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Air-Stable P-Chiral Phosphorus Ligands for Asymmetric Catalysis and Synthesis

by Prof. Wenjun Tang and Kaidi Li

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Glossary of Terms

$[\alpha]_D$	.....	Specific rotation
AAS	.....	Atomic Absorption Standard
ACS	.....	Conforms to American Chemical Society specifications
air sensitive	.....	Product may chemically react with atmospheric oxygen or carbon dioxide at ambient conditions. Handle and store under an inert atmosphere of nitrogen or argon.
amp	.....	Ampouled
b.p.	.....	Boiling point in °C at 760mm, unless otherwise noted
d.	.....	Density
dec.	.....	Decomposes
elec. gr.	.....	Electronic Grade, suitable for electronic applications
f.p.	.....	Flash point in °F
gran.	.....	Granular
heat sensitive	.....	Product may chemically degrade if stored for prolonged periods of time at ambient temperatures or higher. Store at 5°C or lower.
hydrate	.....	Unspecified water content which may vary slightly from lot to lot
hygroscopic	.....	Product may absorb water if exposed to the atmosphere for prolonged periods of time (dependent on humidity and temperature). Handle and store under an inert atmosphere of nitrogen or argon.
light sensitive	.....	Product may chemically degrade if exposed to light
liq.	.....	Liquid
m.p.	.....	Melting point in °C
moisture sensitive	.....	Product may chemically react with water. Handle and store under an inert atmosphere of nitrogen or argon.
NMR grade		Suitable as a Nuclear Magnetic Resonance reference standard
optical grade	.....	For optical applications
pwdr.	.....	Powder
primary standard	.....	Used to prepare reference standards and standardize volumetric solutions
PURATREM	.....	Product has a minimum purity of 99.99% (metals basis)
purified	.....	A grade higher than technical, often used where there are no official standards
P. Vol.	.....	Pore volume
pyrophoric	.....	Product may spontaneously ignite if exposed to air at ambient conditions
reagent	.....	High purity material, generally used in the laboratory for detecting, measuring, examining or analyzing other substances
REO	.....	Rare Earth Oxides. Purity of a specific rare-earth metal expressed as a percentage of total rare-earths oxides.
SA	.....	Surface area
store cold	.....	Product should be stored at -18°C or 4°C, unless otherwise noted (see product details)
subl.	.....	Sublimes
superconductor grade	.....	A high purity, analyzed grade, suitable for preparing superconductors
tech. gr.	.....	Technical grade for general industrial use
TLC	.....	Suitable for Thin Layer Chromotography
v.p.	.....	Vapor pressure mm of Hg
xtl.	.....	Crystalline

About Purity

Chemical purity	.....	is reported after the chemical name, e.g. Ruthenium carbonyl, 99%
Metals purity	.....	is reported in parentheses with the respective element, e.g. Gallium (III) bromide, anhydrous, granular (99.999%-Ga) PURATREM where 100% minus the metal purity is equal to the maximum allowable percentage of trace metal impurity

Biographical Sketches

Prof. Wenjun Tang

Wenjun Tang was born in Zhejiang Province, China. He received his B. Eng. degree in 1995 from East China University of Sciences and Technology, his M.S. in 1998 from Shanghai Institute of Organic Chemistry, Chinese Academy of Sciences (CAS), and his Ph.D. in 2003 from Pennsylvania State University. After two-years of postdoctoral research at the Scripps Research Institute, he worked six years as a process chemist at Boehringer Ingelheim Pharmaceuticals Inc. In 2011, he took his current position as a research professor at Shanghai Institute of Organic Chemistry, CAS. His research interests are in the areas of asymmetric catalysis, total synthesis of natural products, and development of efficient chemical processes. He was an awardee of the President's Award for individual excellence at Boehringer Ingelheim Pharmaceuticals (2009), the National "Thousand Talents" Youth program (2012), the National Homogeneous Catalysis Youth Award (2015), the National Science Fund for Distinguished Young Scholars (2017), and the National "Ten-thousand Talents" Program (2019).

Kaidi Li

Kaidi Li was born and raised in Dongying, an oil city in China. He received his B.S. in Pharmacy from Fudan University, where he developed great interest in synthetic chemistry. For his undergraduate studies, he received extensive experimental and theoretical training. Since 2017, he has been a graduate student in Wenjun Tang's group at Shanghai Institute of Organic Chemistry, Chinese Academy of Sciences. His current research interests are in the area of chiral boron chemistry, synthesis and application of P-chiral phosphorus ligands.

Air-stable P-chiral Phosphorus Ligands for Asymmetric Catalysis and Synthesis

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1. Introduction

P-chiral phosphorus ligands are not only historically important, but also synthetically versatile in the field of asymmetric catalysis and synthesis.[1] In the early 1970s, Knowles developed the landmark P-chiral phosphorus ligand DIPAMP and applied it successfully in the production of L-DOPA, signifying the beginning and the power of asymmetric catalysis for industrial application. Since then, great progress has been achieved in the field of asymmetric catalysis with the development of numerous chiral ligands. Nonetheless, the development of P-chiral phosphorus ligands was overlooked and underdeveloped for a long period of time mostly because of their synthetic difficulties. It was not until the late 1990s that the development of P-chiral phosphorus ligands regained the attention thanks to the development of bisP*[2], TangPhos[3], DuanPhos[4], QuinoxP*[5], etc. Moreover, most existing P-chiral phosphorus ligands are air-sensitive liquids and difficult to handle. Hence, we hoped to make our contributions in this area and develop a series of versatile and air-stable P-chiral phosphorus ligands for asymmetric catalysis and synthesis.[6]

Over the past ten years, we have designed and developed a series of P-chiral bis- and monophosphorus ligands based on the 2,3-dihydrobenzo[*d*][1,3]oxaphosphole motif. Their applications toward the efficient synthesis of chiral natural products and drugs are explored. These P-chiral ligands have unique structural and physical properties including conformational unambiguousness, high tunability of their electronic and steric properties, and operational simplicity as air-stable solids.

2. P-Chiral Biphosphorus Ligands

Our research was initiated on structural modification of TangPhos[4], which proved to be an excellent P-chiral phosphorus ligand in asymmetric hydrogenation. However, the use of costly sparteine in synthesis and its high air-sensitivity limited the availability and applicability of TangPhos. We proposed that the addition of aryl rings on both sides of TangPhos would lead to a ligand with improved air stability and ease of preparation (Figure 1).[7] Besides, the installation of substituents on the aryl rings provides options to modify the shape, depth, and electronic properties of the chiral pockets. Thus, a 2,3-dihydrobenzo[*d*][1,3]oxaphosphole core was designed and synthesized. Reaction of *tert*-butyldichlorophosphine with lithiated 1,3-dimethoxybenzene followed by treatment with water and

formaldehyde, consecutively, led to the formation of phosphine oxide **2**. Methoxy de-protection with HI followed by mesylation and ring closure under basic conditions yielded phenol **3**. Resolution by treatment with chiral menthyl chloroformate gave rise to the key chiral scaffold (*S*)-**3**, setting the foundation for developing a library of chiral ligands on the basis of 2,3-dihydrobenzo[*d*][1,3]oxaphosphole motif.

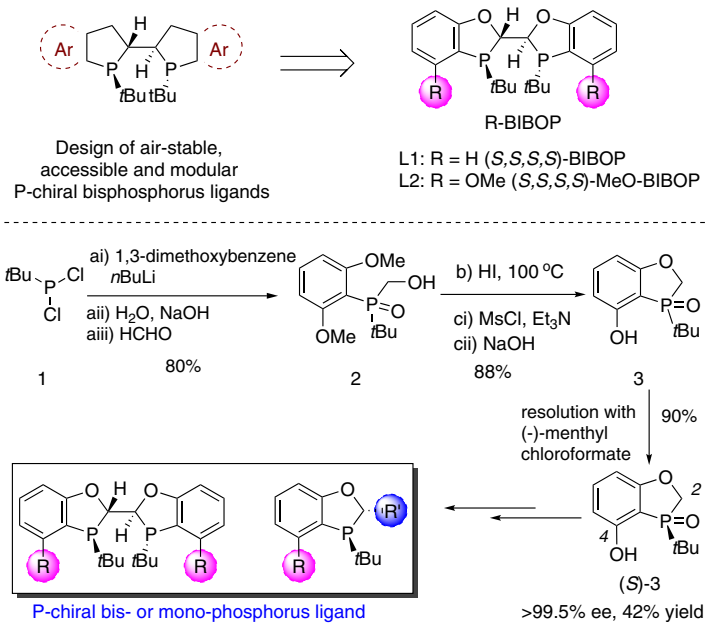
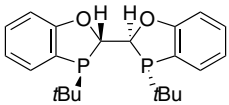


***Figure 1**. Design and synthesis of air-stable and modular P-chiral bisphosphorus ligands*

2.1 BIBOP



(*S,S,S,S*)-BIBOP (L1)

1. A bench-stable chiral bisphosphorus ligand
2. An efficient ligand for Rh-catalyzed asymmetric hydrogenation of functionalized olefins.

BIBOP is an excellent ligand for rhodium-catalyzed asymmetric hydrogenation of various functionalized olefins in both academic research and industrial practice. Its rhodium complex can be applied for asymmetric hydrogenation of *α*-(acylamino)acrylic acid derivatives, *α*-arylenamides, *β*-(acylamino) acrylic acid derivatives, and itaconates (Figure 2.).[7] Excellent enantioselectivities (up to 99% ee) and high TONs (up to 2000) have been achieved in the synthesis of chiral α- and β-amino acids, chiral amines, and chiral carboxylic acid derivatives.

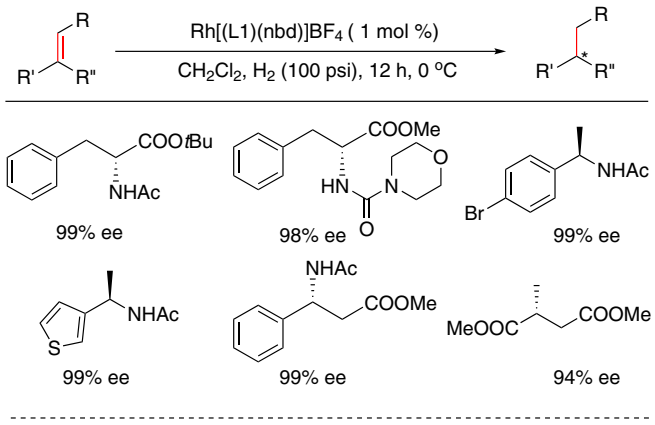
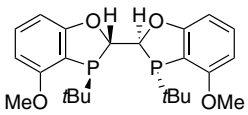


***Figure 2**. Enantioselective hydrogenation of functionalized olefins by Rh-BIBOP catalyst*

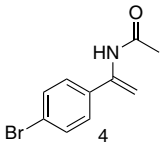
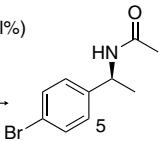
2.2 MeO-BIBOP



(*S,S,S,S*)-MeO-BIBOP (L2)

1. Enantioselective for asymmetric hydrogenation/asymmetric propargylation/asymmetric reduction/asymmetric hydrofomylation
2. Extremely low catalyst loading (TON > 200,000) in Rh-catalyzed asymmetric hydrogenation of N-(1-(4-bromophenyl)-vinyl)acetamide

MeO-BIBOP is the more electron-rich version of BIBOP. The presence of two methoxy groups *ortho* to the phosphorus center on the two aryl rings in the structure of MeO-BIBOP has enabled the asymmetric hydrogenation of *N*-(1-(4-bromophenyl)-vinyl)acetamide with the highest TONs to date (Figure 3).[8] Besides applications in asymmetric hydrogenation[9], MeO-BIBOP has proven to be an efficient ligand for various other transformations including asymmetric propargylation of benzaldehyde with a propargyl borolane reagent using Cu-catalyst[10] , asymmetric reduction of aryl ketone with a Ru-MeO-BIBOP-diamine catalyst at extremely low catalyst loading (0.001 mol%)[11], and hydroformylation of vinyl acetate into *α*-acetyl aldehyde with an excellent branch/linear ratio and 90% ee.[12]

Entry	Transformation		
1 asymmetric hydrogenation	 4 (4 Kg)	Rh[(NBD)$_2$]BF$_4$ (31 mg, 0.0005 mol%) (*R,R,R,R*)-MeO-BIBOP (*ent*-L2) (45 mg, 0.0006 mol %) MeOH, 25 °C, 24 h	 5	90% ee *quantitative yield*

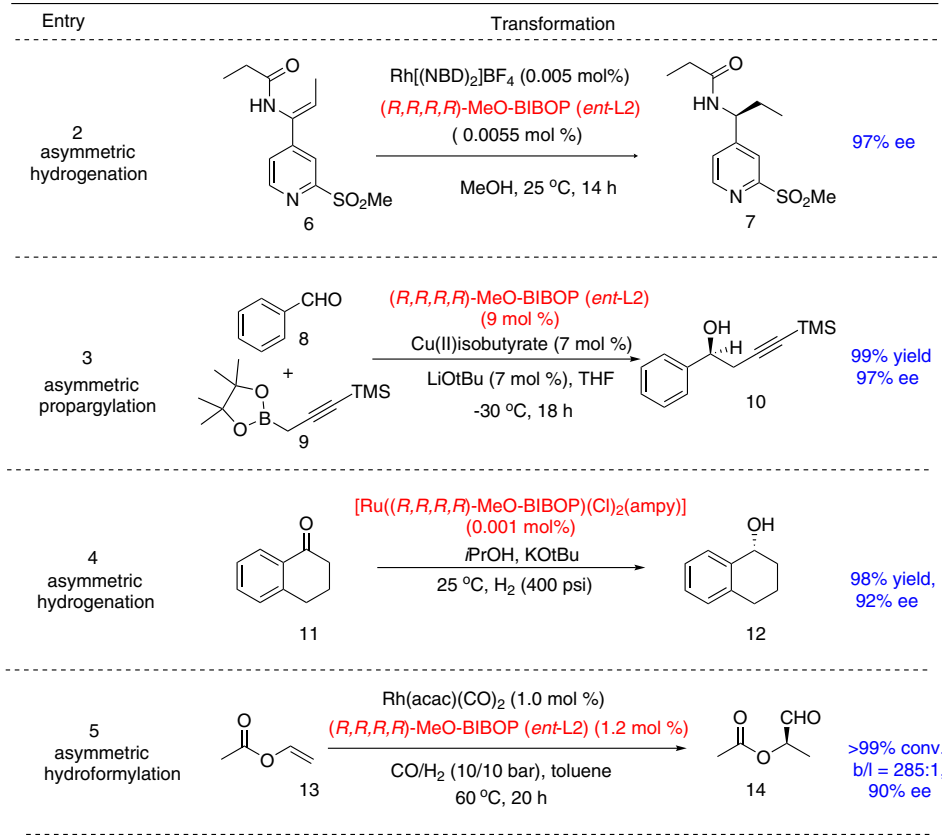
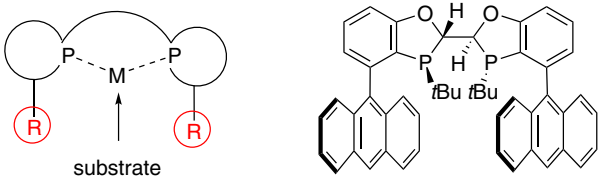


***Figure 3**. Asymmetric catalytic reactions employed with MeO-BIBOP*

2.3 WingPhos



(*S*,*S*,*S*,*S*)-WingPhos (L3)

1. Possessing deep chiral pockets capable of long-range stereochemical control
2. The *tert*-butyl groups control the orientations of the anthryl groups, which interact with the substrates during catalysis.

Rh-WingPhos is a highly efficient catalyst for rhodium-catalyzed hydrogenation of (*E*)-*β*-arylenamides, forming a variety of chiral cyclic and acyclic *β*-arylamine derivatives with various functionalities and excellent enantioselectivities at low catalyst loadings (TONs up to 10,000) (Figure 4). Because of the ready accessibility of (*E*)-*β*-arylenamine substrates, this method offers practical preparation for a series of chiral *β*-arylamines.[29]

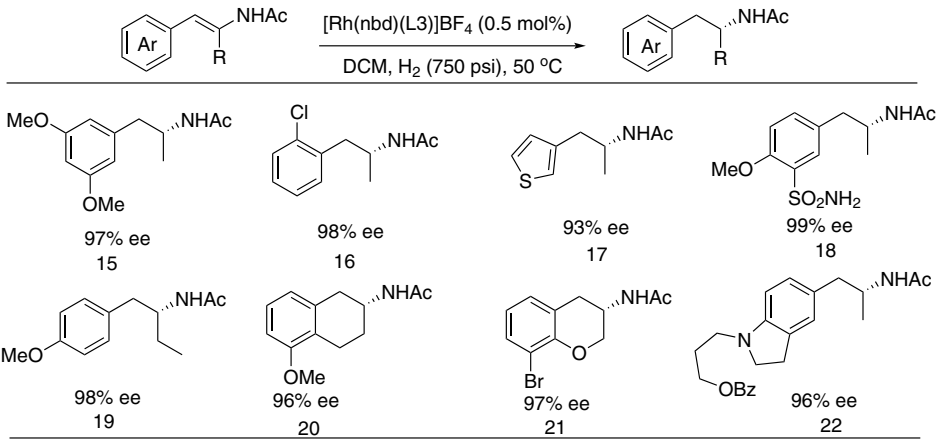


Figure 4. *Asymmetric hydrogenation employed with WingPhos*

WingPhos is also a capable ligand for catalytic asymmetric addition reactions. With the rhodium–WingPhos as the catalyst, CsF as the base, and $MgBr_2$ as an additive, a variety of aryl ketones with different electronic properties and substitution patterns reacted with aryl boroxines (Figure 5), forming a series of chiral diaryl alkyl carbinols in excellent yields and ee's. Calculations suggested that the interaction between the aryl group of the ketone and the anthryl moieties of WingPhos may have directed the stereochemical outcome.[13]

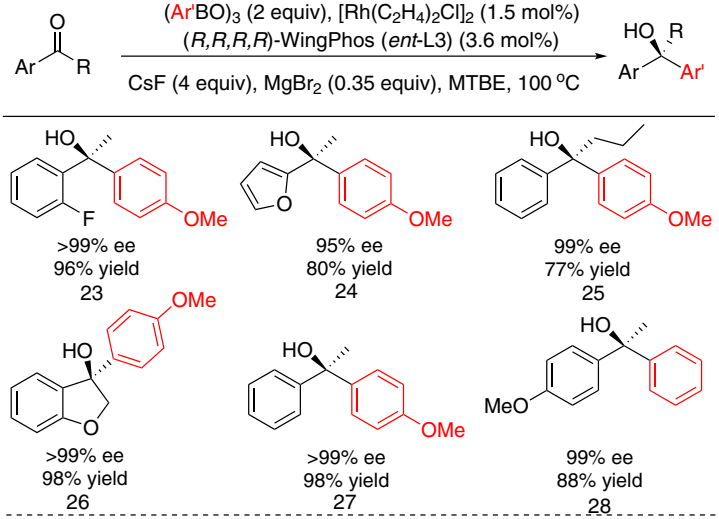
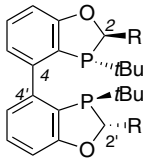


Figure 5. *Asymmetric addition employed with WingPhos*

2.4 R-BABIBOP



R-BABIBOP

L4: R = H ((*R,R*)-BABIBOP)
L5: R = *i*Pr ((*R,R,R,R*)-*i*Pr-BABIBOP)

1. P-chiral biaryl bisphosphorus ligand
2. Highly modular through variation of the R-substituents.

The P-chiral bisphosphorus ligands R-BABIBOP posses several structural features: a) the chiral elements of the ligands are originated from the central P-chirality instead of the biaryl axial chirality; b) The biaryl ligands adopt the coordination modes similar to BINAP- or BIPHEP-type ligands; c) The steric and electronic properties are highly modular through the variations of the R groups at 2,2' positions. By using Pd−*i*Pr-BABIBOP catalyst (**Pd−L5**), the hydrogenation of ethyl 3-oxo-3-phenylpropanoate proceeded in pentafluoropropanol/TFA under 35 atm H_2 to form the chiral alcohol product with 93% ee in 99% yield with a TON of 10 000 (Figure 6).[14] Besides the applications in palladium-catalyzed asymmetric hydrogenation, BABIBOP is also efficient for rhodium-catalyzed asymmetric hydrogenation of di- and trisubstituted enamides[15] and copper-catalyzed hydrogenation of 2-substituted 1-tetralones via dynamic kinetic resolution.[16]

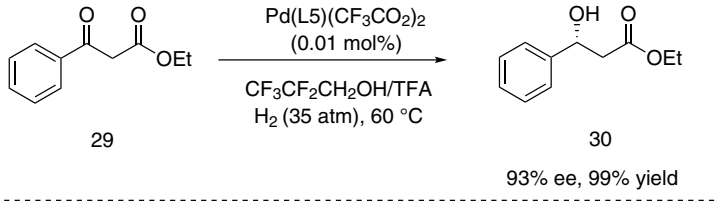
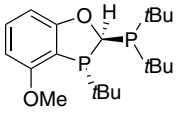


Figure 6. *Asymmetric hydrogenation employed with R-BABIBOP ligands*

2.5 MeO-POP



(2S,3R)-MeO-POP(L6)

Unlike most chiral C_2-symmetric ligands, MeO-POP is an effective C_1-symmetric bisphosphorus ligand. MeO-POP is an air-stable and operationally convenient solid, which can be applied to Rh-catalyzed asymmetric hydrogenation of *α*-(acylamino)acrylates or *β*-(acylamino)acrylates to prepare chiral *α*- or *β*-amino acid derivatives (Figure 7).[17]

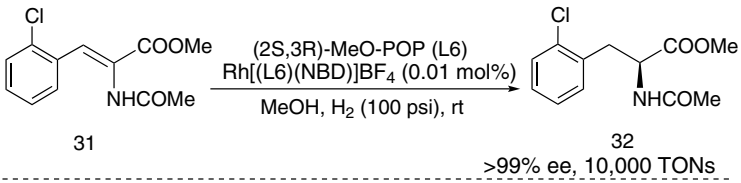


Figure 7. *Asymmetric hydrogenation of α-(acylamino)acrylates catalyzed by MeO-POP ligand*

3. P-chiral monophosphorus ligands

Compared to a number of efficient chiral bisphosphorus ligands, a smaller number of effective monophosphorus ligands are available due to lack of conformationally defined and systematically tunable framework.[18] Although monophosphoramidite ligands have demonstrated to be among the most versatile in academic research, their relatively electron-defficient and unstable nature has hampered broad applications in industrial settings. The 2,3-dihydrobenzo[*d*][1,3]oxaphosphole motif developed by us has shown excellent properties including good air-stability, resistance to harsh reaction conditions (aqueous, basic or high temperature), and high tunability. More importantly, the electron-rich nature of these monophosphorus ligands enables the activation of inert bonds where monophosphoramidite ligands are incapable. We therefore developed a library of P-chiral biaryl monophosphorus ligands (Figure 8), which have shown high efficiency in Suzuki-Miyaura coupling, asymmetric palladium-catalyzed dearomative cyclization, asymmetric hydroboration and diboration, asymmetric nickel-catalyzed reductive coupling, etc.

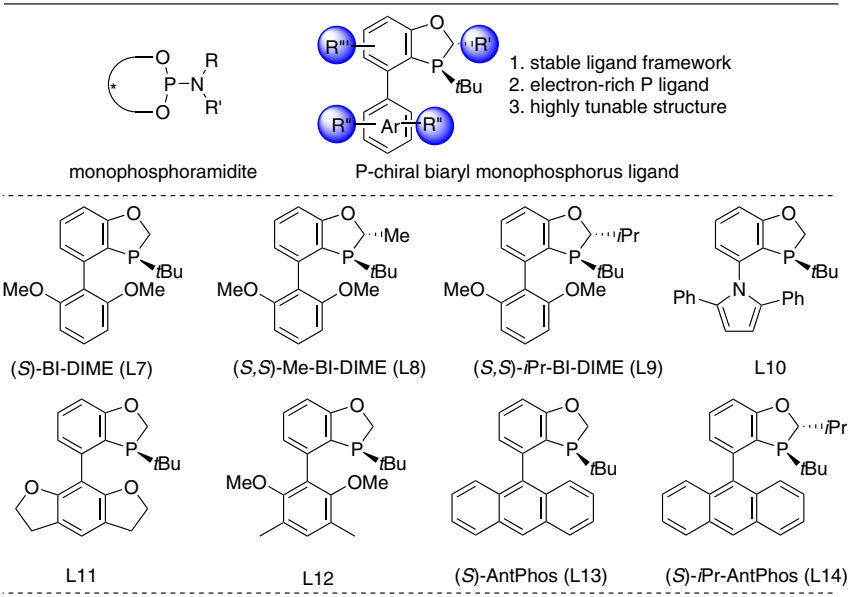


Figure 8. *P-chiral biaryl monophophorus ligands*

3.1 Suzuki-Miyaura coupling reaction

Dialkylbiaryl phosphorus ligands such as SPhos are effective ligands for the Suzuki-Miyaura cross-coupling reaction. However, SPhos possesses two major conformers by rotation of its P-aryl bond, resulting in two conformers of its palladium complex. The more sterically hindered conformer is considered the more effective for cross-coupling and the less sterically hindered is considered to be inferior. By contrast, the monophosphorus ligands derived from 2,3-dihydrobenzo[*d*][1,3]oxaphosphole structure have the effective and sterically hindered conformer, facilitating the transmetallation and reductive elimination process of sterically hindered cross-couplings. Thus, BI-DIME and AntPhos are effective ligands for sterically hindered cross-coupling reactions, particularly for the syntheses of tetra-*ortho*-substituted biaryls and sterically hindered alkyl arenes (Figure 9). Moreover, AntPhos enables the Suzuki-Miyaura coupling reaction at extremely low catalyst loading. At 0.005 mol% Pd loading, the coupling of 1-chloro-2-nitrobenzene and (3,4,5-trifluorophenyl)boronic acid proceeded smoothly to form the coupling product in 96% yield at a metric ton scale.[19] Me-BI-DIME and iPr-BI-DIME are excellent ligands for asymmetric Suzuki−Miyaura coupling reactions, and high enantioselectivities have been achieved on various tri-*ortho*-substituted biaryls.[20] More challenging asymmetric tetra-*ortho*-substituted biaryls have been achieved with NitinPhos.[21]

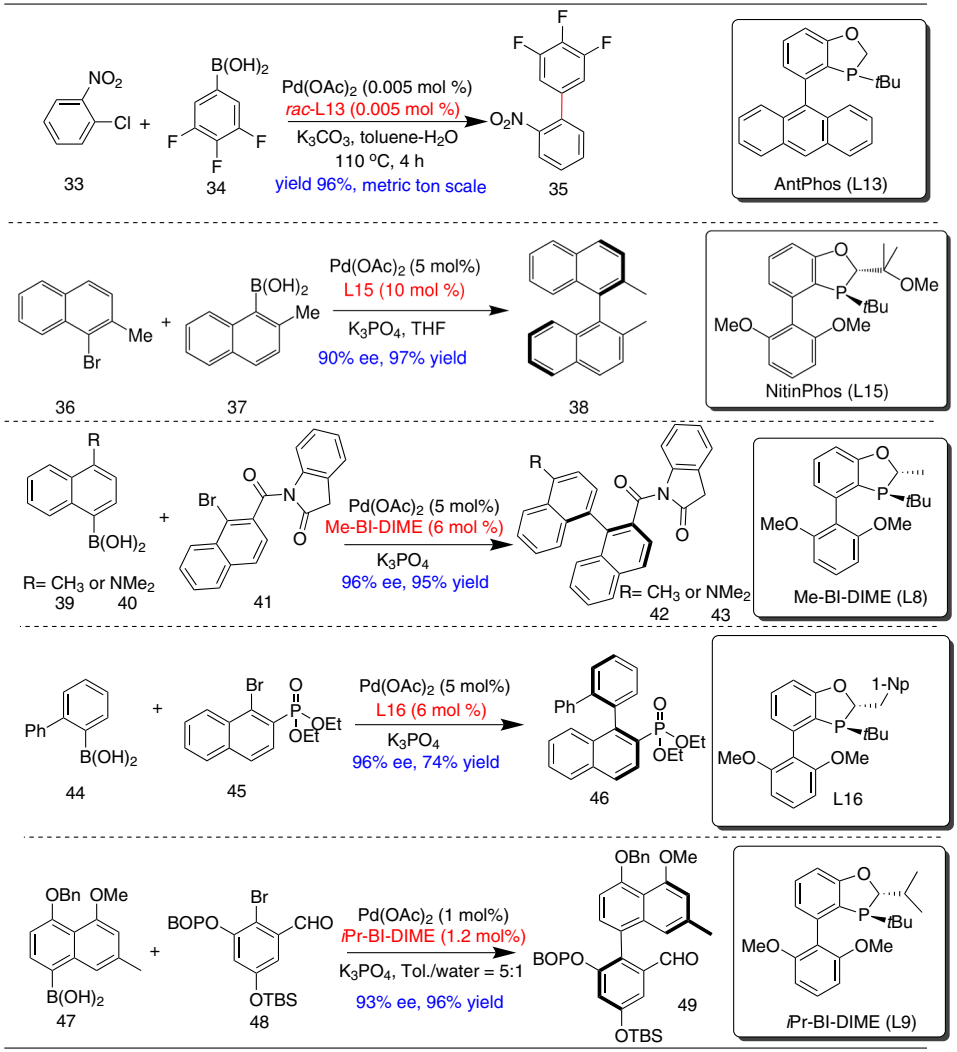
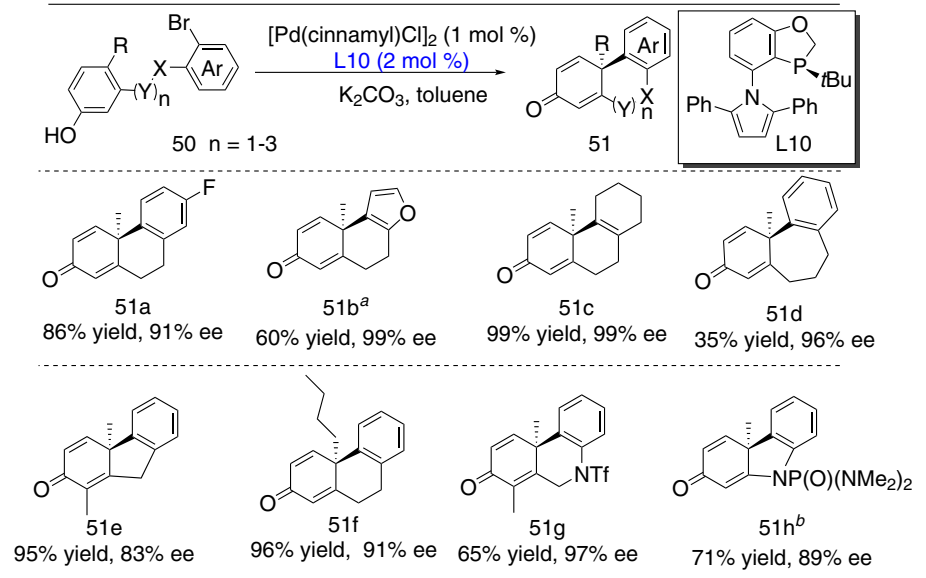


Figure 9. *Asymmetric Suzuki−Miyaura coupling of tetra-ortho-substituted biaryls*

3.2 Asymmetric palladium-catalyzed dearomative cyclization

Asymmetric palladium-catalyzed dearomative cyclization offers advantages in the synthesis of chiral polycyclic natural products bearing all-carbon quaternary centers. With **Pd-L10** as the catalyst, the cyclization of aryl bromide **50** containing a phenol moiety formed the cyclization product **51** with excellent ee's in satisfactory yields (Figure 10).[22] The substrate scope was broad and compatible with various heterocycles such as furyl and quinoline, forming five-, six-, or seven-membered rings in good to excellent yields. These cyclization skeletons are synthetically useful intermediates for the synthesis of terpenes, steroids, polyketides, and alkaloids.



[a]vinyl triflate was employed as the starting materials; [b]AntPhos (L14) was employed as the chiral ligand.

Figure 10. *Asymmetric palladium-catalyzed dearomative cyclization*

3.3 Asymmetric hydroboration and diboration

The use of BI-DIME has proven to be crucial for the regioselectivity and enantioselectivity of sterically hindered asymmetric hydroboration and diboration reactions. Although formation of chiral tertiary boronic esters as Markovnikov products are rare and challenging in hydroboration, the Rh-BI-DIME catalyst allowed, for the first time, the formation of a series of *α*-amino tertiary boronic acid esters with excellent ee's and satisfactory yields (Figure 11).[23] Mechanistic studies have shown that the transformation is likely to proceed through hydroboration over the diboration of the acyl imine pathway. Chiral BI-DIME has also enabled the conversion of allene to a series of tertiary boronic esters,[24] which are useful building blocks for natural products, agrochemicals, and therapeutic reagents.

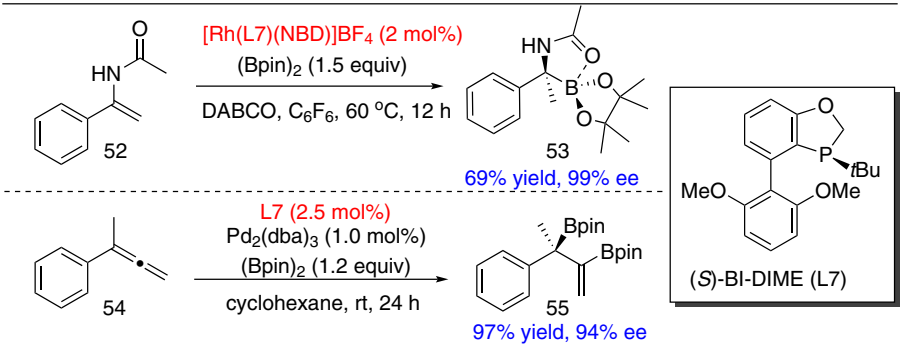


Figure 11. *Asymmetric hydroboration and diboration catalyzed by BI-DIME*

3.4 Asymmetric nickel-catalyzed reductive coupling

With chiral AntPhos as the key ligand and Et_3SiH as the reducing reagent, the Ni-catalyzed cyclization of alkynone **56** proceeds to form chiral tertiary alcohol **57** in excellent yield and with high ee (Figure 12).[25] With DI-BIDIME (**L17**) as the chiral ligand, the lowest catalyst loading in Ni-catalyzed reductive

coupling reported to date has been realized. Alkynones with an N-linker such as **58** are transformed to chiral pyrrolidine **59**.[26] In addition, the intermolecular coupling catalyzed by Ni−BI-DIME (Ni−**L7**) between alkyne **60** and aldehyde **61** proceeds smoothly to form chiral allylic alcohol **62**.[27]

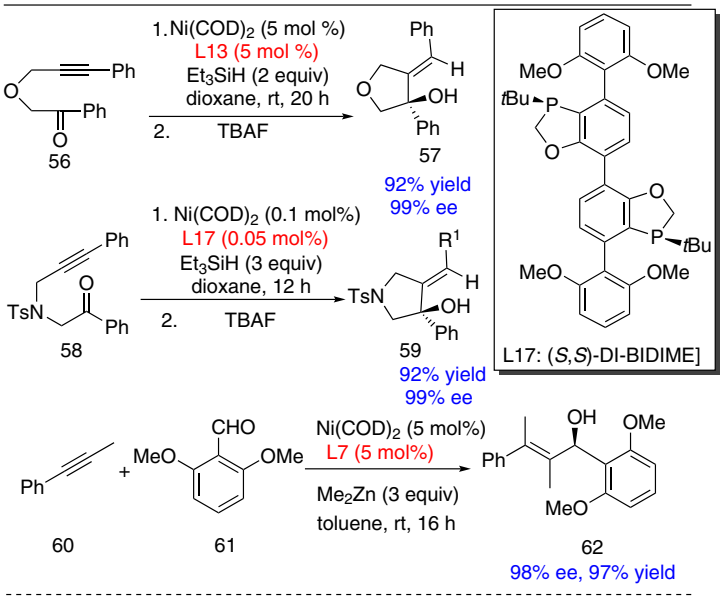


Figure 12. *Ni-catalyzed cyclization of alkynone or alkyne with aldehyde*

3.5 Asymmetric palladium-catalyzed intramolecular arylation

Palladium–catalyzed intramolecular arylation has become an important method to forge a chiral scaffold. Chiral monophosphorus ligands are also suitable for such transformations. For example, cyclization of aryl bromide **63** containing an *o*-carborane moiety gives a carbon-boron coupling chiral-at-cage product **64** (Figure 13).[28] Likewise, the cyclization of o-bromo-phenylphosphonate **65** using catalyst Pd-*ent*-**L11** forms the P-chiral phosphonate **66** with 88% ee and in 83% yield, which is an important intermediate for the synthesis of P-chiral phosphorus ligands.[29]

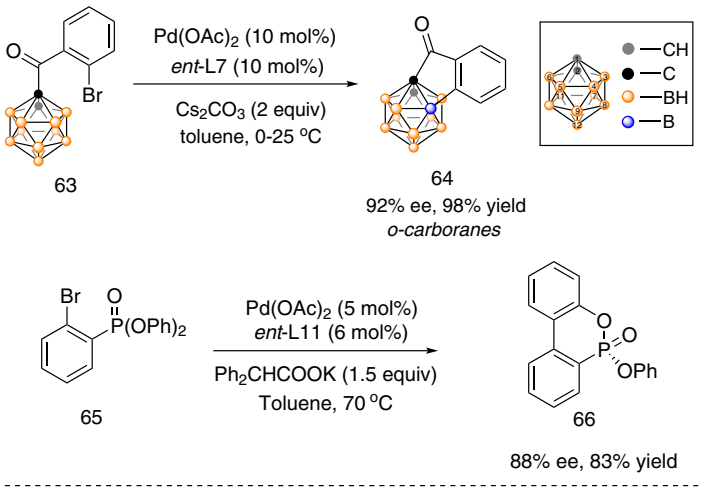
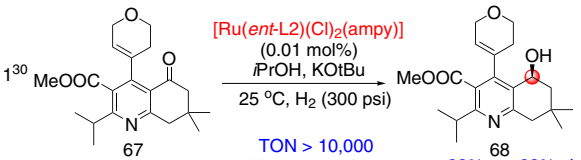
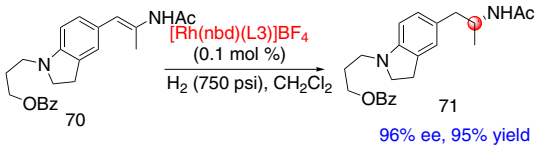
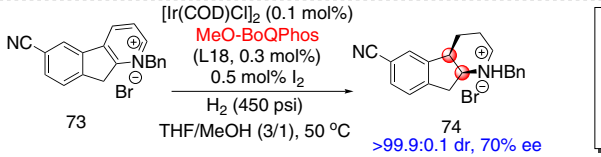
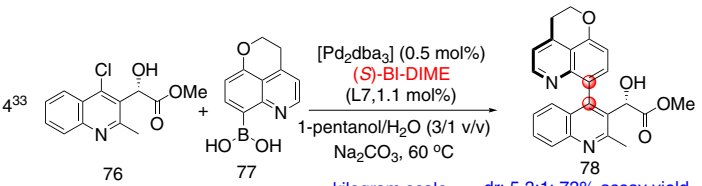
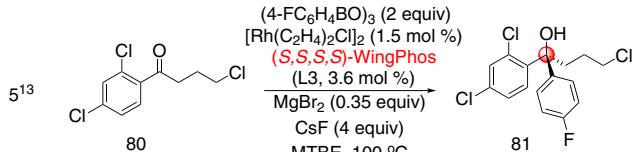
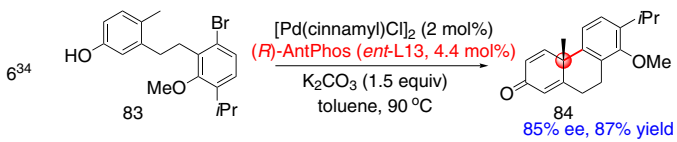


Figure 13. *Asymmetric palladium-catalyzed intramolecular arylation*

3.6 Applications in synthesis of chiral natural products and therapeutic agents

Chiral ligands based on the 2,3-dihydrobenzo[*d*][1,3]-oxaphosphole motif have proven to be applicable in efficient syntheses of a number of chiral natural products and therapeutic agents. With these chiral ligands, significant improvements in synthetic efficiency have been achieved by implementing asymmetric hydrogenation and carbon-carbon coupling reactions. In many cases, these transformations can't be realized by other commercially available ligands (Figure 14).[30,31,32,33,34,35,36]

Entry	Transformation	Target product
1[30]		
2[31]		
3[32]		
4[33]		
5[13]		
6[34]		

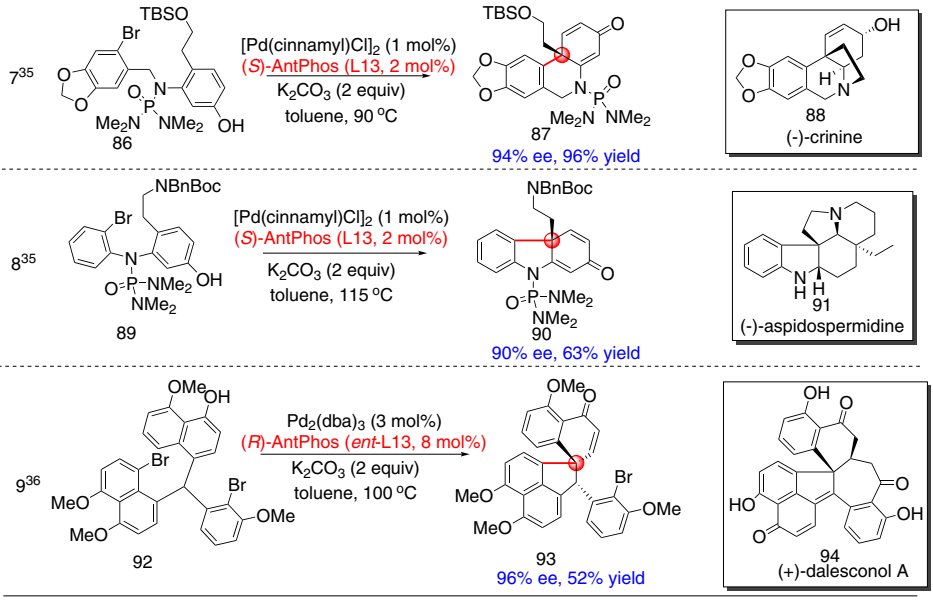


Figure 14. *Applications in synthesis of chiral natural products and therapeutic agents*

4. Other chiral ligands

Installation of a 2-pyridyl substituent (**L18**)[37], an oxazoline moiety (**L19**)[38], and an olefin moiety (**L20**)[39] on the 2,3-dihydrobenzo[*d*][1,3]oxaphosphole framework led to a series of chiral ligands with different functions (Figure 15).

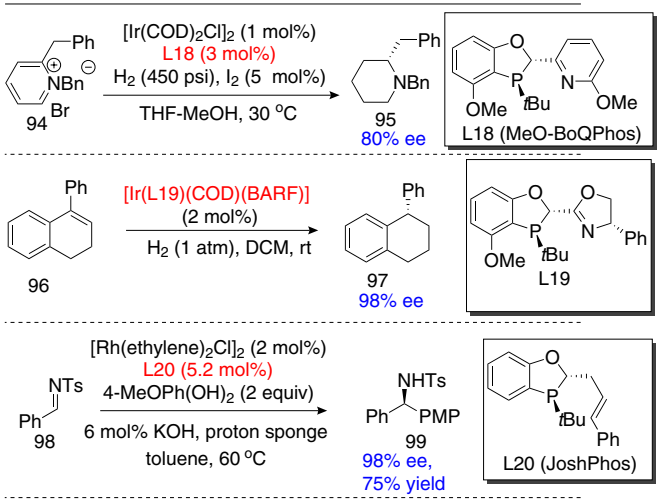


Figure 15. *Other P-chiral phosphorus ligands in asymmetric catalysis*

5. Conclusion and outlook

A series of monophosphorus and bisphosphorus ligands based on the 2,3-dihydrobenzo[*d*][1,3]oxaphosphole motif have been developed, which are efficient for a number of asymmetric transformations including cross-coupling reaction, asymmetric hydrogenation, and et al. Their unique structural properties including conformational unambiguousness and modularity have allowed us to develop a series of efficient ligands including MeO-BIBOP, WingPhos, MeO-POP, BABIBOP, BI-DIME, AntPhos, MeO-BoQPhos, etc. Syntheses of an array of biologically important chiral natural products and therapeutic agents with much improved efficiency are realized with employment of these ligands in catalysis. As the design and synthesis of chiral ligands and catalysts are ongoing in our laboratory, it is without any doubt that such continuing efforts will facilitate advances in asymmetric catalysis as well as synthetic organic chemistry.

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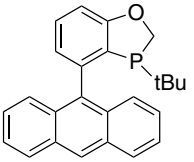
Reference of Ligands Mentioned in the Article

Ligand #	Strem #	Description
L1	**15-6270**	(2S,2'S,3S,3'S)-3,3'-Di-tert-butyl-2,2',3,3'-tetrahydro-2,2'-bibenzo[d][1,3]oxaphosphole, 97% (>99% ee) (2S,2'S,3S,3'S)-BIBOP
L2	**15-6255**	(2S,2'S,3S,3'S)-3,3'-Di-tert-butyl-4,4'-dimethoxy-2,2',3,3'-tetrahydro-2,2'-bibenzo[d][1,3]oxaphosphole, 97% (>99% ee) (2S,2'S,3S,3'S)-MeO-BIBOP
ent-L2	**15-6250**	(2R,2'R,3R,3'R)-3,3'-Di-tert-butyl-4,4'-dimethoxy-2,2',3,3'-tetrahydro-2,2'-bibenzo[d][1,3]oxaphosphole, 97% (>99% ee) (2R,2'R,3R,3'R)-MeO-BIBOP
L3	**15-1975**	(2S,2'S,3S,3'S)-4,4'-Di(anthracen-9-yl)-3,3'-di-t-butyl-2,2',3,3'-tetrahydro-2,2'-bibenzo[d][1,3]oxaphosphole, min 98%, (>99% ee), [(2S,2'S,3S,3'S)-WingPhos]
ent-L3	**15-1970**	(2R,2'R,3R,3'R)-4,4'-Di(anthracen-9-yl)-3,3'-di-t-butyl-2,2',3,3'-tetrahydro-2,2'-bibenzo[d][1,3]oxaphosphole, min 98% (>90% ee), [(2R,2'R,3R,3'R)-WingPhos]
L4	**15-6415**	(3R,3'R)-3,3'-Di-tert-butyl-2,2',3,3'-tetrahydro-4,4'-bibenzo[d][1,3]oxaphosphole, min. 97% (99% ee) (3R,3'R)-BABIBOP
L5	**15-6445**	(2R,2'R,3R,3'R)-3,3'-Di-tert-butyl-2,2'-diisopropyl-2,2',3,3'-tetrahydro-4,4'-bibenzo[d][1,3]oxaphosphole, min. 97% (99% ee) (2R,2'R,3R,3'R)-DI-iPr-BABIBOP
L6	**15-6280**	(2S,3R)-3-(tert-Butyl)-2-(di-tert-butylphosphino)-4-methoxy-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee) (2S,3R)-MeO-POP
L7	**15-6210**	(S)-3-(t-Butyl)-4-(2,6-dimethoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, min. 97% (S)-BI-DIME
L8	**15-6220**	(2S,3S)-3-(t-Butyl)-4-(2,6-dimethoxyphenyl)-2-methyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, min. 97% (S,S)-Me-BI-DIME
L9	**15-6230**	(2S,3S)-3-(t-Butyl)-4-(2,6-dimethoxyphenyl)-2-i-propyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, min. 97% (S,S)-iPr-BI-DIME
L10	**15-6320**	(S)-1-(3-(tert-Butyl)-2,3-dihydrobenzo[d][1,3]oxaphosphol-4-yl)-2,5-diphenyl-1H-pyrrole, 97% (>99% ee)
L11	**15-6295**	(S)-3-(tert-Butyl)-4-(2,3,5,6-tetrahydrobenzo[1,2-b:5,4-b']difuran-8-yl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)
L12	**15-6840**	(S)-3-(tert-Butyl)-4-(2,6-dimethoxy-3,5-dimethylphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)
L13	**15-1967**	(S)-4-(Anthracen-9-yl)-3-(t-butyl-2,3-dihydrobenzo[d][1,3]oxaphosphole,99+% (>99% ee) [(S)-AntPhos]
L14	**15-6820**	(2S,3S)-4-(Anthracen-9-yl)-3-(tert-butyl)-2-isopropyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)
L15	*Please inquire.*	
L16	*Please inquire.*	
L17	*Please inquire.*	
L18	**15-6854**	2-((2S,3S)-3-(tert-Butyl)-4-methoxy-2,3-dihydrobenzo[d][1,3]oxaphosphol-2-yl)-6-methoxypyridine, 97% (>99% ee) (2S,3S)-MeO-BoQPhos
L19	*Please inquire.*	
L20	*Please inquire.*	

PHOSPHORUS (Compounds)

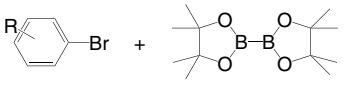
15-1960 **4-(Anthracen-9-yl)-3-(t-butyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 98+% rac-AntPhos** *(1268693-24-8)*
$C_{25}H_{23}O_3P$; FW: 370.42; pale yellow pwdr.
air sensitive, (store cold)
Note: Sold in collaboration with Zejun for research purposes only. Patents ZL201310020371.1, CN 201610056390.



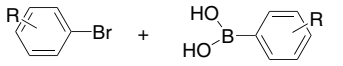
25mg
100mg
500mg

Technical Notes:

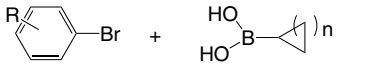
1. Ligand/palladium catalyst for general Miyaura borylation reactions.
2. Ligand/palladium catalyst for general and sterically demanding Suzuki-Miyaura cross-coupling reactions.
3. Ligand/palladium catalyst for aryl-alkyl Suzuki-Miyaura cross-coupling reactions.
4. Ligand/nickel catalyst for intramolecular reductive cyclization.
5. Ligand/palladium catalyst for Dearomative cyclization.



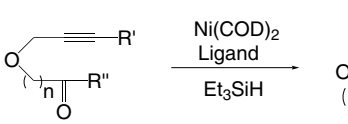
Tech. Note (1)
Ref. (1)



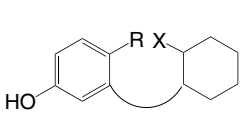
Tech. Note (2)
Ref. (2)



Tech. Note (3)
Ref. (3)



Tech. Note (4)
Ref. (4)

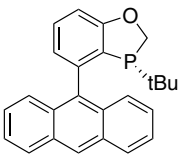


Tech. Note (5)
Ref. (5,6)

References:

1. *Org. Lett.,* **2011,***13*,1366.
2. *Chem. Eur. J.,* **2013,***19*,2261.
3. *Org.Chem. Front.,* **2014**,*1*, 225.
4. *Angew. Chem. Int. Ed.,* **2015**, *54,* 2520.
5. *Angew. Chem. Int. Ed.,* **2015**, *54,* 3033.
6. *Tetrahedron,* **2016,** *72,* 1782.

15-1963 **(R)-4-(Anthracen-9-yl)-3-(t-butyl-2,3-dihydrobenzo[d][1,3]oxaphosphole,98+% (>99% ee) [(R)-AntPhos]** *(1456816-37-7)*
$C_{25}H_{23}O_3P$; FW: 370.42; light-yellow xtl.
air sensitive, (store cold)
Note: Sold in collaboration with Zejun for research purposes only. Patents ZL201310020371.1, CN 201610056390.



25mg
100mg
500mg

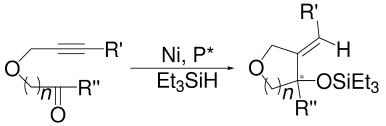
Technical Note:

1. See 15-1960 (page 17)

PHOSPHORUS (Compounds)

15-1967 **(S)-4-(Anthracen-9-yl)-3-(t-butyl-2,3-dihydrobenzo[d][1,3]oxaphosphole,99+% (>99% ee) [(S)-AntPhos]** *(1807740-34-6)* 25mg 100mg 500mg
$C_{25}H_{23}O_3P$; FW: 370.42; light yellow xtl.
air sensitive, (store cold)
Note: Sold in collaboration with Zejun for research purposes only. Patents ZL201310020371.1, CN 201610056390.

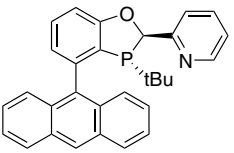
Technical Note:
1. Ligand for the enantioselective nickel-catalyzed intramolecular reductive cyclization of alkynones.



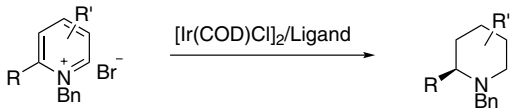
Tech. Note (1)
Ref. (1)

References:
1. *Angew. Chem. Int. Ed.,* **2015**, *54*, 2520.

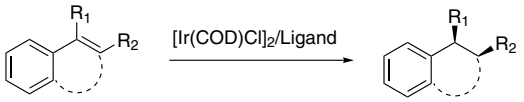
15-6892 **NEW** **2-((2R,3R)-4-(Anthracen-9-yl)-3-(tert-butyl)-2,3-dihydrobenzo[d][1,3]oxaphosphol-2-yl)pyridine, 97% (>99% ee)** *(1542796-14-4)* 25mg 100mg 500mg
$C_{30}H_{26}NOP$; FW: 447.51; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.



Technical Notes:
1. Ligand used with iridium catalyst for asymmetric hydrogenation of pydinium salts.
2. Ligand used with iridium catalyst for asymmetric hydrogenation of unfunctionalized alkenes.



Tech. Note (1)
Ref. (1-3)



Tech. Note (2)
Ref. (4-5)

References:
1. *Org. Lett.* **2018**, *20*, 1333−1337.
2. *Org. Lett.* **2016,***18*, 4920−4923.
3. *J. Am. Chem. Soc.* **2016**, *138*, 15473−15481.
4. *J. Org. Chem.* **2014**,*79*, 993-1000.
5. *Angew. Chem. Int. Ed.* **2014**, *53*, 14428–14432.

15-6894 **NEW** **2-((2S,3S)-4-(Anthracen-9-yl)-3-(tert-butyl)-2,3-dihydrobenzo[d][1,3] oxaphosphol-2-yl)pyridine, 97% (>99% ee)** 25mg 100mg 500mg
$C_{30}H_{26}NOP$; FW: 447.51; white to off-white solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

Technical Note:
1. See 15-6892 (page 18)

PHOSPHORUS (Compounds)

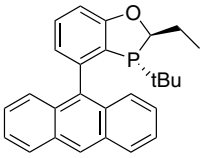
15-6888

NEW

(2R,3R)-4-(Anthracen-9-yl)-3-(tert-butyl)-2-ethyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)

$C_{27}H_{27}OP$; FW: 398.48; white to off-white solid

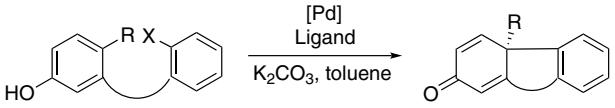
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.



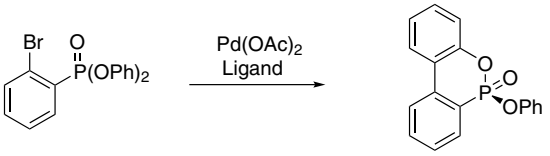
100mg
500mg

Technical Notes:

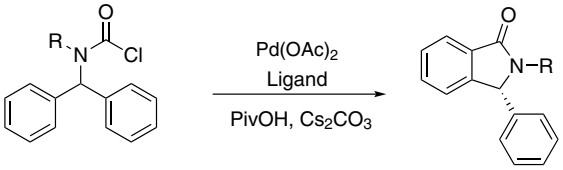
1. Ligand used with palladium catalyst for asymmetric intramolecular cyclization.
2. Ligand used with palladium catalyst for C-H functionalization.
3. Ligand used with palladium catalyst for Suzuki-Miyaura cross-coupling reactions.
4. Ligand used with nickel catalyst for asymmetric intramolecular/intermolecular reductive cyclization.
5. Ligand used with palladium catalyst for asymmetric cyclization.
6. Ligand used with palladium catalyzed Heck-type reactions.



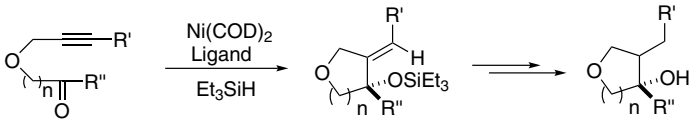
Tech. Note (1)
Ref. (1-4)



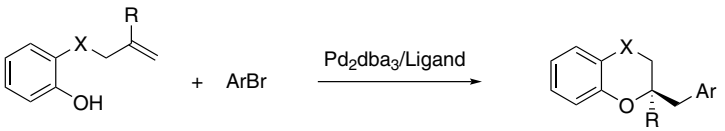
Tech. Note (2)
Ref. (5)



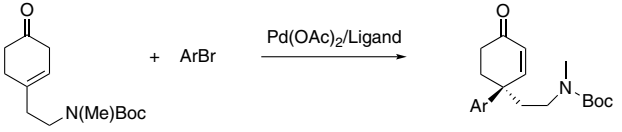
Tech. Note (3)
Ref. (6)



Tech. Note (4)
Ref. (7)



Tech. Note (5)
Ref. (8)



Tech. Note (6)
Ref. (9)

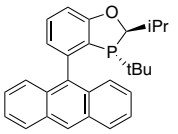
PHOSPHORUS (Compounds)

15-6888 ***(continued)*** **(2R,3R)-4-(Anthracen-9-yl)-3-(tert-butyl)-2-ethyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)**

References:
1. *Angew. Chem., Int. Ed.* **2015**, *54*, 3033-3037.
2. *Tetrahedron*. **2016**, *72*, 1782–1786.
3. *Chem. Sci.* **2017**, *8*, 6247-6256.
4. *J. Am. Chem. Soc.* **2017**, *139*, 6630.
5. *Org. Chem. Front.* **2015,** *2*, 1342-1345.
6. *Tetrahedron.* **2019**, *75*, 3239-3247.
7. *Angew. Chem., Int. Ed.* **2015**, *54*, 2520 -2524.
8. *Angew. Chem., Int. Ed.* **2016**, *55*, 5044–5048.
9. *J. Org. Chem.* **2016**, *81*, 10165−10171.

15-6890 NEW **(2S,3S)-4-(Anthracen-9-yl)-3-(tert-butyl)-2-ethyl-2,3-dihydrobenzo[d][1,3] oxaphosphole, 97% (>99% ee)** *(1884594-03-9)* 100mg 500mg
$C_{27}H_{27}OP$; FW: 398.48; white to off-white solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.
Technical Note:
1. See 15-6888 (page 19)

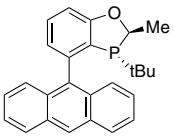
15-6818 NEW **(2R,3R)-4-(Anthracen-9-yl)-3-(tert-butyl)-2-isopropyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)** 25mg 100mg 500mg
$C_{28}H_{29}OP$; FW: 412.51; light yellow solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.



Technical Note:
1. See 15-6888 (page 19)

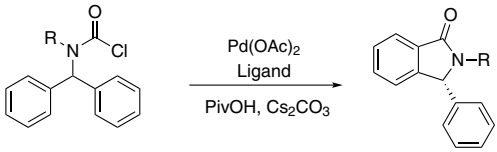
15-6820 NEW **(2S,3S)-4-(Anthracen-9-yl)-3-(tert-butyl)-2-isopropyl-2,3-dihydrobenzo[d][1,3] oxaphosphole, 97% (>99% ee)** *(1891002-61-1)* 25mg 100mg 500mg
$C_{28}H_{29}OP$; FW: 412.51; light yellow solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.
Technical Note:
1. See 15-6888 (page 19)

15-6822 NEW **(2R,3R)-4-(Anthracen-9-yl)-3-(tert-butyl)-2-methyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)** 25mg 100mg 500mg
(1477517-20-6)
$C_{26}H_{25}OP$; FW: 384.46; light yellow solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.



Technical Note:
1. See 15-6888 (page 19)

15-6824 NEW **(2S,3S)-4-(Anthracen-9-yl)-3-(tert-butyl)-2-methyl-2,3-dihydrobenzo[d][1,3] oxaphosphole, 97% (>99% ee** 25mg 100mg 500mg
$C_{26}H_{25}OP$; FW: 384.46; light yellow solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.
Technical Note:
1. Ligand used with palladium catalyst for Suzuki-Miyaura cross-coupling reactions.



Tech. Note (1)
Ref. (1)

References:
1. *Tetrahedron*, **2019**, *75*, 3239-3247

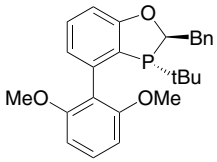
96-0660 **BABIBOP Ligand Kit**
See page 43

PHOSPHORUS (Compounds)

15-6848

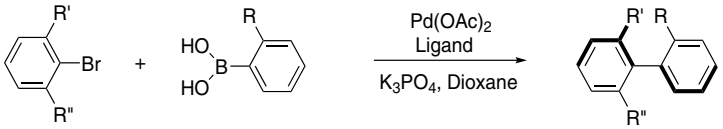
NEW

(2R,3R)-2-Benzyl-3-(tert-butyl)-4-(2,6-dimethoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee) *(1884457-36-6)*
$C_{26}H_{29}O_3P$; FW: 420.18; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

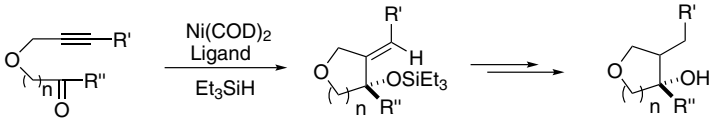


100mg
500mg
1g

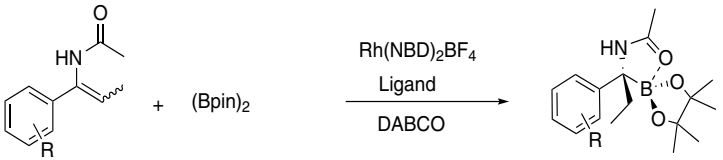
Technical Notes:
1. Ligand used with palladium catalyst for asymmetric Suzuki-Miyaura cross-coupling reactions.
2. Ligand used with nickel catalyst for asymmetric intramolecular/intermolecular reductive addition.
3. Ligand used with rhodium or palladium catalyzed asymmetric boration.
4. Ligand used with palladium catalyzed asymmetric C-H functionalizaiton.



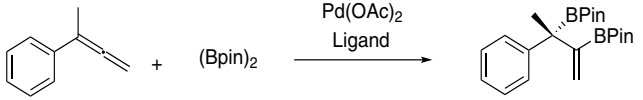
Tech. Note (1)
Ref. (1-5)

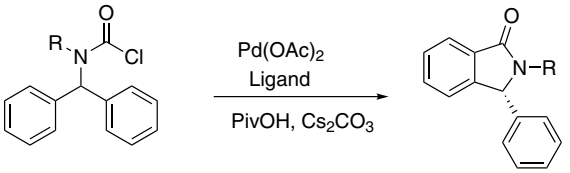


Tech. Note (2)
Ref. (6,7)

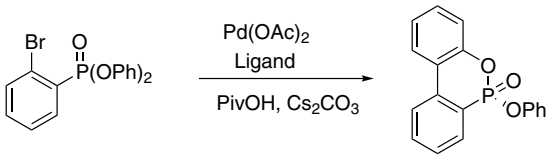


Tech. Note (3)
Ref. (8,9)





Tech. Note (4)
Ref. (10,11)



PHOSPHORUS (Compounds)

15-6848 **(2R,3R)-2-Benzyl-3-(tert-butyl)-4-(2,6-dimethoxyphenyl)-2,3-dihydrobenzo[d][1,3]**
(continued) **oxaphosphole, 97% (>99% ee)** *(1884457-36-6)*

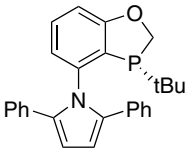
References:
1. *Org. Lett.* **2012**, *14* , 2258–2261.
2. *J. Am. Chem. Soc*., **2014**, *136*, 570–573.
3. *Angew. Chem., Int. Ed*. **2015**, *54*, 7144-7148.
4. *Adv. Synth. Catal*. **2016**, *358*, 3522-3527.
5. *ACS Catal.* **2018**, *8*, 10190-10209.
6. *Angew. Chem., Int. Ed*. **2015**, *54*, 2520 -2524.
7. *Org. Chem. Front.* **2015**, *2*, 1322-1325.
8. *J. Am. Chem. Soc.* **2015,** *137*, 6746-6749.
9. *Chem. Sci*. **2017**, *8*, 5161-5165.
10. *Tetrahedron*, **2019**, *75(24)*, 3239-3247.
11. *Org. Chem. Front*. **2015**, *2*, 1342-1345.

15-6846 **(2S,3S)-2-Benzyl-3-(tert-butyl)-4-(2,6-dimethoxyphenyl)-2,3-dihydrobenzo[d]** 100mg
NEW **[1,3]oxaphosphole, 97% (>99% ee)** *(1373432-13-3)* 500mg
$C_{26}H_{29}O_3P$; FW: 420.18; white to off-white solid 1g
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

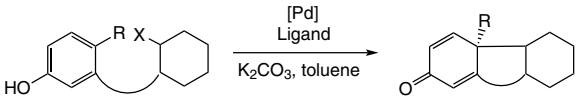
Technical Note:
1. See 15-6848 (page 21)

96-0650 **BI-DIME Ligand Kit**
See page 44

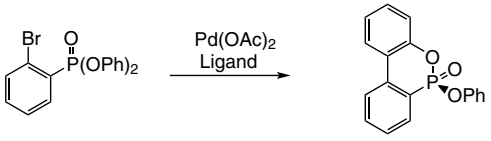
15-6315 **(R)-1-(3-(tert-Butyl)-2,3-dihydrobenzo[d][1,3]** 50mg
NEW **oxaphosphol-4-yl)-2,5-diphenyl-1H-pyrrole, 97%** 250mg
(>99% ee) *(1884457-40-2)*
$C_{27}H_{26}NOP$; FW: 411.48; light yellow xtl.
air sensitive
Note: Sold in collaboration with Zejun for research purposes only. Patents: ZL2013105048267, CN104558038.



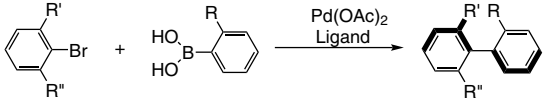
Technical Notes:
1. Ligand/palladium catalyst for dearomative cyclization.
2. Ligand/palladium catalyst for cyclization.
3. Ligand/palladium catalyst for Suzuki-Miyaura cross-coupling reactions.
4. Ligand/nickel catalyst for asymmetric intramolecular/intremolecular reductive cyclization.
5. Ligand/palladium catalyst for asymmetric cyclization.



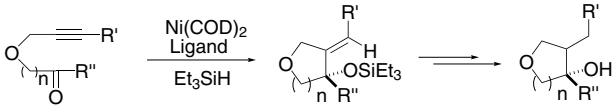
Tech. Note (1)
Ref. (1-4)



Tech. Note (2)
Ref. (5)



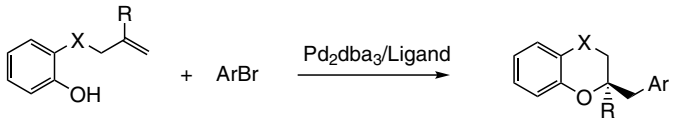
Tech. Note (3)
Ref. (6-7)



Tech. Note (4)
Ref. (8)

PHOSPHORUS (Compounds)

15-6315 ***(continued)*** **(R)-1-(3-(tert-Butyl)-2,3-dihydrobenzo[d][1,3]oxaphosphol-4-yl)-2,5-diphenyl-1H-pyrrole, 97% (>99% ee)** *(1884457-40-2)*



Tech. Note (5)
Ref. (9)

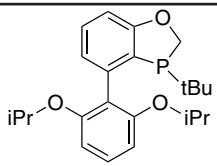
References:

1. *Angew. Chem., Int. Ed*. **2015**, *54*, 3033.
2. *Tetrahedron*. **2016**. *72*, 1782.
3. *Chem. Sci.*, **2017**, *8*, 6247.
4. *J. Am. Chem. Soc*. **2017**, *139*, 6630.
5. *Org. Chem. Front*. **2015**, *2*, 1342.
6. *Org. Lett*. **2012**, *14* , 2258.
7. *J. Am. Chem. Soc.*, **2014**, *136*, 570.
8. *Angew. Chem., Int. Ed*. **2015**, *54*, 2520.
9. *Angew. Chem., Int. Ed*. **2016**, *55*, 5044.

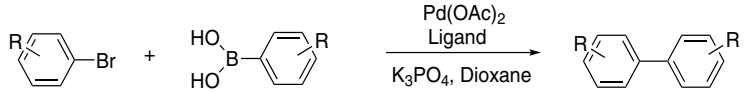
15-6320 NEW **(S)-1-(3-(tert-Butyl)-2,3-dihydrobenzo[d][1,3]oxaphosphol-4-yl)-2,5-diphenyl-1H-pyrrole, 97% (>99% ee)** *(1683581-58-9)* 50mg 250mg
$C_{27}H_{26}NOP$; FW: 411.48; light yellow xtl.
air sensitive
Note: Sold in collaboration with Zejun for research purposes only. Patents: ZL2013105048267, CN104558038.

Technical Note:
1. See 15-6315 (page 22)

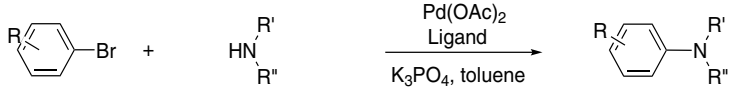
15-6868 NEW **3-(tert-Butyl)-4-(2,6-diisopropoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97%** 100mg 500mg
$C_{23}H_{31}O_3P$; FW: 386.20; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607



Technical Notes:
1. Ligand used with palladium catalyst for general and/or sterically demanding Suzuki-Miyaura cross-coupling reactions.
2. Ligand used with palladium catalyst for sterically demanding Buchwald-Hartwig amination.



Tech. Note (1)
Ref. (1,2)

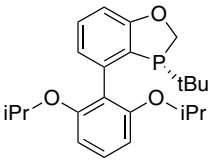


Tech. Note (2)
Ref. (3)

References:

1. *Angew. Chem., Int. Ed*. **2010**, *49*, 5879-5883.
2. *Chem. Eur. J*. **2013**, *19*, 2261-2265.
3. *Adv. Syn. Cat*. **2011**, *353*, 533-537.

15-6810 NEW **(R)-3-(tert-Butyl)-4-(2,6-diisopropoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)** 25mg 100mg 500mg
$C_{23}H_{31}O_3P$; FW: 386.20; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.



Technical Notes:
1. See 15-6848 (page 21)

PHOSPHORUS (Compounds)

15-6812 NEW

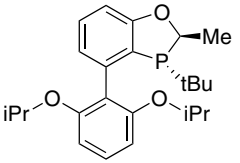
(S)-3-(tert-Butyl)-4-(2,6-diisopropoxyphenyl)-2,3-dihydrobenzo[d][1,3] oxaphosphole, 97% (>99% ee)
$C_{23}H_{31}O_3P$; FW: 386.20; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

25mg
100mg
500mg

Technical Note:
1. See 15-6848 (page 21)

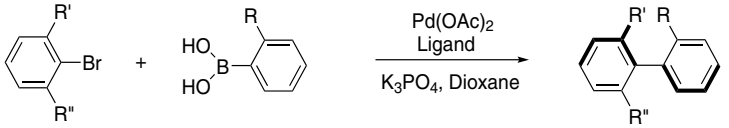
15-6826 NEW

(2R,3R)-3-(tert-Butyl)-4-(2,6-diisopropoxyphenyl)-2-methyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)
$C_{24}H_{33}O_3P$; FW: 400.21; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

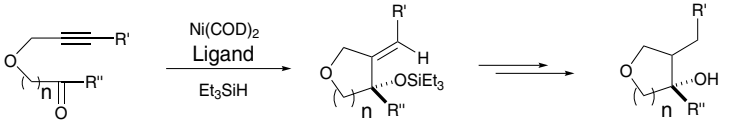


25mg
100mg
500mg

Technical Notes:
1. Ligand used with palladium catalyst for asymmetric Suzuki-Miyaura cross-coupling reactions.
2. Ligand used with nickel catalyst for asymmetric intramolecular/intermolecular reductive addition.



Tech. Note (1)
Ref. (1-5)



Tech. Note (2)
Ref. (6,7)

References:
1. *Org. Lett.* **2012**, *14* , 2258–2261.
2. *J. Am. Chem. Soc.*, **2014**, *136*, 570–573.
3. *Angew. Chem., Int. Ed.* **2015**, *54,* 7144-7148.
4. *Adv. Synth. Catal.* **2016**, *358*, 3522-3527.
5. *ACS Catal*. **2018**, *8*, 10190-10209.
6. *Angew. Chem., Int. Ed.* **2015**, *54*, 2520 -2524.
7. *Org. Chem. Front.* **2015**, *2*, 1322-1325.

15-6828 NEW

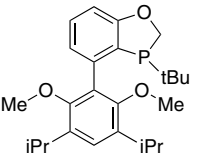
(2S,3S)-3-(tert-butyl)-4-(2,6-diisopropoxyphenyl)-2-methyl-2,3-dihydro-benzo[d][1,3]oxaphosphole, 97% (>99% ee)
$C_{24}H_{33}O_3P$; FW: 400.21; white to off-white solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

25mg
100mg
500mg

Technical Note:
1. See 15-6826 (page 24)

15-6866 NEW

3-(tert-Butyl)-4-(3,5-diisopropyl-2,6-dimethoxyphenyl)-2,3-dihydrobenzo[d][1,3] oxaphosphole, 97%
$C_{25}H_{35}O_3P$; FW: 414.23; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.



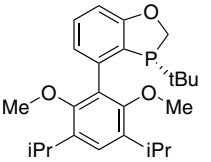
100mg
500mg

Technical Note:
1. See 15-6868 (page 23)

PHOSPHORUS (Compounds)

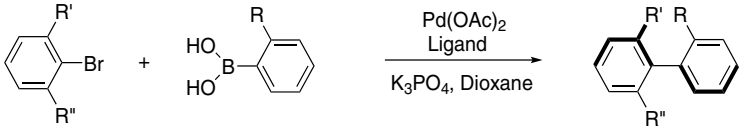
15-6838 NEW

(R)-3-(tert-Butyl)-4-(3,5-diisopropyl-2,6-dimethoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)
$C_{25}H_{35}O_3P$; FW: 414.23; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

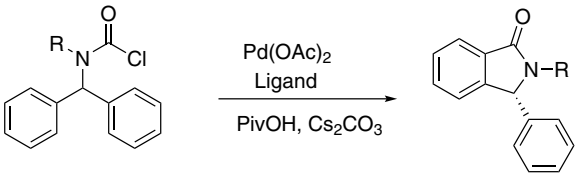


25mg
100mg
500mg

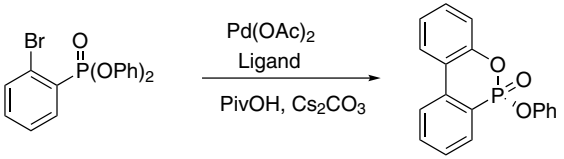
Technical Notes:
1. Ligand used with palladium catalyst for asymmetric Suzuki-Miyaura cross-coupling reactions.
2. Ligand used with palladium catalyzed asymmetric C-H functionalizaiton.



Tech. Note (1)
Ref. (1-5)



Tech. Note (2)
Ref. (6,7)



References:
1. *Org. Lett.* **2012**, *14* , 2258–2261.
2. *J. Am. Chem. Soc*., **2014**, *136*, 570–573.
3. *Angew. Chem., Int. Ed*. **2015**, *54*, 7144-7148.
4. *Adv. Synth. Catal.* **2016**, *358*, 3522-3527.
5. *ACS Catal*. **2018**, *8,* 10190-10209.
6. Tetrahedron, 2019, 75(24), 3239-3247.
7. *Org. Chem. Front.* **2015**, *2,* 1342-1345.

15-6844 NEW

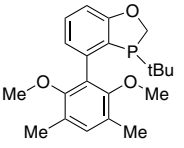
(S)-3-(tert-Butyl)-4-(3,5-diisopropyl-2,6-dimethoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)
$C_{25}H_{35}O_3P$; FW: 414.23; white to off-white solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

25mg
100mg
500mg

Technical Note:
1. See 15-6838 (page 25)

15-6864 NEW

3-(tert-Butyl)-4-(2,6-dimethoxy-3,5-dimethyl-phenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97%
$C_{21}H_{27}O_3P$; FW: 358.16; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.



100mg
500mg

Technical Note:
1. See 15-6868 (page 23)

PHOSPHORUS (Compounds)

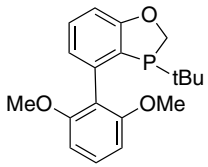
15-6834 NEW
(R)-3-(tert-Butyl)-4-(2,6-dimethoxy-3,5-dimethylphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee) 25mg 100mg 500mg
$C_{21}H_{27}O_3P$; FW: 358.16; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

Technical Note:
1. See 15-6838 (page 25)

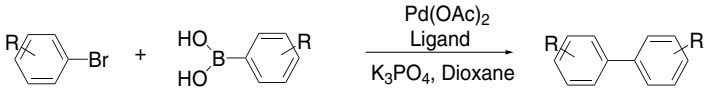
15-6840 NEW
(S)-3-(tert-Butyl)-4-(2,6-dimethoxy-3,5-dimethylphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee) *(2021202-03-7)* 25mg 100mg 500mg
$C_{21}H_{27}O_3P$; FW: 358.16; white to off-white solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

Technical Note:
1. See 15-6838 (page 25)

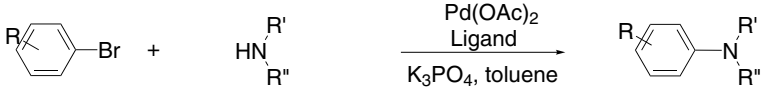
15-6205 NEW
3-(t-Butyl)-4-(2,6-dimethoxyphenyl)-2,3-dihydro-benzo[d][1,3]oxaphosphole, min. 97% rac-BI-DIME *(1246888-90-3)* 25mg 100mg 500mg
$C_{19}H_{23}O_3P$; FW: 330.36; white xtl.
Note: Sold in collaboration with Zejun for research purposes only. Patents: ZL2013105048267, CN104558038



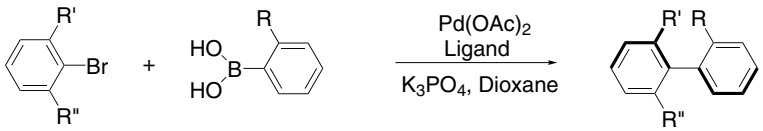
Technical Notes:
1. Ligand/palladium catalyst for general and sterically demanding Suzuki-Miyaura cross-coupling reactions.
2. Ligand/palladium catalyst for sterically demanding Buchwald-Hartwig amination.
3. Ligand/palladium catalyst for asymmetric Suzuki-Miyaura cross-coupling reactions.
4. Ligand/nickel catalyst for asymmetric intramolecular reductive cyclization.
5. Ligand/rhodium catalyst for asymmetric hydroboration.



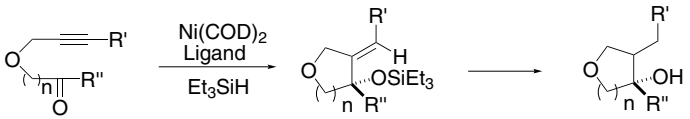
Tech. Note (1)
Ref. (1,2)



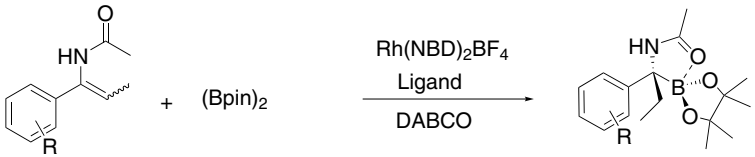
Tech. Note (2)
Ref. (3)



Tech. Note (3)
Ref. (4,5,6)



Tech. Note (4)
Ref. (7,8)



Tech. Note (5)
Ref. (9)

PHOSPHORUS (Compounds)

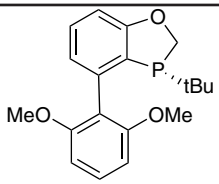
15-6205 **3-(t-Butyl)-4-(2,6-dimethoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, min. 97%**
(continued) **rac-BI-DIME** *(1246888-90-3)*

References:

1. *Angew. Chem., Int. Ed*. **2010**, *49*, 5879-5883.
2. *Chem. Eur. J.* **2013**, *19*, 2261-2265.
3. *Adv. Syn. Cat*. **2011**, *353*, 533-537.
4. *Org. Lett.* **2012**, *14* , 2258–2261.
5. *J. Am. Chem. Soc.*, **2014**, *136*, 570–573.
6. *Angew. Chem., Int. Ed.* **2015**, *54*, 7144-7148.
7. *Angew. Chem., Int. Ed.* **2015**, *54*, 2520 -2524.
8. *Org. Chem. Front.* **2015**, *2*, 1322-1325.
9. *J. Am. Chem. Soc*. **2015**, *137*, 6746-6749.

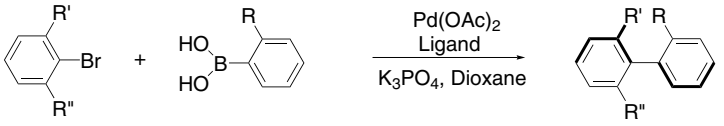
15-6211 **NEW**

(R)-3-(t-Butyl)-4-(2,6-dimethoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, min. 97% (R)-BI-DIME *(1373432-03-7)*
$C_{19}H_{23}O_3P$; FW: 330.36; light-yellow xtl.
Note: Sold in collaboration with Zejun for research purposes only. Patents: ZL2013105048267, CN104558038.

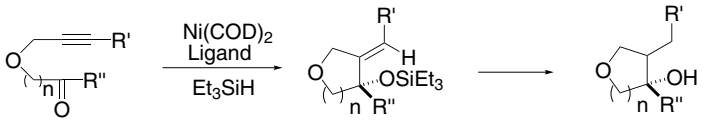


25mg
100mg
500mg

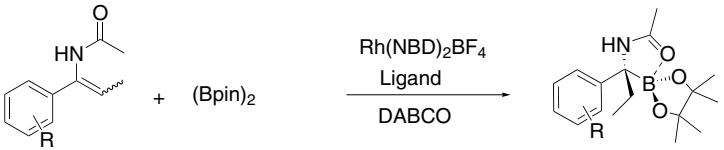
Technical Notes:
1. Ligand/palladium catalyst for asymmetric Suzuki-Miyaura cross-coupling reactions.
2. Ligand/nickel catalyst for asymmetric intramolecular reductive cyclization.
3. Ligand/rhodium catalyst for asymmetric hydroboration.



Tech. Note (1)
Ref. (1,2,3)



Tech. Note (2)
Ref. (4,5)



Tech. Note (3)
Ref. (6)

References:

1. *Org. Lett*. **2012**, *14* , 2258–2261.
2. *J. Am. Chem. Soc.*, **2014**, *136*, 570–573.
3. *Angew. Chem., Int. Ed*. **2015**, *54*, 7144-7148.
4. *Angew. Chem., Int. Ed*. **2015**, *54*, 2520 -2524.
5. *Org. Chem. Front.* **2015**, *2*, 1322-1325.
6. *J. Am. Chem. Soc*. **2015**, *137*, 6746-6749.

15-6210 **NEW**

(S)-3-(t-Butyl)-4-(2,6-dimethoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, min. 97% (S)-BI-DIME *(1373432-09-7)*
$C_{19}H_{23}O_3P$; FW: 330.36; light-yellow xtl.
Note: Sold in collaboration with Zejun for research purposes only.
Patents: ZL2013105048267, CN104558038.

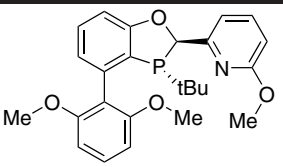
25mg
100mg
500mg

Technical Note:
1. See 15-6211 (page 27)

PHOSPHORUS (Compounds)

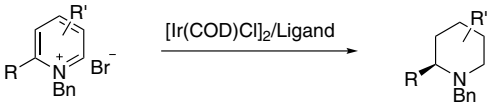
15-6862 NEW

2-((2R,3R)-3-(tert-Butyl)-4-(2,6-dimethoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphol-2-yl)-6-methoxypyridine, 97% (>99% ee)
$C_{25}H_{28}NO_4P$; FW: 437.47; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

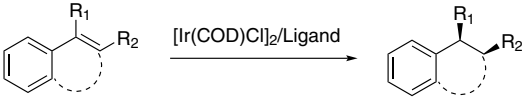


25mg
100mg
500mg

Technical Notes:
1. Ligand used with iridium catalyst for asymmetric hydrogenation of pydinium salts.
2. Ligand used with iridium catalyst for asymmetric hydrogenation of unfunctionalized alkenes.



Tech. Note (1)
Ref. (1-3)



Tech. Note (2)
Ref. (4-5)

References:
1. *Org. Lett.* **2018**, *20*, 1333−1337.
2. *Org. Lett.* **2016**,*18*, 4920−4923.
3. *J. Am. Chem. Soc.* **2016**, *138*, 15473−15481.
4. *J. Org. Chem.* **2014**,*79*, 993-1000.
5. *Angew. Chem. Int. Ed.* **2014**, *53*, 14428–14432.

15-6856 NEW

2-((2S,3S)-3-(tert-Butyl)-4-(2,6-dimethoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphol-2-yl)-6-methoxypyridine, 97% (>99% ee) *(2003230-67-7)*
$C_{25}H_{28}NO_4P$; FW: 437.47; white to off-white solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

25mg
100mg
500mg

Technical Note:
1. See 15-6862 (page 28)

15-6882 NEW

(R)-3-(tert-Butyl)-4-(2,6-dimethoxyphenyl)-2,2-dimethyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)
$C_{21}H_{27}O_3P$; FW: 358.16; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

25mg
100mg
500mg

Technical Note:
1. See 15-6826 (page 24)

15-6880 NEW

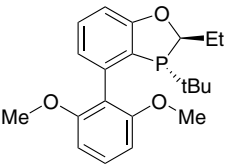
(S)-3-(tert-Butyl)-4-(2,6-dimethoxyphenyl)-2,2-dimethyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee) *(2227217-19-6)*
$C_{21}H_{27}O_3P$; FW: 358.16; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

25mg
100mg
500mg

Technical Note:
1. See 15-6826 (page 24)

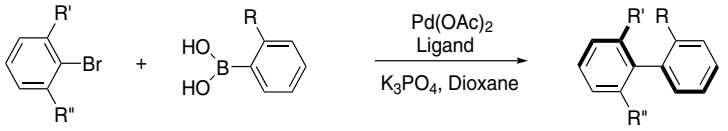
15-6886 NEW

(2R,3R)-3-(tert-Butyl)-4-(2,6-dimethoxyphenyl)-2-ethyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)
$C_{21}H_{27}O_3P$; FW: 358.16; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.



100mg
500mg

Technical Note:
1. Ligand used with palladium catalyst for asymmetric Suzuki-Miyaura cross-coupling reactions.



Tech. Note (1)
Ref. (1-5)

PHOSPHORUS (Compounds)

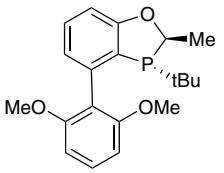
15-6886 ***(continued)*** **(2R,3R)-3-(tert-Butyl)-4-(2,6-dimethoxyphenyl)-2-ethyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)**

References:
1. *Org. Lett.* **2012**, *14* , 2258–2261.
2. *J. Am. Chem. Soc.*, **2014**, *136*, 570–573.
3. *Angew. Chem., Int. Ed*. **2015**, *54*, 7144-7148.
4. *Adv. Synth. Catal.* **2016**, *358*, 3522-3527.
5. *ACS Catal.* **2018**, *8*, 10190-10209.

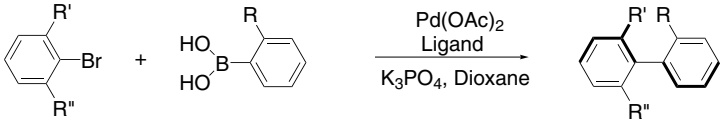
15-6884 NEW **(2S,3S)-3-(tert-Butyl)-4-(2,6-dimethoxyphenyl)-2-ethyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)** *(2247162-97-4)*
$C_{21}H_{27}O_3P$; FW: 358.16; white to off-white solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.
100mg
500mg

Technical Note:
1. See 15-6886 (page 28)

15-6225 NEW **(2R,3R)-3-(t-Butyl)-4-(2,6-dimethoxyphenyl)-2-methyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, min. 97% (R,R)-Me-BI-DIME** *(1477517-18-2)*
$C_{20}H_{25}O_3P$; FW: 344.38; light-yellow xtl.
Note: Sold in collaboration with Zejun for research purposes only. Patents: ZL2013105048267, CN104558038.
25mg
100mg
500mg



Technical Note:
1. Ligand/palladium catalyst for asymmetric Suzuki-Miyaura cross-coupling reactions.



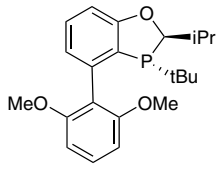
Tech. Note (1)
Ref. (1,2,3)

References:
1. *Org. Lett.* **2012**, *14* , 2258–2261.
2. *J. Am. Chem. Soc.* **2014,** *136*, 570-573.
3. *Angew. Chem., Int. Ed*. **2015**, *54*, 7144-7148.

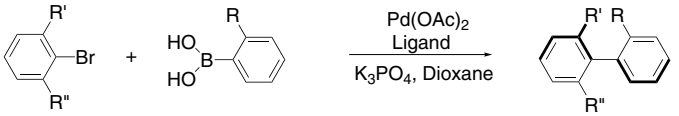
15-6220 NEW **(2S,3S)-3-(t-Butyl)-4-(2,6-dimethoxyphenyl)-2-methyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, min. 97% (S,S)-Me-BI-DIME** *(1373432-11-1)*
$C_{20}H_{25}O_3P$; FW: 344.38; light-yellow xtl.
Note: Sold in collaboration with Zejun for research purposes only.
Patents: ZL2013105048267, CN104558038.
25mg
100mg
500mg

Technical Note:
1. See 15-6225 (page 29)

15-6235 NEW **(2R,3R)-3-(t-Butyl)-4-(2,6-dimethoxyphenyl)-2-i-propyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, min. 97% (>99% ee), (R,R)-iPr-BI-DIME** *(1477517-19-3)*
$C_{22}H_{29}O_3P$; FW: 372.44; light-yellow xtl.
Note: Sold in collaboration with Zejun for research purposes only. Patents: ZL2013105048267, CN104558038.
25mg
100mg
500mg



Technical Note:
1. Ligand/palladium catalyst for asymmetric Suzuki-Miyaura cross-coupling reactions.



Tech. Note (1)
Ref. (1,2,3)

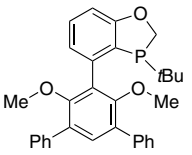
References:
1. *Org. Lett.* **2012**, *14* , 2258–2261.
2. *J. Am. Chem. Soc.* **2014,** *136*, 570-573.
3. *Angew. Chem., Int. Ed*. **2015**, *54*, 7144-7148.

PHOSPHORUS (Compounds)

15-6230 NEW
(2S,3S)-3-(t-Butyl)-4-(2,6-dimethoxyphenyl)-2-i-propyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, min. 97% (>99% ee), (S,S)-iPr-BI-DIME *(1477517-21-7)*
$C_{22}H_{29}O_3P$; FW: 372.44; light-yellow xtl.
Note: Sold in collaboration with Zejun for research purposes only.
Patents: ZL2013105048267, CN104558038.
25mg 100mg 500mg

Technical Note:
1. See 15-6235 (page 29)

15-6896 NEW
3-(tert-Butyl)-4-(4',6'-dimethoxy-[1,1':3',1''-terphenyl]-5'-yl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97%
$C_{31}H_{31}O_3P$; FW: 482.20; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.
100mg 500mg



Technical Note:
1. See 15-6868 (page 23)

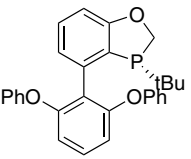
15-6836 NEW
(R)-3-(tert-Butyl)-4-(4',6'-dimethoxy-[1,1':3',1''-terphenyl]-5'-yl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)
$C_{31}H_{31}O_3P$; FW: 482.20; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.
25mg 100mg 500mg

Technical Note:
1. See 15-6838 (page 25)

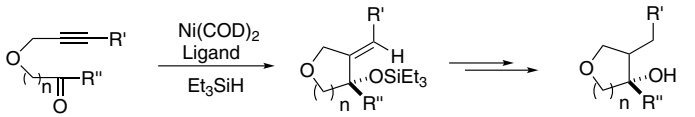
15-6842 NEW
(S)-3-(tert-Butyl)-4-(4',6'-dimethoxy-[1,1':3',1''-terphenyl]-5'-yl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee) *(2021201-99-8)*
$C_{31}H_{31}O_3P$; FW: 482.20; white to off-white solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.
25mg 100mg 500mg

Technical Note:
1. See 15-6838 (page 25)

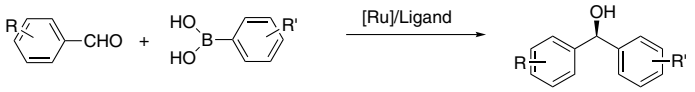
15-6814 NEW
(R)-3-(tert-Butyl)-4-(2,6-diphenoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee) *(1441830-74-5)*
$C_{29}H_{27}O_3P$; FW: 454.17; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607
25mg 100mg 500mg



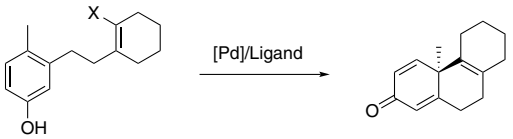
Technical Notes:
1. Ligand used with nickel catalyst for asymmetric intramolecular/intermolecular reductive addition.
2. Ligand used with ruthenium catalyzed asymmetric addition.
3. Ligand used with palladium catalyst for asymmetric intramolecular cyclization.



Tech. Note (1)
Ref. (1,2)



Tech. Note (2)
Ref. (3)



Tech. Note (3)
Ref. (4,5)

PHOSPHORUS (Compounds)

15-6814 ***(continued)*** **(R)-3-(tert-Butyl)-4-(2,6-diphenoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)** *(1441830-74-5)*

References:

1. *Angew. Chem., Int. Ed.* **2015**, *54*, 2520 -2524.
2. *Org. Chem. Front.* **2015**, *2*, 1322-1325.
3. *J. Org. Chem.* **2013**, *78*, 6350-6355.
4. *Angew. Chem., Int. Ed.* **2015**, *54*, 3033-3037.
5. *Tetrahedron.* **2016**, *72*, 1782–1786.

15-6816 NEW

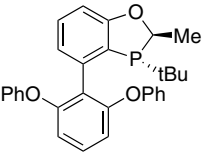
(S)-3-(tert-Butyl)-4-(2,6-diphenoxyphenyl)-2,3-dihydrobenzo[d][1,3] oxaphosphole, 97% (>99% ee)
$C_{29}H_{27}O_3P$; FW: 454.16; light yellow solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

25mg
100mg
500mg

Technical Note:
1. See 15-6814 (page 30)

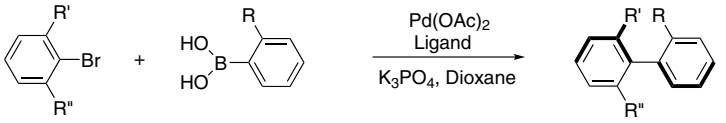
15-6830 NEW

(2R,3R)-3-(tert-butyl)-4-(2,6-diphenoxyphenyl)-2-methyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)
$C_{30}H_{29}O_3P$; FW: 468.18; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

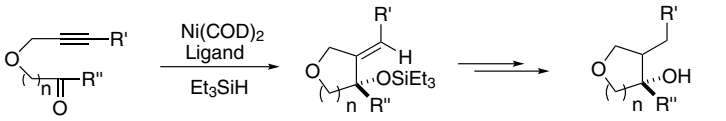


25mg
100mg
500mg

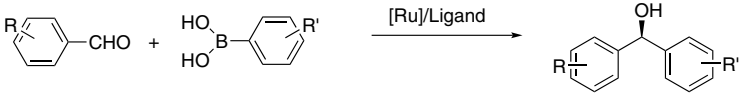
Technical Notes:
1. Ligand used with palladium catalyst for asymmetric Suzuki-Miyaura cross-coupling reactions.
2. Ligand used with nickel catalyst for asymmetric intramolecular/intermolecular reductive addition.
3. Ligand used with ruthenium catalyzed asymmetric addition.
4. Ligand used with palladium catalyst for asymmetric intramolecular cyclization.



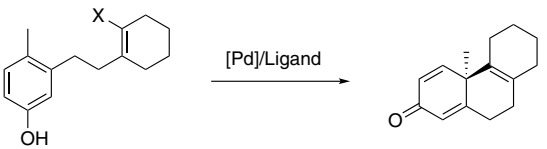
Tech. Note (1)
Ref. (1-5)



Tech. Note (2)
Ref. (6,7)



Tech. Note (3)
Ref. (8)



Tech. Note (4)
Ref. (9,10)

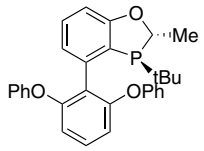
References:

1. *Org. Lett.* **2012**, *14* , 2258–2261.
2. *J. Am. Chem. Soc.*, **2014**, *136*, 570–573.
3. *Angew. Chem., Int. Ed.* **2015**, *54*, 7144-7148.
4. *Adv. Synth. Catal.* **2016**, *358*, 3522-3527.
5. *ACS Catal.* **2018**, *8*, 10190-10209.
6. *Angew. Chem., Int. Ed.* **2015**, *54*, 2520 -2524.
7. *Org. Chem. Front.* **2015**, *2*, 1322-1325.
8. *J. Org. Chem.* **2013**, *78*, 6350-6355.
9. *Angew. Chem., Int. Ed.* **2015**, *54*, 3033-3037.
10. *Tetrahedron*. **2016**, *72*, 1782–1786.

PHOSPHORUS (Compounds)

15-6832 NEW

(2S,3S)-3-(tert-Butyl)-4-(2,6-diphenoxyphenyl)-2-methyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)
$C_{30}H_{29}O_3P$; FW: 468.18; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

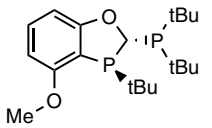


25mg
100mg
500mg

Technical Notes:
1. See 15-6830 (page 31)

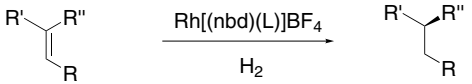
15-6285 NEW

(2R,3S)-3-(tert-Butyl)-2-(di-tert-butylphosphino)-4-methoxy-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee) (2R,3S)-MeO-POP
$C_{20}H_{34}O_2P_2$; FW: 368.44; light yellow pwdr.
air sensitive
Note: Sold in collaboration with Zejun for research purposes only. Patents: ZL2013105048267, CN104558038.



25mg
100mg

Technical Note:
1. Ligand/Rhodium catalyst for asymmetric hydrogenation.



Tech. Note (1)
Ref. (1)

References:
1. *Org. Lett.* **2010**, *12*, 176.

15-6280 NEW

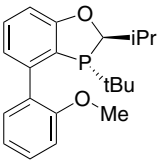
(2S,3R)-3-(tert-Butyl)-2-(di-tert-butylphosphino)-4-methoxy-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee) (2S,3R)-MeO-POP *(1215081-28-9)*
$C_{20}H_{34}O_2P_2$; FW: 368.44; light yellow pwdr.
air sensitive
Note: Sold in collaboration with Zejun for research purposes only.
Patents: ZL2013105048267, CN104558038.

25mg
100mg

Technical Note:
1. See 15-6285 (page 32)

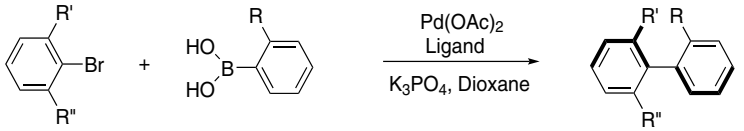
15-6878

(2R,3R)-3-(tert-Butyl)-2-isopropyl-4-(2-methoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)
$C_{21}H_{27}O_2P$; FW: 342.17; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

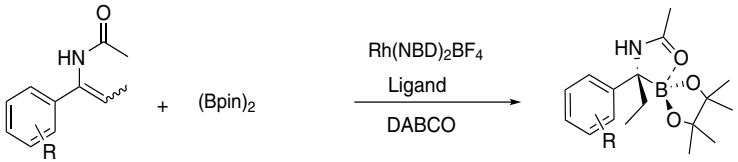


100mg
500mg

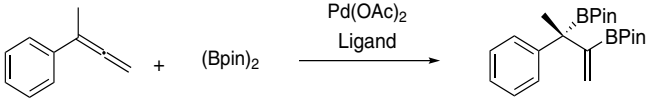
Technical Notes:
1. Ligand used with palladium catalyst for asymmetric Suzuki-Miyaura cross-coupling reactions.
2. Ligand used with rhodium or palladium catalyzed asymmetric boration.



Tech. Note (1)
Ref. (1-5)



Tech. Note (2)
Ref. (6,7)



PHOSPHORUS (Compounds)

15-6878 *(continued)* **(2R,3R)-3-(tert-Butyl)-2-isopropyl-4-(2-methoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)**

References:

1. *Org. Lett.* **2012**, *14* , 2258–2261.
2. *J. Am. Chem. Soc.,* **2014**, *136*, 570–573.
3. *Angew. Chem., Int. Ed.* **2015**, *54*, 7144-7148.
4. *Adv. Synth. Catal.* **2016**, *358*, 3522-3527.
5. *ACS Catal.* **2018**, *8*, 10190-10209.
6. *J. Am. Chem. Soc.* **2015**, *137*, 6746-6749.
7. *Chem. Sci.* **2017**, *8*, 5161-5165.

15-6876 NEW

(2S,3S)-3-(tert-Butyl)-2-isopropyl-4-(2-methoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee) 100mg 500mg

$C_{21}H_{27}O_2P$; FW: 342.17; white to off-white solid

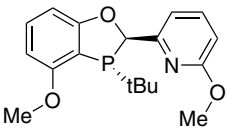
Note: Sold under license from Zejun for research purposes only.

Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

Technical Note:
1. See 15-6878 (page 32)

15-6860 NEW

2-((2R,3R)-3-(tert-Butyl)-4-methoxy-2,3-dihydrobenzo[d][1,3]oxaphosphol-2-yl)-6-methoxypyridine, 97% (>99% ee), (2R,3R)-MeO-BoQPhos *(1542796-16-6)* 25mg 100mg 500mg

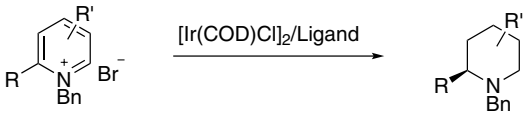


$C_{18}H_{22}NO_3P$; FW: 331.35; white to off-white solid

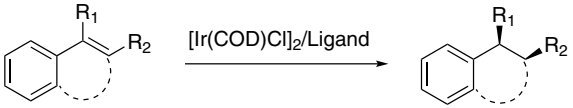
air sensitive

Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

Technical Notes:
1. Ligand used with iridium catalyst for asymmetric hydrogenation of pydinium salts.
2. Ligand used with iridium catalyst for asymmetric hydrogenation of unfunctionalized alkenes.



Tech. Note (1)
Ref. (1-3)



Tech. Note (2)
Ref. (4-5)

References:

1. *Org. Lett.* **2018**, *20*, 1333−1337.
2. *Org. Lett.* **2016**,*18*, 4920−4923.
3. *J. Am. Chem. Soc.* **2016**, *138*, 15473−15481.
4. *J. Org. Chem.* **2014**,*79*, 993-1000.
5. *Angew. Chem. Int. Ed.* **2014**, *53*, 14428–14432.

15-6854 NEW

2-((2S,3S)-3-(tert-Butyl)-4-methoxy-2,3-dihydrobenzo[d][1,3]oxaphosphol-2-yl)-6-methoxypyridine, 97% (>99% ee), (2S,3S)-MeO-BoQPhos *(1777796-37-8)* 25mg 100mg 500mg

$C_{18}H_{22}NO_3P$; FW: 331.35; white to off-white solid

air sensitive

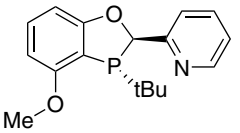
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

Technical Note:
1. See 15-6860 (page 33)

PHOSPHORUS (Compounds)

15-6858 NEW

2-((2R,3R)-3-(tert-Butyl)-4-methoxy-2,3-dihydrobenzo[d][1,3]oxaphosphol-2-yl)pyridine, 97% (>99% ee) *(1542796-07-5)*
$C_{17}H_{20}NO_2P$; FW: 301.32; white to off-white solid
air sensitive
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.



25mg
100mg
500mg

Technical Note:
1. See 15-6860 (page 33)

15-6852 NEW

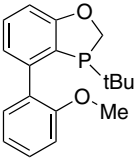
2-((2S,3S)-3-(tert-Butyl)-4-methoxy-2,3-dihydrobenzo[d][1,3]oxaphosphol-2-yl) pyridine, 97% (>99% ee)
$C_{17}H_{20}NO_2P$; FW: 301.32; white to off-white solid
air sensitive
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

25mg
100mg
500mg

Technical Note:
1. See 15-6860 (page 33)

15-6870 NEW

3-(tert-Butyl)-4-(2-methoxyphenyl)-2,3-dihydrobenzo[d][1,3] oxaphosphole, 97% *(1246888-88-9)*
$C_{18}H_{21}O_2P$; FW: 300.12; white to off-white solid
air sensitive
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

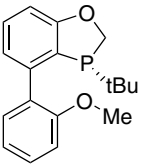


1g
5g

Technical Note:
1. See 15-6868 (page 23)

15-6872 NEW

(R)-3-(tert-Butyl)-4-(2-methoxyphenyl)-2,3-dihydrobenzo[d] [1,3]oxaphosphole, 97% (>99% ee) *(1338454-28-6)*
$C_{18}H_{21}O_2P$; FW: 300.12; white to off-white solid
air sensitive
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.



100mg
500mg

Technical Notes:
1. See 15-6878 (page 32)

15-6874 NEW

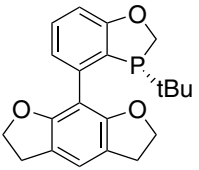
(S)-3-(tert-Butyl)-4-(2-methoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)
$C_{18}H_{21}O_2P$; FW: 300.12; White to off-white solid
air sensitive
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

100mg
500mg

Technical Note:
1. See 15-6878 (page 32)

15-6290 NEW

(R)-3-(tert-Butyl)-4-(2,3,5,6-tetrahydrobenzo[1,2-b:5,4-b']difuran-8-yl)-2,3-dihydrobenzo[d][1,3] oxaphosphole, 97% (>99% ee) *(1835717-07-1)*
$C_{21}H_{23}O_3P$; FW: 354.39; white pwdr.
air sensitive
Note: Sold in collaboration with Zejun for research purposes only. Patents: ZL2013105048267, CN104558038.

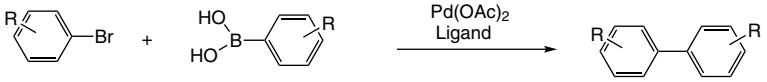


50mg
250mg

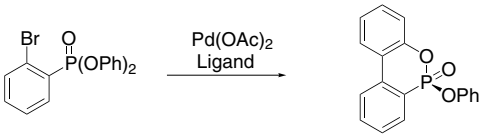
Technical Notes:
1. Ligand/palladium catalyst for general Suzuki-Miyaura borylation reactions.
2. Ligand/palladium catalyst for Cyclization.
3. Ligand/palladium catalyst for general and sterically demanding Suzuki-Miyaura cross-coupling reactions.
4. Ligand/palladium catalyst for sterically demanding Buchwald-Hartwig amination.
5. Ligand/palladium catalyst for asymmetric Suzuki-Miyaura cross-coupling reactions.
6. Ligand/nickel catalyst for asymmetric intramolecular/intremolecular reductive cyclization.
7. Ligand/rhodium catalyst for asymmetric hydroboration.

PHOSPHORUS (Compounds)

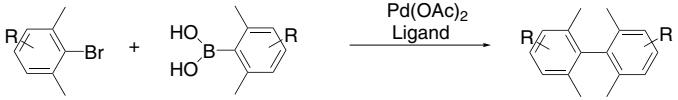
15-6290 **(R)-3-(tert-Butyl)-4-(2,3,5,6-tetrahydrobenzo[1,2-b:5,4-b']difuran-8-yl)-2,3-dihydrobenzo[d]**
(continued) **[1,3]oxaphosphole, 97% (>99% ee)** *(1835717-07-1)*



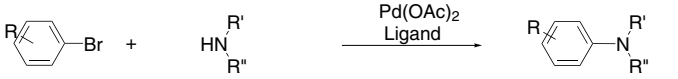
Tech. Note (1)
Ref. (1)



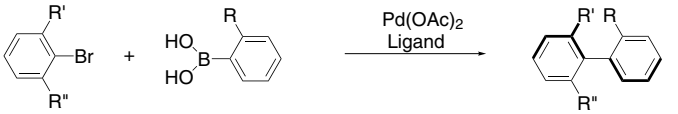
Tech. Note (2)
Ref. (2)



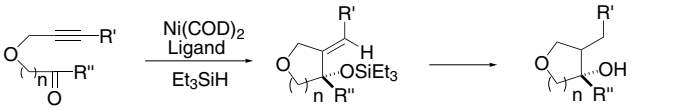
Tech. Note (3)
Ref. (3)



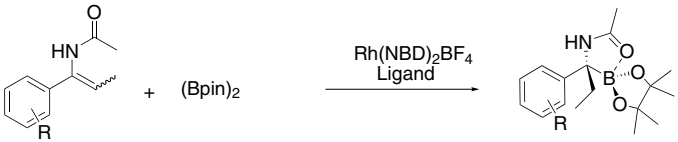
Tech. Note (4)
Ref. (4)



Tech. Note (5)
Ref. (5,6)



Tech. Note (6)
Ref. (6,7)



Tech. Note (7)
Ref. (8)

References:

1. *Angew. Chem., Int. Ed.* **2010**, *49*, 5879-5883.
2. *Org. Chem. Front.* **2015**, *2*, 1342-1345.
3. *Chem. Eur. J.* **2013**, *19*, 2261-2265.
4. *Adv. Syn. Cat.* **2011**, *353*, 533-537.
5. *Org. Lett.* **2012**, *14* , 2258–2261.
6. *J. Am. Chem. Soc.*, **2014**, *136*, 570–573.
7. *Angew. Chem., Int. Ed.* **2015**, *54*, 7144-7148.
8. *Angew. Chem., Int. Ed.* **2015**, *54*, 2520 -2524.
9. *J. Am. Chem. Soc.* **2015**, *137*, 6746-6749.

15-6295 **(S)-3-(tert-Butyl)-4-(2,3,5,6-tetrahydrobenzo[1,2-b:5,4-b']difuran-8-yl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)** 50mg 250mg

NEW

$C_{21}H_{23}O_3P$; FW: 354.39; white pwdr.

air sensitive

Note: Sold in collaboration with Zejun for research purposes only.

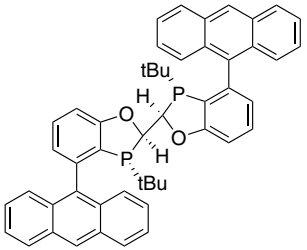
Patents: ZL2013105048267, CN104558038.

Technical Note:

1. See 15-6290 (page 34)

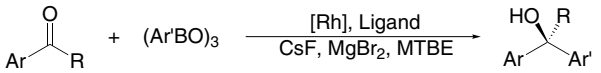
PHOSPHORUS (Compounds)

15-1970 **(2R,2'R,3R,3'R)-4,4'-Di(anthracen-9-yl)-3,3'-di-t-butyl-2,2',3,3'-tetrahydro-2,2'-bibenzo[d][1,3]oxaphosphole, min 98% (>90% ee), [(2R,2'R,3R,3'R)-WingPhos]** *(1884680-45-8)*
$C_{50}H_{44}O_2P_2$; FW: 738.83; light yellow pwdr.
air sensitive, (store cold)
Note: Sold in collaboration with Zejun for research purposes only. Patents ZL201310020371.1, CN 201610056390.



25mg
100mg
500mg

Technical Note:
1. Ligand for rhodium-catalyzed enantioselective addition of arylboroxines to simple aryl ketones.



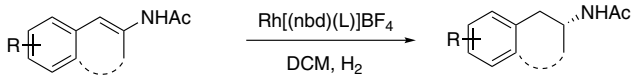
Tech. Note (1)
Ref. (1)

References:
1. *Angew. Chem.Int Ed.*, **2016,** *55,* 4527.

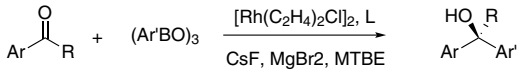
15-1975 **(2S,2'S,3S,3'S)-4,4'-Di(anthracen-9-yl)-3,3'-di-t-butyl-2,2',3,3'-tetrahydro-2,2'-bibenzo[d][1,3]oxaphosphole, min 98%, (>99% ee), [(2S,2'S,3S,3'S)-WingPhos]** *(1435940-19-4)*
$C_{50}H_{44}O_2P_2$; FW: 738.83; light yellow pwdr.
air sensitive, (store cold)
Note: Sold in collaboration with Zejun for research purposes only.
Patents ZL201310020371.1, CN 201610056390.

25mg
100mg
500mg

Technical Notes:
1. Ligand/Rhodium catalyst for asymmetric hydrogenation.
2. Ligand/Rhodium catalyst for asymmetric arylboronic reagents addition to aryl ketones.



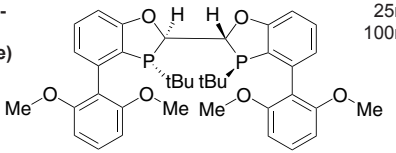
Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)

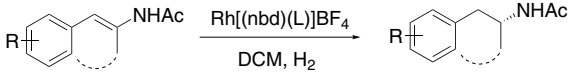
References:
1. *Angew. Chem.Int.Ed.,* **2013**, *52*, 4235.
2. *Angew. Chem.Int Ed.*, **2016,** *55,* 4527.

15-6240 NEW **(2R,2'R,3R,3'R)-3,3'-Di-tert-butyl-4,4'-bis(2,6-dimethoxyphenyl)-2,2',3,3'-tetrahydro-2,2'-bibenzo[d][1,3]oxaphosphole, 97% (>99% ee) (2R,2'R,3R,3'R)-Bis-BIDIME** *(1884680-48-1)*
$C_{38}H_{44}O_6P_2$; FW: 658.70; White xtl.
Note: Sold in collaboration with Zejun for research purposes only.
Patents: ZL2013105048267, CN104558038.

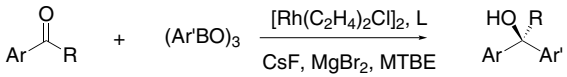


25mg
100mg

Technical Notes:
1. Ligand/Rhodium catalyst for asymmetric hydrogenation of enamides.
2. Ligand/Rhodium catalyst for asymmetric arylboronic reagents addition to aryl ketones.



Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2,3)

References:
1. *Angew. Chem., Int. Ed.* **2013**, *52*, 4235.
2. *Angew. Chem., Int. Ed.* **2016**, *55*, 4527.
3. *Adv. Syn. Cat.* **2013**, *355*, 1297.

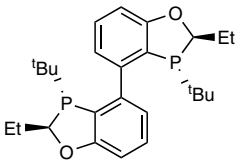
PHOSPHORUS (Compounds)

15-6245 NEW — **(2S,2'S,3S,3'S)-3,3'-Di-tert-butyl-4,4'-bis(2,6-dimethoxyphenyl)-2,2',3,3'-tetrahydro-2,2'-bibenzo[d][1,3]oxaphosphole, 97% (>99% ee) (2S,2'S,3S,3'S)-Bis-BIDIME** *(1435940-21-8)* — 25mg, 100mg

$C_{38}H_{44}O_6P_2$; FW: 658.70; white xtl.
Note: Sold in collaboration with Zejun for research purposes only.
Patents: ZL2013105048267, CN104558038.

Technical Note:
1. See 15-6240 (page 36)

15-6440 NEW — **(2R,2'R,3R,3'R)-3,3'-Di-tert-butyl-2,2'-diethyl-2,2',3,3'-tetrahydro-4,4'-bibenzo[d][1,3]oxaphosphole, min. 97% (99% ee) (2R,2'R,3R,3'R)-DI-Et-BABIBOP** — 25mg, 100mg

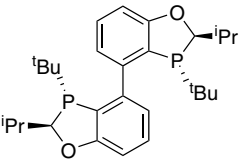


$C_{26}H_{36}O_2P_2$; FW: 442.51; white to off-white solid
air sensitive, (store cold)
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

15-6425 NEW — **(2S,2'S,3S,3'S)-3,3'-Di-tert-butyl-2,2'-diethyl-2,2',3,3'-tetrahydro-4,4'-bibenzo[d][1,3]oxaphosphole, min. 97% (99% ee) (2S,2'S,3S,3'S)-DI-Et-BABIBOP** — 25mg, 100mg

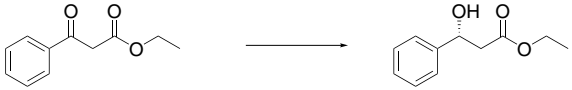
$C_{26}H_{36}O_2P_2$; FW: 442.51; white to off-white solid
air sensitive, (store cold)
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

15-6445 NEW — **(2R,2'R,3R,3'R)-3,3'-Di-tert-butyl-2,2'-diisopropyl-2,2',3,3'-tetrahydro-4,4'-bibenzo[d][1,3]oxaphosphole, min. 97% (99% ee) (2R,2'R,3R,3'R)-DI-iPr-BABIBOP** *(2214207-75-5)* — 25mg, 100mg



$C_{28}H_{40}O_2P_2$; FW: 470.57; white to off-white solid
air sensitive, (store cold)
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

Technical Note:
1. Ligand used in palladium-catalyzed asymmetric hydrogenation.



Tech. Note (1)
Ref. (1)

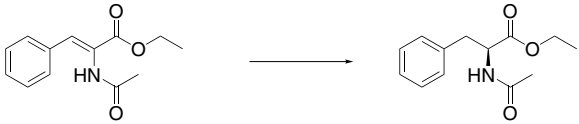
References:
1. *Chi. J. Chem.*, **2018**, *36*, 153-156.

15-6430 NEW — **(2S,2'S,3S,3'S)-3,3'-Di-tert-butyl-2,2'-diisopropyl-2,2',3,3'-tetrahydro-4,4'-bibenzo[d][1,3]oxaphosphole, min. 97% (99% ee) (2S,2'S,3S,3'S)-DI-iPr-BABIBOP** *(2207601-12-3)* — 25mg, 100mg

$C_{28}H_{40}O_2P_2$; FW: 470.57; white to off-white solid
air sensitive, (store cold)
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

Technical Notes:
1. Ligand used for copper-catalyzed asymmetric hydrogenation of 2-substituted ketones.
2. Ligand used for rhodium catalyst for asymmetric hydrogenation enamides.

Tech. Note (1)
Ref. (1)



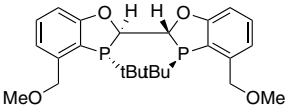
Tech. Note (2)
Ref. (2)

References:
1. *Chem. Sci.*, **2018**, *9*, 4505-4510.
2. *Org. Lett*, **2018**, *20*, 1725-1729.

PHOSPHORUS (Compounds)

15-6250 NEW

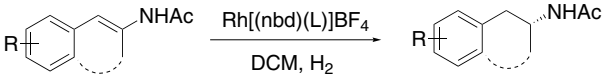
(2R,2'R,3R,3'R)-3,3'-Di-tert-butyl-4,4'-dimethoxy-2,2',3,3'-tetrahydro-2,2'-bibenzo[d][1,3]oxaphosphole, 97% (>99% ee) (2R,2'R,3R,3'R)-MeO-BIBOP *(1228758-57-3)*
$C_{24}H_{32}O_4P_2$; FW: 446.46; white pwdr.
Note: Sold in collaboration with Zejun for research purposes only. Patents: ZL2013105048267, CN104558038.



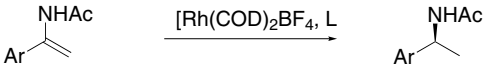
25mg
100mg

Technical Notes:

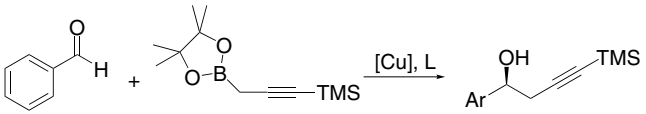
1. Ligand/Rhodium catalyst for asymmetric hydrogenation of enamides.
2. Ligand/Rhodium catalyst for asymmetric arylboronic reagents addition to aryl ketones.
3. Ligand/Copper catalyst for asymmetric addition.
4. Ligand/Rhodium catalyst for asymmetric hydrogenation.
5. Ligand/Rhodium catalyst for asymmetric hydroformylation.



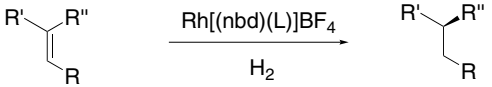
Tech. Note (1)
Ref. (1)



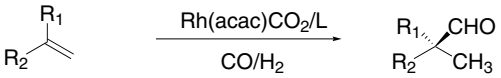
Tech. Note (2)
Ref. (2)



Tech. Note (3)
Ref. (3)



Tech. Note (4)
Ref. (4)



Tech. Note (5)
Ref. (5)

References:

1. *Angew. Chem., Int. Ed*. **2013**, *52*, 4235.
2. *Org. Process Res. Dev.,* **2013**, *17*, 1061.
3. *J. Am. Chem. Soc.* **2010**, *132*, 7600.
4. *Org. Lett.* **2010**, *12*, 176.
5. *Org. Lett.* **2016**, *18*, 3346.

15-6255 NEW

(2S,2'S,3S,3'S)-3,3'-Di-tert-butyl-4,4'-dimethoxy-2,2',3,3'-tetrahydro-2,2'-bibenzo[d][1,3]oxaphosphole, 97% (>99% ee) (2S,2'S,3S,3'S)-MeO-BIBOP *(1202033-19-9)*
$C_{24}H_{32}O_4P_2$; FW: 446.46; white pwdr.
Note: Sold in collaboration with Zejun for research purposes only. Patents: ZL2013105048267, CN104558038.

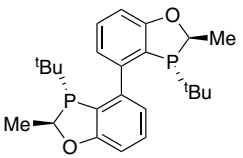
25mg
100mg

Technical Note:

1. See 15-6250 (page 38)

15-6435 NEW

(2R,2'R,3R,3'R)-3,3'-Di-tert-butyl-2,2'-dimethyl-2,2',3,3'-tetrahydro-4,4'-bibenzo[d][1,3]oxaphosphole, min. 97% (99% ee) (2R,2'R,3R,3'R)-DI-Me-BABIBOP *(2214207-74-4)*
$C_{24}H_{32}O_2P_2$; FW: 414.46; white to off-white solid
air sensitive, (store cold)
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.



25mg
100mg

Technical Note:

1. See 15-6445 (page 37)

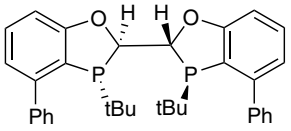
PHOSPHORUS (Compounds)

15-6420 NEW — 25mg, 100mg

(2S,2'S,3S,3'S)-3,3'-Di-tert-butyl-2,2'-dimethyl-2,2',3,3'-tetrahydro-4,4'-bibenzo[d][1,3]oxaphosphole, min. 97% (99% ee)
(2S,2'S,3S,3'S)-DI-Me-BABIBOP *(2207601-10-1)*
$C_{24}H_{32}O_2P_2$; FW: 414.46; white to off-white solid
air sensitive, (store cold)
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

Technical Note:
1. See 15-6430 (page 37)

15-6260 NEW — 25mg, 100mg



(2R,2'R,3R,3'R)-3,3'-Di-tert-butyl-4,4'-diphenyl-2,2',3,3'-tetrahydro-2,2'-bibenzo[d][1,3]oxaphosphole, 97% (>99% ee)
(2R,2'R,3R,3'R)-Ph-BIBOP
$C_{34}H_{36}O_2P_2$; FW: 538.60; light yellow xtl.
air sensitive, light sensitive, moisture sensitive
Note: Sold in collaboration with Zejun for research purposes only.
Patents: ZL2013105048267, CN104558038.

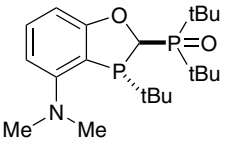
Technical Notes:
1. See 15-6240 (page 36)

15-6265 NEW — 25mg, 100mg

(2S,2'S,3S,3'S)-3,3'-Di-tert-butyl-4,4'-diphenyl-2,2',3,3'-tetrahydro-2,2'-bibenzo[d][1,3]oxaphosphole, 97% (>99% ee) (2S,2'S,3S,3'S)-Ph-BIBOP *(1202033-21-3)*
$C_{34}H_{36}O_2P_2$; light yellow xtl.
air sensitive
Note: Sold in collaboration with Zejun for research purposes only.
Patents: ZL2013105048267, CN104558038.

Technical Note:
1. See 15-6240 (page 36)

15-6330 NEW — 100mg, 500mg



racemic-Di-tert-butyl(3-(tert-butyl)-4-(dimethylamino)-2,3-dihydrobenzo[d][1,3]oxaphosphol-2-yl)phosphine oxide, 97% *(1788085-47-1)*
$C_{21}H_{37}NO_2P_2$; FW: 397.48; white pwdr.
air sensitive
Note: Sold in collaboration with Zejun for research purposes only. Patents: ZL2013105048267, CN104558038.

Technical Notes:
1. Ligand/palladium catalyst for aryl-alkyl Suzuki-Miyaura cross-coupling reactions with ArBr.
2. Ligand/palladium catalyst for aryl-alkyl Suzuki-Miyaura cross-coupling reactions with ArOTf.

Tech. Note (1)
Ref. (1)

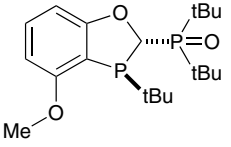
Tech. Note (2)
Ref. (2)

References:
1. *Angew. Chem., Int. Ed.* **2015**, *54*, 3792-3796.
2. *Org. Biomol. Chem.,* **2017***,15,* 9903-9909.

PHOSPHORUS (Compounds)

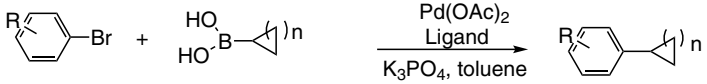
15-6325 NEW

racemic-Di-tert-butyl(3-(tert-butyl)-4-methoxy-2,3-dihydrobenzo[d][1,3]oxaphosphol-2-yl)phosphine oxide, 97% *(1788085-46-0)*
$C_{20}H_{34}O_3P_2$; FW: 384.43; white xtl.
air sensitive
Note: Sold in collaboration with Zejun for research purposes only. Patents: ZL2013105048267, CN104558038.



100mg
500mg

Technical Notes:
1. Ligand/palladium catalyst for aryl-alkyl Suzuki-Miyaura cross-coupling reactions with ArBr.
2. Ligand/palladium catalyst for aryl-alkyl Suzuki-Miyaura cross-coupling reactions with ArOTf.



Tech. Note (1)
Ref. (1)

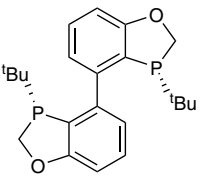
Tech. Note (1)
Ref. (2)

Tech. Note (2)
Ref. (3)

References:
1. *Org. Chem. Front.* **2014**, *1*, 225-229.
2. *Angew. Chem., Int. Ed.* **2015**, *54*, 3792-3796.
3. *Org. Biomol. Chem.* DOI: 10.1039/c7ob0253.

15-6415 NEW

(3R,3'R)-3,3'-Di-tert-butyl-2,2',3,3'-tetrahydro-4,4'-bibenzo[d][1,3]oxaphosphole, min. 97% (99% ee) (3R,3'R)-BABIBOP *(2214207-73-3)*
$C_{22}H_{28}O_2P_2$; FW: 386.41; white to off-white solid
air sensitive, (store cold)
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.



25mg
100mg

Technical Note:
1. See 15-6445 (page 37)

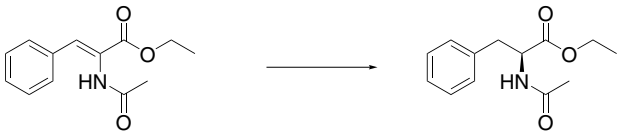
15-6410 NEW

(3S,3'S)-3,3'-Di-tert-butyl-2,2',3,3'-tetrahydro-4,4'-bibenzo[d][1,3] oxaphosphole, min. 97% (99% ee) (3S,3'S)-BABIBOP *(2207601-04-3)*
$C_{22}H_{28}O_2P_2$; FW: 386.41; white to off-white solid
air sensitive, (store cold)
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

25mg
100mg

Technical Notes:
1. Ligand used in copper-catalyzed asymmetric hydrogenation of 2-substituted ketones.
2. Ligand used in rhodium catalyst for asymmetric hydrogenation enamides.
3. Ligand used in palladium-catalyzed asymmetric hydrogenation.

Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)

PHOSPHORUS (Compounds)

15-6410 ***(continued)*** **(3S,3'S)-3,3'-Di-tert-butyl-2,2',3,3'-tetrahydro-4,4'-bibenzo[d][1,3]oxaphosphole, min. 97% (99% ee) (3S,3'S)-BABIBOP** *(2207601-04-3)*

Tech. Note (3)
Ref. (3)

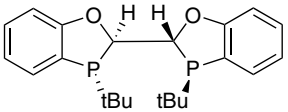
References:

1. *Chem. Sci.*, **2018**, *9*, 4505-4510.
2. *Org. Lett*, **2018**, *20*, 1725-1729.
3. *Chi. J. Chem.*, **2018**, *36*, 153-156.

15-6275

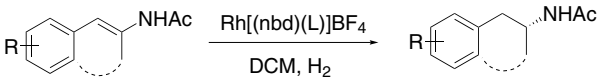
NEW

(2R,2'R,3R,3'R)-3,3'-Di-tert-butyl-2,2',3,3'-tetrahydro-2,2'-bibenzo[d][1,3]oxaphosphole, 97% (>99% ee) (2R,2'R,3R,3'R)-BIBOP *(1610785-35-7)*
$C_{22}H_{28}O_2P_2$; FW: 386.40; white pwdr.
air sensitive
Note: Sold in collaboration with Zejun for research purposes only.
Patents: ZL2013105048267, CN104558038.

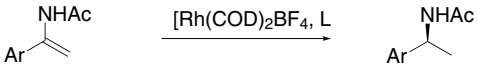


25mg
100mg

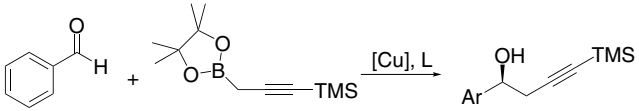
Technical Notes:
1. Ligand/Rhodium catalyst for asymmetric hydrogenation of enamides.
2. Ligand/Rhodium catalyst for asymmetric arylboronic reagents addition to aryl ketones.
3. Ligand/Copper catalyst for asymmetric addition.
4. Ligand/Rhodium catalyst for asymmetric hydrogenation.
5. Ligand/Rhodium catalyst for asymmetric hydroformylation.



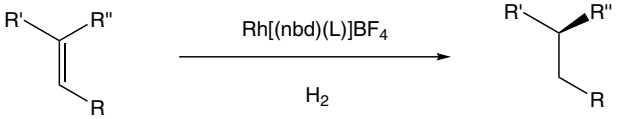
Tech. Note (1)
Ref. (1)



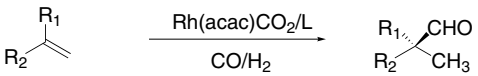
Tech. Note (2)
Ref. (2)



Tech. Note (3)
Ref. (3)



Tech. Note (4)
Ref. (4)



Tech. Note (5)
Ref. (5)

References:

1. *Angew. Chem., Int. Ed.* **2013**, *52*, 4235.
2. *Org. Process Res. Dev.*, **2013**, *17*, 1061.
3. *J. Am. Chem. Soc.* **2010**, *132*, 7600.
4. *Org. Lett.* **2010**, *12*, 176.
5. *Org. Lett.* **2016**, *18*, 3346.

15-6270

NEW

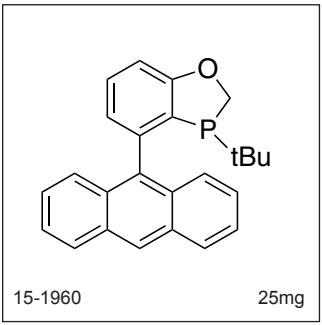
(2S,2'S,3S,3'S)-3,3'-Di-tert-butyl-2,2',3,3'-tetrahydro-2,2'-bibenzo[d][1,3] oxaphosphole, 97% (>99% ee) (2S,2'S,3S,3'S)-BIBOP *(1202033-17-7)*
$C_{22}H_{28}O_2P_2$; FW: 386.40; white pwdr.
air sensitive
Note: Sold in collaboration with Zejun for research purposes only.
Patents: ZL2013105048267, CN104558038.

25mg
100mg

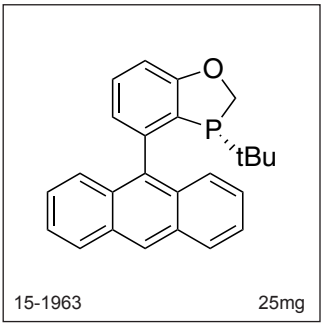
Technical Note:
1. See 15-6275 (page 41)

KITS - AntPhos and WingPhos Kit

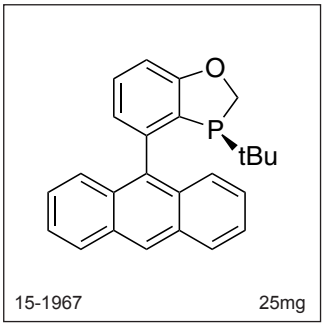
96-3810 **AntPhos and WingPhos Kit**
Sold in collaboration with Zejun for research purposes only.
Patents ZL201310020371.1, CN 201610056390.
Components also available for individual sale.
Contains the following:



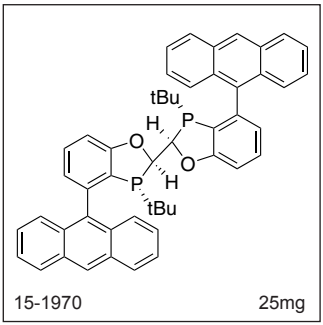
15-1960 25mg



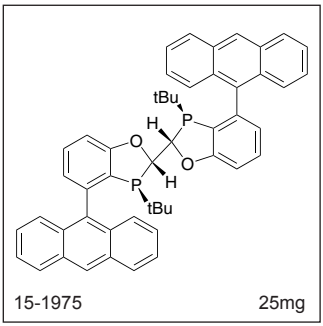
15-1963 25mg



15-1967 25mg



15-1970 25mg



15-1975 25mg

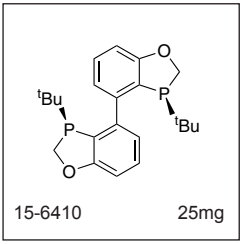
15-1960	4-(Anthracen-9-yl)-3-(t-butyl-2,3-dihydrobenzo[d][1,3] oxaphosphole, 98+% rac-AntPhos *(1268693-24-8)*	25mg	See page 17
15-1963	(R)-4-(Anthracen-9-yl)-3-(t-butyl-2,3-dihydrobenzo[d][1,3] oxaphosphole,98+% (>99% ee) [(R)-AntPhos] *(1456816-37-7)*	25mg	See page 17
15-1967	(S)-4-(Anthracen-9-yl)-3-(t-butyl-2,3-dihydrobenzo[d][1,3] oxaphosphole,99+% (>99% ee) [(S)-AntPhos] *(1807740-34-6)*	25mg	See page 18
15-1970	(2R,2'R,3R,3'R)-4,4'-Di(anthracen-9-yl)-3,3'-di-t-butyl-2,2',3,3'-tetrahydro-2,2'-bibenzo[d][1,3]oxaphosphole, min 98% (>90% ee), [(2R,2'R,3R,3'R)-WingPhos] *(1884680-45-8)*	25mg	See page 36
15-1975	(2S,2'S,3S,3'S)-4,4'-Di(anthracen-9-yl)-3,3'-di-t-butyl-2,2',3,3'-tetrahydro-2,2'-bibenzo[d][1,3]oxaphosphole, min 98%, (>99% ee), [(2S,2'S,3S,3'S)-WingPhos] *(1435940-19-4)*	25mg	See page 36

KITS - BABIBOP Ligand Kit

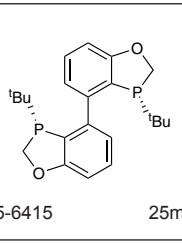
96-0660 **BABIBOP Ligand Kit**

NEW

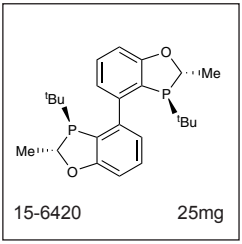
Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.
Components also available for individual sale.
Contains the following:



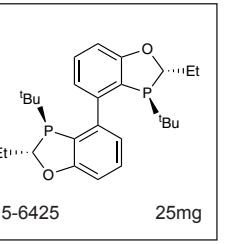
15-6410 25mg



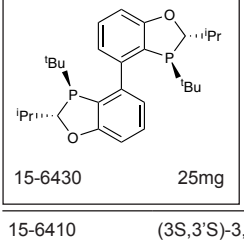
15-6415 25mg



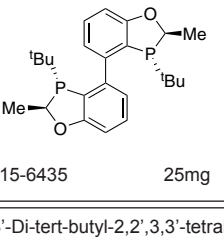
15-6420 25mg



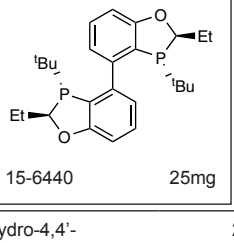
15-6425 25mg



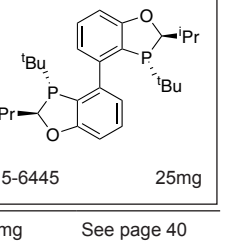
15-6430 25mg



15-6435 25mg



15-6440 25mg



15-6445 25mg

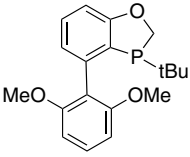
15-6410	(3S,3'S)-3,3'-Di-tert-butyl-2,2',3,3'-tetrahydro-4,4'-bibenzo[d][1,3]oxaphosphole, min. 97% (99% ee) (3S,3'S)-BABIBOP *(2207601-04-3)*	25mg	See page 40
15-6415	(3R,3'R)-3,3'-Di-tert-butyl-2,2',3,3'-tetrahydro-4,4'-bibenzo[d][1,3]oxaphosphole, min. 97% (99% ee) (3R,3'R)-BABIBOP *(2214207-73-3)*	25mg	See page 40
15-6420	(2S,2'S,3S,3'S)-3,3'-Di-tert-butyl-2,2'-dimethyl-2,2',3,3'-tetrahydro-4,4'-bibenzo[d][1,3]oxaphosphole, min. 97% (99% ee) (2S,2'S,3S,3'S)-DI-Me-BABIBOP *(2207601-10-1)*	25mg	See page 39
15-6425	(2S,2'S,3S,3'S)-3,3'-Di-tert-butyl-2,2'-diethyl-2,2',3,3'-tetrahydro-4,4'-bibenzo[d][1,3]oxaphosphole, min. 97% (99% ee) (2S,2'S,3S,3'S)-DI-Et-BABIBOP	25mg	See page 37
15-6430	(2S,2'S,3S,3'S)-3,3'-Di-tert-butyl-2,2'-diisopropyl-2,2',3,3'-tetrahydro-4,4'-bibenzo[d][1,3]oxaphosphole, min. 97% (99% ee) (2S,2'S,3S,3'S)-DI-iPr-BABIBOP *(2207601-12-3)*	25mg	See page 37
15-6435	(2R,2'R,3R,3'R)-3,3'-Di-tert-butyl-2,2'-dimethyl-2,2',3,3'-tetrahydro-4,4'-bibenzo[d][1,3]oxaphosphole, min. 97% (99% ee) (2R,2'R,3R,3'R)-DI-Me-BABIBOP *(2214207-74-4)*	25mg	See page 38
15-6440	(2R,2'R,3R,3'R)-3,3'-Di-tert-butyl-2,2'-diethyl-2,2',3,3'-tetrahydro-4,4'-bibenzo[d][1,3]oxaphosphole, min. 97% (99% ee) (2R,2'R,3R,3'R)-DI-Et-BABIBOP	25mg	See page 37
15-6445	(2R,2'R,3R,3'R)-3,3'-Di-tert-butyl-2,2'-diisopropyl-2,2',3,3'-tetrahydro-4,4'-bibenzo[d][1,3]oxaphosphole, min. 97% (99% ee) (2R,2'R,3R,3'R)-DI-iPr-BABIBOP *(2214207-75-5)*	25mg	See page 37

KITS - BI-DIME Ligand Kit

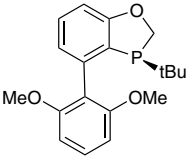
96-0650 **BI-DIME Ligand Kit**

NEW

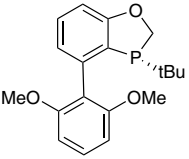
Sold in collaboration with Zejun for research purposes only.
Patents: ZL2013105048267, CN104558038.
Components also available for individual sale.
Contains the following:



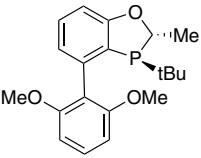
15-6205 25mg



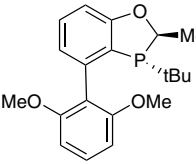
15-6210 25mg



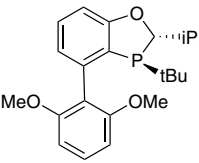
15-6211 25mg



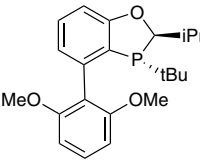
15-6220 25mg



15-6225 25mg



15-6230 25mg



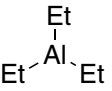
15-6235 25mg

15-6205	3-(t-Butyl)-4-(2,6-dimethoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, min. 97% rac-BI-DIME *(1246888-90-3)*	25mg	See page 26
15-6210	(S)-3-(t-Butyl)-4-(2,6-dimethoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, min. 97% (S)-BI-DIME *(1373432-09-7)*	25mg	See page 27
15-6211	(R)-3-(t-Butyl)-4-(2,6-dimethoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, min. 97% (R)-BI-DIME *(1373432-03-7)*	25mg	See page 27
15-6220	(2S,3S)-3-(t-Butyl)-4-(2,6-dimethoxyphenyl)-2-methyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, min. 97% (S,S)-Me-BI-DIME *(1373432-11-1)*	25mg	See page 29
15-6225	(2R,3R)-3-(t-Butyl)-4-(2,6-dimethoxyphenyl)-2-methyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, min. 97% (R,R)-Me-BI-DIME *(1477517-18-2)*	25mg	See page 29
15-6230	(2S,3S)-3-(t-Butyl)-4-(2,6-dimethoxyphenyl)-2-i-propyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, min. 97% (S,S)-iPr-BI-DIME *(1477517-21-7)*	25mg	See page 30

ALUMINUM (Compounds)

13-1905 NEW — **Triethylaluminum paraffin pellet** *(97-93-8)* — 2pcs, 10pcs

$C_6H_{15}Al$; FW: 114.16; paraffin pellet
air sensitive, moisture sensitive, (store cold)
Note: Developed by XiMo. Sold under license from XiMo for research purposes only.



Technical Note:

1. Safe, non-pyrophoric formulated triethyl aluminum pellet for use in treating solvent and substrate materials for metathesis reactions in order to scavenge catalyst poisoning impurities before introduction of sensitive metathesis catalysts.

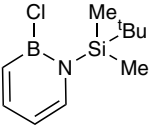
AMMONIUM (Compounds)

26-2900 — **Iron(III) ammonium sulfate dodecahydrate, min 98.5% (ACS)** *(7783-83-7)*
See page 48

BORON (Compounds)

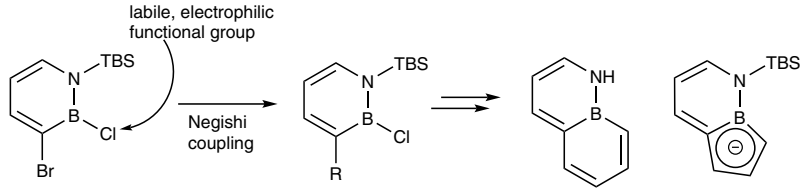
05-0150 NEW amp HAZ — **1-(tert-Butyldimethylsilyl)-2-chloro-1,2-dihydro-1,2-azaborine, 98%** *(1138164-75-6)* — 250mg, 1g

$C_{10}H_{19}BClNSi$; FW: 227.61; pale yellow to purple liq.; m.p. < -45°C; b.p. 75°C @200 mTorr
air sensitive, moisture sensitive

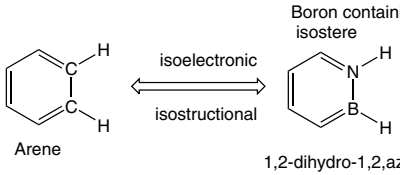


Technical Notes:

1. Functionalized azaborine compounds are potential candidates for use as therapeutic pharmaceutical agents.
2. Precursor for the synthesis of new BN-naphthalene and BN-indenyl compounds.
3. Precursor and intermediate for many other azaborines which are studied for varied applications such as organic synthesis, catalysis, hydrogen storage, optoelectronic materials, and drug discovery. Azaborines are isoelectronic analogues of benzenoid compounds/arenes.



Tech. Note (2)
Ref. (2)



Tech. Note (3)
Ref. (3)

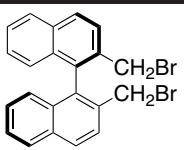
References:

1. *PCT Int. Appl.* **2015**, WO 2015160688 A1 20151022.
2. *J. Am. Chem. Soc.*, **2015**, *137* (28), 8932–8935.
3. *J. Am. Chem. Soc.,* **2018**, *140*, 1184-1194.

CARBON (Compounds)

06-0486 NEW — **(R)-2,2'-Bis(bromomethyl)-1,1'-binaphthalene, 95% (99% ee)** *(86631-56-3)* — 250mg

$C_{22}H_{16}Br_2$; FW: 440.2; white to light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.



06-0487 NEW — **(S)-2,2'-Bis(bromomethyl)-1,1'-binaphthalene, 95% (99% ee)** *(37803-02-4)* — 250mg

$C_{22}H_{16}Br_2$; FW: 440.2; white to light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.

CERIUM (Compounds)

58-5820 NEW amp

Cerium(III) iodide, anhydrous (99.99%-Ce) (REO) PURATREM *(7790-87-6)*
CeI_3; FW: 520.82; yellow beads; m.p. 750
light sensitive, moisture sensitive, hygroscopic

1g
5g
25g

COPPER (Compounds)

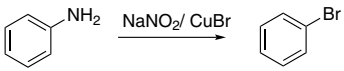
29-2907 NEW

Copper(I) bromide (99.99%-Cu) PURATREM *(7787-70-4)*
BrCu; FW: 143.45; off-white to pale-green pwdr.; m.p. 492; b.p. 1345; d. 4.98
moisture sensitive, hygroscopic

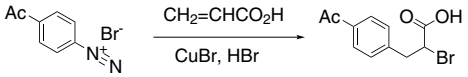
25g
100g

Technical Notes:

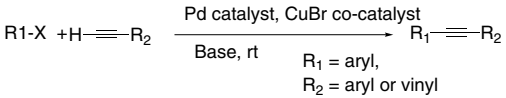
1. Used for the synthesis of organic compounds e.g. the Sandmeyer reaction.
2. Also used as a raw material to make organocopper reagents.
3. Catalyst for the Meerwein reaction, the arylation of alkenes by diazonium salts.
4. Cocatalyst in the Sonogashira coupling reaction.



Tech. Note (1)
Ref. (1)



Tech. Note (3)
Ref. (3)



Tech. Note (4)
Ref. (4)

References:

1. *Chem. Rev.*, **1947**, *40(2)*, 251-277.
2. Posner, G. H. *An Introduction to Synthesis Using Organocopper Reagents*; Wiley: New York, **1980**.
3. *J. Org. Chem.*, **1961**, *26*, 3362.
4. *J. Organomet. Chem.,* **2002**, *653 (1–2)*, 46–49.

ELECTROPOLISHED STAINLESS STEEL BUBBLERS (Vertical)

97-7000 NEW

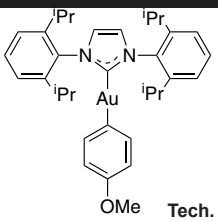
Stainless steel low volume bubbler, 7ml, vertical, electropolished with fill-port, PCTFE valve stem tip

1cyl

GOLD (Compounds)

79-0290 NEW

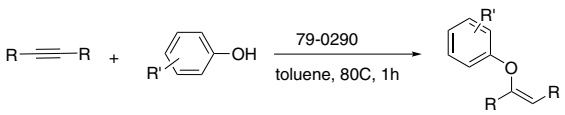
[1,3-Bis(2,6-di-isopropylphenyl)imidazol-2-ylidene] methoxyphenylgold(I), 98+%
$C_{34}H_{43}N_2OAu$; FW: 692.68



100mg
500mg

Technical Note:

1. The gold complex has been used to generate active catalytic species in the hydrophenoxylation of alkynes (see equation) and can be used to enable related transformations.



Tech. Note (1)
Ref. (1,2)

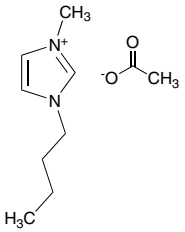
References:

1. *Beil. J. Org. Chem.* **2013**, *9*, 2002-2008.
2. *Angew. Chem. Int. Ed.* **2013**, *52*, 9767-9770.
3. *ACS Catal.* **2015**, *5*, 6918-6921.
4. *Adv. Synth. Cat.* **2016**, *358*, 3857-3862.

IONIC LIQUIDS (Compounds)

07-0720 NEW

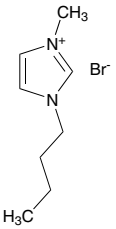
1-Butyl-3-methylimidazolium acetate, 95%, [BMIM]acetate
(284049-75-8)
$C_{10}H_{18}N_2O_2$; FW: 198.26; yellow to dark yellow viscous liq.
air sensitive, hygroscopic



10g
50g

07-0710 NEW

3-Butyl-1-methylimidazolium bromide, 98% [BMIM]Br
(85100-77-2)
$C_8H_{15}BrN_2$; FW: 219.12; white solid ; m.p. 75ºC
air sensitive, hygroscopic

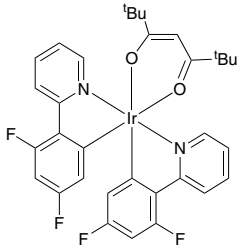


10g
50g

IRIDIUM (Compounds)

77-8030 NEW

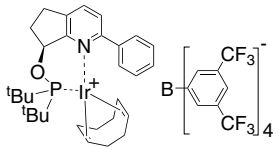
Bis[3,5-difluoro-2-(2-pyridinyl-κN)phenyl-κC] (2,2,6,6-tetramethyl-3,5-heptanedionato-κO,κO') iridium(III), min. 98% *(562099-10-9)*
$C_{33}H_{31}F_4IrN_2O_2$; FW: 755.83;
yellow to green yellow pwdr.
air sensitive, moisture sensitive
Note: Precursor for Photocatalyst Synthesis



100mg
500mg

77-5025 NEW

(S)-(-)-[(1,5-Cyclooctadien-7-(2-phenyl-6,7-dihydro-5H-[1]pyridin)-di-(tert-butyl) phosphiniteiridium(I)]tetrakis[3,5-bis(trifluoromethyl)phenyl]borate, min. 97%
(881310-39-0)
$C_{62}H_{54}BF_{24}IrNOP$; FW: 1519.16;
orange to red solid
air sensitive, moisture sensitive, (store cold)
Note: Sold in collaboration with Solvias for research purposes only.



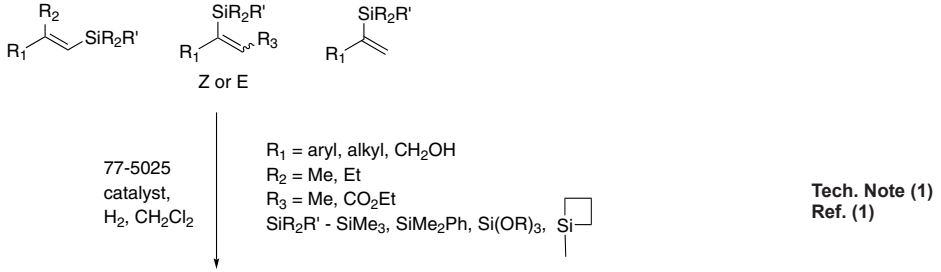
100mg
500mg

Technical Notes:

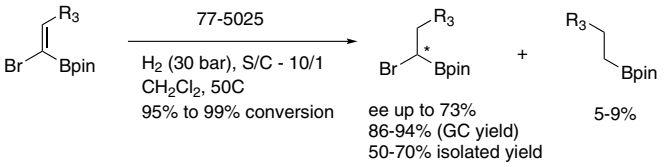
1. Iridium-Catalyzed Enantioselective Hydrogenation of Vinylsilanes.
2. Study of chemoselective asymmetric hydrogenation of (1-bromo-1-alkenyl)boronic esters with iridium–P^N complexes.

IRIDIUM (Compounds)

77-5025 **(S)-(-)-[(1,5-Cyclooctadien-7-(2-phenyl-6,7-dihydro-5H-[1]pyridin)-di-(tert-butyl) phosphiniteiridium(I)]tetrakis[3,5-bis(trifluoromethyl)phenyl]borate, min. 97%** *(881310-39-0)*
(continued)



Tech. Note (1)
Ref. (1)

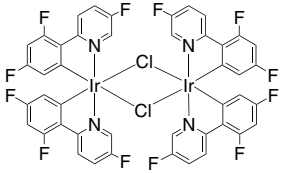


Tech. Note (2)
Ref. (2)

References:

1. *Advanced synthesis and catalysis*, **2017**, *359 (15)*, 2523-2529.
2. *Tetrahedron*, **2014**, *70 (16),* 2654-2660.

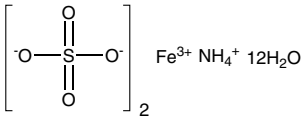
77-0355 **Di-μ-chlorotetrakis[3,5-difluoro-2-(5-fluoro-2-pyridinyl-κN)phenyl-κC]diiridium, min. 98% (mixture of isomers)** *(849723-04-2)*
NEW
$C_{44}H_{20}Cl_2F_{12}Ir_2N_4$; FW: 1288.01;
yellow to green-yellow solid
air sensitive
Note: Precursor for Photocatalyst Synthesis



250mg
1g

IRON (Compounds)

26-2900 **Iron(III) ammonium sulfate dodecahydrate, min 98.5% (ACS)** *(7783-83-7)*
NEW
$NH_4Fe(SO_4)_2(H_2O)_{12}$; FW: 266.00 (482.19);
pale purple xtl.; m.p. 39-41
air sensitive, light sensitive, hygroscopic, (store cold)



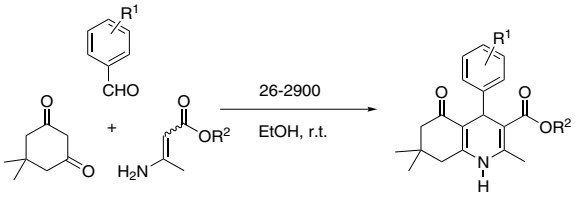
25g
100g

Technical Notes:

1. Catalyst for the preparation of 1,4-dihydropyridines. Improved conditions for the Hantzsch reaction.
2. Use of Ferric Ammonium Sulfate in Serum Cholesterol Determination.
3. Used as an indicator (argentimetric titrations) and as a mordant in dyeing and printing textiles.

IRON (Compounds)

26-2900 **Iron(III) ammonium sulfate dodecahydrate, min 98.5% (ACS)** *(7783-83-7)*
(continued)



Tech. Note (1)
Ref. (1)

References:

1. *Monatsh Chem.,* **2012**, *143*, 931.
2. *Clinical chemistry,* **1973**, *19 (1)*, 121.
3. The Merck Index, 12th Ed., Entry # 549.

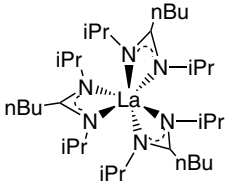
LANTHANUM (Compounds)

57-1500 **Tris(N,N'-di-i-propylpentylamidinato)lanthanum(III), 98% (99.999%-La) PURATREM** 1g 5g

NEW

amp

$C_{33}H_{69}N_6La$; FW: 688.84; off white to beige solid
air sensitive, moisture sensitive
Note: Product sold under, use subject to, terms and conditions of label license at www.strem.com/harvard2

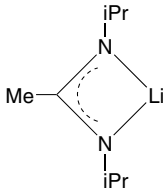


LITHIUM (Compounds)

03-8000 **(N,N'-Di-i-propylacetamidinato)lithium, min. 97% (99.99+%-Li) PURATREM** 1g 5g

NEW

$C_8H_{17}N_2Li$; FW: 148.17; off white to beige solid
air sensitive, moisture sensitive
Note: Sold in collaboration with HepatoChem.



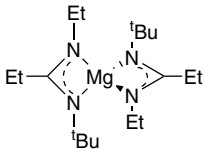
MAGNESIUM (Compounds)

12-0865 **Bis(N-t-butyl-N'-ethylpropanimidamidato)magnesium, min. 98% (99.99+%-Li) PURATREM** 1g 5g

NEW

amp

$C_{18}H_{38}MgN_4$; FW: 334.82; off-white to tan solid
air sensitive, moisture sensitive
Note: Product sold under, use subject to, terms and conditions of label license at www.strem.com/harvard2



MOLYBDENUM (Compounds)

42-0575 2pcs
10pcs

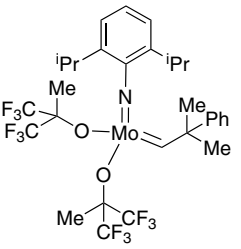
NEW

[2,6-Bis(1-methylethyl)benzenaminato(2-)] bis(1,1,1,3,3,3-hexafluoro-2-methyl-2-propanolato-κO)(2-methyl-2-phenylpropylidene)-, (T-4) molybdenum, paraffin pellet *(139220-25-0)*

$C_{30}H_{35}F_{12}MoNO_2$; FW: 763.53; paraffin pellet

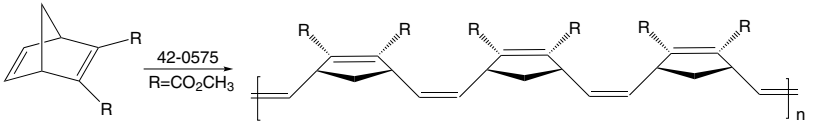
air sensitive, moisture sensitive

Note: Developed by XiMo. Sold under license from XiMo for research purposes only.

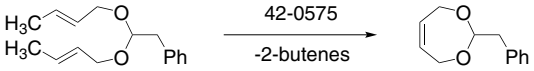


Technical Notes:

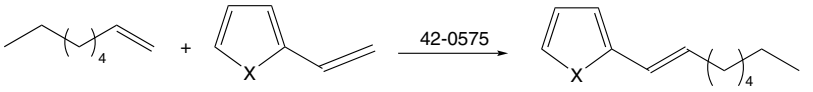
1. General metathesis of many ordinary olefins, especially terminal olefins, and will ROMP many norbornene or substituted norbornadiene monomers to give all cis, and often isotactic, polymers.
2. Useful for the "ring-closing" of dienes or the coupling of terminal olefins.
3. Highly active and most commonly used in cross metathesis of alphatic alkenes with 2-vinyl aromatics.



Tech. Note (1)
Ref. (1,2)



Tech. Note (2)
Ref. (3,4)



Tech. Note (3)
Ref. (6)

References:

1. *J. Am. Chem. Soc.,* **1994**, *116*, 3414.
2. *J. Am. Chem. Soc*., **1993**, *115*, 4413.
3. *J. Am. Chem. Soc*., **1992**, *114*, 5426.
4. *J. Am. Chem. Soc*., **1992**, *114*, 7324.
5. *Tetrahedron*, **1998**, *54*, 4413. (review article)
6. *J. Mol. Catal. Chem*., **2002**, *190*, 45.

42-0530 100mg
500mg

NEW

amp

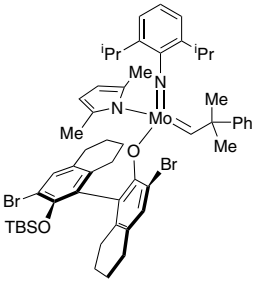
[2,6-Bis(1-methylethyl)benzenaminato(2-)][(1R)-3,3'-dibromo-2'-[[(1,1-dimethylethyl)dimethylsilyl] oxy]-5,5',6,6',7,7',8,8'-octahydro[1,1'-binaphthalen]-2-olato-kO](2,5-dimethyl-1H-pyrrol-1-yl) (2-methyl-2-phenylpropylidene) molybdenum (VI) *(1103220-99-0)*

$C_{54}H_{70}Br_2MoN_2O_2Si$; FW: 1063; orange pwdr.

air sensitive, moisture sensitive

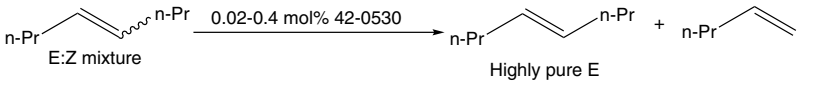
Note: Developed by XiMo. Sold under license from XiMo for research purposes only.

Patents: U.S. 9,687,834, EP2242578.



Technical Notes:

1. Catalyst used in Z-selective cross metathesis.
2. Catalyst used in enantio- or diastereo-selective ene-yne ring closing metathesis.

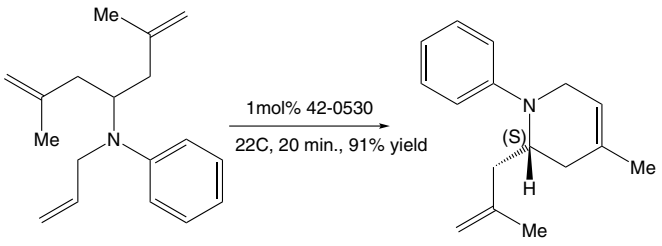


Tech. Note (1)
Ref. (2)

MOLYBDENUM (Compounds)

42-0530 *(continued)*

[2,6-Bis(1-methylethyl)benzenaminato(2-)][(1R)-3,3'-dibromo-2'-[[(1,1-dimethylethyl) dimethylsilyl]oxy]-5,5',6,6',7,7',8,8'-octahydro[1,1'-binaphthalen]-2-olato-kO](2,5-dimethyl-1H-pyrrol-1-yl)(2-methyl-2-phenylpropylidene) molybdenum (VI) *(1103220-99-0)*



e.e. 93% (S)

Tech. Note (2)
Ref. (1)

References:

1. *Nature*, **2008**, *456*, 933-937.
2. *J. Am. Chem. Soc.*, **2011**, *133*, 11512.
3. *J. Am. Chem. Soc.*, **2009**, *131*, 10652.
4. *Org. Process Res. & Dev.*, **2016**, *20*, 1709.

42-0535 NEW

[2,6-Bis(1-methylethyl)benzenaminato(2-)][(1R)-3,3'-dibromo-2'-[[(1,1-dimethylethyl)dimethylsilyl]oxy]-5,5',6,6',7,7',8,8'-octahydro[1,1'-binaphthalen]-2-olato-kO](2,5-dimethyl-1H-pyrrol-1-yl)(2-methyl-2-phenylpropylidene) molybdenum (VI), paraffin pellets *(75980-60-8)*

2pcs
10pcs

$C_{54}H_{70}Br_2MoN_2O_2Si$; FW: 1063; paraffin pellet
air sensitive, moisture sensitive, (store cold)
Note: Developed by XiMo. Sold under license from XiMo for research purposes only.
Patents: U.S. 9,687,834, EP2242578.

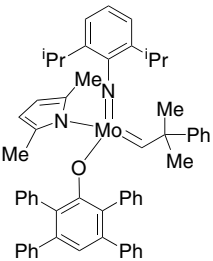
Technical Note:

1. See 42-0530 (page 50)

42-0510 NEW amp

[2,6-Bis(1-methylethyl)benzenaminato(2-)] (2,5-dimethyl-1H-pyrrol-1-yl) (4',6'-diphenyl[1,1':3',1''-terphenyl]-2'-olato) (2-methyl-2-phenylpropylidene) molybdenum(VI) *(1572180-69-8)*

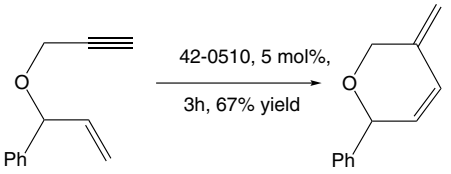
100mg
500mg



$C_{58}H_{58}MoN_2O$; FW: 895.05; orange powdr.
air sensitive, moisture sensitive, (store cold)
Note: Developed by XiMo. Sold under license from XiMo for research purposes only.
Patents: US20140309466, WO14139679.

Technical Note:

1. Catalyst for general metathesis reactions including cross metathesis and ring closing metathesis.



>98% endo product

Tech. Note (1)
Ref. (1)

References:

1. *J. Am. Chem. Soc.*, **2009**, *131*, 10652.
2. *Org. Process Res. & Dev.,* **2016**, *20*, 1709.

MOLYBDENUM (Compounds)

42-0515 NEW — 2pcs, 10pcs

[2,6-Bis(1-methylethyl)benzenaminato(2-)](2,5-dimethyl-1H-pyrrol-1-yl)(4',6'-diphenyl[1,1':3',1''-terphenyl]-2'-olato)(2-methyl-2-phenylpropylidene) molybdenum(VI) in paraffin formulated pellet

$C_{58}H_{58}MoN_2O$; FW: 895.05; paraffin pellet

air sensitive, moisture sensitive, (store cold)

Note: Developed by XiMo. Sold under license from XiMo for research purposes only.

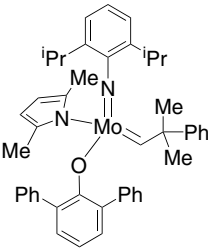
Patents: US20140309466, WO14139679.

Technical Note:

1. See 42-0510 (page 51)

42-0520 NEW amp — 100mg, 500mg

[2,6-Bis(1-methylethyl)benzenaminato(2-)](2,5-dimethyl-1H-pyrrol-1-yl)(2-methyl-2-phenylpropylidene)([1,1':3',1''-terphenyl]-2'-olato) molybdenum(VI) *(1703808-70-1)*



$C_{46}H_{50}MoN_2O$; FW: 742.86; yellow pwdr.

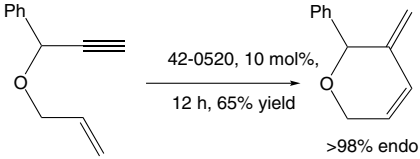
air sensitive, moisture sensitive, (store cold)

Note: Developed by XiMo. Sold under license from XiMo for research purposes only.

Patents: US20140309466, WO14139679.

Technical Note:

1. Catalyst for general metathesis reactions including cross metathesis and endo-selective ene-yne ring closing metathesis.



Tech. Note (1)
Ref. (1)

References:

1. *J. Am. Chem. Soc.*, **2009**, *131*, 10652.

42-0525 NEW — 2pcs, 10pcs

[2,6-Bis(1-methylethyl)benzenaminato(2-)](2,5-dimethyl-1H-pyrrol-1-yl)(2-methyl-2-phenylpropylidene)([1,1':3',1''-terphenyl]-2'-olato) molybdenum(VI), paraffin formulated pellet *(1703808-70-1)*

$C_{46}H_{50}MoN_2O$; FW: 742.86; paraffin pellet

air sensitive, moisture sensitive, (store cold)

Note: Developed by XiMo. Sold under license from XiMo for research purposes only.

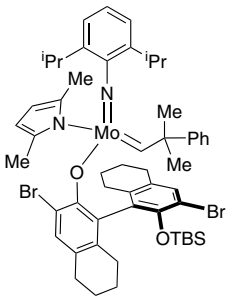
Patents: US20140309466, WO14139679.

Technical Note:

1. See 42-0520 (page 52)

42-0560 NEW amp — 100mg, 500mg

(S)-1-((3,3'-Dibromo-2'-((tert-butyldimethylsilyl)oxy)-5,5',6,6',7,7',8,8'-octahydro-[1,1'-binaphthalen]-2-yl)oxy)-N-(2,6-diisopropylphenyl)-1-(2,5-dimethyl-1H-pyrrol-1-yl)-1-(2-methyl-2-phenylpropylidene) molybdenum (VI) *(1196674-83-5)*



$C_{54}H_{70}Br_2MoN_2O_2Si$; FW: 1063; red pwdr.

air sensitive, moisture sensitive, (store cold)

Note: Developed by XiMo. Sold under license from XiMo for research purposes only.

Patents: U.S. 9,687,834, EP2242578.

Technical Notes:

1. Z-selective cross metathesis.
2. Enantio- or diasatereoselective en-yne ring closing metathesis.

References:

1. *Nature*, **2008**, *456*, 933-937.
2. *J. Am. Chem. Soc.*, **2011**, *133*, 11512.
3. *J. Am. Chem. Soc.*, **2009**, *131*, 10652.

MOLYBDENUM (Compounds)

42-0565 NEW

(S)-1-((3,3'-Dibromo-2'-((tert-butyldimethylsilyl)oxy)-5,5',6,6',7,7',8,8'-octahydro-[1,1'-binaphthalen]-2-yl)oxy)-N-(2,6-diisopropylphenyl)-1-(2,5-dimethyl-1H-pyrrol-1-yl)-1-(2-methyl-2-phenylpropylidene)molybdenum (VI) paffin pellets *(1196674-83-5)*
$C_{54}H_{70}Br_2MoN_2O_2Si$; FW: 1063; paffin pellet
air sensitive, moisture sensitive, (store cold)
Note: Developed by XiMo. Sold under license from XiMo for research purposes only.
Patents: U.S. 9,687,834, EP2242578.

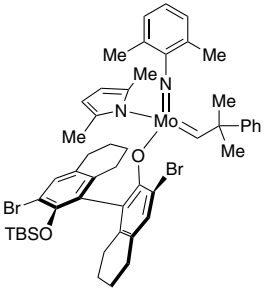
2pcs
10pcs

Technical Note:
1. See 42-0560 (page 52)

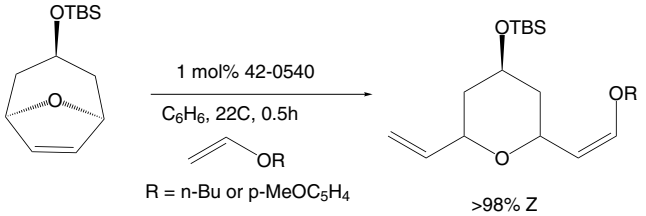
42-0540 NEW amp

(R)-1-((3,3'-Dibromo-2'-((tert-butyldimethylsilyl) oxy)-5,5',6,6',7,7',8,8'-octahydro-[1,1'-binaphthalen]-2-yl)oxy)-1-(2,5-dimethyl-1H-pyrrol-1-yl)-N-(2,6-dimethylphenyl)-1-(2-methyl-2-phenylpropylidene)molybdenum (VI) *(1300026-28-1)*
$C_{50}H_{62}Br_2MoN_2O_2Si$; FW: 1006.89; orange pwdr.
air sensitive, moisture sensitive, (store cold)
Note: Developed by XiMo. Sold under license from XiMo for research purposes only.
Patents: U.S. 9,687,834, EP2242578.

100mg
500mg



Technical Note:
1. Catalyst used for:
   a. Enantio-selective ring opening/cross metathesis.
   b. Ring closing metathesis.
   c. Enantio- and endo-selective ene-yne ring closing metathesis.



Tech. Note (1)
Ref. (2)

References:
1. *Nature*, **2011**, *471*, 461-466.
2. *J. Am. Chem. Soc.*, **2012**, *134*, 2788-2799.

42-0545 NEW

(R)-1-((3,3'-Dibromo-2'-((tert-butyldimethylsilyl)oxy)-5,5',6,6',7,7',8,8'-octahydro-[1,1'-binaphthalen]-2-yl)oxy)-1-(2,5-dimethyl-1H-pyrrol-1-yl)-N-(2,6-dimethylphenyl)-1-(2-methyl-2-phenylpropylidene)molybdenum (VI) paffin pellets *(1300026-28-1)*
$C_{50}H_{62}Br_2MoN_2O_2Si$; FW: 1006.89; paffin pellet
air sensitive, moisture sensitive, (store cold)
Note: Developed by XiMo. Sold under license from XiMo for research purposes only.
Patents: U.S. 9,687,834, EP2242578.

2pcs
10pcs

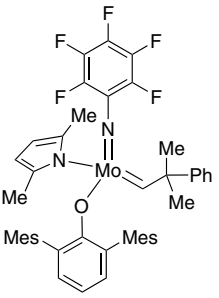
Technical Note:
1. See 42-0540 (page 53)

MOLYBDENUM (Compounds)

42-0550 NEW amp

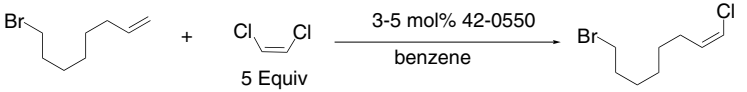
(2,5-Dimethyl-1H-pyrrol-1-yl)(2,2'',4,4'',6,6''-hexamethyl[1,1':3',1''-terphenyl]-2'-olato)(2-methyl-2-phenylpropylidene)[2,3,4,5,6-pentafluorobenzenaminato(2-)-κN] ,(T-4) molybdenum(VI) *(1433803-79-2)*
$C_{46}H_{45}F_5MoN_2O$; FW: 832.81; orange pwdr.
air sensitive, moisture sensitive, (store cold)
Note: Developed by XiMo. Sold under license from XiMo for research purposes only.
Patent: U.S. 9,441,059.

100mg
500mg

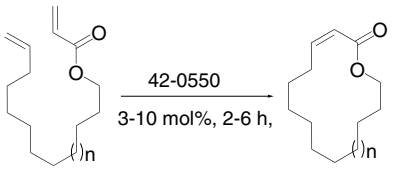


Technical Notes:

1. Z-selective alkenyl halide synthesis by cross metathesis.
2. Stereoselective macrocyclic ring closing metathesis.



Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)

Macrocyclic Z-enolates

References:

1. *Nature*, **2016**, *531*, 459.
2. *J. Am. Chem. Soc.*, **2014**, *136*, 16493.

42-0555 NEW

(2,5-Dimethyl-1H-pyrrol-1-yl)(2,2'',4,4'',6,6''-hexamethyl[1,1':3',1''-terphenyl]-2'-olato)(2-methyl-2-phenylpropylidene)[2,3,4,5,6-pentafluorobenzenaminato(2-)-κN],(T-4) molybdenum(VI), paraffin pellets *(1433803-79-2)*
$C_{46}H_{45}F_5MoN_2O$; FW: 832.81; paraffin pellet
air sensitive, moisture sensitive, (store cold)
Note: Developed by XiMo. Sold under license from XiMo for research purposes only.
Patent: U.S. 9,441,059.

2pcs
10pcs

Technical Note:

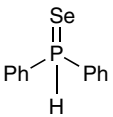
1. See 42-0550 (page 54)

NANOMATERIALS (Compounds)

15-1772 NEW

Diphenylphosphine selenide, 98% *(5853-64-5)*
$C_{12}H_{11}PSe$; FW: 265.15; white to off-white pwdr.; m.p. 111-112
moisture sensitive
Note: Precursor for quantum dot synthesis

1g
5g



Technical Note:

1. Reagent used for the preparation of highly emissive Se-based quantum dots: PbSe [1, 2] ZnSe [3] and CdSe [4-6] quantum dots.

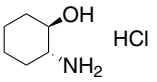
References:

1. *J. Am. Chem. Soc.* **2010**, *132*, 10973.
2. *Nanoscale*, **2015**, *7*, 5299.
3. *ACS Appl. Mater. Interfaces*, **2012**, *4*, 4302.
4. *Chem. Phys.*, **2016**, *471*, 24.
5. *J. Phys. Chem. A*, **2016**, *120*, 918.
6. *J. Am. Chem. Soc.*, **2016**, *138*, 3382.

NITROGEN (Compounds)

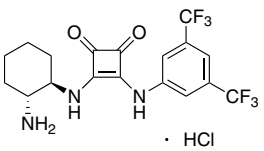
07-7222 NEW — 1g

(1R,2R)-2-Aminocyclohexanol hydrochloride, 95% (99% ee) *(13374-31-7)*
$C_6H_{14}ClNO$; FW: 151.6; white to light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.



07-1360 NEW — 50mg

3-[(1R,2R)-2-Aminocyclohexylamino]-4-[3,5-bis(trifluoromethyl)phenylamino]cyclobut-3-ene-1,2-dione Hydrochloride, 98%, (99% ee)
$C_{18}H_{17}F_6N_3O_2$; FW: 457.8; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.

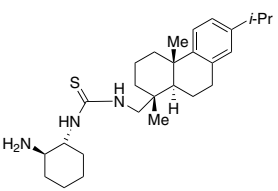


07-1359 NEW — 50mg

3-[(1S,2S)-2-Aminocyclohexylamino]-4-[3,5-bis(trifluoromethyl)phenylamino] cyclobut-3-ene-1,2-dione Hydrochloride, 95%, (99% ee)
$C_{18}H_{17}F_6N_3O_2$; FW: 457.8; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.

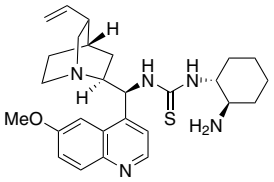
07-6329 NEW — 50mg

N-[(1R,2R)-2-Aminocyclohexyl]-N'-[[(1R,4aS,10aR)-1,2,3,4,4a,9,10,10a-octahydro-1,4a-dimethyl-7-isopropyl -1-phenanthrenyl] methyl]thiourea, 95% *(1094496-54-4)*
$C_{27}H_{43}N_3S$; FW: 441.7; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.



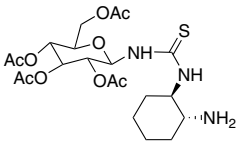
07-6369 NEW — 50mg

N-[(1R,2R)-2-Aminocyclohexyl]-N'-[(8α,9S)-6'-methoxycinchonan-9-yl]thiourea, 98% *(1052184-48-1)*
$C_{27}H_{37}N_5OS$; FW: 479.7; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.



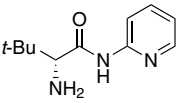
07-6363 NEW — 100mg

N-[(1R,2R)-2-Aminocyclohexyl]-N'-(2,3,4,6-tetra-O-acetyl-β-D-glucopyranosyl)thiourea, 95% *(933456-75-8)*
$C_{21}H_{33}N_3O_9S$; FW: 503.6; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.



07-6356 NEW — 100mg

(2R)-2-Amino-3,3-dimethyl-N-2-pyridinylbutanamide, 98%, (99% ee) *(1568087-94-4)*
$C_{11}H_{17}N_3O$; FW: 207.3; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

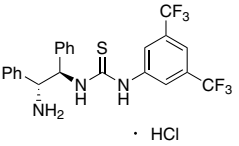


07-6355 NEW — 100mg

(2S)-2-Amino-3,3-dimethyl-N-2-pyridinylbutanamide, 98%, (99% ee) *(171764-07-1)*
$C_{11}H_{17}N_3O$; FW: 207.3; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

07-6370 NEW — 100mg

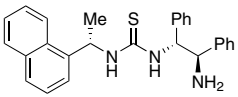
N-[(1R,2R)-2-Amino-1,2-diphenylethyl]-N'-[3,5-bis(trifluoromethyl)phenyl]thiourea Hydrocholoride, 98%, (99% ee)
$C_{23}H_{19}F_6N_3S$; FW: 519.9 ; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.



NITROGEN (Compounds)

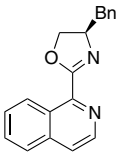
07-6371 NEW — 100mg
N-[(1S,2S)-2-Amino-1,2-diphenylethyl]-N'-[3,5-bis(trifluoromethyl)phenyl]thiourea Hydrocholoride, 98%, (99% ee)
$C_{23}H_{19}F_6N_3S$; FW: 519.9 ; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.

07-6351 NEW — 50mg
N-[(1R,2R)-2-Amino-1,2-diphenylethyl]-N'-[(S)-1-(1-naphthalenyl)ethyl]thiourea, 95%, (99% ee)
$C_{27}H_{27}N_3S$; FW: 425.6; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.



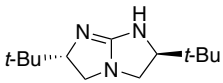
07-6350 NEW — 50mg
N-[(1S,2S)-2-Amino-1,2-diphenylethyl]-N'-[(R)-1-(1-naphthalenyl)ethyl]thiourea, 98%, (99% ee)
$C_{27}H_{27}N_3S$; FW: 425.6; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

07-1373 NEW — 50mg
1-[(4R)-4-Benzyl-4,5-dihydro-2-oxazolyl]isoquinoline, 98%, (99% ee)
$C_{19}H_{16}N_2O$; FW: 288.3; white-brown pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.



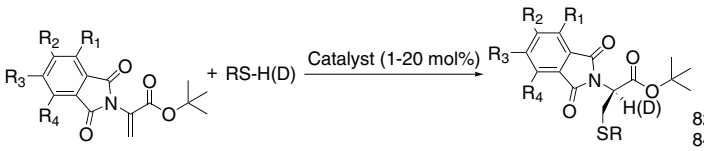
07-1374 NEW — 50mg
1-[(4S)-4-Benzyl-4,5-dihydro-2-oxazolyl]isoquinoline, 98%, (99% ee)
$C_{19}H_{16}N_2O$; FW: 288.3; white-light brown pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

07-6372 NEW — 50mg
(2S,6S)-2,6-Bis(1,1-dimethylethyl)-2,3,5,6-tetrahydro-1H-imidazo[1,2-a]imidazole, 98%
(877773-38-1)
$C_{13}H_{25}N_3$; FW: 223.4; white-brown pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.



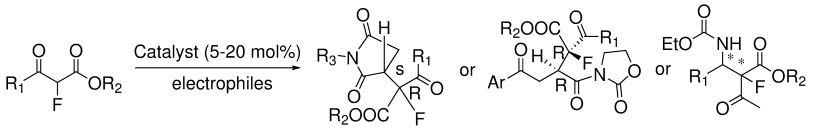
Technical Notes:

1. Protonation- The guanidine derivative catalyzes a tandem conjugate addition-enantioselective protonation reaction of phthalimidoacrylates with thiols and itaconimides with phosphine oxides.
2. Addition of Fluorocarbon Nucleophiles- Synthesis of a chiral quaternary carbon center bearing a fluorine atom: enantio- and diastereoselective guanidine-catalyzed addition of fluorocarbon nucleophiles. The title reaction provides adducts having quaternary carbon centers bearing a fluorine atom with high ee and d.r. values.
3. Allylic Amination- The title reaction-enantiodivergent and γ-selective asymmetric allylic amination using the guanidine catalyst can deliver both enantiomers of the product with excellent enantioselectivity by judicious choice of the double bond geometry of the the β,γ-unsaturated carbonyl compound.
4. Isomerization- We report that chiral bicyclic guanidine is found to catalyze the isomerization of alkynes to chiral allenes with high enantioselectivities. This Bronsted base catalyzed 1,3-proton shift reaction, an efficient and atom economical reaction, proceeds through deprotonation and protonation sequences.



82-99% yield
84-94% e.e.

Tech. Note (1)
Ref. (1)



up to 99% yield
up to >99:1 dr
up to 99% e.e.

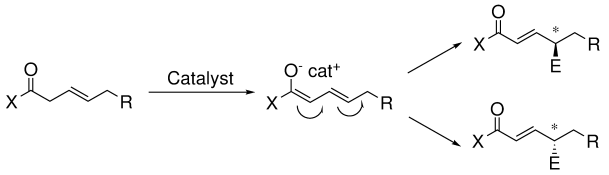
up to 91% yield
up to 99:1 dr
up to 96% e.e.

up to 99% yield
up to 98:2 dr
84% e.e.

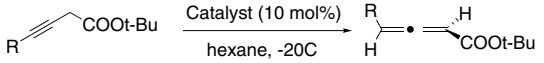
Tech. Note (2)
Ref. (2)

NITROGEN (Compounds)

07-6372 **(2S,6S)-2,6-Bis(1,1-dimethylethyl)-2,3,5,6-tetrahydro-1H-imidazo[1,2-a]imidazole, 98%**
(continued) *(877773-38-1)*



Tech. Note (3)
Ref. (3)



up to 95% e.e.

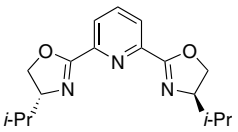
Tech. Note (4)
Ref. (4)

References:

1. *Angew. Chem. Int. Ed.*, **2008,** *47*, 5641-5645.
2. *Angew. Chem. Int. Ed.*, **2009**, *48*, 3627-3631.
3. *Angew. Chem. Int. Ed.*, **2012**, *51*, 2382-2386.
4. *J. Am. Chem. Soc.*, **2009**, *131*, 7212-7213.

07-1365 NEW — **2,6-Bis[(4R)-isopropyl-2-oxazolin-2-yl]pyridine, 98%, (99% ee)** *(131864-67-0)* — 1g

$C_{17}H_{23}N_3O_2$; FW: 301.4; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

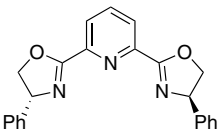


07-1366 NEW — **2,6-Bis[(4S)-isopropyl-2-oxazolin-2-yl]pyridine, 98%, (99% ee)** *(118949-61-4)* — 1g

$C_{17}H_{23}N_3O_2$; FW: 301.4; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

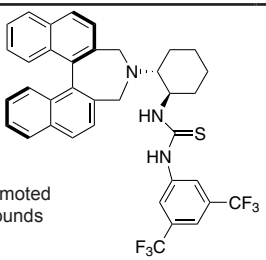
07-1363 NEW — **2,6-Bis[(4R)-phenyl-2-oxazolin-2-yl]pyridine, 98%, (99% ee)** *(128249-70-7)* — 1g

$C_{23}H_{19}N_3O_2$; FW: 369.4; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.



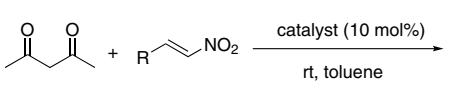
07-6339 NEW — **N-[3,5-Bis(trifluoromethyl)phenyl]-N'-[(1R,2R)-2-[(11bR)-3,5-dihydro-4H-dinaphth[2,1-c:1',2'-e]azepin-4-yl]cyclohexyl]thiourea, 98%, (99% ee)** *(1040235-96-8)* — 50mg

$C_{37}H_{31}F_6N_3S$; FW: 663.7; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.



Technical Note:

1. Michael Addition- Bifunctional amine-thiourea organocatalyst promoted enantioselective Michael reaction between 1,3-dicarbonyl compounds and nitro olefins.



up to 86% yield
up to 96% e.e.

Tech. Note (1)
Ref. (1)

References:

1. *J. Org. Chem.*, **2008**, *73*, 5202-5205.

NITROGEN (Compounds)

07-6335 NEW **N-[3,5-Bis(trifluoromethyl)phenyl]-N'-[(1S,2S)-2-[(11bR)-3,5-dihydro-4H-dinaphth[2,1-c:1',2'-e]azepin-4-yl]cyclohexyl]thiourea, 98%, (99% ee)** 50mg

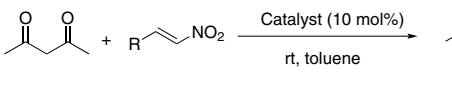
(1040245-49-5)

$C_{37}H_{31}F_6N_3S$; FW: 663.7; white-light yellow pwdr.

Note: Sold in collaboration with Daicel for research purposes only.

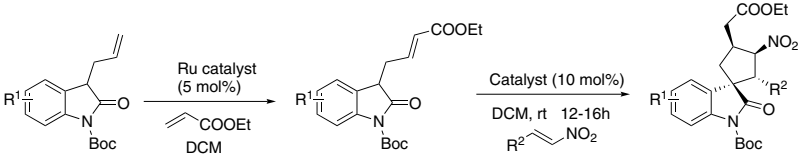
Technical Notes:

1. Michael Addition to promote enantioselective Michael reaction between 1,3-dicarbonyl compounds and nitro olefins.
2. Spirocyclopentaneoxindoles with four contiguous stereocenters including one spiroquaternary stereocenter are synthesized by a combined Ru-catalyzed cross-metathesis/organocatalyzed asymmetric double-Michael addition.
3. Catalytic enantioselective conjugate addition reaction of α-fluoro-β-ketoesters to nitroalkenes.
4. Catalytic enantioselective electrophilic α-hydrazination promoted by chiral bifunctional organocatalysts.
5. Catalytic enantioselective Mannich reaction promoted by chiral bifunctional organocatalysts..



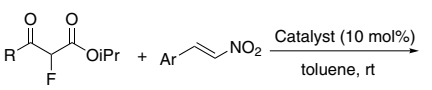
up to 86% yield
up to 96% e.e.

Tech. Note (1)
Ref. (1)



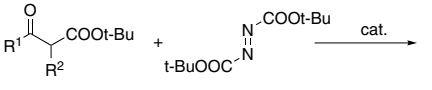
up to 87% yield
up to >30:1 dr
up to >99% e.e.

Tech. Note (2)
Ref. (2)



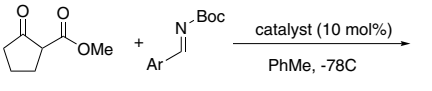
1.5:1~5:1 dr
83~99% e.e.

Tech. Note (3)
Ref. (3)



up to 99% e.e.

Tech. Note (4)
Ref. (4)



up to 100:0 dr
99% e.e.

Tech. Note (5)
Ref. (5)

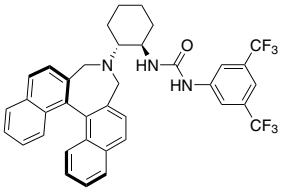
References:

1. *J. Org. Chem.*, **2008**, *73*, 5202-5205.
2. *Org. Lett.*, **2011**, *13*, 6200-6203.
3. *Tetrahedron Lett.*, **2009**, *50*, 4674-4676.
4. *Tetrahedron Lett.,* **2008**, *49,* 5527-5530.
5. *J. Org. Chem.*, **2009**, *74*, 5734-5737.

NITROGEN (Compounds)

07-6353 NEW — **N-[3,5-Bis(trifluoromethyl)phenyl]-N'-[(1R,2R)-2-[(11bR)-3,5-dihydro-4H-dinaphth[2,1-c:1',2'-e]azepin-4-yl]cyclohexyl]urea, 98%, (99% ee)** *(1069115-56-5)* — 50mg

$C_{37}H_{31}F_6N_3O$; FW: 647.7; white-light red pwdr.
Note: Sold in collaboration with Daicel for research purposes only.

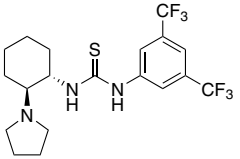


07-6352 NEW — **N-[3,5-Bis(trifluoromethyl)phenyl]-N'-[(1S,2S)-2-[(11bR)-3,5-dihydro-4H-dinaphth[2,1-c:1',2'-e]azepin-4-yl]cyclohexyl]urea, 98%, (99% ee)** *(1069114-13-1)* — 50mg

$C_{37}H_{31}F_6N_3O$; FW: 647.7; white-yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.

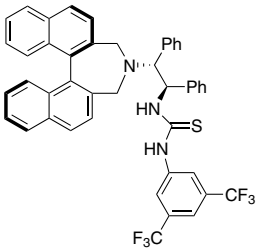
07-6354 NEW — **1-[3,5-Bis(trifluoromethyl)phenyl]-3-[(1S,2S)-2-(pyrrolidin-1-yl)cyclohexyl]thiourea, 98%, (99% ee)** *(1248348-67-5)* — 50mg

$C_{19}H_{23}F_6N_3S$; FW: 439.5; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.



07-6340 NEW — **N-[3,5-Bis(trifluoromethyl)phenyl]-N'-[(1R,2R)-2-[(11bR)-3,5-dihydro-4H-dinaphth[2,1-c:1',2'-e]azepin-4-yl]-1,2-diphenylethyl]thiourea, 95%, (99% ee)** — 50mg

$C_{45}H_{33}F_6N_3S$; FW: 761.8; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.



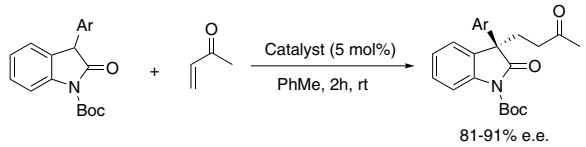
Technical Note:
1. See 07-6342 (page 59)

07-6342 NEW — **N-[3,5-Bis(trifluoromethyl)phenyl]-N'-[(1S,2S)-2-[(11bR)-3,5-dihydro-4H-dinaphth[2,1-c:1',2'-e]azepin-4-yl]-1,2-diphenylethyl]thiourea, 95%, (99% ee)** *(1069114-12-0)* — 50mg

$C_{45}H_{33}F_6N_3S$; FW: 761.8; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.

Technical Notes:
1. Electrophilic α-Hydrazination- Treatment of β-ketoesters with azodicarboxylates as electrophilic amination reagents.
2. Conjugate Addition- The enantioselective conjugate addition reaction of 3-aryl-substituted oxindoles with methyl vinyl ketone.

Tech. Note (1)
Ref. (1)



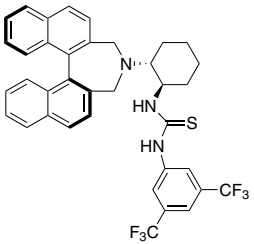
Tech. Note (2)
Ref. (2)

References:
1. *Tetrahedron Lett.*, **2008**, *49*, 5527-5530.
2. *Molecules,* **2012**, *17*, 7523-7532.

NITROGEN (Compounds)

07-6336 NEW

N-[3,5-Bis(trifluoromethyl)phenyl]-N'-[(1R,2R)-2-[(11bS)-3,5-dihydro-4H-dinaphth[2,1-c:1',2'-e]azepin-4-yl]cyclohexyl]thiourea, 98%, (99% ee)
$C_{37}H_{31}F_6N_3S$; FW: 663.7; white-yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.



50mg

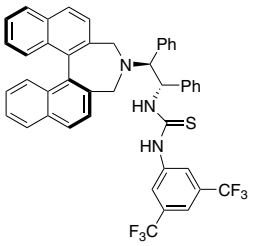
07-6338 NEW

N-[3,5-Bis(trifluoromethyl)phenyl]-N'-[(1S,2S)-2-[(11bS)-3,5-dihydro-4H-dinaphth[2,1-c:1',2'-e]azepin-4-yl]cyclohexyl]thiourea, 98%, (99% ee)
$C_{37}H_{31}F_6N_3S$; FW: 663.7; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.

50mg

07-6341 NEW

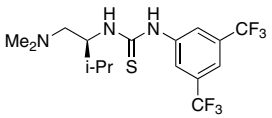
N-[3,5-Bis(trifluoromethyl)phenyl]-N'-[(1S,2S)-2-[(11bS)-3,5-dihydro-4H-dinaphth[2,1-c:1',2'-e]azepin-4-yl]-1,2-diphenylethyl]thiourea, 98%, (99% ee)
$C_{45}H_{33}F_6N_3S$; FW: 761.8; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.



50mg

07-6334 NEW

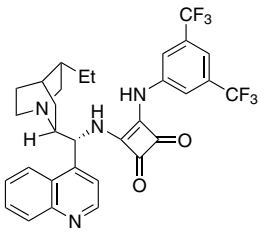
(S)-1-[3,5-Bis(trifluoromethyl)phenyl]-3-[1-(dimethylamino)-3-methylbutan-2-yl]thiourea, 98%, (99% ee) *(1048692-50-7)*
$C_{16}H_{21}F_6N_3S$; FW: 401.4; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.



50mg

07-1362 NEW

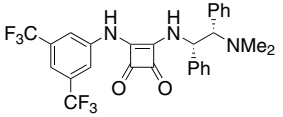
3-[[3,5-Bis(trifluoromethyl)phenyl]amino]-4-[[(9R)-10,11-dihydrocinchonan-9-yl]amino]-3-cyclobutene-1,2-dione, 98% *(1407166-64-6)*
$C_{31}H_{28}F_6N_4O_2$; FW: 602.6; white-yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.



50mg

07-1354 NEW

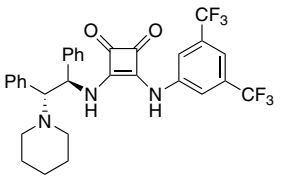
3-[[3,5-Bis(trifluoromethyl)phenyl]amino]-4-[[(1S,2S)-2-(dimethylamino)-1,2-diphenylethyl]amino]-3-cyclobutene-1,2-dione, 98%, (99% ee) *(1263205-97-5)*
$C_{28}H_{23}F_6N_3O_2$; FW: 547.5; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.



50mg

07-1352 NEW

3-[[3,5-Bis(trifluoromethyl)phenyl]amino]-4-[[(1R,2R)-1,2-diphenyl-2-(1-piperidinyl)ethyl]amino]-3-cyclobutene-1,2-dione, 98%, (99% ee) *(1454257-32-9)*
$C_{31}H_{27}F_6N_3O_2$; FW: 587.6; white-light brown pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.



50mg

NITROGEN (Compounds)

07-1353 NEW

3-[[3,5-Bis(trifluoromethyl)phenyl]amino]-4-[[(1S,2S)-1,2-diphenyl-2-(1-piperidinyl)ethyl]amino]-3-cyclobutene-1,2-dione, 98%, (99% ee) 50mg

$C_{31}H_{27}F_6N_3O_2$; FW: 587.6; white-light brown pwdr.

(store cold)

Note: Sold in collaboration with Daicel for research purposes only.

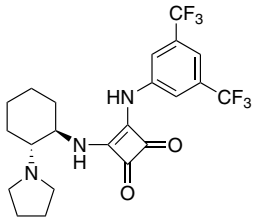
07-1355 NEW

3-[[3,5-Bis(trifluoromethyl)phenyl]amino]-4-[[(1R,2R)-2-(1-pyrrolidinyl)cyclohexyl]amino]-3-cyclobutene-1,2-dione, 98%, (99% ee) 50mg

(1211565-10-4)

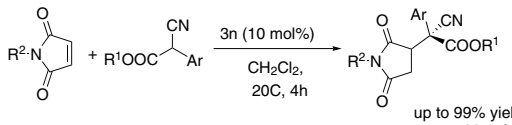
$C_{22}H_{23}F_6N_3O_2$; FW: 475.4; white-brown pwdr.

Note: Sold in collaboration with Daicel for research purposes only.



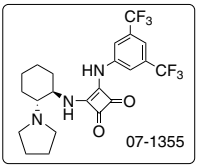
Technical Note:

1. 1. Michael Addition- An efficient diastereo- and enantioselective addition of α-substituted isocyanoacetates to N-aryl maleimides.



up to 99% yield
up to >20:1 dr
up to >91% e.e.

Tech. Note (1)
Ref. (1)



References:

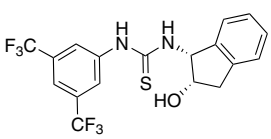
1. *Tetrahedron,* **2013**, *69*, 10763-10771.

07-6333 NEW

N-[3,5-Bis(trifluoromethyl)phenyl]-N'-[(1R,2S)-2,3-dihydro-2-hydroxy-1H-inden-1-yl]thiourea, 95%, (99% ee) *(871828-95-4)* 50mg

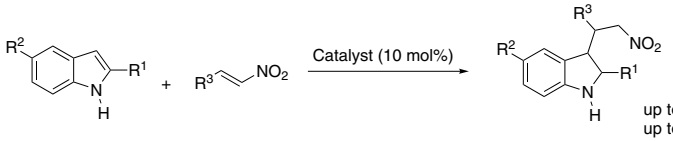
$C_{18}H_{14}F_6N_2OS$; FW: 420.4; white-light yellow pwdr.

Note: Sold in collaboration with Daicel for research purposes only.



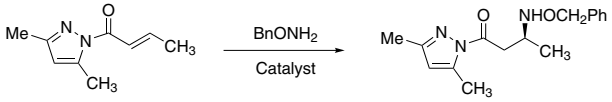
Technical Notes:

1. Friedel-Crafts Alkylation- access to optically active 2-indolyl-1-nitro derivatives by enantioselective Friedel-Crafts alkylation of indoles with nitroalkenes (R1= R2= H, R3= Ph).
2. Conjugate Addition- Conjugate addition of O-protected hydroxylamines to pyrazole-derived enoates proceeds with high efficiency and enantioselectivity.



up to 88% yield
up to 89% e.e.

Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)

References:

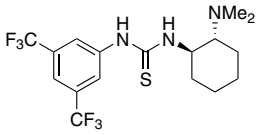
1. *Angew. Chem. Int. Ed.,* **2005**, *44*, 6576-6579.
2. *J. Am. Chem. Soc.*, **2007**, *129*, 8064-8065.

NITROGEN (Compounds)

07-6331 1g

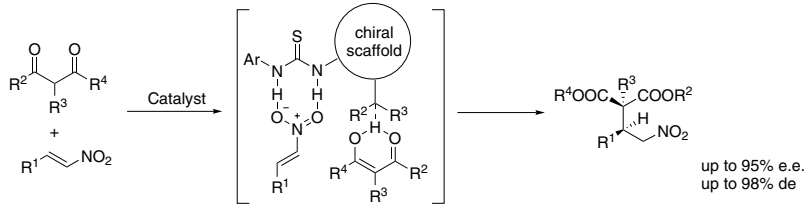
NEW

1-[3,5-Bis(trifluoromethyl) phenyl]-3-[(1R,2R)-2-(dimethylamino)cyclohexyl] thiourea, 98%, (99% ee) *(620960-26-1)*
$C_{17}H_{21}F_6N_3S$; FW: 413.4; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.

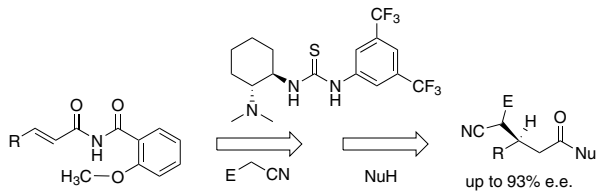


Technical Notes:

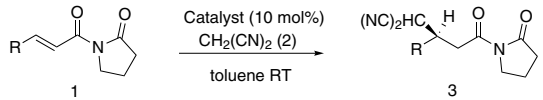
1. Michael Addition- Michael reaction of malonates to afforded Michael adducts with high yields and enantioselectivities (up to 95%, up to 93% ee).
2. Synthesized a new class of bifunctional catalysts bearing a thiourea moiety and an amino group on a chiral scaffold.
3. A thiourea-catalyzed asymmetric Michael addition of activated methylene compounds to α,β-unsaturated imides derived from 2-pyrrolidinone and 2-methoxybenzamide.
4. High enantioselectivities (up to 94 % ee) were attained in the Michael addition of a variety of α,β-unsaturated imides (1) and malononitrile.
5. Alkylation- Primary aminothiourea derivatives catalyze enantioselective alkylation of α-arylpriopionaldehdyes with diarylbromomethane.
6. Living Ring-Opening Polymerization- A versatile, metal-free, organocatalytic approach to the living ring-opening polymerization of lactide.
7. Neber Reaction- The first enantioselective Neber reaction of β-ketoxime sulfonates catalyzed by a bifunctional thiourea.



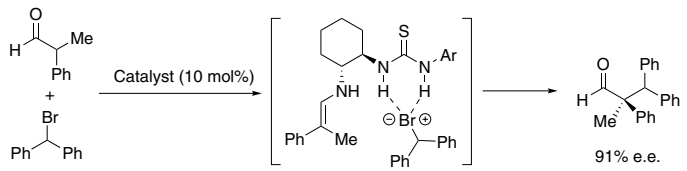
Tech. Note (2)
Ref. (2)



Tech. Note (3)
Ref. (3)



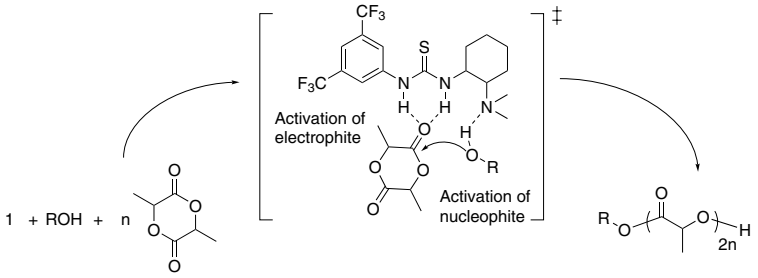
Tech. Note (4)
Ref. (4)



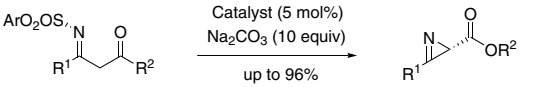
Tech. Note (5)
Ref. (5)

NITROGEN (Compounds)

07-6331 **1-[3,5-Bis(trifluoromethyl)phenyl]-3-[(1R,2R)-2-(dimethylamino)cyclohexyl]thiourea, 98%, (99% ee)** *(620960-26-1)*
(continued)



Tech. Note (6)
Ref. (6)



Tech. Note (7)
Ref. (7)

References:

1. *J. Am. Chem. Soc.,* **2003,** *125*, 12672-12673.
2. *J. Am. Chem. Soc.*, **2005**, *127*, 119-125.
3. *J. Am. Chem. Soc.*, **2006**, *128*, 9413-9419.
4. *Angew. Chem. Int. Ed.,* **2005**, *44*, 4032-4035.
5. *J. Am. Chem. Soc.*, **2010**, *132*, 9286-9288.
6. *J. Am. Chem. Soc.*, **2005**, *127*, 13798-13799
7. *Org. Lett.,* **2011**, *13*, 6374-6377.

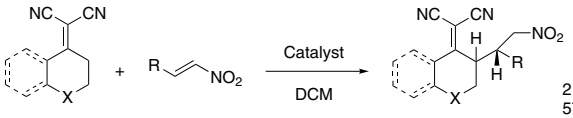
07-6332 **1-[3,5-Bis(trifluoromethyl)phenyl]-3-[(1S,2S)-2-(dimethylamino)cyclohexyl] thiourea, 98%, (99% ee)** *(851477-20-8)* 1g

NEW

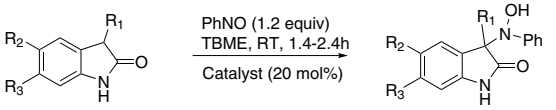
$C_{17}H_{21}F_6N_3S$; FW: 413.4; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.

Technical Notes:

1. Michael Addition- The bifunctional chiral thiourea-tertiary amine organocatalysts have been applied to a direct asymmetric vinylogous Michael addition of α,α-dicyanoolefins to nitroolefins with 2-10 mol % catalyst loadings.
2. Oxyamination- An enantioselective α-oxyamination of unprotected 3-substituted oxindoles with nitrosobenzene catalyzed by tertiary amine-thiourea bifunctional organocatalysts has been developed and affords the corresponding 3-amino-2-oxindole derivatives in good yields and with moderate to excellent enantioselectivities.
3. Michael-Michael Cascade Reaction- A novel chiral amine thiourea catalyzed, highly enantioselective Michael-Michael cascade process serves as a “one-pot” approach to synthetically and biologically significant chiral tetrahydrothiophenes.
4. The first highly diastereo- and enantioselective organocatalytic synthesis of 2,2-disubstituted-2H-oxazol-5-ones is described.



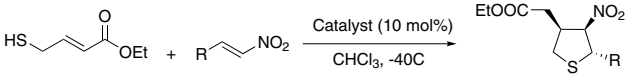
Tech. Note (1)
Ref. (1)



Tech. Note (2)
Ref. (2)

NITROGEN (Compounds)

07-6332 ***(continued)*** **1-[3,5-Bis(trifluoromethyl)phenyl]-3-[(1S,2S)-2-(dimethylamino)cyclohexyl]thiourea, 98%, (99% ee)** *(851477-20-8)*



R= aryl and alkyl

up to 93% yield
6:1 - >30:1 d.r.
92-97% e.e.

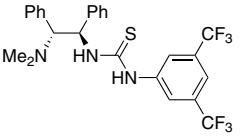
Tech. Note (3)
Ref. (3)

References:

1. *Tetrahedron,* **2007**, *63*, 5123-5128.
2. *Org. Biomol. Chem.*, **2012**, *10*, 431-439.
3. *Chem. Eur. J.*, **2011**, *17*, 770-774.
4. *Chem. Eur. J.*, **2010**, *16,* 9884-9889.

07-6344 NEW

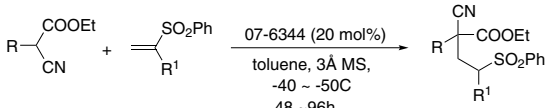
N-[3,5-Bis(trifluoromethyl)phenyl]-N'-[(1R,2R)-2-(dimethylamino)-1,2-diphenylethyl]thiourea, 98%, (99% ee) *(834917-24-7)*
$C_{25}H_{23}F_6N_3S$; FW: 511.5; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.



50mg

Technical Notes:

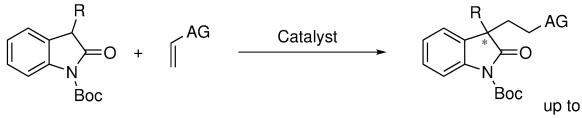
1. Michael Addition- highly enantioselective catalysts for the Michael addition of α-substituted cyanoacetates to vinyl sulfones, giving an efficient protocol for the construction of an all-carbon substituted quaternary stereocentre.
2. Asymmetric catalysis of chiral oxindoles bearing 3-position all-carbon quaternary stereocenters.
3. The enantioselective Michael addition of dialkyl phosphites to N-unprotected isatylidene malononitriles.
4. Aldol Reaction- The first example of a direct catalytic asymmetric intermolecular aldol reaction of 3-isothiocyanato oxindoles to simple ketones.
5. Cascade Aldol-Cyclization- A highly efficient method for the construction of a family of spiro[oxazolidine-2-thione-oxindoles] with 3-isothiocyanato oxindoles and aldehydes via a cascade aldol-cyclization.



52-96% yield
72-96% e.e.

Tech. Note (1)
Ref. (1)

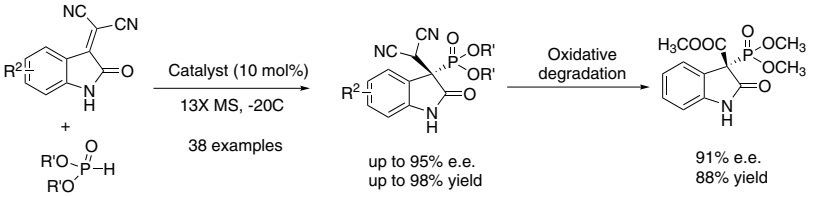
For R = aryl R^1 = H
For R = aryl R^1 = SO_2Ph



R = Ar or CH_3 AG = COOR' or SOOR''

up to 99% yield
up to 91% e.e.

Tech. Note (2)
Ref. (2)



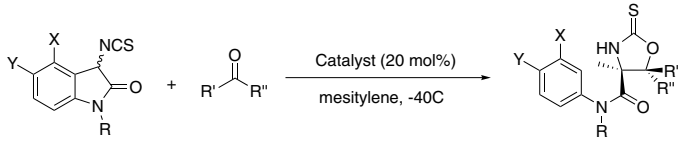
up to 95% e.e.
up to 98% yield

91% e.e.
88% yield

Tech. Note (3)
Ref. (3)

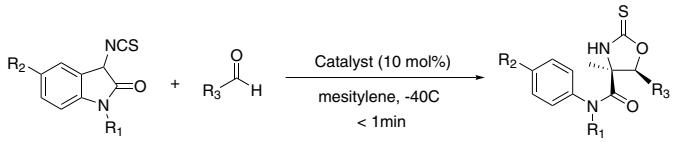
NITROGEN (Compounds)

07-6344 ***(continued)*** **N-[3,5-Bis(trifluoromethyl)phenyl]-N'-[(1R,2R)-2-(dimethylamino)-1,2-diphenylethyl] thiourea, 98%, (99% ee)** *(834917-24-7)*



up to 95% yield
up to 95:5 dr
up to 98% e.e.

Tech. Note (4)
Ref. (4)



up to 95% yield
up to 98:2 dr
up to 89% e.e.

Tech. Note (5)
Ref. (5)

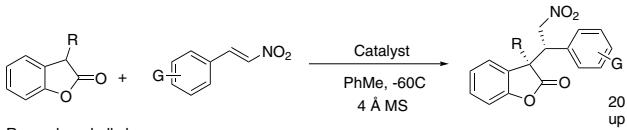
References:

1. *Org. Biomol. Chem.*, **2006**, *4*, 2097-2099.
2. *Org. Biomol. Chem.*, **2010**, *8*, 77-82.
3. *Tetrahedron*, **2014**, *70*, 2406-2415.
4. *Org. Lett.,* **2011**, *13*, 2472-2475.
5. *Tetrahedron*, **2013**, *69*, 5281-5286.

07-6345 NEW **N-[3,5-Bis(trifluoromethyl)phenyl]-N'-[(1S,2S)-2-(dimethylamino)-1,2-diphenylethyl]thiourea, 98%, (99% ee)** *(1233369-41-9)* 100mg
$C_{25}H_{23}F_6N_3S$; FW: 511.5; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.

Technical Note:

1. Michael Addition- an organocatalytic strategy for the asymmetric catalysis of chiral benzofuran-2(3H)-ones bearing 3-position all-carbon quaternary stereocenters.



R = aryl and alkyl

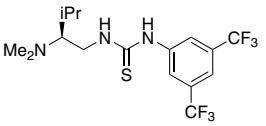
20 examples
up to 98% yield
up to 99:1 dr
up to 91% e.e.

Tech. Note (1)
Ref. (1)

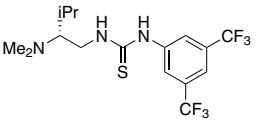
References:

1. *Org. Biomol. Chem.*, **2012**, *10*, 413-420.

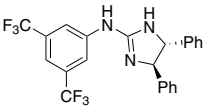
07-6349 NEW **N-[3,5-Bis(trifluoromethyl)phenyl]-N'-[(2S)-2-(dimethylamino)-3-methylbutyl]thiourea, 95%, (99% ee)** *(1048692-60-9)* 50mg
$C_{16}H_{21}F_6N_3S$; FW: 401.4; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.



07-6348 NEW **N-[3,5-Bis(trifluoromethyl)phenyl]-N'-[(2R)-2-(dimethylamino)-3-methylbutyl]thiourea, 98%, (99% ee)** 50mg
$C_{16}H_{21}F_6N_3S$; FW: 401.4; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.



07-1376 NEW **(4R,5R)-N-(3,5-Bis(trifluoromethyl)phenyl)-4,5-diphenyl-4,5-dihydro-1H-imidazol-2-amine, 98%, (99% ee)** 50mg
$C_{23}H_{17}N_3F_6$; FW: 449.4; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.



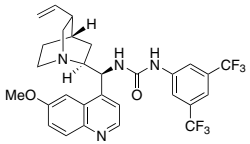
NITROGEN (Compounds)

07-1375 NEW — 50mg

(4S,5S)-N-(3,5-Bis(trifluoromethyl)phenyl)-4,5-diphenyl-4,5-dihydro-1H-imidazol-2-amine, 98%, (99% ee)
$C_{23}H_{17}N_3F_6$; FW: 449.4; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.

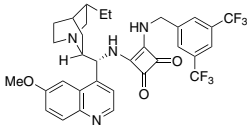
07-6328 NEW — 50mg

N-[3,5-Bis(trifluoromethyl)phenyl]-N'-[(8α,9S)-6'-methoxycinchonan-9-yl]urea, 98%, (99% ee) *(957770-66-0)*
$C_{29}H_{28}F_6N_4O_2$; FW: 578.5; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.



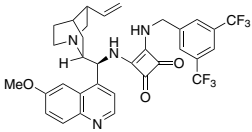
07-1361 NEW — 50mg

3-[[[3,5-Bis(trifluoromethyl)phenyl]methyl]amino]-4-[[(9R)-10,11-dihydro-6'-methoxycinchonan-9-yl]amino]-3-cyclobutene-1,2-dione, 95% *(1363811-07-7)*
$C_{33}H_{32}F_6N_4O_3$; FW: 646.6; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.



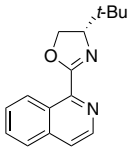
07-1357 NEW — 50mg

3-[[[3,5-Bis(trifluoromethyl)phenyl]methyl]amino]-4-[[(8α,9S)-6'-methoxycinchonan-9-yl]amino]-3-cyclobutene-1,2-dione, 98% *(1210360-60-3)*
$C_{33}H_{30}F_6N_4O_3$; FW: 644.6; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.



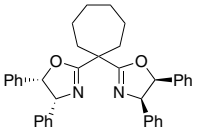
07-1370 NEW — 50mg

1-[(4S)-4-tert-Butyl-4,5-dihydro-2-oxazolyl]isoquinoline, 98% *(1402851-52-8)*
$C_{16}H_{18}N_2O$; FW: 254.3; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.



07-1398 NEW — 50mg

(4R,4'R,5S,5'S)-2,2'-(Cycloheptane-1,1-diyl) bis(4,5-diphenyl-4,5-dihydrooxazole), 98%, (99% ee)
$C_{37}H_{36}N_2O_2$; FW: 540.7; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

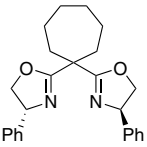


07-1399 NEW — 50mg

(4S,4'S,5R,5'R)-2,2'-(Cycloheptane-1,1-diyl)bis(4,5-diphenyl-4,5-dihydrooxazole), 95%, (99% ee)
$C_{37}H_{36}N_2O_2$; FW: 540.7; white-yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

07-1396 NEW — 50mg

(4R,4'R)-2,2'-(Cycloheptane-1,1-diyl)bis(4-phenyl-4,5-dihydrooxazole), 98%, (99% ee)
$C_{25}H_{28}N_2O_2$; FW: 388.5; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

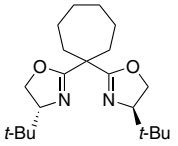


07-1397 NEW — 50mg

(4S,4'S)-2,2'-(Cycloheptane-1,1-diyl)bis(4-phenyl-4,5-dihydrooxazole), 98%, (99% ee)
$C_{25}H_{28}N_2O_2$; FW: 388.5; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

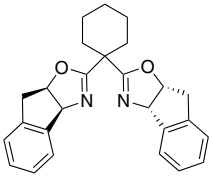
NITROGEN (Compounds)

07-1400 NEW — **(4R,4'R)-2,2'-(Cycloheptane-1,1-diyl)bis(4-tert-butyl-4,5-dihydrooxazole), 98%, (99% ee)** — 50mg
$C_{21}H_{36}N_2O_2$; FW: 348.5; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

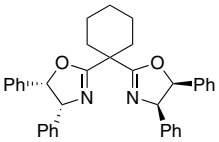


07-1401 NEW — **(4S,4'S)-2,2'-(Cycloheptane-1,1-diyl)bis(4-tert-butyl-4,5-dihydrooxazole), 98%, (99% ee)** — 50mg
$C_{21}H_{36}N_2O_2$; FW: 348.5; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

07-1387 NEW — **(3aS,3a'S,8aR,8a'R)-2,2'-Cyclohexylidenebis[8,8a-dihydro-3aH-indeno[1,2-d]oxazole], 98%, (99% ee)** — 50mg
(182122-13-0)
$C_{26}H_{26}N_2O_2$; FW: 398.5; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

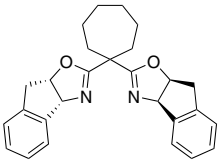


07-1390 NEW — **(4R,4'R,5S,5'S)-2,2'-Cyclohexylidenebis[4,5-dihydro-4,5-diphenyloxazole], 98%, (99% ee)** — 50mg
$C_{36}H_{34}N_2O_2$; FW: 526.7; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.



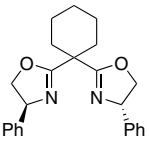
07-1391 NEW — **(4S,4'S,5R,5'R)-2,2'-Cyclohexylidenebis[4,5-dihydro-4,5-diphenyloxazole], 98%, (99% ee)** — 50mg
$C_{36}H_{34}N_2O_2$; FW: 526.7; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

07-1394 NEW — **(3aR,3'aR,8aS,8'aS)-2,2'-Cyclohexylidenebis[3a,8a-dihydro-8H-indeno[1,2-d]oxazole, 98%, (99% ee)** — 50mg
(2085239-89-8)
$C_{27}H_{28}N_2O_2$; FW: 412.5; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

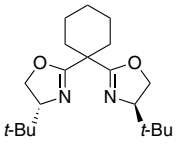


07-1395 NEW — **(3aS,3'aS,8aR,8'aR)-2,2'-Cyclohexylidenebis[3a,8a-dihydro-8H-indeno[1,2-d] oxazole, 98%, (99% ee)** — 50mg
$C_{27}H_{28}N_2O_2$; FW: 412.5; white-light brown pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

07-1389 NEW — **(4S,4'S)-2,2'-Cyclohexylidenebis[4,5-dihydro-4-phenyloxazole], 98%, (99% ee)** — 50mg
$C_{24}H_{26}N_2O_2$; FW: 374.5; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.



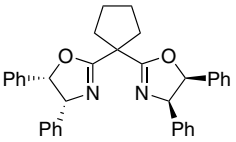
07-1392 NEW — **(4R,4'R)-2,2'-Cyclohexylidenebis[4-tert-butyl-4,5-dihydrooxazole], 98%, (99% ee)** — 50mg
$C_{20}H_{34}N_2O_2$; FW: 334.5; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.



NITROGEN (Compounds)

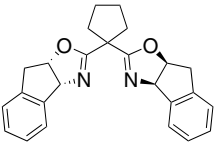
07-1393 NEW
(4S,4'S)-2,2'-Cyclohexylidenebis[4-tert-butyl-4,5-dihydrooxazole], 98%, (99% ee) *(298693-04-6)* 50mg
$C_{20}H_{34}N_2O_2$; FW: 334.5; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

07-1382 NEW
(4R,4'R,5S,5'S)-2,2'-Cyclopentylidenebis[4,5-dihydro-4,5-diphenyloxazole], 98%, (99% ee) 50mg
$C_{35}H_{32}N_2O_2$; FW: 512.6; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.



07-1383 NEW
(4S,4'S,5R,5'R)-2,2'-Cyclopentylidenebis[4,5-dihydro-4,5-diphenyloxazole], 98%, (99% ee) 50mg
$C_{35}H_{32}N_2O_2$; FW: 512.6; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

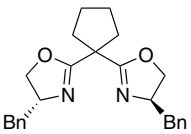
07-7220 NEW
(3aR,3'aR,8aS,8'aS)-2,2'-Cyclopentylidenebis[3a,8a-dihydro-8H-indeno[1,2-d]oxazole] 98%, (99% ee) 100mg
(2005443-90-1)
$C_{25}H_{24}N_2O_2$; FW: 384.5; white to light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.



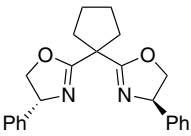
07-1381 NEW
(3aS,3'aS,8aR,8'aR)-2,2'-Cyclopentylidenebis[3a,8a-dihydro-8H-indeno[1,2-d]oxazole], 98%, (99% ee) *(182122-12-9)* 50mg
$C_{25}H_{24}N_2O_2$; FW: 384.5; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

07-1380 NEW
(4S,4'S)-2,2'-Cyclopentylidenebis[4,5-dihydro-4-(phenylmethyl)oxazole], 95%, (99% ee) *(1003886-05-2)* 50mg
$C_{25}H_{28}N_2O_2$; FW: 388.5; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

07-1379 NEW
(4R,4'R)-2,2'-Cyclopentylidenebis[4,5-dihydro-4-(phenylmethyl)oxazole], 98%, (99% ee) 50mg
(2005443-99-0)
$C_{25}H_{28}N_2O_2$; FW: 388.5; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.



07-7210 NEW
(4R,4'R)-2,2'-Cyclopentylidenebis[4,5-dihydro-4-phenyloxazole], 95% (99% ee) *(1246401-49-9)* 100mg
$C_{23}H_{24}N_2O_2$; FW: 360.4; white to light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.



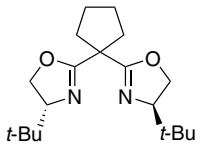
07-7218 NEW
(4S,4'S)-2,2'-Cyclopentylidenebis[4,5-dihydro-4-phenyloxazole], 98%, (99% ee) 100mg
(1639791-77-7)
$C_{23}H_{24}N_2O_2$; FW: 360.4; white to light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

07-1385 NEW
(4S,4'S)-2,2'-Cyclopentylidenebis[4-tert-butyl-4,5-dihydrooxazole], 95%, (99% ee) 50mg
(298693-03-5)
$C_{19}H_{32}N_2O_2$; FW: 320.5; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

NITROGEN (Compounds)

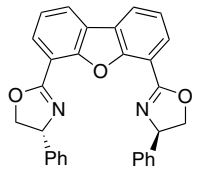
07-1384 NEW — 50mg

(4R,4'R)-2,2'-Cyclopentylidenebis[4-tert-butyl-4,5-dihydrooxazole], 98%, (99% ee)
$C_{19}H_{32}N_2O_2$; FW: 320.5; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.



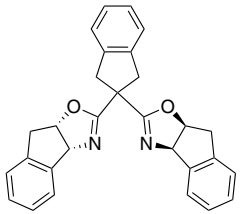
07-1402 NEW — 50mg

(4R,4'R)-2,2'-(4,6-Dibenzofurandiyl)bis[4,5-dihydro-4-phenyloxazole], 95% *(195433-00-2)*
$C_{30}H_{22}N_2O_3$; FW: 458.5; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.



07-1403 NEW — 50mg

(3aR,3a'R,8aS,8a'S)-2,2'-(1,3-Dihydro-2H-inden-2-ylidene)bis[3a,8a-dihydro-8H-indeno[1,2-d]oxazole], 98%, (99% ee)
$C_{29}H_{24}N_2O_2$; FW: 432.5; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

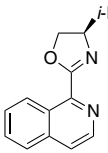


07-1404 NEW — 50mg

(3aS,3a'S,8aR,8a'R)-2,2'-(1,3-Dihydro-2H-inden-2-ylidene)bis[3a,8a-dihydro-8H-indeno[1,2-d]oxazole], 98%, (99% ee) *(188780-28-1)*
$C_{29}H_{24}N_2O_2$; FW: 432.5; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

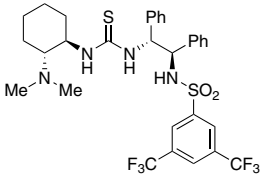
07-1368 NEW — 100mg

1-[(4R)-4,5-Dihydro-4-isopropyl-2-oxazolyl]isoquinoline, 98%, (99% ee) *(280755-83-1)*
$C_{15}H_{16}N_2O$; FW: 240.3; white-yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.



07-6357 NEW — 50mg

N-[(1R,2R)-2-[[[[(1R,2R)-2-(Dimethylamino)cyclohexyl]amino]thioxomethyl]amino]-1,2-diphenylethyl]-3,5-bis(trifluoromethyl)benzenesulfonamide, 95%, (99% ee) *(1020665-73-9)*
$C_{31}H_{34}F_6N_4O_2S_2$; FW: 672.7; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.

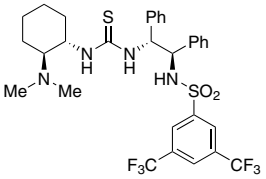


07-6359 NEW — 50mg

N-[(1S,2S)-2-[[[[(1R,2R)-2-(Dimethylamino)cyclohexyl]amino]thioxomethyl]amino]-1,2-diphenylethyl]-3,5-bis(trifluoromethyl)benzenesulfonamide, 95%, (99% ee) *(1448608-06-7)*
$C_{31}H_{34}F_6N_4O_2S_2$; FW: 672.7; white-yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.

07-6360 NEW — 50mg

N-[(1R,2R)-2-[[[[(1S,2S)-2-(Dimethylamino)cyclohexyl]amino]thioxomethyl]amino]-1,2-diphenylethyl]-3,5-bis(trifluoromethyl)benzenesulfonamide, 98%, (99% ee)
(1448608-07-8)
$C_{31}H_{34}F_6N_4O_2S_2$; FW: 672.7; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.



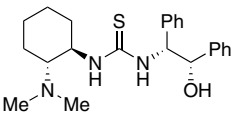
NITROGEN (Compounds)

07-6358 NEW — 50mg

N-[(1S,2S)-2-[[[[(1S,2S)-2-(Dimethylamino)cyclohexyl]amino]thioxomethyl]amino]-1,2-diphenylethyl]-3,5-bis(trifluoromethyl)benzenesulfonamide, 98%, (99% ee) *(1449480-55-0)*
$C_{31}H_{34}F_6N_4O_2S_2$; FW: 672.7; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.

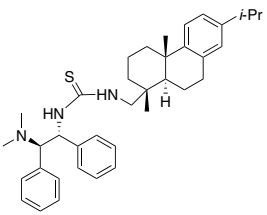
07-6361 NEW — 50mg

N-[(1R,2R)-2-(Dimethylamino)cyclohexyl]-N'-[(1R,2S)-2-hydroxy-1,2-diphenylethyl]thiourea, 98%, (99% ee) *(1046493-36-0)*
$C_{23}H_{31}N_3OS$; FW: 397.6; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.



07-6373 NEW — 50mg

N-[(1R,2R)-2-(Dimethylamino)-1,2-diphenylethyl]-N'-[[(1R,4aS,10aR)-1,2,3,4,4a,9,10,10a-octahydro-1,4a-dimethyl-7-isopropyl-1-phenanthrenyl]methyl]thiourea, 98%, (99% ee)
$C_{37}H_{49}N_3S$; FW: 567.9; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.



07-6330 NEW — 50mg

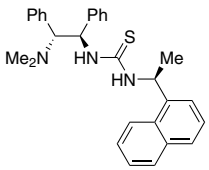
N-[(1S,2S)-2-(Dimethylamino)-1,2-diphenylethyl]-N'-[[(1R,4aS,10aR)-1,2,3,4,4a,9,10,10a-octahydro-1,4a-dimethyl-7-isopropyl-1-phenanthrenyl]methyl]thiourea, 98%, (99% ee)
$C_{37}H_{49}N_3S$; FW: 567.9; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.

07-6347 NEW — 50mg

1-[(1S,2S)-2-(Dimethylamino)-1,2-diphenylethyl]-3-[(R)-1-(naphthalen-1-yl)ethyl]thiourea, 95%, (99% ee)
$C_{29}H_{31}N_3S$; FW: 453.6; white-yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

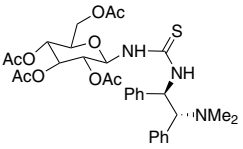
07-6346 NEW — 50mg

1-[(1R,2R)-2-(Dimethylamino)-1,2-diphenylethyl]-3-[(S)-1-(naphthalen-1-yl)ethyl]thiourea, 98%, (99% ee)
$C_{29}H_{31}N_3S$; FW: 453.6; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.



07-6364 NEW — 100mg

N-[(1R,2R)-2-(Dimethylamino)-1,2-diphenylethyl]-N'-(2,3,4,6-tetra-O-acetyl-β-D-glucopyranosyl)thiourea, 98%, (99% ee) *(1440198-44-6)*
$C_{31}H_{39}N_3O_9S$; FW: 629.7; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

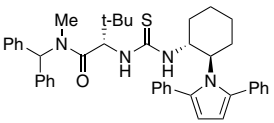


07-6365 NEW — 100mg

N-[(1S,2S)-2-(Dimethylamino)-1,2-diphenylethyl]-N'-(2,3,4,6-tetra-O-acetyl-β-D-glucopyranosyl)thiourea, 98%, (99% ee) *(1414889-04-5)*
$C_{31}H_{39}N_3O_9S$; FW: 629.7; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

07-6362 NEW — 50mg

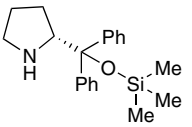
(2S)-N-(Diphenylmethyl)-N,3,3-trimethyl-2-[[[[(1R,2R)-2-2,5-diphenyl-1H-pyrrol-1-yl)cyclohexyl]amino]thioxomethyl]amino]butanamide, 98%
$C_{43}H_{48}N_4OS$; FW: 668.9; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.



NITROGEN (Compounds)

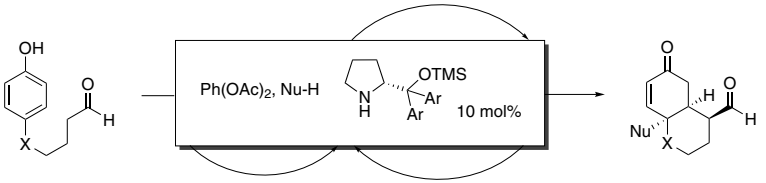
07-7234 NEW

(R)-Diphenylprolinol trimethyl silyl ether, 95% (99% ee) 1g
(943757-71-9)
$C_{20}H_{27}NOSi$; FW: 325.5; white to light brown viscous liq.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

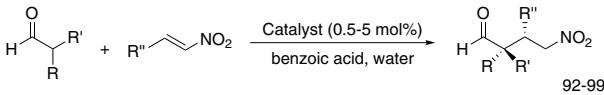


Technical Notes:

1. Michael Addition- oxidative dearomatization of substituted phenols followed by a desymmetrizing secondary amine-catalyzed asymmetric intramolecular Michael addition controls three new stereogenic centers and an array of exploitable orthogonal functionality.
2. A highly effective catalytic procedure for the Michael addition of aldehydes to nitroalkenes is achieved.
3. Conjugate Addition- An unprecedented 1,6-enamine conjugate from1,3-bis(sulfonyl) butadienes.
4. ABT-341 was synthesized in a one-pot process. An asymmetric Michael reaction, a domino Michael/Horner-Wadsworth-Emmons reaction combined with a retro-aldol reaction, base-catalyzed isomerization, amide-bond formation, and reduction of the nitro group all took place in a single flask.
5. Efficient synthesis in a small number of synthetic steps using one-pot operations involving several successive reactions.



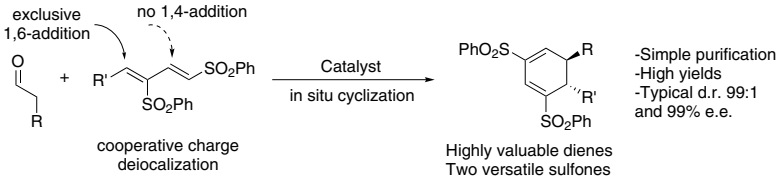
Tech. Note (1)
Ref. (1)



R''= alkyl, aryl, COOR''

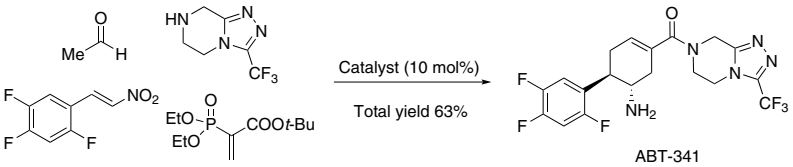
92-99% e.e.
syn/anti 81:19-98:2

Tech. Note (2)
Ref. (2)



-Simple purification
-High yields
-Typical d.r. 99:1 and 99% e.e.

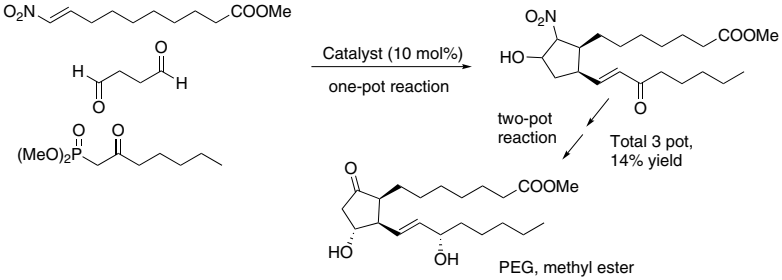
Tech. Note (3)
Ref. (3)



Tech. Note (4)
Ref. (4)

NITROGEN (Compounds)

07-7234 **(R)-Diphenylprolinol trimethyl silyl ether, 95% (99% ee)** *(943757-71-9)*
(continued)

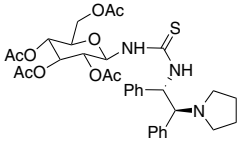


Tech. Note (5)
Ref. (5)

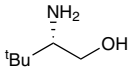
References:

1. *J. Am. Chem. Soc.*, **2008**, *130*, 404-405.
2. *Angew. Chem. Int. Ed.*, **2008**, *47*, 545-548.
3. *Angew. Chem. Int. Ed.*, **2011**, *50*, 5095-5098.
4. *Angew. Chem. Int. Ed.*, **2011**, *50*, 2824-2827.
5. *Angew. Chem. Int. Ed.,* **2013,** *52*, 3450-3452.

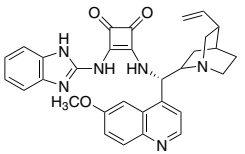
07-6366 NEW
N-[(1S,2S)-1,2-Diphenyl-2-(1-pyrrolidinyl)ethyl]-N'-(2,3,4,6-tetra-O-acetyl-β-D-glucopyranosyl) thiourea, 95% *(1414889-06-7)*
$C_{33}H_{41}N_3O_9S$; FW: 655.8; white~light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.
50mg



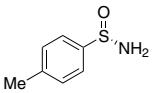
07-7224 NEW
L-tert-Leucinol, 98% (99% ee) *(13374-31-7)*
$C_6H_{15}NO$; FW: 117.2; white to light yellow solid
Note: Sold in collaboration with Daicel for research purposes only.
1g



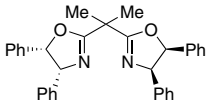
07-1358 NEW
3-[[(8α,9S)-6'-Methoxycinchonan-9-yl]amino]-4-[(1H-benzimidazol-2-yl)amino]-3-cyclobutene-1,2-dione, 98%
$C_{31}H_{30}N_6O_3$; FW: 534.6; white-yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.
50mg



07-7228 NEW
(S)-4-Methylbenzenesulfinamide, 95% (99% ee) *(188447-91-8)*
C_7H_9NOS; FW: 155.2; white to light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.
1g



07-1378 NEW
(4R,4'R,5S,5'S)-2,2'-(1-Methylethylidene)bis[4,5-dihydro-4,5-diphenyloxazole], 98%, (99% ee) *(157904-67-1)*
$C_{33}H_{30}N_2O_2$; FW: 486.6; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.
50mg

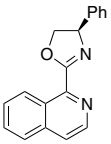


07-1377 NEW
(4S,4'S,5R,5'R)-2,2'-(1-Methylethylidene)bis[4,5-dihydro-4,5-diphenyloxazole], 98%, (99% ee) *(157825-96-2)*
$C_{33}H_{30}N_2O_2$; FW: 486.6; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.
50mg

NITROGEN (Compounds)

07-1371 NEW — 100mg

1-[(4R)-4-Phenyl-4,5-dihydro-2-oxazolyl]isoquinoline, 95%, (99% ee)



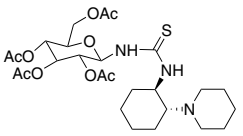
$C_{18}H_{14}N_2O$; FW: 274.3; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

07-1372 NEW — 100mg

1-[(4S)-4-Phenyl-4,5-dihydro-2-oxazolyl]isoquinoline, 95%, (99% ee)
$C_{18}H_{14}N_2O$; FW: 274.3; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

07-6368 NEW — 50mg

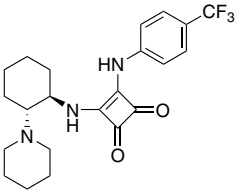
N-[(1R,2R)-2-(1-Piperidinylamino)cyclohexyl]-N'-(2,3,4,6-tetra-O-acetyl-β-D-glucopyranosyl)thiourea, 98%



$C_{26}H_{41}N_3O_9S$; FW: 571.7; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

07-1356 NEW — 50mg

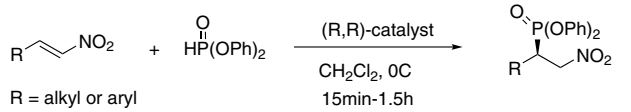
3-[[(1R,2R)-2-(1-Piperidinyl)cyclohexyl]amino]-4-[[4-(trifluoromethyl)phenyl]amino]-3-cyclobutene-1,2-dione, 98%, (99% ee) *(1211565-08-0)*



$C_{22}H_{26}F_3N_3O_2$; FW: 421.5; white-light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.

Technical Notes:

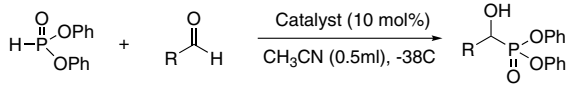
1. Michael Addition- highly enantioselective Michael addition reaction of diphenyl phosphite to a range of nitroalkenes.
2. Hydrophosphonylation- diphenylphosphite has been successfully employed in a chiral Pudovik reaction with aldehydes, extending the generality of this asymmetric methodology.
3. Friedel-Crafts/Substitution Domino Reaction- Dihydroarylfuran skeletons are efficiently synthesized from (Z)-bromonitroalkenes and naphthol derivatives in good yields and excellent enantioselectivities



R = alkyl or aryl

23 examples
95-99% e.e.

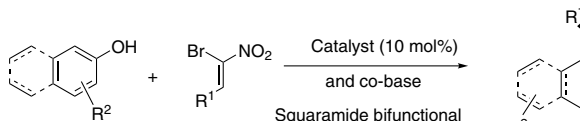
Tech. Note (1)
Ref. (1)



R = alkyl, aryl

yield up to 98%
ee up to 88%

Tech. Note (2)
Ref. (2)



e.e. up to 99%

Tech. Note (3)
Ref. (3)

References:

1. *Angew. Chem. Int. Ed.*, **2010**, *49*, 153-156.
2. *Org. Biomol. Chem.*, **2014**, *12*, 1258-1264.
3. *Angew. Chem. Commun.*, **2013**, *49*, 2001-2003.

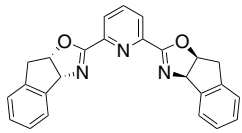
07-1367 NEW — 250mg

(3aS,3'aS,8aR,8'aR)-2,2'-(2,6-Pyridinediyl)bis[3a,8a-dihydro-8H-indeno[1,2-d]oxazole], 95%, (99% ee) *(185346-09-2)*
$C_{25}H_{19}N_3O_2$; FW: 393.4; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

NITROGEN (Compounds)

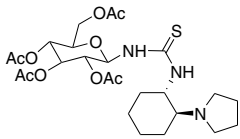
07-7212 NEW — **(3aR,3'aR,8aS,8'aS)-2,2'-(2,6-Pyridinediyl) bis[3a,8a-dihydro-8H-indeno[1,2-d]oxazole], 98% (99% ee)** *(357209-32-6)* — 500mg

$C_{25}H_{19}N_3O_2$; FW: 393.4; white to light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.



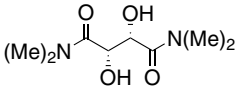
07-6367 NEW — **N-[(1S,2S)-2-(1-Pyrrolidinyl)cyclohex-yl]-N'-(2,3,4,6-tetra-O-acetyl-β-D-glucopyranosyl) thiourea, 98%** *(1471290-67-1)* — 50mg

$C_{25}H_{39}N_3O_9S$; FW: 557.7; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.



07-7226 NEW — **N,N,N',N'-Tetramethyl-D-tartaramide, 98% (99% ee)** *(63126-52-3)* — 5g

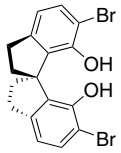
$C_8H_{16}N_2O_4$; FW: 204.2; white to light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.



OXYGEN (Compounds)

08-1252 NEW — **(R)-6,6'-Dibromo-2,2',3,3'-tetrahydro-1,1'-spirobi[1H-indene]-7,7'-diol, 95% (99 ee)** *(1286189-15-8)* — 250mg

$C_{17}H_{14}Br_2O_2$; FW: 410.1; white to light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.

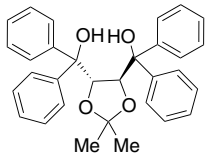


08-1250 NEW — **(S)-6,6'-Dibromo-2,2',3,3'-tetrahydro-1,1'-spirobi[1H-indene]-7,7'-diol, 98% (99% ee)** *(1621066-74-7)* — 250mg

$C_{17}H_{14}Br_2O_2$; FW: 410.10; white to light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.

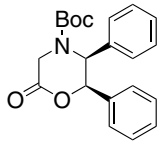
08-1258 NEW — **(4S,5S)-2,2-Dimethyl-α,α,α',α'-tetraphenyl-1,3-diox-olane-4,5-dimethanol, 98% (99% ee)** *(93379-49-8)* — 1g

$C_{31}H_{30}O_4$; FW: 466.6; white to light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.



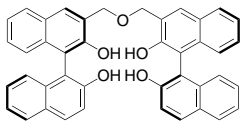
08-1262 NEW — **(2R,3S)-6-Oxo-2,3-diphenyl-4-morpholinecarboxylic acid t-butyl ester, 98% (99% ee)** *(112741-49-8)* — 1g

$C_{21}H_{23}NO_4$; FW: 353.4; white to light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.



08-1256 NEW — **(1R,1''R)-3,3''-[Oxybis(methylene)]bis-[1,1'-binaphthalene]-2,2'-diol, 95% (99% ee)** *(265116-85-6)* — 100mg

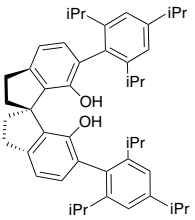
$C_{42}H_{30}O_5$; FW: 614.7; white to light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.



OXYGEN (Compounds)

08-1254 NEW

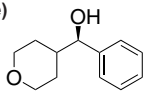
(R)-2,2',3,3'-Tetrahydro-6,6'-bis(2,4,6-tri-isopropylphenyl)-1,1'-spirobi[1H-indene]-7,7'-diol, 95% (99% ee) *(1372719-98-6)*
$C_{47}H_{60}O_2$; FW: 657; white to light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.



50mg

08-1260 NEW

(αR)-Tetrahydro-α-phenyl-2H-pyran-4-methanol, 98% (99% ee) *(1800345-36-1)*
$C_{12}H_{16}O_2$; FW: 192.3; white to Light yellow pwdr.
Note: Sold in collaboration with Daicel for research purposes only.

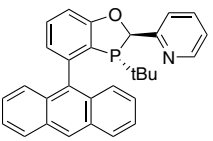


500mg

PHOSPHORUS (Compounds)

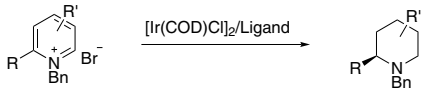
15-6892 NEW

2-((2R,3R)-4-(Anthracen-9-yl)-3-(tert-butyl)-2,3-dihydrobenzo[d][1,3]oxaphosphol-2-yl)pyridine, 97% (>99% ee) *(1542796-14-4)*
$C_{30}H_{26}NOP$; FW: 447.51; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

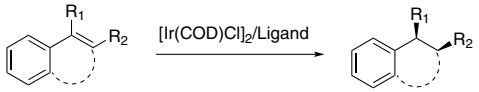


25mg
100mg
500mg

Technical Notes:
1. Ligand used with iridium catalyst for asymmetric hydrogenation of pydinium salts.
2. Ligand used with iridium catalyst for asymmetric hydrogenation of unfunctionalized alkenes.



Tech. Note (1)
Ref. (1-3)



Tech. Note (2)
Ref. (4-5)

References:
1. *Org. Lett.* **2018**, *20*, 1333−1337.
2. *Org. Lett.* **2016,***18*, 4920−4923.
3. *J. Am. Chem. Soc.* **2016**, *138*, 15473−15481.
4. *J. Org. Chem.* **2014**,*79*, 993-1000.
5. *Angew. Chem. Int. Ed.* **2014**, *53*, 14428–14432.

15-6894 NEW

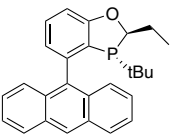
2-((2S,3S)-4-(Anthracen-9-yl)-3-(tert-butyl)-2,3-dihydrobenzo[d][1,3]oxaphosphol-2-yl)pyridine, 97% (>99% ee)
$C_{30}H_{26}NOP$; FW: 447.51; white to off-white solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

25mg
100mg
500mg

Technical Note:
1. See 15-6892 (page 75)

15-6888 NEW

(2R,3R)-4-(Anthracen-9-yl)-3-(tert-butyl)-2-ethyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)
$C_{27}H_{27}OP$; FW: 398.48; white to off-white solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

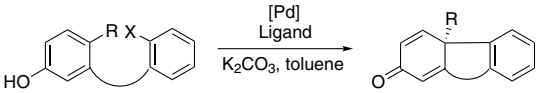


100mg
500mg

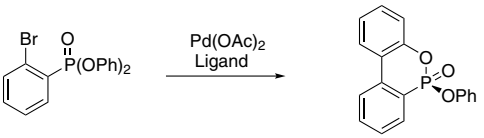
Technical Notes:
1. Ligand used with palladium catalyst for asymmetric intramolecular cyclization.
2. Ligand used with palladium catalyst for C-H functionalization.
3. Ligand used with palladium catalyst for Suzuki-Miyaura cross-coupling reactions.
4. Ligand used with nickel catalyst for asymmetric intramolecular/intermolecular reductive cyclization.
5. Ligand used with palladium catalyst for asymmetric cyclization.
6. Ligand used with palladium catalyzed Heck-type reactions.

OXYGEN (Compounds)

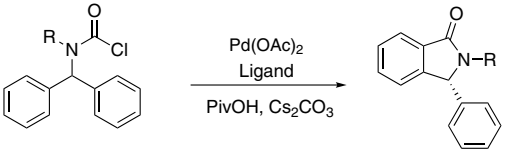
15-6888 **(2R,3R)-4-(Anthracen-9-yl)-3-(tert-butyl)-2-ethyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)**
(continued)



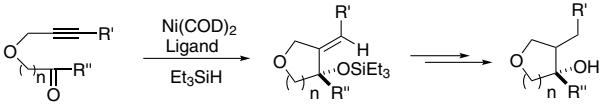
Tech. Note (1)
Ref. (1-4)



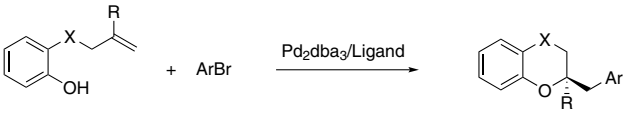
Tech. Note (2)
Ref. (5)



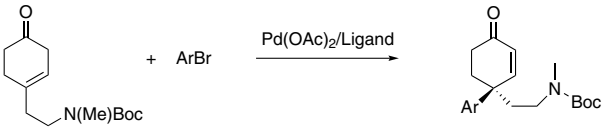
Tech. Note (3)
Ref. (6)



Tech. Note (4)
Ref. (7)



Tech. Note (5)
Ref. (8)



Tech. Note (6)
Ref. (9)

References:

1. *Angew. Chem., Int. Ed.* **2015**, *54*, 3033-3037.
2. *Tetrahedron*. **2016**, *72*, 1782–1786.
3. *Chem. Sci.* **2017**, *8*, 6247-6256.
4. *J. Am. Chem. Soc.* **2017**, *139*, 6630.
5. *Org. Chem. Front.* **2015,** *2*, 1342-1345.
6. *Tetrahedron.* **2019**, *75*, 3239-3247.
7. *Angew. Chem., Int. Ed.* **2015**, *54*, 2520 -2524.
8. *Angew. Chem., Int. Ed.* **2016**, *55*, 5044–5048.
9. *J. Org. Chem.* **2016**, *81*, 10165−10171.

15-6890 **(2S,3S)-4-(Anthracen-9-yl)-3-(tert-butyl)-2-ethyl-2,3-dihydrobenzo[d][1,3] oxaphosphole, 97% (>99% ee)** *(1884594-03-9)* 100mg 500mg

NEW

$C_{27}H_{27}OP$; FW: 398.48; white to off-white solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

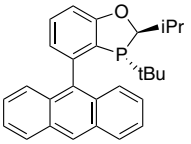
Technical Note:

1. See 15-6888 (page 75)

PHOSPHORUS (Compounds)

15-6818 NEW

(2R,3R)-4-(Anthracen-9-yl)-3-(tert-butyl)-2-isopropyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)
$C_{28}H_{29}OP$; FW: 412.51; light yellow solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.



25mg
100mg
500mg

Technical Notes:
1. See 15-6888 (page 75)

15-6820 NEW

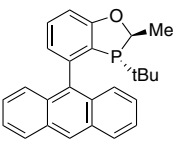
(2S,3S)-4-(Anthracen-9-yl)-3-(tert-butyl)-2-isopropyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee) *(1891002-61-1)*
$C_{28}H_{29}OP$; FW: 412.51; light yellow solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

25mg
100mg
500mg

Technical Note:
1. See 15-6888 (page 75)

15-6822 NEW

(2R,3R)-4-(Anthracen-9-yl)-3-(tert-butyl)-2-methyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)
(1477517-20-6)
$C_{26}H_{25}OP$; FW: 384.46; light yellow solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.



25mg
100mg
500mg

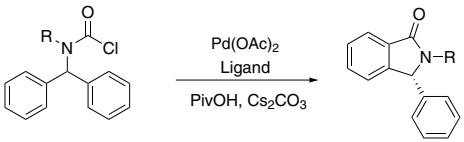
Technical Notes:
1. See 15-6888 (page 75)

15-6824 NEW

(2S,3S)-4-(Anthracen-9-yl)-3-(tert-butyl)-2-methyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)
$C_{26}H_{25}OP$; FW: 384.46; light yellow solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

25mg
100mg
500mg

Technical Note:
1. Ligand used with palladium catalyst for Suzuki-Miyaura cross-coupling reactions.



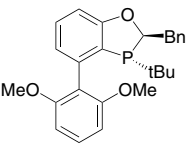
Tech. Note (1)
Ref. (1)

References:
1. *Tetrahedron*, **2019**, *75*, 3239-3247

96-0660 **BABIBOP Ligand Kit**
See page 91

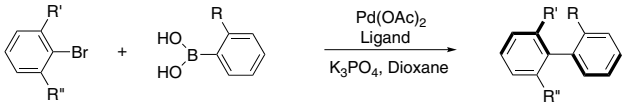
15-6848 NEW

(2R,3R)-2-Benzyl-3-(tert-butyl)-4-(2,6-dimethoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)
(1884457-36-6)
$C_{26}H_{29}O_3P$; FW: 420.18; white to off-white solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.



100mg
500mg
1g

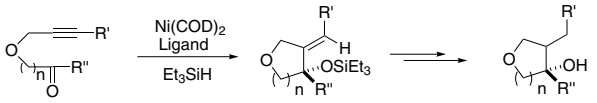
Technical Notes:
1. Ligand used with palladium catalyst for asymmetric Suzuki-Miyaura cross-coupling reactions.
2. Ligand used with nickel catalyst for asymmetric intramolecular/intermolecular reductive addition.
3. Ligand used with rhodium or palladium catalyzed asymmetric boration.
4. Ligand used with palladium catalyzed asymmetric C-H functionalization.



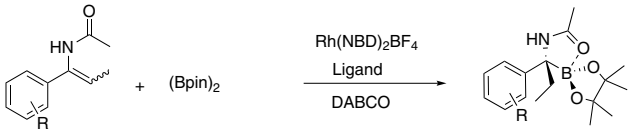
Tech. Note (1)
Ref. (1-5)

PHOSPHORUS (Compounds)

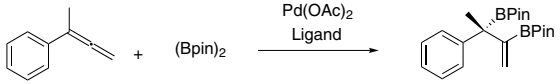
15-6848 ***(continued)*** **(2R,3R)-2-Benzyl-3-(tert-butyl)-4-(2,6-dimethoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)** *(1884457-36-6)*



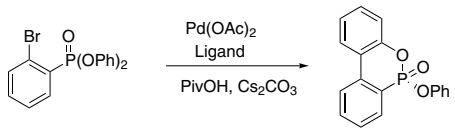
Tech. Note (2)
Ref. (6,7)



Tech. Note (3)
Ref. (8,9)



Tech. Note (4)
Ref. (10,11)



References:

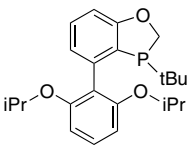
1. *Org. Lett.* **2012**, *14* , 2258–2261.
2. *J. Am. Chem. Soc*., **2014**, *136*, 570–573.
3. *Angew. Chem., Int. Ed*. **2015**, *54*, 7144-7148.
4. *Adv. Synth. Catal*. **2016**, *358*, 3522-3527.
5. *ACS Catal*. **2018**, *8*, 10190-10209.
6. *Angew. Chem., Int. Ed*. **2015**, *54*, 2520 -2524.
7. *Org. Chem. Front.* **2015**, *2*, 1322-1325.
8. *J. Am. Chem. Soc.* **2015,** *137*, 6746-6749.
9. *Chem. Sci*. **2017**, *8*, 5161-5165.
10. *Tetrahedron*, **2019**, *75(24)*, 3239-3247.
11. *Org. Chem. Front*. **2015**, *2*, 1342-1345.

15-6846 NEW **(2S,3S)-2-Benzyl-3-(tert-butyl)-4-(2,6-dimethoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)** *(1373432-13-3)* 100mg 500mg 1g
$C_{26}H_{29}O_3P$; FW: 420.18; white to off-white solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

Technical Note:

1. See 15-6848 (page 77)

15-6868 NEW **3-(tert-Butyl)-4-(2,6-diisopropoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97%** 100mg 500mg
$C_{23}H_{31}O_3P$; FW: 386.20; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607

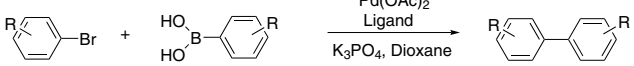


Technical Notes:

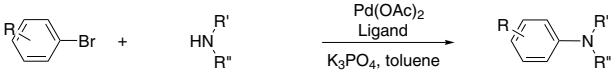
1. Ligand used with palladium catalyst for general and/or sterically demanding Suzuki-Miyaura cross-coupling reactions.
2. Ligand used with palladium catalyst for sterically demanding Buchwald-Hartwig amination.

PHOSPHORUS (Compounds)

15-6868 **3-(tert-Butyl)-4-(2,6-diisopropoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97%**
(continued)



Tech. Note (1)
Ref. (1,2)

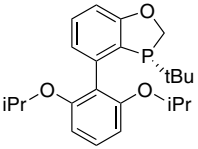


Tech. Note (2)
Ref. (3)

References:

1. *Angew. Chem., Int. Ed.* **2010**, *49*, 5879-5883.
2. *Chem. Eur. J.* **2013**, *19*, 2261-2265.
3. *Adv. Syn. Cat.* **2011**, *353*, 533-537.

15-6810 **(R)-3-(tert-Butyl)-4-(2,6-diisopropoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)**
NEW
$C_{23}H_{31}O_3P$; FW: 386.20; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.



25mg
100mg
500mg

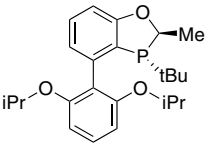
Technical Notes:
1. See 15-6848 (page 77).

15-6812 **(S)-3-(tert-Butyl)-4-(2,6-diisopropoxyphenyl)-2,3-dihydrobenzo[d][1,3] oxaphosphole, 97% (>99% ee)**
NEW
$C_{23}H_{31}O_3P$; FW: 386.20; white to off-white solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

25mg
100mg
500mg

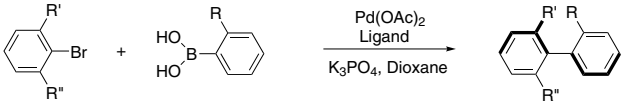
Technical Note:
1. See 15-6848 (page 77)

15-6826 **(2R,3R)-3-(tert-Butyl)-4-(2,6-diisopropoxyphenyl)-2-methyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)**
NEW
$C_{24}H_{33}O_3P$; FW: 400.21; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323;
US 20180155375 A1 20180607.

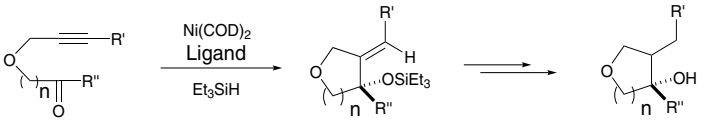


25mg
100mg
500mg

Technical Notes:
1. Ligand used with palladium catalyst for asymmetric Suzuki-Miyaura cross-coupling reactions.
2. Ligand used with nickel catalyst for asymmetric intramolecular/intermolecular reductive addition.



Tech. Note (1)
Ref. (1-5)



Tech. Note (2)
Ref. (6,7)

References:

1. *Org. Lett.* **2012**, *14* , 2258–2261.
2. *J. Am. Chem. Soc.*, **2014**, *136*, 570–573.
3. *Angew. Chem., Int. Ed.* **2015**, *54,* 7144-7148.
4. *Adv. Synth. Catal.* **2016**, *358*, 3522-3527.
5. *ACS Catal.* **2018**, *8*, 10190-10209.
6. *Angew. Chem., Int. Ed.* **2015**, *54*, 2520 -2524.
7. *Org. Chem. Front.* **2015**, *2*, 1322-1325.

PHOSPHORUS (Compounds)

15-6828 NEW

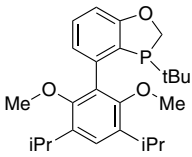
(2S,3S)-3-(tert-butyl)-4-(2,6-diisopropoxyphenyl)-2-methyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)
$C_{24}H_{33}O_3P$; FW: 400.21; white to off-white solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

25mg
100mg
500mg

Technical Notes:
1. See 15-6826 (page 79)

15-6866 NEW

3-(tert-Butyl)-4-(3,5-diisopropyl-2,6-dimethoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97%
$C_{25}H_{35}O_3P$; FW: 414.23; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

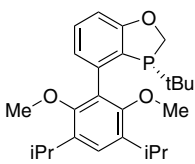


100mg
500mg

Technical Notes:
1. See 15-6868 (page 78)

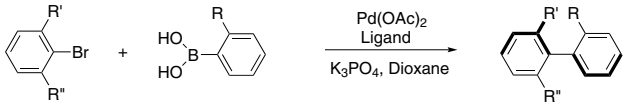
15-6838 NEW

(R)-3-(tert-Butyl)-4-(3,5-diisopropyl-2,6-dimethoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)
$C_{25}H_{35}O_3P$; FW: 414.23; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

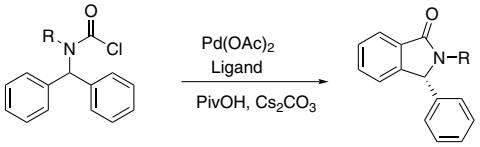


25mg
100mg
500mg

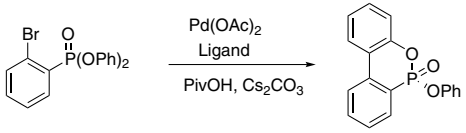
Technical Notes:
1. Ligand used with palladium catalyst for asymmetric Suzuki-Miyaura cross-coupling reactions.
2. Ligand used with palladium catalyzed asymmetric C-H functionalizaiton.



Tech. Note (1)
Ref. (1-5)



Tech. Note (2)
Ref. (6,7)



References:

1. *Org. Lett.* **2012**, *14* , 2258–2261.
2. *J. Am. Chem. Soc*., **2014**, *136*, 570–573.
3. *Angew. Chem., Int. Ed*. **2015**, *54*, 7144-7148.
4. *Adv. Synth. Catal.* **2016**, *358*, 3522-3527.
5. *ACS Catal*. **2018**, *8,* 10190-10209.
6. Tetrahedron, **2019,** *75(24),* 3239-3247.
7. *Org. Chem. Front*. **2015**, *2,* 1342-1345.

15-6844 NEW

(S)-3-(tert-Butyl)-4-(3,5-diisopropyl-2,6-dimethoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)
$C_{25}H_{35}O_3P$; FW: 414.23; white to off-white solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

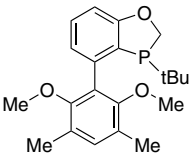
25mg
100mg
500mg

Technical Note:
1. See 15-6838 (page 80)

PHOSPHORUS (Compounds)

15-6864 NEW

3-(tert-Butyl)-4-(2,6-dimethoxy-3,5-dimethylphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97%
$C_{21}H_{27}O_3P$; FW: 358.16; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

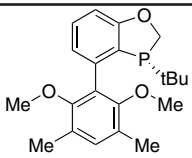


100mg
500mg

Technical Notes:
1. See 15-6868 (page 78)

15-6834 NEW

(R)-3-(tert-Butyl)-4-(2,6-dimethoxy-3,5-dimethylphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)
$C_{21}H_{27}O_3P$; FW: 358.16; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.



25mg
100mg
500mg

Technical Notes:
1. See 15-6838 (page 80)

15-6840 NEW

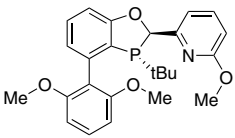
(S)-3-(tert-Butyl)-4-(2,6-dimethoxy-3,5-dimethylphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee) *(2021202-03-7)*
$C_{21}H_{27}O_3P$; FW: 358.16; white to off-white solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

25mg
100mg
500mg

Technical Note:
1. See 15-6838 (page 80)

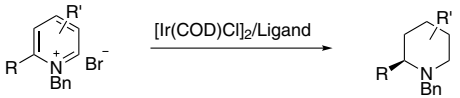
15-6862 NEW

2-((2R,3R)-3-(tert-Butyl)-4-(2,6-dimethoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphol-2-yl)-6-methoxypyridine, 97% (>99% ee)
$C_{25}H_{28}NO_4P$; FW: 437.47; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

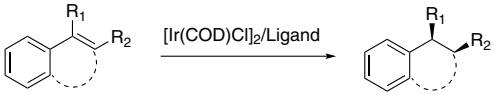


25mg
100mg
500mg

Technical Notes:
1. Ligand used with iridium catalyst for asymmetric hydrogenation of pydinium salts.
2. Ligand used with iridium catalyst for asymmetric hydrogenation of unfunctionalized alkenes.



Tech. Note (1)
Ref. (1-3)



Tech. Note (2)
Ref. (4-5)

References:
1. *Org. Lett.* **2018**, *20*, 1333−1337.
2. *Org. Lett.* **2016**,*18*, 4920−4923.
3. *J. Am. Chem. Soc.* **2016**, *138*, 15473−15481.
4. *J. Org. Chem.* **2014**,*79*, 993-1000.
5. *Angew. Chem. Int. Ed.* **2014**, *53*, 14428–14432.

15-6856 NEW

2-((2S,3S)-3-(tert-Butyl)-4-(2,6-dimethoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphol-2-yl)-6-methoxypyridine, 97% (>99% ee) *(2003230-67-7)*
$C_{25}H_{28}NO_4P$; FW: 437.47; white to off-white solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

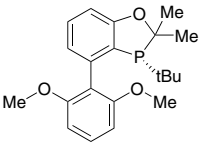
25mg
100mg
500mg

Technical Notes:
1. See 15-6862 (page 81)

PHOSPHORUS (Compounds)

15-6882 NEW

(R)-3-(tert-Butyl)-4-(2,6-dimethoxyphenyl)-2,2-dimethyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)
$C_{21}H_{27}O_3P$; FW: 358.16; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.



25mg
100mg
500mg

Technical Notes:
1. See 15-6826 (page 79)

15-6880 NEW

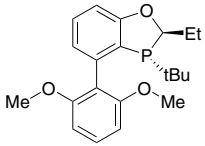
(S)-3-(tert-Butyl)-4-(2,6-dimethoxyphenyl)-2,2-dimethyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee) *(2227217-19-6)*
$C_{21}H_{27}O_3P$; FW: 358.16; white to off-white solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

25mg
100mg
500mg

Technical Notes:
1. See 15-6826 (page 79)

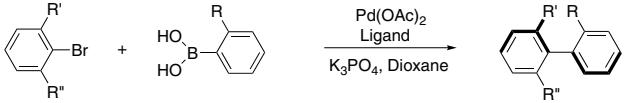
15-6886 NEW

(2R,3R)-3-(tert-Butyl)-4-(2,6-dimethoxyphenyl)-2-ethyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)
$C_{21}H_{27}O_3P$; FW: 358.16; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.



100mg
500mg

Technical Note:
1. Ligand used with palladium catalyst for asymmetric Suzuki-Miyaura cross-coupling reactions.



Tech. Note (1)
Ref. (1-5)

References:
1. *Org. Lett.* **2012**, *14* , 2258–2261.
2. *J. Am. Chem. Soc.*, **2014**, *136*, 570–573.
3. *Angew. Chem., Int. Ed.* **2015**, *54*, 7144-7148.
4. *Adv. Synth. Catal.* **2016**, *358*, 3522-3527.
5. *ACS Catal.* **2018**, *8*, 10190-10209.

15-6884 NEW

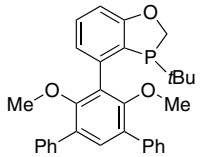
(2S,3S)-3-(tert-Butyl)-4-(2,6-dimethoxyphenyl)-2-ethyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee) *(2247162-97-4)*
$C_{21}H_{27}O_3P$; FW: 358.16; white to off-white solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

100mg
500mg

Technical Note:
1. See 15-6886 (page 82)

15-6896 NEW

3-(tert-Butyl)-4-(4',6'-dimethoxy-[1,1':3',1''-terphenyl]-5'-yl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97%
$C_{31}H_{31}O_3P$; FW: 482.20; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

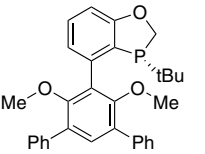


100mg
500mg

Technical Notes:
1. See 15-6868 (page 78)

15-6836 NEW

(R)-3-(tert-Butyl)-4-(4',6'-dimethoxy-[1,1':3',1''-terphenyl]-5'-yl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)
$C_{31}H_{31}O_3P$; FW: 482.20; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.



25mg
100mg
500mg

Technical Notes:
1. See 15-6838 (page 80)

PHOSPHORUS (Compounds)

15-6842 NEW

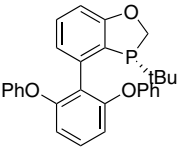
(S)-3-(tert-Butyl)-4-(4',6'-dimethoxy-[1,1':3',1''-terphenyl]-5'-yl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee) *(2021201-99-8)*
$C_{31}H_{31}O_3P$; FW: 482.20; white to off-white solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

25mg
100mg
500mg

Technical Notes:
1. See 15-6838 (page 80)

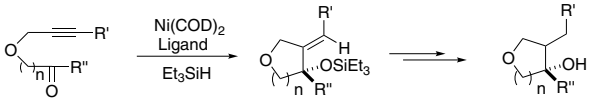
15-6814 NEW

(R)-3-(tert-Butyl)-4-(2,6-diphenoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee) *(1441830-74-5)*
$C_{29}H_{27}O_3P$; FW: 454.17; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607

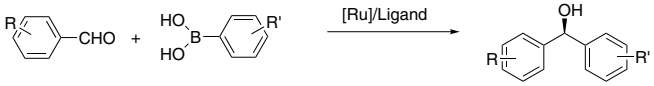


25mg
100mg
500mg

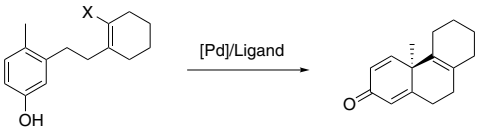
Technical Notes:
1. Ligand used with nickel catalyst for asymmetric intramolecular/intermolecular reductive addition.
2. Ligand used with ruthenium catalyzed asymmetric addition.
3. Ligand used with palladium catalyst for asymmetric intramolecular cyclization.



Tech. Note (1)
Ref. (1,2)



Tech. Note (2)
Ref. (3)



Tech. Note (3)
Ref. (4,5)

References:

1. *Angew. Chem., Int. Ed*. **2015**, *54*, 2520 -2524.
2. *Org. Chem. Front.* **2015**, *2*, 1322-1325.
3. *J. Org. Chem*. **2013**, *78*, 6350-6355.
4. *Angew. Chem., Int. Ed*. **2015**, *54*, 3033-3037.
5. *Tetrahedron*. **2016**, *72*, 1782–1786.

15-6816 NEW

(S)-3-(tert-Butyl)-4-(2,6-diphenoxyphenyl)-2,3-dihydrobenzo[d][1,3] oxaphosphole, 97% (>99% ee)
$C_{29}H_{27}O_3P$; FW: 454.16; light yellow solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

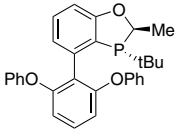
25mg
100mg
500mg

Technical Notes:
1. See 15-6814 (page 83)

PHOSPHORUS (Compounds)

15-6830 NEW

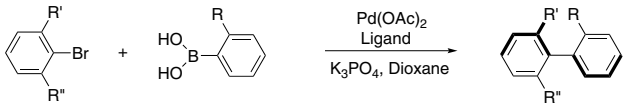
(2R,3R)-3-(tert-Butyl)-4-(2,6-diphenoxyphenyl)-2-methyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)
$C_{30}H_{29}O_3P$; FW: 468.18; white to off-white solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.



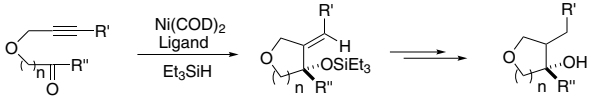
25mg
100mg
500mg

Technical Notes:

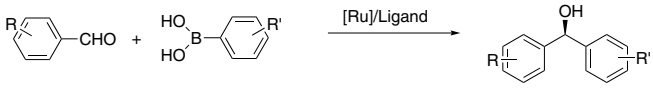
1. Ligand used with palladium catalyst for asymmetric Suzuki-Miyaura cross-coupling reactions.
2. Ligand used with nickel catalyst for asymmetric intramolecular/intermolecular reductive addition.
3. Ligand used with ruthenium catalyzed asymmetric addition.
4. Ligand used with palladium catalyst for asymmetric intramolecular cyclization.



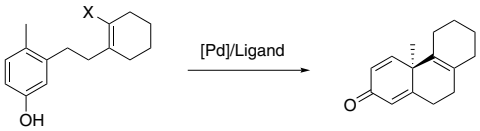
Tech. Note (1)
Ref. (1-5)



Tech. Note (2)
Ref. (6,7)



Tech. Note (3)
Ref. (8)



Tech. Note (4)
Ref. (9,10)

References:

1. *Org. Lett.* **2012**, *14* , 2258–2261.
2. *J. Am. Chem. Soc.*, **2014**, *136*, 570–573.
3. *Angew. Chem., Int. Ed.* **2015**, *54*, 7144-7148.
4. *Adv. Synth. Catal.* **2016**, *358*, 3522-3527.
5. *ACS Catal.* **2018**, *8*, 10190-10209.
6. *Angew. Chem., Int. Ed.* **2015**, *54*, 2520 -2524.
7. *Org. Chem. Front.* **2015**, *2*, 1322-1325.
8. *J. Org. Chem.* **2013**, *78*, 6350-6355.
9. *Angew. Chem., Int. Ed.* **2015**, *54*, 3033-3037.
10. *Tetrahedron*. **2016**, *72*, 1782–1786.

15-6832 NEW

(2S,3S)-3-(tert-Butyl)-4-(2,6-diphenoxyphenyl)-2-methyl-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)
$C_{30}H_{29}O_3P$; FW: 468.18; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

25mg
100mg
500mg

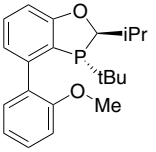
Technical Notes:

1. See 15-6830 (page 84)

PHOSPHORUS (Compounds)

15-6878 NEW

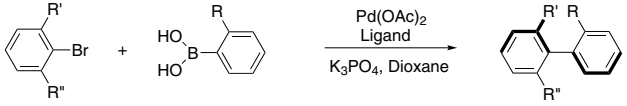
(2R,3R)-3-(tert-Butyl)-2-isopropyl-4-(2-methoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)
$C_{21}H_{27}O_2P$; FW: 342.17; white to off-white solid
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.



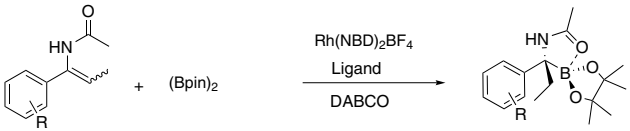
100mg
500mg

Technical Notes:

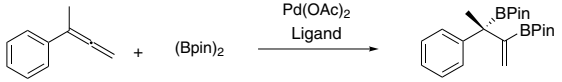
1. Palladium catalyst for asymmetric Suzuki-Miyaura cross-coupling reactions.
2. Rhodium or palladium catalyzed asymmetric boration.



Tech. Note (1)
Ref. (1-5)



Tech. Note (2)
Ref. (6,7)



References:

1. *Org. Lett.* **2012**, *14* , 2258–2261.
2. *J. Am. Chem. Soc.,* **2014**, *136*, 570–573.
3. *Angew. Chem., Int. Ed.* **2015**, *54*, 7144-7148.
4. *Adv. Synth. Catal.* **2016**, *358*, 3522-3527.
5. *ACS Catal.* **2018**, *8*, 10190-10209.
6. *J. Am. Chem. Soc.* **2015**, *137*, 6746-6749.
7. *Chem. Sci.* **2017**, *8*, 5161-5165.

15-6876 NEW

(2S,3S)-3-(tert-Butyl)-2-isopropyl-4-(2-methoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)
$C_{21}H_{27}O_2P$; FW: 342.17; white to off-white solid
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

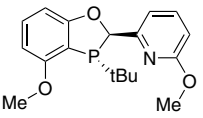
100mg
500mg

Technical Notes:

1. See 15-6878 (page 85)

15-6860 NEW

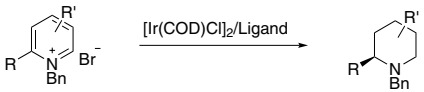
2-((2R,3R)-3-(tert-Butyl)-4-methoxy-2,3-dihydrobenzo[d][1,3]oxaphosphol-2-yl)-6-methoxypyridine, 97% (>99% ee)
(2R,3R)-MeO-BoQPhos *(1542796-16-6)*
$C_{18}H_{22}NO_3P$; FW: 331.35; white to off-white solid
air sensitive
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.



25mg
100mg
500mg

Technical Notes:

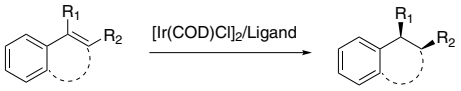
1. Ligand used with iridium catalyst for asymmetric hydrogenation of pydinium salts.
2. Ligand used with iridium catalyst for asymmetric unfunctionalized alkenes.



Tech. Note (1)
Ref. (1-3)

PHOSPHORUS (Compounds)

15-6860 ***(continued)*** **2-((2R,3R)-3-(tert-Butyl)-4-methoxy-2,3-dihydrobenzo[d][1,3]oxaphosphol-2-yl)-6-methoxypyridine, 97% (>99% ee) (2R,3R)-MeO-BoQPhos** *(1542796-16-6)*



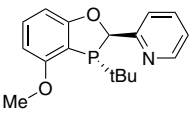
Tech. Note (2)
Ref. (4-5)

References:
1. *Org. Lett.* **2018**, *20*, 1333−1337.
2. *Org. Lett.* **2016**,*18*, 4920−4923.
3. *J. Am. Chem. Soc.* **2016**, *138*, 15473−15481.
4. *J. Org. Chem.* **2014**,*79*, 993-1000.
5. *Angew. Chem. Int. Ed.* **2014**, *53*, 14428–14432.

15-6854 NEW **2-((2S,3S)-3-(tert-Butyl)-4-methoxy-2,3-dihydrobenzo[d][1,3]oxaphosphol-2-yl)-6-methoxypyridine, 97% (>99% ee) (2S,3S)-MeO-BoQPhos** *(1777796-37-8)* 25mg 100mg 500mg
$C_{18}H_{22}NO_3P$; FW: 331.35; white to off-white solid
air sensitive
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

Technical Notes:
1. See 15-6860 (page 85)

15-6858 NEW **2-((2R,3R)-3-(tert-Butyl)-4-methoxy-2,3-dihydrobenzo[d][1,3]oxaphosphol-2-yl)pyridine, 97% (>99% ee)** *(1542796-07-5)* 25mg 100mg 500mg



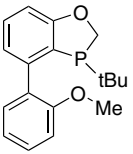
$C_{17}H_{20}NO_2P$; FW: 301.32; white to off-white solid
air sensitive
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

Technical Notes:
1. See 15-6860 (page 85)

15-6852 NEW **2-((2S,3S)-3-(tert-Butyl)-4-methoxy-2,3-dihydrobenzo[d][1,3]oxaphosphol-2-yl) pyridine, 97% (>99% ee)** 25mg 100mg 500mg
$C_{17}H_{20}NO_2P$; FW: 301.32; white to off-white solid
air sensitive
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

Technical Notes:
1. See 15-6860 (page 85)

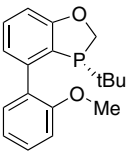
15-6870 NEW **3-(tert-Butyl)-4-(2-methoxyphenyl)-2,3-dihydrobenzo[d][1,3] oxaphosphole, 97%** *(1246888-88-9)* 1g 5g



$C_{18}H_{21}O_2P$; FW: 300.12; white to off-white solid
air sensitive
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

Technical Notes:
1. See 15-6868 (page 78)

15-6872 NEW **(R)-3-(tert-Butyl)-4-(2-methoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee)** *(1338454-28-6)* 100mg 500mg



$C_{18}H_{21}O_2P$; FW: 300.12; white to off-white solid
air sensitive
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

Technical Notes:
1. See 15-6878 (page 85)

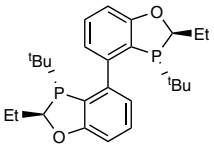
PHOSPHORUS (Compounds)

15-6874 NEW
(S)-3-(tert-Butyl)-4-(2-methoxyphenyl)-2,3-dihydrobenzo[d][1,3]oxaphosphole, 97% (>99% ee) 100mg 500mg
$C_{18}H_{21}O_2P$; FW: 300.12; white to off-white solid
air sensitive
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

Technical Notes:
1. See 15-6878 (page 85)

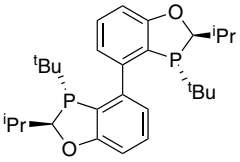
15-1772 **Diphenylphosphine selenide, 98%** *(5853-64-5)*
See page 54

15-6440 NEW
(2R,2'R,3R,3'R)-3,3'-Di-tert-butyl-2,2'-diethyl-2,2',3,3'-tetrahydro-4,4'-bibenzo[d][1,3]oxaphosphole, min. 97% (99% ee) (2R,2'R,3R,3'R)-DI-Et-BABIBOP 25mg 100mg
$C_{26}H_{36}O_2P_2$; FW: 442.51; white to off-white solid
air sensitive, (store cold)
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.



15-6425 NEW
(2S,2'S,3S,3'S)-3,3'-Di-tert-butyl-2,2'-diethyl-2,2',3,3'-tetrahydro-4,4'-bibenzo[d][1,3]oxaphosphole, min. 97% (99% ee) (2S,2'S,3S,3'S)-DI-Et-BABIBOP 25mg 100mg
$C_{26}H_{36}O_2P_2$; FW: 442.51; white to off-white solid
air sensitive, (store cold)
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

15-6445 NEW
(2R,2'R,3R,3'R)-3,3'-Di-tert-butyl-2,2'-diisopropyl-2,2',3,3'-tetrahydro-4,4'-bibenzo[d][1,3]oxaphosphole, min. 97% (99% ee) (2R,2'R,3R,3'R)-DI-iPr-BABIBOP *(2214207-75-5)* 25mg 100mg
$C_{28}H_{40}O_2P_2$; FW: 470.57; white to off-white solid
air sensitive, (store cold)
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.



Technical Note:
1. Ligand used in palladium-catalyzed asymmetric hydrogenation.

Tech. Note (1)
Ref. (1)

References:
1. *Chi. J. Chem.*, **2018**, *36*, 153-156.

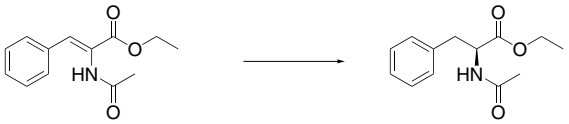
15-6430 NEW
(2S,2'S,3S,3'S)-3,3'-Di-tert-butyl-2,2'-diisopropyl-2,2',3,3'-tetrahydro-4,4'-bibenzo[d][1,3]oxaphosphole, min. 97% (99% ee) (2S,2'S,3S,3'S)-DI-iPr-BABIBOP *(2207601-12-3)* 25mg 100mg
$C_{28}H_{40}O_2P_2$; FW: 470.57; white to off-white solid
air sensitive, (store cold)
Note: Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

Technical Notes:
1. Ligand used for copper-catalyzed asymmetric hydrogenation of 2-substituted ketones.
2. Ligand used for rhodium catalyst for asymmetric hydrogenation enamides.

Tech. Note (1)
Ref. (1)

PHOSPHORUS (Compounds)

15-6430 ***(continued)*** **(2S,2'S,3S,3'S)-3,3'-Di-tert-butyl-2,2'-diisopropyl-2,2',3,3'-tetrahydro-4,4'-bibenzo[d][1,3]oxaphosphole, min. 97% (99% ee) (2S,2'S,3S,3'S)-DI-iPr-BABIBOP** *(2207601-12-3)*

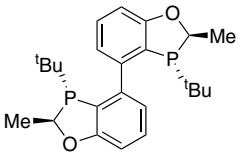


Tech. Note (2)
Ref. (2)

References:

1. *Chem. Sci.*, **2018**, *9*, 4505-4510.
2. *Org. Lett*, **2018**, *20*, 1725-1729.

15-6435 NEW **(2R,2'R,3R,3'R)-3,3'-Di-tert-butyl-2,2'-dimethyl-2,2',3,3'-tetrahydro-4,4'-bibenzo[d][1,3]oxaphosphole, min. 97% (99% ee) (2R,2'R,3R,3'R)-DI-Me-BABIBOP** *(2214207-74-4)* 25mg 100mg



$C_{24}H_{32}O_2P_2$; FW: 414.46; white to off-white solid
air sensitive, (store cold)
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

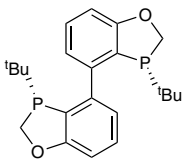
Technical Note:
1. See 15-6445 (page 87)

15-6420 NEW **(2S,2'S,3S,3'S)-3,3'-Di-tert-butyl-2,2'-dimethyl-2,2',3,3'-tetrahydro-4,4'-bibenzo[d][1,3]oxaphosphole, min. 97% (99% ee) (2S,2'S,3S,3'S)-DI-Me-BABIBOP** *(2207601-10-1)* 25mg 100mg

$C_{24}H_{32}O_2P_2$; FW: 414.46; white to off-white solid
air sensitive, (store cold)
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

Technical Note:
1. See 15-6430 (page 87)

15-6415 NEW **(3R,3'R)-3,3'-Di-tert-butyl-2,2',3,3'-tetrahydro-4,4'-bibenzo[d][1,3]oxaphosphole, min. 97% (99% ee) (3R,3'R)-BABIBOP** *(2214207-73-3)* 25mg 100mg



$C_{22}H_{28}O_2P_2$; FW: 386.41; white to off-white solid
air sensitive, (store cold)
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

Technical Note:
1. See 15-6445 (page 87)

15-6410 NEW **(3S,3'S)-3,3'-Di-tert-butyl-2,2',3,3'-tetrahydro-4,4'-bibenzo[d][1,3]oxaphosphole, min. 97% (99% ee) (3S,3'S)-BABIBOP** *(2207601-04-3)* 25mg 100mg

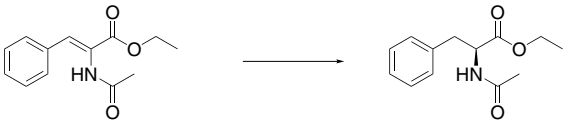
$C_{22}H_{28}O_2P_2$; FW: 386.41; white to off-white solid
air sensitive, (store cold)
Note: Sold under license from Zejun for research purposes only. Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.

Technical Notes:
1. Ligand used in copper-catalyzed asymmetric hydrogenation of 2-substituted ketones.
2. Ligand used in rhodium catalyst for asymmetric hydrogenation enamides.
3. Ligand used in palladium-catalyzed asymmetric hydrogenation.

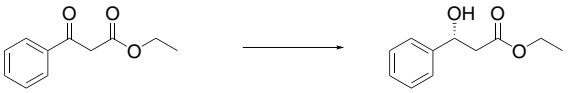
Tech. Note (1)
Ref. (1)

PHOSPHORUS (Compounds)

15-6410 ***(continued)*** **(3S,3'S)-3,3'-Di-tert-butyl-2,2',3,3'-tetrahydro-4,4'-bibenzo[d][1,3]oxaphosphole, min. 97% (99% ee) (3S,3'S)-BABIBOP** *(2207601-04-3)*



Tech. Note (2)
Ref. (2)



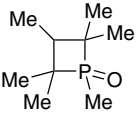
Tech. Note (3)
Ref. (3)

References:

1. *Chem. Sci.*, **2018**, *9*, 4505-4510.
2. *Org. Lett*, **2018**, *20*, 1725-1729.
3. *Chi. J. Chem.*, **2018**, *36*, 153-156.

15-8150 **NEW**

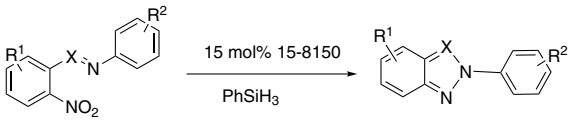
1,2,2,3,4,4 Hexamethylphosphetane 1-oxide *(16083-94-6)*
$C_9H_{19}OP$; FW: 174.22; white solid
Note: Product sold under, use subject to, terms and conditions of label license at www.strem.com/mit



100mg
500mg

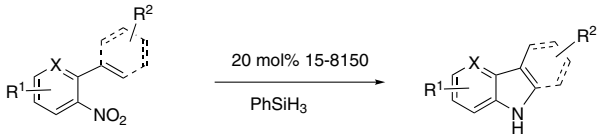
Technical Notes:

1. Catalyst used for the reductive cyclization of o-nitrobenzaldimines, o-nitrobenzenes and related substrates.
2. Catalyst used for the reductive cyclization of o-nitrobiaryl and –styrenyl derivatives.



X = C,N

Tech. Note (1)
Ref. (1)



X = C,N

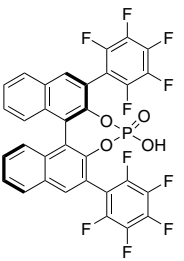
Tech. Note (2)
Ref. (2)

References:

1. *J. Am. Chem. Soc.,* **2017**, *139*, 6839.
2. *J. Am. Chem. Soc.,* **2018**, *140*, 3103.

15-1398 **NEW**

(11bR)-4-Hydroxy-2,6-bis(2,3,4,5,6-pentafluorophenyl)-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) *(1284293-45-3)*
$C_{32}H_{11}F_{10}O_4P$; FW: 680.4; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.



50mg

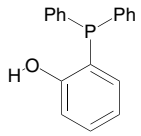
15-1399 **NEW**

(11bS)-4-Hydroxy-2,6-bis(2,3,4,5,6-pentafluorophenyl)-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee *(1882075-20-8)*
$C_{32}H_{11}F_{10}O_4P$; FW: 680.4; white-light yellow pwdr.
(store cold)
Note: Sold in collaboration with Daicel for research purposes only.

50mg

PHOSPHORUS (Compounds)

15-9120 NEW **(2-Hydroxyphenyl)diphenylphosphine, 97%** *(60254-10-6)* 1g
$C_{18}H_{15}OP$; white to off-white solid ; m.p. 142-150
air sensitive

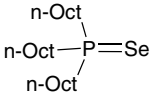


Technical Notes:
1. Synthesis, properties, handling and applications of (2-hydroxyphenyl) diphenylphosphine in esterification, condensation and etherification reactions are reviewed.
2. Rhenium(I) Tricarbonyl Complexes with (2-Hydroxyphenyl)diphenylphosphine as PO Bidentate Ligand and ^{99m}Tc complexes with potential for radiopharmaceutical applications
3. Ligand used to make a nickel catalyst used in the copolymerization of ethylene with linear olefins.

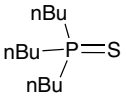
References:

1. *e-EROS Encyclopedia of Reagents for Organic Synthesis*, **2012**, 1-4.
2. *Inorg. Chem.*, **2017**, *56 (14)*, 8175–8186.
3. *J. Polym. Sci. A Polym. Chem.*, **2009**, *47*, 258-266.

15-6657 NEW **Trioctylphosphine selenide min. 99%, (15% Se, dissolved in TOP)** *(20612-73-1)* 25g 100g 500g
$(C_8H_{17})_3PSe$; FW: 449.59; light yellow liq.
Note: Precursor for quantum dot synthesis

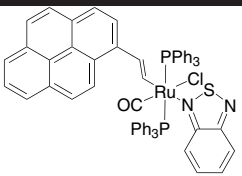


15-6658 NEW **Tributylphosphine sulfide min. 99%, (7% S, dissolved in TBP)** 25g 100g 500g
(3084-50-2)
$(C_8H_{17})_3PS$; FW: 402.71; light yellow liq.
Note: Precursor for quantum dot synthesis

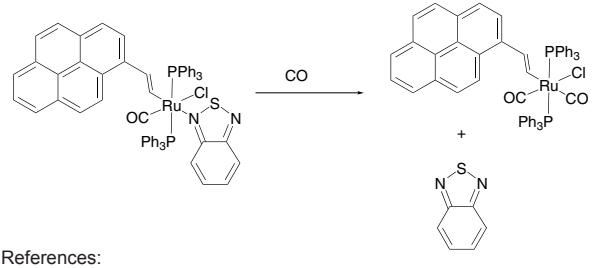


RUTHENIUM (Compounds)

44-0548 NEW **(2,1,3-Benzothiadiazole-κN1)carbonylchloro[(1E)-2-(1-pyrenyl)ethenyl]bis(triphenylphosphine) ruthenium(II), 97%** *(1621871-86-0)* 250mg 1g
$C_{61}H_{45}ClN_2OP_2RuS$; FW: 1052.55; red orange solid



Technical Note:
1. A Chromo-Fluorogenic Synthetic "Canary" for CO Detection. The chromo-fluorogenic detection of carbon monoxide in air has been achieved. This probe shows exceptional sensitivity and selectivity in its sensing behavior in the solid state. A color response visible to the naked eye is observed at 5 ppb of CO, and a remarkably clear color change occurs from orange to yellow at the onset of toxic CO concentrations (100 ppm) in air.



Tech. Note (1)
Ref. (1)

References:

1. *J. Am. Chem. Soc.,* **2014**, *136*, 11930−11933.

SELENIUM (Compounds)

15-1772 **Diphenylphosphine selenide, 98%** *(5853-64-5)*
See page 54

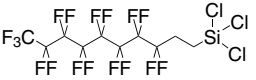
15-6657 **Trioctylphosphine selenide min. 99%, (15% Se, dissolved in TOP)** *(20612-73-1)*
See page 90

SILICON (Compounds)

07-7234 **(R)-Diphenylprolinol trimethyl silyl ether, 95% (99% ee)** *(943757-71-9)*
See page 71

SILICON (Compounds)

14-5450 NEW
Perfluorodecyl-1H,1H,2H,2H-trichlorosilane, 97% FTDS *(78560-44-8)*
$C_{10}H_4Cl_3F_{17}Si$; FW: 581.56; colorless liq.
air sensitive, moisture sensitive



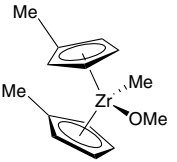
5g
25g

SULFUR (Compounds)

15-6658 **Tributylphosphine sulfide min. 99%, (7% S, dissolved in TBP)** *(3084-50-2)*
See page 90

ZIRCONIUM (Compounds)

40-1028 NEW
Bis(methylcyclopentadienyl)(methyl)(methoxy)zirconium(IV), 98+% *(916597-01-8)*
$C_{14}H_{20}OZr$; FW: 295.53; colorless to light yellow liq.
air sensitive, moisture sensitive



500mg
2g

Technical Note:

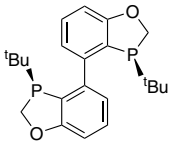
1. Precursor for the atomic layer deposition of zirconium oxide using water or ozone as co-reactants.

References:

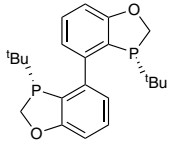
1. *J. Electrochem. Soc..*, **2010**, *157 (10)*, G202-G210.
2. *Thin Solid Films,* **2010**, *519 (2)*, 666-673.
3. *Journal of Vacuum Science & Technology B: Microelectronics and Nanometer Structures Processing, Measurement, and Phenomena,* **2009**, *27*, 389.
4. *Chem. Mater.,* **2008**, *20 (17)*, 5698-5705.
5. *Chemical vapor deposition*, **2008**, *14*, 358-365.
6. *Journal of Materials Chemistry*, **2008**, *28*, 3385-3390.

KITS - BABIBOP Ligand Kit

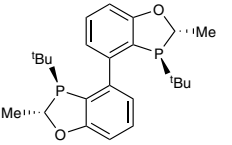
96-0660 NEW
BABIBOP Ligand Kit
Sold under license from Zejun for research purposes only.
Patents: CN 107827929 A 20180323; US 20180155375 A1 20180607.
Components also available for individual sale. Contains the following:



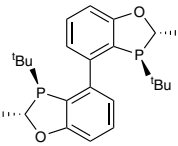
15-6410 25mg
(3S,3'S)-BABIBOP



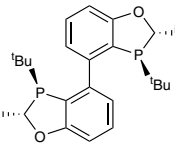
15-6415 25mg
(3R,3'R)-BABIBOP



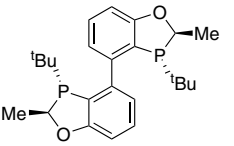
15-6420 25mg
(2S,2'S,3S,3'S)-DI-Me-BABIBOP



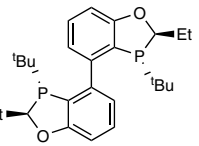
15-6425 25mg
(2S,2'S,3S,3'S)-DI-Et-BABIBOP



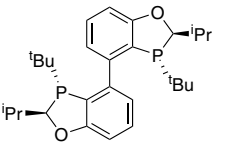
15-6430 25mg
(2S,2'S,3S,3'S)-DI-iPr-BABIBOP



15-6435 25mg
(2R,2'R,3R,3'R)-DI-Me-BABIBOP

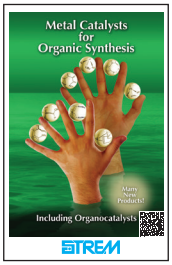


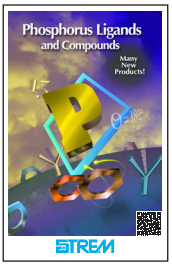
15-6440 25mg
(2R,2'R,3R,3'R)-DI-Et-BABIBOP

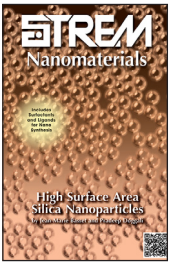


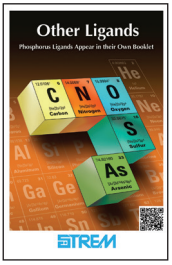
15-6445 25mg
(2R,2'R,3R,3'R)-DI-iPr-BABIBOP

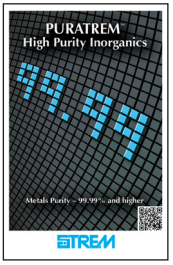
Available Booklets

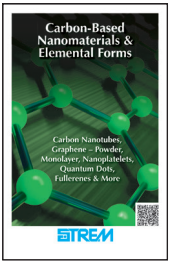


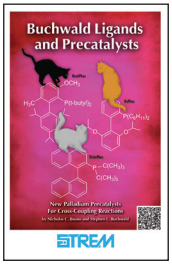


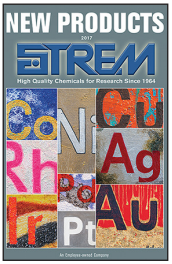


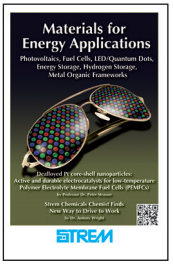


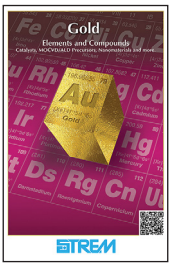


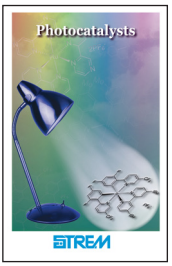


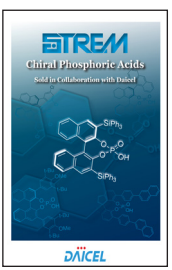












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