ligands.

On the following pages is a listing of all available phosphine ligands from Acros Organics grouped by the following criteria:

- monodentate mono-, di- and triarylphosphines
- monodentate trialkylphosphines
- phosphine halogenides and ligand precursors
- bidentate, non-chiral phosphine ligands
- chiral phosphine ligands

<sup>1</sup> H.-U.Blase, A.Indolese, A.Schnyder, Curr. Science. 78 **2000** 1336.

<sup>2</sup> C.A.Tolman, Chem.Rev. **1977** 77, 313.

<sup>3</sup> A.F.Littke, G.C.Fu, Angew.Chem. **1999** 111, 2568. J.P.Wolfe, H.Tomori, J.P.Sadighi, J.Jin, S.L.Buchwald, J.Org.Chem. **2000** 65, 1158.

<sup>4</sup> J.P.Wolfe, Angew.Chem. **1999** 111, 2570.

<sup>5</sup> D.H.Valentine, J.H.Hillhouse, Synthesis **2003** 16 2437.



# PHOSPHINE LIGANDS

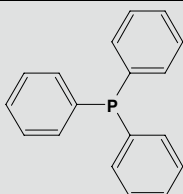
## 1. TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

14042

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

**TRIPHENYLPHOSPHINE, 99%**

C18 H15 P  
262.285  
603-35-0

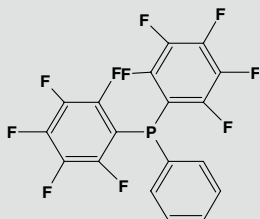


20649

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

**BIS(PENTAFLUOROPHENYL)PHENYLPHOSPHINE 98%+**

C18 H5 F10 P  
442.190  
5074-71-5

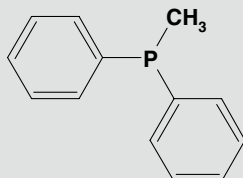


22390

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

**METHYLDIPHENYLPHOSPHINE, 99%**

C13 H13 P  
200.216  
1486-28-8

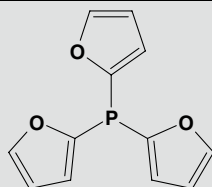


29480

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

**TRI-(2-FURYL)PHOSPHINE, 98%**

C12 H9 O3 P  
232.172  
5518-52-5

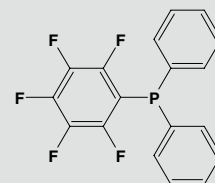


30575

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

**DIPHENYL(PENTAFLUOROPHENYL)PHOSPHINE, 98%**

C18 H10 F5 P  
352.238  
5525-95-1

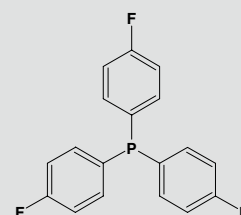


30634

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

**TRIS(4-FLUOROPHENYL)PHOSPHINE, 99%**

C18 H12 F3 P  
316.257  
18437-78-0

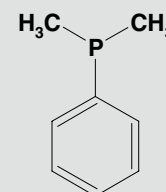


31010

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

**DIMETHYLPHENYLPHOSPHINE, 97%**

C8 H11 P  
138.147  
672-66-2

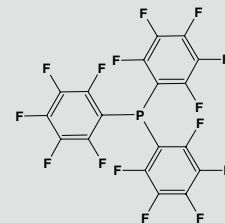


31316

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

**TRIS(PENTAFLUOROPHENYL)PHOSPHINE, 97%**

C18 F15 P  
532.142  
1259-35-4

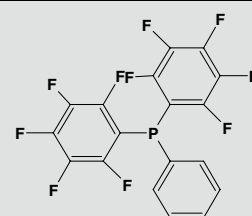


31317

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

**BIS(PENTAFLUOROPHENYL)-PHENYLPHOSPHINE 90%+**

C18 H5 F10 P  
442.190  
5074-71-5



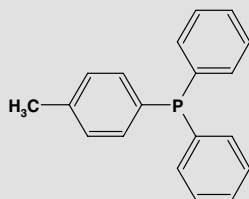


**31533**

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

**DIPHENYL(P-TOLYL)PHOSPHINE, 96%**

C19 H17 P  
276.312  
1031-93-2

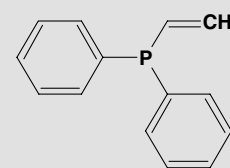


**32117**

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

**VINYLDIPHENYLPHOSPHINE, 97%**

C14 H13 P  
212.227  
2155-96-6

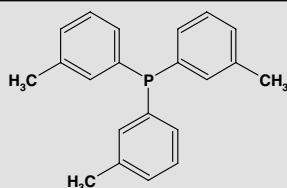


**31728**

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

**TRI-M-TOLYLPHOSPHINE, 98%**

C21 H21 P  
304.365  
6224-63-1

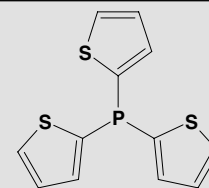


**35180**

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

**TRIS(2-THIENYL)PHOSPHINE, 98%**

C12 H9 P S3  
280.372  
24171-89-9

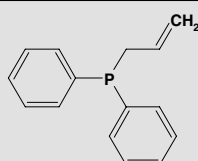


**32086**

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

**ALLYLDIPHENYLPHOSPHINE, TECH., 80%**

C15 H15 P  
226.253  
2741-38-0

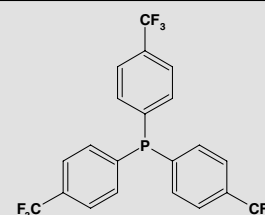


**35534**

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

**TRIS(4-TRIFLUOROMETHYLPHENYL)PHOSPHINE, 99%**

C21 H12 F9 P  
466.279  
13406-29-6

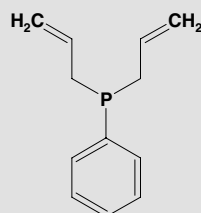


**32091**

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

**DIALLYLPHENYLPHOSPHINE, 95%**

C12 H15 P  
190.221  
29949-75-5

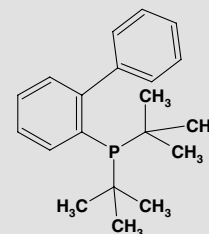


**35621**

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

**2-(DI-TERT-BUTYLPHOSPHINO)-BIPHENYL, 99%**

C20 H27 P  
298.402  
224311-51-7

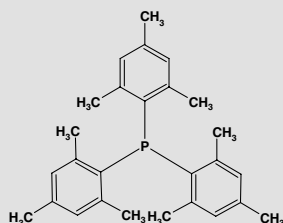


**32113**

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

**TRIMESITYLPHOSPHINE, 97%**

C27 H33 P  
388.525  
23897-15-6

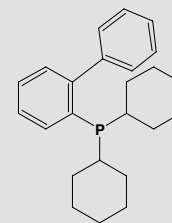


**35622**

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

**2-(DICYCLOHEXYL-PHOSPHINO)BIPHENYL, 98%**

C24 H31 P  
350.477  
247940-06-3





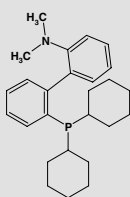
# PHOSPHINE LIGANDS

35623

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

## 2-DICYCLOHEXYL-PHOSPHINO-2'-(N,N-DI-METHYLAMINO)BIPHENYL 97%

C21 H21 P  
304.365  
6224-63-1

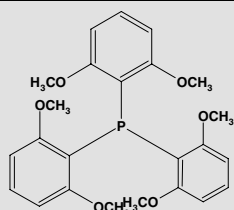


36496

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

## TRIS(2,6-DIMETHOXY-PHENYL)-PHOSPHINE

C24 H27 O6 P  
442.441  
85417-41-0

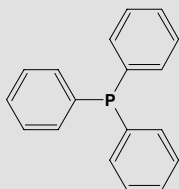


36684

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

## TRIPHEYLPHOSPHINE RESIN 1% CROSSLINKED WITH DVB, 1.2-1.5 MMOL/G, 200-400 MESH

39319-11-4

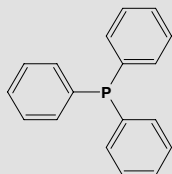


36687

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

## TRIPHEYLPHOSPHINE RESIN 1% CROSSLINKED WITH DVB, 1.2-1.5 MMOL/G, 100-200 MESH

39319-11-4

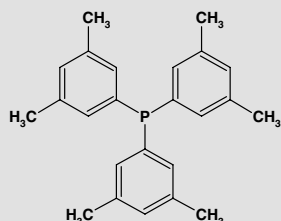


37627

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

## TRIS(3,5-DIMETHYLPHENYL)PHOSPHINE

C24 H27 P  
346.445  
69227-47-0

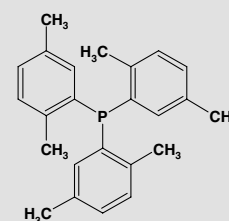


37628

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

## TRIS(2,5-DIMETHYLPHENYL)PHOSPHINE

C24 H27 P  
346.445  
115034-38-3

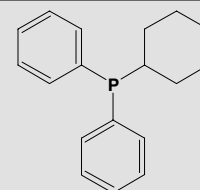


40610

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

## CYCLOHEXYL DIPHENYL PHOSPHINE

C18 H21 P  
268.333  
6372-42-5

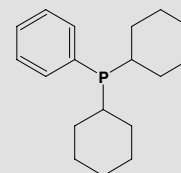


40708

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

## DICYCLOHEXYL PHENYL PHOSPHINE

C18 H27 P  
274.381  
6476-37-5

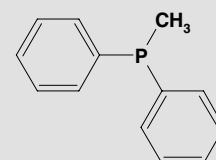


40897

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

## METHYLDIPHENYL-PHOSPHINE, 98%

C13 H13 P  
200.216  
1486-28-8

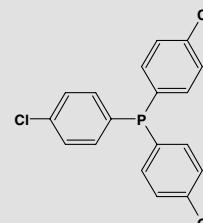


42221

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

## TRIS(4-CHLOROPHENYL)PHOSPHINE, 97%

C18 H12 Cl3 P  
365.620  
1159-54-2



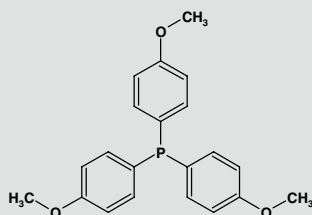


42224

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

**TRIS(4-METHOXYPHENYL)PHOSPHINE, 95%**

C21 H21 O3 P  
352.363  
855-38-9

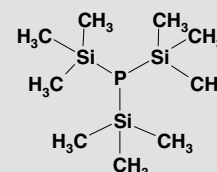


29170

TRIALKYL-PHOSPHINES

**TRIS(TRIMETHYLSILYL)PHOSPHINE, 98%**

C9 H27 P Si3  
250.541  
15573-38-3

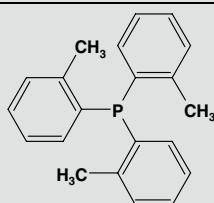


42232

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

**TRI-O-TOLYLPHOSPHINE, 99%**

C21 H21 P  
304.365  
6163-58-2

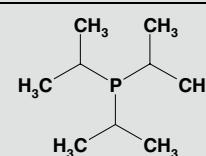


31733

TRIALKYL-PHOSPHINES

**TRISOPROPYLPHOSPHINE, 98%**

C9 H21 P  
160.237  
6476-36-4

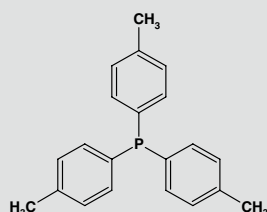


42233

TRIARYLPHOSPHINES, MONO- AND DI-ARYL-PHOSPHINES

**TRI-P-TOLYLPHOSPHINE, 95%**

C21 H21 P  
304.365  
1038-95-5

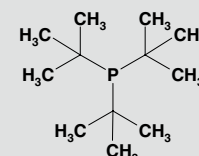


36089

TRIALKYL-PHOSPHINES

**TRI-TERT-BUTYLPHOSPHINE, 95%**

C12 H27 P  
202.317  
13716-12-6



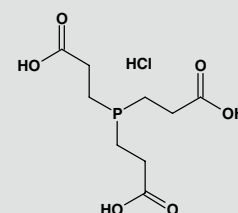
## 2. TRIALKYL-PHOSPHINES

36383

TRIALKYL-PHOSPHINES

**TRIS(2-CARBOXYETHYL)PHOSPHINE HYDROCHLORIDE**

C9 H16 CL O6 P  
286,646  
51805-45-9

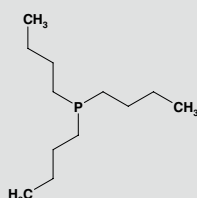


13934

TRIALKYL-PHOSPHINES

**TRI-N-BUTYLPHOSPHINE, 95%**

C12 H27 P  
202.317  
998-40-3

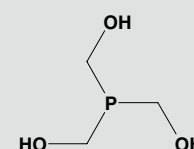


36384

TRIALKYL-PHOSPHINES

**TRIS(HYDROXYMETHYL)PHOSPHINE**

C3 H9 O3 P  
124.076  
2767-80-8





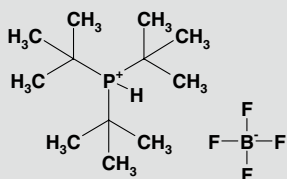
# PHOSPHINE LIGANDS

36694

TRIALKYL-PHOSPHINES

TRI-TERT-BUTYLPHOSPHINE, TETRAFLUOROBORATE

C12 H28 B F4 P  
290.13  
131274-22-1

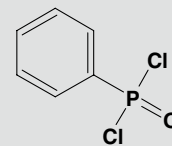


13080

PHOSPHINE HALOGENIDES AND LIGAND PRECURSORS

PHENYLPHOSPHONIC DICHLORIDE, 97%

C6 H5 CL2 O P  
194.982  
824-72-6

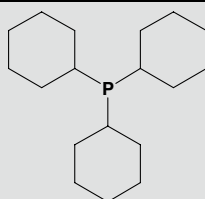


42161

TRIALKYL-PHOSPHINES

TRICYCLOHEXYL PHOSPHINE, 97%

C18 H33 P  
280.428  
2622-14-2

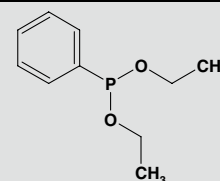


16526

PHOSPHINE HALOGENIDES AND LIGAND PRECURSORS

DIETHYL PHENYL-PHOSPHONITE, 99%

C10 H15 O2 P  
198.199  
1638-86-4

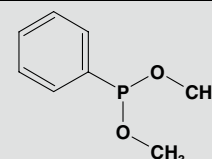


16527

PHOSPHINE HALOGENIDES AND LIGAND PRECURSORS

DIMETHYL PHENYL-PHOSPHONITE, 98%

C8 H11 O2 P  
170.145  
2946-61-4



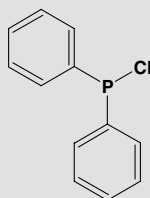
## 3. PHOSPHINE HALOGENIDES AND LIGAND PRECURSORS

10913

PHOSPHINE HALOGENIDES AND LIGAND PRECURSORS

CHLORODIPHENYL-PHOSPHINE, TECH., 95%

C12 H10 CL P  
220.634  
1079-66-9

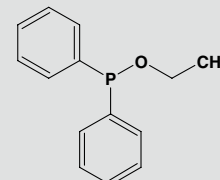


16528

PHOSPHINE HALOGENIDES AND LIGAND PRECURSORS

ETHYL DIPHENYL-PHOSPHINITE, 99%

C14 H15 O P  
230.242  
719-80-2

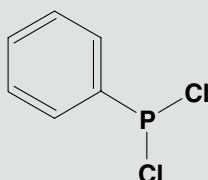


11366

PHOSPHINE HALOGENIDES AND LIGAND PRECURSORS

DICHLOROPHENYLPHOSPHINE, 97%

C6 H5 CL2 P  
178.983  
644-97-3

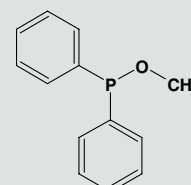


16529

PHOSPHINE HALOGENIDES AND LIGAND PRECURSORS

METHYL DIPHENYL-PHOSPHINITE, 99%

C13 H13 O P  
216.215  
4020-99-9



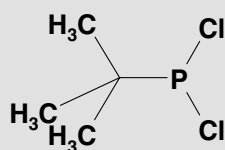



**30053**

PHOSPHINE HALOGENIDES AND LIGAND PRECURSORS

**TERT-BUTYLDICHLORO PHOSPHINE**

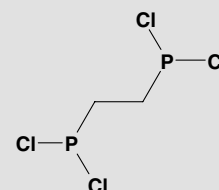
C<sub>4</sub>H<sub>9</sub>Cl<sub>2</sub>P  
158.993  
25979-07-1


**32147**

PHOSPHINE HALOGENIDES AND LIGAND PRECURSORS

**1,2-BIS(DICHLORO-PHOSPHINO)ETHANE, 97%**

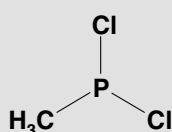
C<sub>2</sub>H<sub>4</sub>Cl<sub>4</sub>P<sub>2</sub>  
231.811  
28240-69-9


**31024**

PHOSPHINE HALOGENIDES AND LIGAND PRECURSORS

**METHYLDICHLORO PHOSPHINE, 90% TECHN**

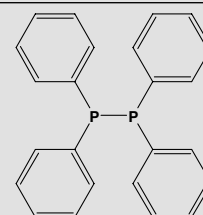
C<sub>3</sub>H<sub>3</sub>Cl<sub>2</sub>P  
116.914  
676-83-5


**32153**

PHOSPHINE HALOGENIDES AND LIGAND PRECURSORS

**TETRAPHENYLBI-PHOSPHINE, 98%**

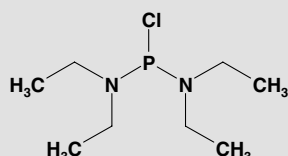
C<sub>24</sub>H<sub>20</sub>P<sub>2</sub>  
370.363  
1101-41-3


**31736**

PHOSPHINE HALOGENIDES AND LIGAND PRECURSORS

**BIS(DIETHYLAMINO)CHLORO PHOSPHINE**

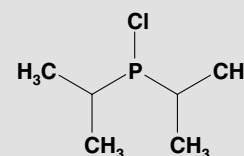
C<sub>8</sub>H<sub>20</sub>ClN<sub>2</sub>P  
210.684  
685-83-6


**32155**

PHOSPHINE HALOGENIDES AND LIGAND PRECURSORS

**CHLORODIISOPROPYLPHOSPHINE, 96%**

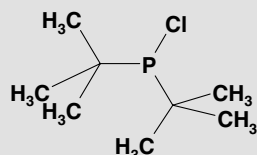
C<sub>6</sub>H<sub>14</sub>ClP  
152.602  
40244-90-4


**32090**

PHOSPHINE HALOGENIDES AND LIGAND PRECURSORS

**DI-TERT-BUTYLCHLORO-PHOSPHINE, 96%**

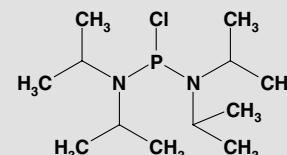
C<sub>8</sub>H<sub>18</sub>ClP  
180.655  
13716-10-4


**32156**

PHOSPHINE HALOGENIDES AND LIGAND PRECURSORS

**BIS(DIISOPROPYLAMINO)CHLORO PHOSPHINE**

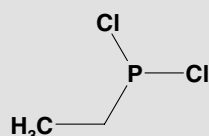
C<sub>12</sub>H<sub>28</sub>ClN<sub>2</sub>P  
266.791  
56183-63-2


**32098**

PHOSPHINE HALOGENIDES AND LIGAND PRECURSORS

**ETHYLDICHLORO PHOSPHINE, 90% TECHN**

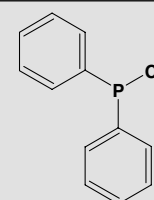
C<sub>2</sub>H<sub>5</sub>Cl<sub>2</sub>P  
130.940  
1498-40-4


**34730**

PHOSPHINE HALOGENIDES AND LIGAND PRECURSORS

**CHLORODIPHENYL-PHOSPHINE, 98%**

C<sub>12</sub>H<sub>10</sub>ClP  
220.634  
1079-66-9





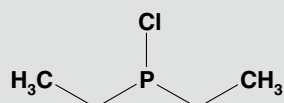
# PHOSPHINE LIGANDS

35329

PHOSPHINE HALOGENIDES AND LIGAND PRECURSORS

**CHLORODICYCLOHEXYLPHOSPHINE, 97%**

C12 H22 Cl P  
232.730  
686-69-1

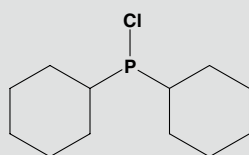


35031

PHOSPHINE HALOGENIDES AND LIGAND PRECURSORS

**CHLORO(DIETHYL)-PHOSPHINE, 95%**

C4 H10 Cl P  
124.549  
686-69-1

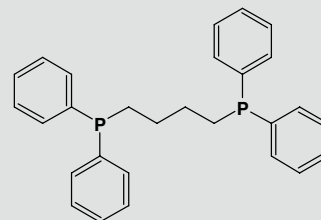


29646

CHELATING NON-CHIRAL PHOSPHINE-LIGANDS

**1,4-BIS(DIPHENYLPHOSPHINO)BUTANE, 98%**

C28 H28 P2  
426.469  
7688-25-7

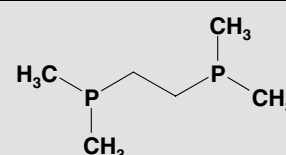


31003

CHELATING NON-CHIRAL PHOSPHINE-LIGANDS

**1,2-BIS(DIMETHYL-PHOSPHINO)ETHANE, 97%**

C6 H16 P2  
150.139  
23936-60-9



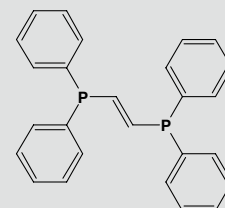
## 4. CHELATING NON-CHIRAL PHOSPHINE-LIGANDS

31004

CHELATING NON-CHIRAL PHOSPHINE-LIGANDS

**TRANS-1,2-BIS(DIPHENYLPHOSPHINO)ETHYLENE, 97%**

C26 H22 P2  
396.400  
983-81-3

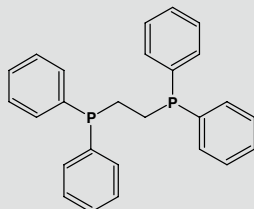


14791

CHELATING NON-CHIRAL PHOSPHINE-LIGANDS

**1,2-BIS(DIPHENYL-PHOSPHINO)ETHANE, 98%**

C26 H24 P2  
398.416  
1663-45-2

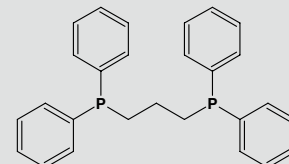


31005

CHELATING NON-CHIRAL PHOSPHINE-LIGANDS

**1,3-BIS(DIPHENYL-PHOSPHINO)PROPANE, 97%**

C27 H26 P2  
412.443  
6737-42-4

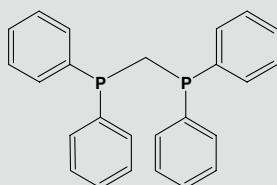


29361

CHELATING NON-CHIRAL PHOSPHINE-LIGANDS

**BIS(DIPHENYLPHOSPHINO)METHANE, 98%**

C25 H22 P2  
384.390  
2071-20-7

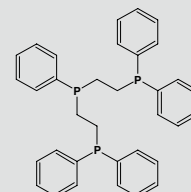


31682

CHELATING NON-CHIRAL PHOSPHINE-LIGANDS

**BIS(2-DIPHENYL-PHOSPHINO,ETHYL)PHENYLPHOSPHINE, 97%**

C34 H33 P3  
534.547  
23582-02-7



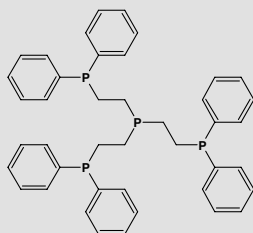


**31683**

CHELATING NON-CHIRAL PHOSPHINE-LIGANDS

**TRIS[2-(DIPHENYL-PHOSPHINO)ETHYL]PHOSPHINE, 97%**

C42 H42 P4  
670.678  
23582-03-8

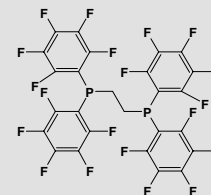


**36370**

CHELATING NON-CHIRAL PHOSPHINE-LIGANDS

**1,2-BIS(DIPENTAFLUOROPHENYLPHOSPHINO)ETHANE, 95%**

C26 H4 F20 P2  
758.226  
76858-94-1

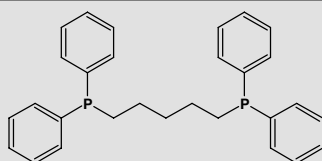


**32085**

CHELATING NON-CHIRAL PHOSPHINE-LIGANDS

**1,5-BIS(DIPHENYL-PHOSPHINO)PENTANE, 97%**

C29 H30 P2  
440.496  
27721-02-4

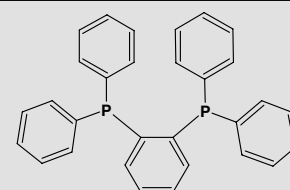


**36375**

CHELATING NON-CHIRAL PHOSPHINE-LIGANDS

**1,2-BIS(DIPHENYL-PHOSPHINO)BENZENE**

C30 H24 P2  
446.459  
13991-08-7

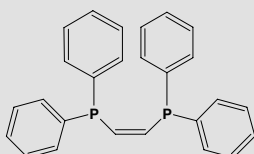


**32089**

CHELATING NON-CHIRAL PHOSPHINE-LIGANDS

**CIS-1,2-BIS (DIPHENYLPHOSPHINO)ETHYLENE, 98%**

C26 H22 P2  
396.400  
983-80-2

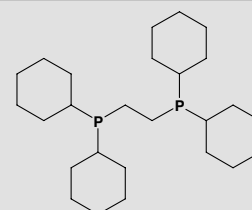


**36385**

CHELATING NON-CHIRAL PHOSPHINE-LIGANDS

**1,2-BIS(DICYCLOHEXYLPHOSPHINO)ETHANE**

C26 H48 P2  
422.607  
23743-26-2

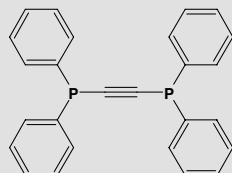


**34779**

CHELATING NON-CHIRAL PHOSPHINE-LIGANDS

**BIS(DIPHENYLPHOSPHINO)ACETYLENE, 98%**

C26 H20 P2  
394.385  
5112-95-8

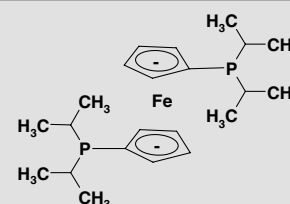


**36387**

CHELATING NON-CHIRAL PHOSPHINE-LIGANDS

**1,1'-BIS(DIISOPROPYLPHOSPHINO)FERROCENE, 98%**

C22 H36 FE P2  
418.31  
97239-80-0

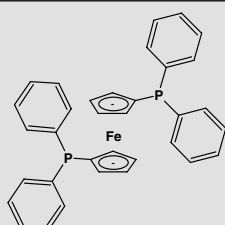


**34801**

CHELATING NON-CHIRAL PHOSPHINE-LIGANDS

**1,1'-BIS(DIPHENYL-PHOSPHINO)FERROCENE**

C35 H28 FE P2  
554.38  
12150-46-8





## 5. CHIRAL PHOSPHINE LIGANDS

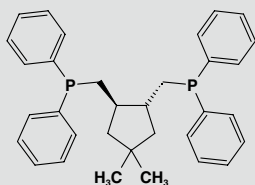
21800

CHIRAL PHOSPHINE LIGANDS

**(-)-2,3-O-ISOPROPYLIDENE-2,3-DIHYDROXY-1,4-BIS(DIPHENYLPHOSPHINO)BUTANE**

«(R,R)-(-)-Diop»

C31 H32 O2 P2  
498.532  
32305-98-9



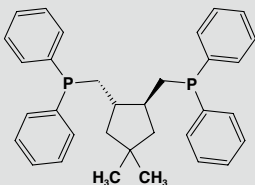
21801

CHIRAL PHOSPHINE LIGANDS

**(+)-2,3-O-ISOPROPYLIDENE-2,3-DIHYDROXY-1,4-BIS(DIPHENYLPHOSPHINO)BUTANE**

«(S,S)-(+)-Diop»

C31 H32 O2 P2  
498.532  
37002-48-5



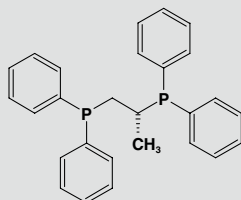
25490

CHIRAL PHOSPHINE LIGANDS

**(R)-(+)-BIS-(1,2-DIPHENYLPHOSPHINO)PROPANE**

«(R)-(+)-Phosphos»

C27 H26 P2  
412.443  
67884-32-6



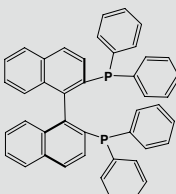
26553

CHIRAL PHOSPHINE LIGANDS

**(R)-(+)-2,2'-BIS(DIPHENYLPHOSPHINO)-1,1'-BINAPHTHYL**

«R-(+)-Binap»

C44 H32 P2  
622.672  
76189-55-4



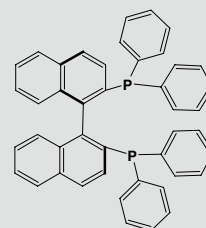
26554

CHIRAL PHOSPHINE LIGANDS

**(S)-(-)-2,2'-BIS(DIPHENYLPHOSPHINO)-1,1'-BINAPHTHYL**

«S-(-)-Binap»

C44 H32 P2  
622.672  
76189-56-5



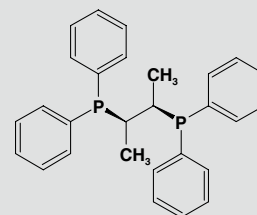
29242

CHIRAL PHOSPHINE LIGANDS

**(2R,3R)-(-)-BIS(DIPHENYLPHOSPHINO)BUTANE**

«(R,R)-Chiraphos»

C28 H28 P2  
426.469  
74839-84-2



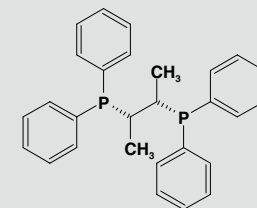
29243

CHIRAL PHOSPHINE LIGANDS

**(2S,3S)-(-)-BIS(DIPHENYLPHOSPHINO)BUTANE**

«(S,S)-Chiraphos»

C28 H28 P2  
426.469  
64896-28-2

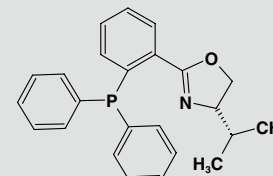


35373

CHIRAL PHOSPHINE LIGANDS

**4S)-(-)-4,5-DIHYDRO-2-[2'-(DIPHENYLPHOSPHINO)PHENYL]-4-ISOPROPYL-OXAZOLE**

C24 H24 N O P  
373.427  
148461-12-5

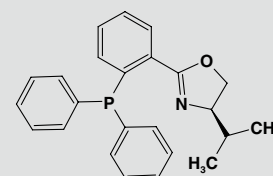


35374

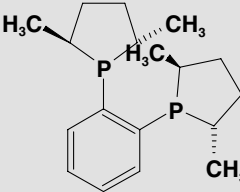
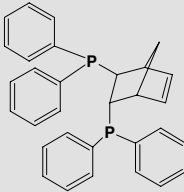
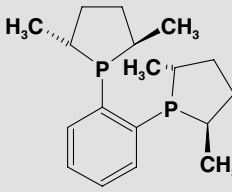
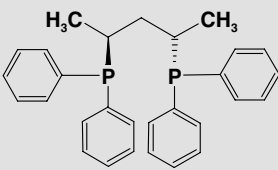
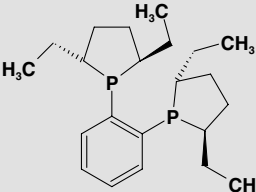
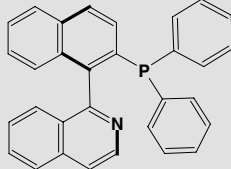
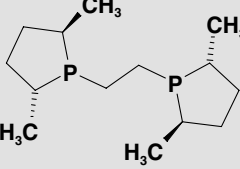
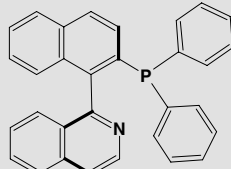
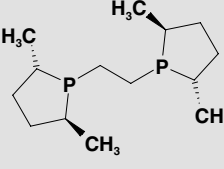
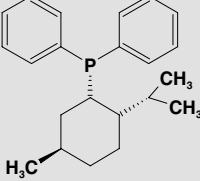
CHIRAL PHOSPHINE LIGANDS

**(4R)-(-)-4,5-DIHYDRO-2-[2'-(DIPHENYLPHOSPHINO)PHENYL]-4-ISOPROPYL-OXAZOLE**

C24 H24 N O P  
373.427  
164858-78-0





<p><b>36369</b></p> <p>CHIRAL PHOSPHINE LIGANDS</p> <p><b>(+)-1,2-BIS((2S,5S)-2,5-DIMETHYL-PHOSPHOLANO)BENZENE</b></p> <p>«S,S-Me-Duphos»</p> <p>C18 H28 P2 306.362 136735-95-0</p> 	<p><b>36376</b></p> <p>CHIRAL PHOSPHINE LIGANDS</p> <p><b>(2R,3R)-(-)-2,3-BIS(DIPHENYLPHOSPHINO)BICYCLO[2.2.1]HEPT-5-ENE</b></p> <p>«R,R-Norphos»</p> <p>C31 H28 P2 462.502 71042-54-1</p> 
<p><b>36371</b></p> <p>CHIRAL PHOSPHINE LIGANDS</p> <p><b>(-)-1,2-BIS((2R,5R)-2,5-DIMETHYL-PHOSPHOLANO)BENZENE</b></p> <p>«R,R-Me-Duphos»</p> <p>C18 H28 P2 306.362 147253-67-6</p> 	<p><b>36377</b></p> <p>CHIRAL PHOSPHINE LIGANDS</p> <p><b>(2S,4S)-(-)-2,4-BIS-(DIPHENYLPHOSPHINO)PENTANE</b></p> <p>«S,S-BDPP»</p> <p>C29 H30 P2 440.496 77876-39-2</p> 
<p><b>36372</b></p> <p>CHIRAL PHOSPHINE LIGANDS</p> <p><b>(-)-1,2-BIS((2R,5R)-2,5-DIETHYL-PHOSPHOLANO)BENZENE</b></p> <p>«R,R-Et-Duphos»</p> <p>C22 H36 P2 362.469 136705-64-1</p> 	<p><b>36380</b></p> <p>CHIRAL PHOSPHINE LIGANDS</p> <p><b>(S)-(-)-1-(2-DIPHENYL-PHOSPHINO-1-NAPHTHYL)ISOQUINOLINE</b></p> <p>«S-Quinap»</p> <p>C31 H22 N P 439.487 149341-33-31</p> 
<p><b>36373</b></p> <p>CHIRAL PHOSPHINE LIGANDS</p> <p><b>(+)-1,2-BIS((2R,5R)-2,5-DIMETHYL-PHOSPHOLANO)ETHANE</b></p> <p>«R,R-Me-BPE»</p> <p>C14 H28 P2 258.320 129648-07-3</p> 	<p><b>36381</b></p> <p>CHIRAL PHOSPHINE LIGANDS</p> <p><b>(R)-(+)-1-(2-DIPHENYL-PHOSPHINO-1-NAPHTHYL)ISOQUINOLINE</b></p> <p>«R-Quinap»</p> <p>C31 H22 N P 439.487 149341-34-4</p> 
<p><b>36374</b></p> <p>CHIRAL PHOSPHINE LIGANDS</p> <p><b>(-)-1,2-BIS((2S,5S)-2,5-DIMETHYL-PHOSPHOLANO)ETHANE</b></p> <p>«S,S-Me-BPE»</p> <p>C14 H28 P2 258.320 136779-26-5</p> 	<p><b>36382</b></p> <p>CHIRAL PHOSPHINE LIGANDS</p> <p><b>(S)-(+)-NEOMENTHYL-DIPHENYLPHOSPHINE</b></p> <p>C22 H29 P 324.439 43077-29-8</p> 



# PHOSPHINE LIGANDS

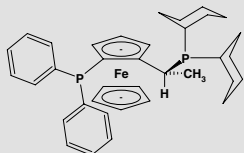
37067

CHIRAL PHOSPHINE LIGANDS

**(R)-(-)-1-[(S)-2-DIPHENYLPHOSPHINO]FERROCENYL]  
ETHYL DICYCLO HEXYLPHOSPHINE**

«Josiphos SLJ001-1»

C36 H44 FE P2  
594,527  
155806-35-2



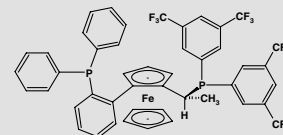
37076

CHIRAL PHOSPHINE LIGANDS

**(R)-(-)-1-[(R)-2-(2'-DIPHENYL-PHOSPHINOPHENYL)  
FERROCENYL]ETHYLDI(BIS-3,5-TRIFLUOROMETHYL-  
PHENYL)PHOSPHINE**

«Walphos SL-W001-1»

C46 H32 F12 FE P2  
930,52  
387868-06-6



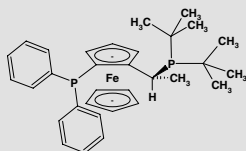
37068

CHIRAL PHOSPHINE LIGANDS

**(R)-(-)-1-[(S)-2-(DIPHENYLPHOSPHINE)FERROCENYL]  
ETHYL DI-TERT-BUTYLPHOSPHINE**

«Josiphos SLJ002-1»

C32 H40 FE P2  
542,453  
155830-69-6



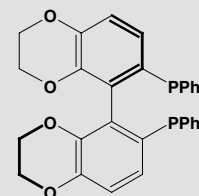
37514

CHIRAL PHOSPHINE LIGANDS

**(R)-[(5,6),(5',6')-BIS(ETHYLENEDIOXY)-BIPHENYL-2,2'-DIYL]-  
BIS(DIPHENYLPHOSPHINE)**

«(R)-Synphos»

C40 H32 O4 P2  
638,627  
445467-61-8



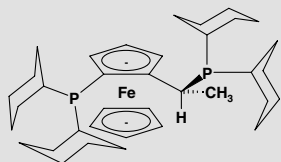
37069

CHIRAL PHOSPHINE LIGANDS

**(R)-(-)-1-[(S)-2-DICYCLOHEXYLPHOSPHINO]FERROCENYL]  
ETHYLDICYCLOHEXYL PHOSPHINE**

«Josiphos SLJ003-1»

C36H56 FE P2  
606,622  
167416-28-6



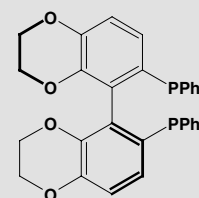
37515

CHIRAL PHOSPHINE LIGANDS

**(S)-[(5,6),(5',6')-BIS(ETHYLENEDIOXY)BIPHENYL-2,2'-DIYL]-  
BIS(DIPHENYLPHOSPHINE)**

«(S)-Synphos»

C40 H32 O4 P2  
638,627  
503538-68-9



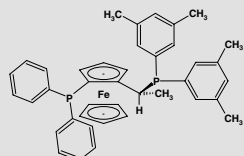
37070

CHIRAL PHOSPHINE LIGANDS

**(R)-(-)-1-[(S)-2-DIPHENYLPHOSPHINO]FERROCENYL]  
ETHYLBIS(3,5-DIMETHYLPHENYL)PHOSPHINE**

«Josiphos SLJ005-1»

C40 H40 FE P2  
638,538  
184095-69-0



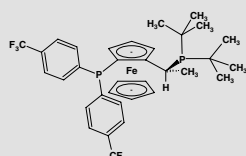
37075

CHIRAL PHOSPHINE LIGANDS

**(R)-(-)-1-[(S)-2-DI-TERT-BUTYLPHOSPHINO]FERROCENYL]  
ETHYLDI-(4-TRIFLUOROMETHYL PHENYL)PHOSPHINE**

«Josiphos SL-J011-1»

C34 H38 F6 FE P2  
678,448  
246231-79-8



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