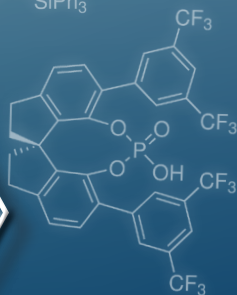
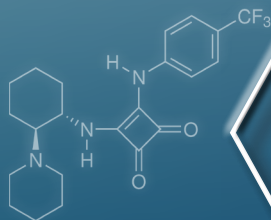
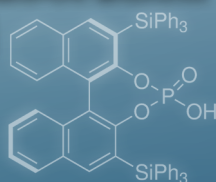
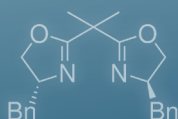
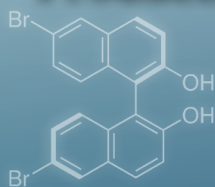




# High Purity Chiral Reagents

Products Sold in Collaboration  
with Daicel



**BINOL  
Ligands**

**BOX  
Ligands**

**Chiral  
Squaramides  
Organocatalysts**

**Chiral  
Phosphoric  
Acids**

**Proline-  
Based  
Organocatalysts**

**Pybox  
Ligands**

**SPINOL-  
Based  
Ligands**

**Taddols**

**Thiourea  
Catalysts**



# High Purity Chiral Reagents

## Products Sold in Collaboration with Daicel



Strem Chemicals is an ISO certified, employee-owned company that manufactures and markets specialty chemicals of high purity. We have been providing fine chemicals for research and commercial production for over fifty years. At Strem, we offer a wide variety of catalysts, ligands, nanomaterials and CVD/ALD precursors. Most of our products are of high purity, typically at 99%, while some are as high as 99.9999% metals purity. We continually seek to provide new technologies from around the globe and

add to our product line. We look forward to further advancements in order to best serve our customers' needs with the quality and service they can trust from Strem.

We have licensing agreements with industry and academia, which allow easier access to patent-protected products for our customers. This booklet is comprised of our products which are sold in collaboration with Daicel.

### ***About Daicel Chiral Technologies, Inc.***

Chiral Technologies, the global leader in enantioselective chromatography, serves pharmaceutical and other life science industries and offers the largest portfolio of chiral stationary phases (CSPs) and analytical and preparative chiral columns for the separation of racemic mixtures into single enantiomers. The company also provides analytical method development and custom separation services. The North and Latin American markets are served through Chiral Technologies, Inc. (West Chester, PA), the European market through Chiral Technologies Europe SAS (Illkirch, France), and the Asian market through Daicel Chiral Technologies India and Daicel Chiral Technologies China, all wholly owned subsidiaries of Daicel.

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Our other booklets, which focus on applications and product classes, are available in print per request and also on our website. Below is a list of current booklet titles that are available. Please also check our Product Resources section online to find additional literature offerings, such as the Strem Chemiker, our technical publication, and product literature sheets.

- Biocatalysts
- Buchwald Ligands and Precatalysts
- Carbon-Based Nanomaterials & Elemental Forms
- Catalysts & Ligands Manufactured Under License of Takasago Patent
- Gold Elements & Compounds
- Heterogeneous Catalysts
- High Purity Chiral Reagents - Sold in Collaboration with Daicel
- Kits
- Materials for Energy Applications
- Metal Catalysts for Organic Synthesis
- Metal Organic Frameworks and Ligands for MOF Synthesis
- MOCVD, CVD & ALD Precursors
- Nanomaterials
- New Products
- Other Ligands
- Phosphorous Ligands and Compounds
- Photocatalysts
- PURATREM: High Purity Inorganics

Ephraim S. Honig, Ph.D., M.B.A.  
Chief Executive Officer



DAICEL 03/19  
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# Glossary of Terms

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

## About Purity

<b>Chemical purity</b>	.....	is reported after the chemical name, e.g. Ruthenium carbonyl, 99%
<b>Metals purity</b>	.....	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

## CARBON (Compounds)

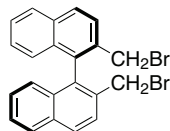
**06-0486** (R)-2,2'-Bis(bromomethyl)-1,1'-binaphthalene, 95% (99% ee)

**NEW**

(86631-56-3)

FW: 440.2; white to Light yellow powdr.

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



250mg

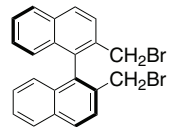
**06-0487** (S)-2,2'-Bis(bromomethyl)-1,1'-binaphthalene, 95% (99% ee)

**NEW**

(37803-02-4)

FW: 440.2; white to Light yellow powdr.

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

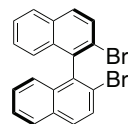


250mg

**06-0483** (1R)-2,2'-Dibromo-1,1'-binaphthalene, min. 98% (86688-08-6)

C<sub>20</sub>H<sub>12</sub>Br<sub>2</sub>; FW: 412.12; white to light-yellow solid

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



50mg

100mg

**06-0484** (1S)-2,2'-Dibromo-1,1'-binaphthalene, min. 98% (150024-49-0)

C<sub>20</sub>H<sub>12</sub>Br<sub>2</sub>; FW: 412.12; white to light yellow powdr.

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



50mg

100mg

## NITROGEN (Compounds)

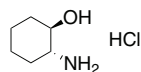
**07-7222** (1R,2R)-2-Aminocyclohexanol hydrochloride, 95% (99% ee)

**NEW**

(13374-31-7)

FW: 151.6; white to Light yellow powdr.

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



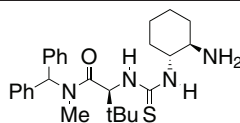
1g

**07-2061** (2S)-2-[[[(1R,2R)-2-Aminocyclohexyl]amino]thioxomethyl]amino]-N-(diphenylmethyl)-N,3,3-trimethylbutanamide, 98%, (99% ee) (1421052-39-2)

**NEW**

C<sub>27</sub>H<sub>38</sub>N<sub>4</sub>OS; FW: 466.70; white to yellow powdr.

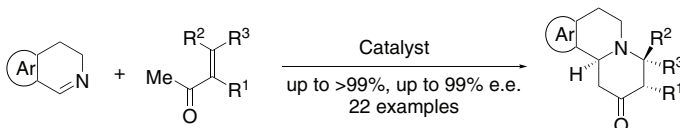
Note: Sold in collaboration with Daicel for research purposes only.



50mg

Technical Note:

1. Formal aza-Diels-Alder Reaction: A highly enantio- and diastereoselective synthesis of indolo- and benzoquinolizidine compounds has been developed through the formal aza-Diels-Alder reaction of enones with cyclic imines.



**Tech. Note (1)**  
**Ref. (1)**

References:

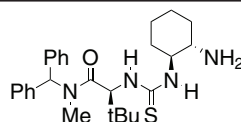
1. J. Am. Chem. Soc., 2013, 135, 1891-1894.

**07-2060** (2S)-2-[[[(1S,2S)-2-Aminocyclohexyl]amino]thioxomethyl]amino]-N-(diphenylmethyl)-N,3,3-trimethylbutanamide, 98%, (99% ee) (1421697-46-2)

**NEW**

C<sub>27</sub>H<sub>38</sub>N<sub>4</sub>OS; FW: 466.70; white to yellow powdr.

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



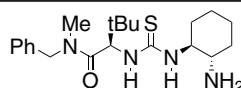
50mg

**07-0955** (2R)-2-[[[(1S,2S)-2-Aminocyclohexyl]amino]thioxomethyl]amino]-N,3,3-trimethyl-N-(phenylmethyl)butanamide, 98%, (99% ee)

**NEW**

C<sub>24</sub>H<sub>34</sub>N<sub>4</sub>OS; FW: 390.60; white to yellow powdr.

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



50mg

## NITROGEN (Compounds)

07-0956

NEW

(2S)-2-[[[[(1R,2R)-2-Aminocyclohexyl]amino]thioxomethyl]amino]-N,3,3-trimethyl-N-(phenylmethyl)butanamide, 98%, (99% ee) (479423-21-7)

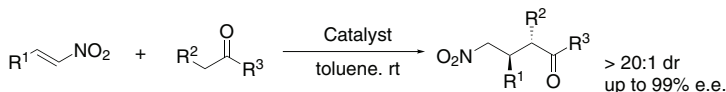
C<sub>22</sub>H<sub>34</sub>N<sub>4</sub>OS; FW: 390.60; white to yellow powdr.

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

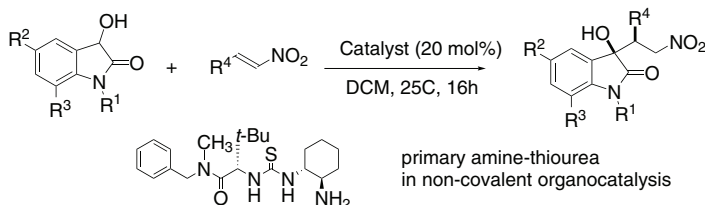
50mg

### Technical Notes:

- Conjugate Addition:** Primary amine-thiourea derivative is an active and highly enantioselective catalyst for the conjugate addition of ketones to nitroalkenes.
- Michael Addition:** The asymmetric Michael addition of dioxindoles to  $\beta$ -substituted nitroalkenes is reported. The bifunctional primary amine-thiourea, by means of a non-covalent-based mode of catalysis, secures direct access to 3-substituted 3-hydroxyoxindole derivatives with high stereocontrol.



Tech. Note (1)  
Ref. (1)



Tech. Note (2)  
Ref. (2)

### References:

- J. Am. Chem. Soc.*, **2006**, 128, 7170-7171.
- Chem. Commun.*, **2012**, 48, 3336-3338.

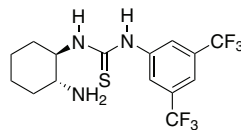
07-0988

NEW

N-[(1R,2R)-2-Aminocyclohexyl]-N'-[3,5-bis(trifluoromethyl)phenyl]thiourea, 98%, (99% ee) (860994-58-7)

C<sub>16</sub>H<sub>17</sub>F<sub>6</sub>N<sub>3</sub>S; FW: 385.40; white to yellow powdr.

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



100mg

07-7018

NEW

(2S)-2-Amino-3,3-dimethyl-N-(phenylmethyl)butanamide, 98%, (99% ee) (207121-91-3)

C<sub>13</sub>H<sub>20</sub>N<sub>2</sub>O; FW: 220.30; white to yellow powdr.

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

100mg

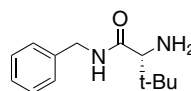
07-7019

NEW

(2R)-2-Amino-3,3-dimethyl-N-(phenylmethyl)butanamide, 98%, (99% ee) (268556-62-3)

C<sub>13</sub>H<sub>20</sub>N<sub>2</sub>O; FW: 220.30; white to yellow powdr.

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



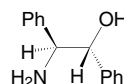
500mg

07-0040

(1R,2S)-2-Amino-1,2-diphenylethanol, min. 98% (23190-16-1)

C<sub>14</sub>H<sub>15</sub>NO; FW: 213.28; white to light yellow powdr.

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



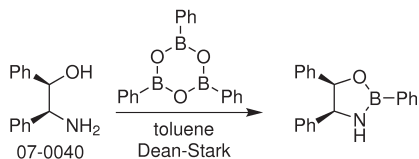
5g  
25g

### Technical Notes:

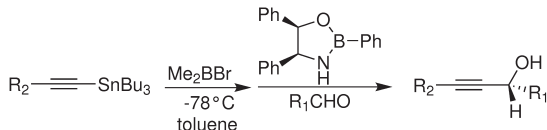
- Ligand used to make chiral oxaborolidines for the enantioselective alkynylation of aldehydes
- Ligand used in organoindium reagents for asymmetric Barbier-type allylations
- Ligand used in organoindium reagents for asymmetric Barbier-type propargylations

## NITROGEN (Compounds)

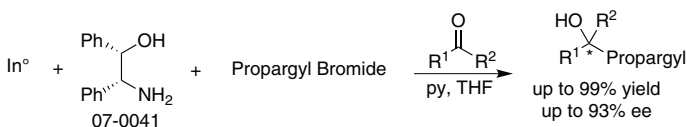
**07-0040** (1R,2S)-2-Amino-1,2-diphenylethanol, min. 98% (23190-16-1)  
(continued)



Tech. Note (1)  
Ref. (1)



Tech. Note (2)  
Ref. (2)



Tech. Note (3)  
Ref. (3)

### References:

1. *J. Am. Chem. Soc.*, **1994**, 116, 3151
2. *J. Org. Chem.*, **2010**, 75, 642
3. *J. Org. Chem.*, **2012**, 77, 889

**07-0041** (1S,2R)-2-Amino-1,2-diphenylethanol, min. 98% (23364-44-5)

C<sub>14</sub>H<sub>15</sub>NO; FW: 213.28; white to light yellow powdr.

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

5g  
25g

### Technical Note:

1. See 07-0040 (page 2)

**07-2081** N-[(1R,2S)-2-Amino-1,2-diphenylethyl]-1,1,1-trifluoromethanesulfonamide, 95%, (99% ee) (167316-28-1)

NEW

C<sub>15</sub>H<sub>15</sub>F<sub>3</sub>N<sub>2</sub>O<sub>2</sub>S; FW: 344.40; white to yellow powdr.

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

100mg

### Technical Note:

1. See 07-2080 (page 3)

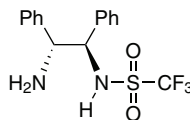
**07-2080** N-[(1R,2R)-2-Amino-1,2-diphenylethyl]-1,1,1-trifluoromethanesulfonamide, 98%, (99% ee) (852212-89-6)

NEW

C<sub>15</sub>H<sub>15</sub>F<sub>3</sub>N<sub>2</sub>O<sub>2</sub>S; FW: 344.40; white to yellow powdr.

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

100mg

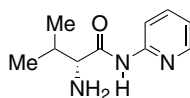


**07-0519** (2R)-2-Amino-3-methyl-N-2-pyridinylbutanamide, min. 98% (1568043-19-5)

C<sub>10</sub>H<sub>15</sub>N<sub>3</sub>O; FW: 193.25; white to light yellow powdr.

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

100mg  
500mg

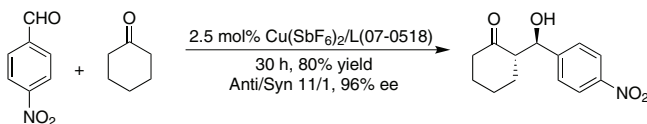


### Technical Note:

1. Ligand for the copper-catalyzed asymmetric aldol reaction

## NITROGEN (Compounds)

**07-0519** (2R)-2-Amino-3-methyl-N-2-pyridinylbutanamide, min. 98% (1568043-19-5)  
(continued)



**Tech. Note (1)**  
**Ref. (1)**

References:

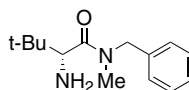
1. *Chem. Commun.*, **2011**, 47, 224

<b>07-0518</b>	<b>(2S)-2-Amino-3-methyl-N-2-pyridinylbutanamide, min. 98% (167261-43-0)</b> C <sub>10</sub> H <sub>15</sub> N <sub>3</sub> O; FW: 193.25; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	100mg 500mg
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Technical Note:

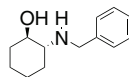
1. See 07-0519 (page 3)

<b>07-8034</b> <b>NEW</b>	<b>(2R)-2-Amino-N,3,3-trimethyl-N-(phenylmethyl)butanamide, 98%, (99% ee)</b> C <sub>14</sub> H <sub>22</sub> N <sub>2</sub> O; FW: 234.30; white to yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	100mg
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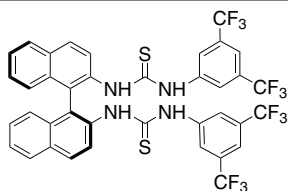
<b>07-8033</b> <b>NEW</b>	<b>(2S)-2-Amino-N,3,3-trimethyl-N-(phenylmethyl)butanamide, 98%, (99% ee) (947383-62-2)</b> C <sub>14</sub> H <sub>22</sub> N <sub>2</sub> O; FW: 234.30; white to yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	100mg
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<b>07-0637</b>	<b>(1R,2R)-2-Benzylamino-1-cyclohexanol, min. 98% (141553-09-5)</b> C <sub>13</sub> H <sub>19</sub> NO; FW: 205.30; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	500mg 2g
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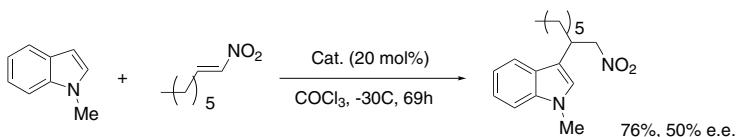
<b>07-0638</b>	<b>(1S,2S)-2-Benzylamino-1-cyclohexanol, min. 98% (322407-34-1)</b> C <sub>13</sub> H <sub>19</sub> NO; FW: 205.30; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	500mg 2g
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<b>07-8410</b> <b>NEW</b>	<b>N,N'-(S)-[1,1'-Binaphthalene]-2,2'-diylbis[N'-(3,5-bis(trifluoromethyl)phenyl)thiourea], 95%, (99% ee) (914497-25-9)</b> C <sub>38</sub> H <sub>22</sub> F <sub>12</sub> N <sub>4</sub> S <sub>2</sub> ; FW: 826.70; white to yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	100mg
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Technical Note:

1. **Friedel-Crafts Addition:** It has been shown that catalytic amounts (10-20 mol%) of novel axially chiral bis-arylthioureas promote the asymmetric organocatalytic Friedel-Crafts type addition of indole and N-methylindole to nitroolefins.



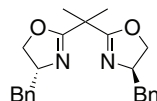
**Tech. Note (1)**  
**Ref. (1)**

References:

1. *Tetrahedron Lett.*, **2006**, 47, 7037-7042.

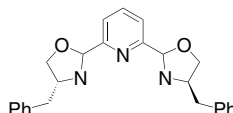
## NITROGEN (Compounds)

**07-7043** **2,2-Bis[(4R)-4-benzyl-2-oxazolin-2-yl]propane, 98%, (99% ee)** (141362-77-8) 100mg  
**NEW**  
 $C_{23}H_{26}N_2O_2$ ; FW: 362.50; white to yellow pwdr.  
 Note: Sold in collaboration with Daicel for research purposes only.



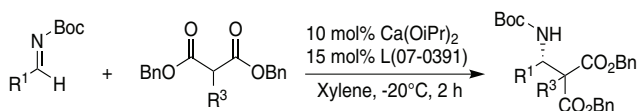
**07-7044** **2,2-Bis[(4S)-4-benzyl-2-oxazolin-2-yl]propane, 98%, (99% ee)** (176706-98-2) 100mg  
**NEW**  
 $C_{23}H_{26}N_2O_2$ ; FW: 362.50; white to yellow pwdr.  
 Note: Sold in collaboration with Daicel for research purposes only.

**07-0390** **2,6-Bis[(4R)-benzyl-2-oxazolin-2-yl]pyridine, min. 98%** (365215-38-9) 25mg  
 100mg  
 $C_{25}H_{23}N_3O_2$ ; FW: 397.47; white to light yellow pwdr.  
 Note: Sold in collaboration with Daicel for research purposes only.

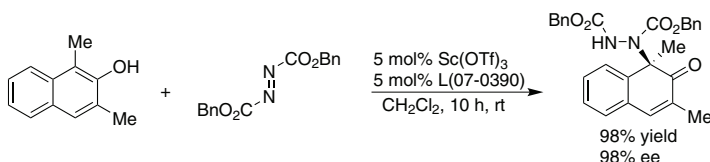


### Technical Notes:

- Ligand for the Calcium-catalyzed asymmetric Mannich reaction of malonates with imines
- Ligand for the Scandium-catalyzed asymmetric dearomatization of 2-naphthols by electrophilic amination



**Tech. Note (1)**  
**Ref. (1)**



**Tech. Note (2)**  
**Ref. (2)**

### References:

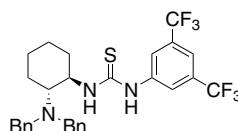
- J. Org. Chem.*, **2010**, 75, 963
- Angew. Chem. Int. Ed.*, **2015**, 54, 2356

**07-0391** **2,6-Bis[(4S)-benzyl-2-oxazolin-2-yl]pyridine, min. 98%** (151670-69-8) 25mg  
 $C_{25}H_{23}N_3O_2$ ; FW: 397.47; white to light yellow pwdr.  
 Note: Sold in collaboration with Daicel for research purposes only.

### Technical Note:

- See 07-0390 (page 5)

**07-6320** **N-[(1R,2R)-2-[Bis(phenylmethyl)amino]cyclohexyl]-N'-[3,5-bis(trifluoromethyl)phenyl]thiourea, 98%, (99% ee)** (1240466-16-3) 50mg  
**NEW**  
 $C_{29}H_{29}F_6N_3S$ ; FW: 565.60; white to yellow pwdr.  
 Note: Sold in collaboration with Daicel for research purposes only.

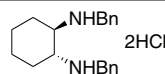


**07-6321** **N-[(1S,2S)-2-[Bis(phenylmethyl)amino]cyclohexyl]-N'-[3,5-bis(trifluoromethyl)phenyl]thiourea, 98%, (99% ee)** (1233369-39-5) 50mg  
**NEW**  
 $C_{29}H_{29}F_6N_3S$ ; FW: 565.60; white to yellow pwdr.  
 Note: Sold in collaboration with Daicel for research purposes only.

### Technical Note:

- See 07-6320 (page 5)

**07-4073** **(1R,2R)-N,N'-Bis(phenylmethyl)-1,2-cyclohexanediamine dihydrochloride, min. 98%** (212611-88-6) 1g  
 5g  
 $C_{20}H_{26}N_2 \cdot 2HCl$ ; FW: 367.36; white to light yellow pwdr.  
 Note: Sold in collaboration with Daicel for research purposes only.



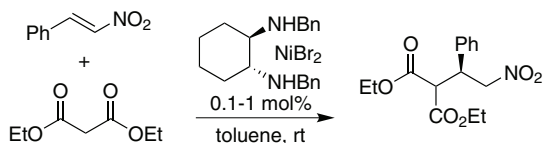
### Technical Notes:

- Ligand for Ni-catalyzed enantioselective Michael additions of 1,3-dicarbonyl compounds to nitroalkenes
- Ligand for Ni-catalyzed enantioselective conjugate addition of  $\alpha$ -ketoesters to nitroalkenes

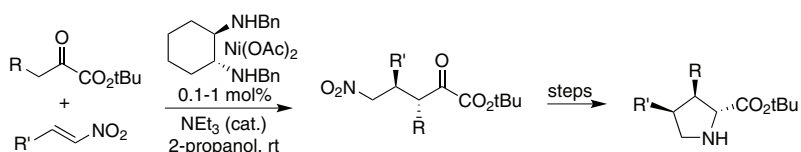


## NITROGEN (Compounds)

**07-4073** (1R,2R)-N,N'-Bis(phenylmethyl)-1,2-cyclohexanediamine dihydrochloride, min. 98%  
(continued) (212611-88-6)



Tech. Note (1)  
Ref. (1)



Tech. Note (2)  
Ref. (2)

### References:

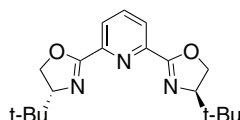
1. *J. Am. Chem. Soc.*, **2007**, 129, 11583
2. *J. Am. Chem. Soc.*, **2010**, 132, 4036

<b>07-4074</b>	(1S,2S)-N,N'-Bis(phenylmethyl)-1,2-cyclohexanediamine dihydrochloride, min. 98% C <sub>20</sub> H <sub>26</sub> N <sub>2</sub> ·2HCl; FW: 367.36; white to light yellow powdr.	1g 5g
Note: Sold in collaboration with Daicel for research purposes only.		

### Technical Note:

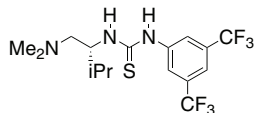
1. See 07-4073 (page 5)

<b>07-7051</b>	<b>2,6-Bis-[(4R)-4-tert-butyloxazolin-2-yl]pyridine, 98%, (99% ee)</b> (185346-17-2) <b>NEW</b> C <sub>19</sub> H <sub>27</sub> N <sub>3</sub> O <sub>2</sub> ; FW: 329.40; white to yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	100mg
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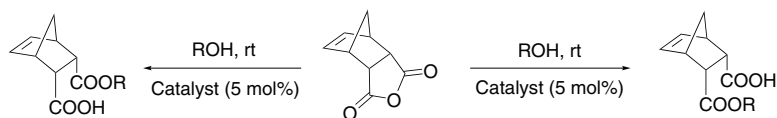
<b>07-7050</b>	<b>2,6-Bis-[(4S)-4-tert-butyloxazolin-2-yl]pyridine, 98%, (99% ee)</b> (118949-63-6) <b>NEW</b> C <sub>19</sub> H <sub>27</sub> N <sub>3</sub> O <sub>2</sub> ; FW: 329.40; white to yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	100mg
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<b>07-7130</b>	<b>(R)-1-[3,5-Bis(trifluoromethyl)phenyl]-3-[1-(dimethylamino)-3-methylbutan-2-yl]thiourea, 98%, (99% ee)</b> (1048692-61-0) <b>NEW</b> C <sub>16</sub> H <sub>21</sub> F <sub>6</sub> N <sub>3</sub> S; FW: 401.40; white to yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg
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### Technical Note:

1. **Methanolysis:** Both ureas and thioureas derived from L-valine or D-valine act as bifunctional organocatalysts able to induce the enantioselective alcoholysis of mono-, bi-, and tricyclic meso anhydrides.



Tech. Note (1)  
Ref. (1)

ROH= MeOH, CH<sub>2</sub>=CHCH<sub>2</sub>OH, C<sub>6</sub>H<sub>5</sub>CH<sub>2</sub>OH

### References:

1. *J. Org. Chem.*, **2010**, 75, 5417-5420.

## NITROGEN (Compounds)

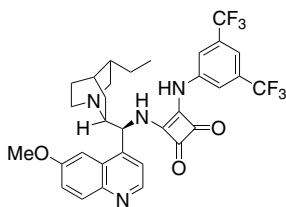
07-7029

NEW

3-[[3,5-Bis(trifluoromethyl)phenyl]amino]-4-[[[(8 $\alpha$ ,9S)-10,11-dihydro-6'-methoxycinchonan-9-yl]amino]-3-cyclobutene-1,2-dione, 98%, (99% ee) (1352957-59-5)

C<sub>32</sub>H<sub>30</sub>F<sub>6</sub>N<sub>3</sub>O<sub>3</sub>; FW: 632.60; white to yellow powdr.

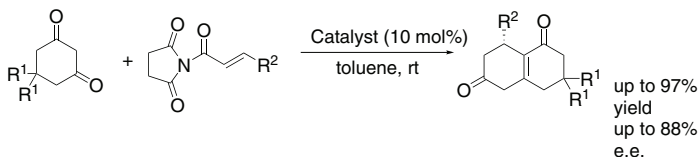
Note: Sold in collaboration with Daicel for research purposes only.



50mg

Technical Note:

- Michael Addition:** The enantioselective tandem Michael addition reaction of dimedone and related 1,3-dicarbonyl compounds with  $\alpha,\beta$ -unsaturated N-acylated succinimides catalyzed by a chiral squaramide catalyst has been investigated.



Tech. Note (1)  
Ref. (1)

References:

- Tetrahedron: Asymmetry*, **2014**, 25, 310-317.

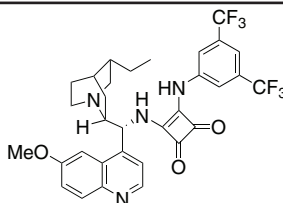
07-7028

NEW

3-[[3,5-Bis(trifluoromethyl)phenyl]amino]-4-[[[(9R)-10,11-dihydro-6'-methoxycinchonan-9-yl]amino]-3-cyclobutene-1,2-dione, 98%, (99% ee) (1407166-63-5)

C<sub>32</sub>H<sub>30</sub>F<sub>6</sub>N<sub>3</sub>O<sub>3</sub>; FW: 632.60; white to yellow powdr.

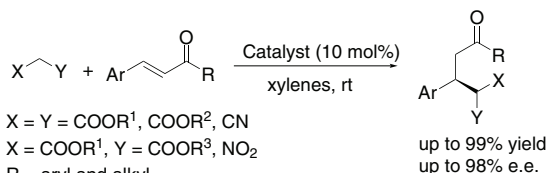
Note: Sold in collaboration with Daicel for research purposes only.



50mg

Technical Note:

- Conjugate Addition:** Conjugate addition reactions of a wide range of nucleophilic enol species with enones, catalyzed by a cinchona alkaloid derived thiourea organocatalyst, have been developed with attending good yields and high enantioselectivities under a mild reaction condition.



Tech. Note (1)  
Ref. (1)

X = Y = COOR<sup>1</sup>, COOR<sup>2</sup>, CN

X = COOR<sup>1</sup>, Y = COOR<sup>3</sup>, NO<sub>2</sub>

R = aryl and alkyl

References:

- J. Am. Chem. Soc.*, **2006**, 128, 12652-12653.

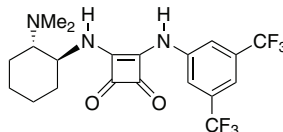
07-7128

NEW

3-[[3,5-Bis(trifluoromethyl)phenyl]amino]-4-[[[(1S,2S)-2-(dimethylamino)cyclohexyl]amino]-3-cyclobutene-1,2-dione, 95%, (99% ee) (1263205-96-4)

C<sub>20</sub>H<sub>21</sub>F<sub>6</sub>N<sub>3</sub>O<sub>2</sub>; FW: 449.40; white to yellow powdr.

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



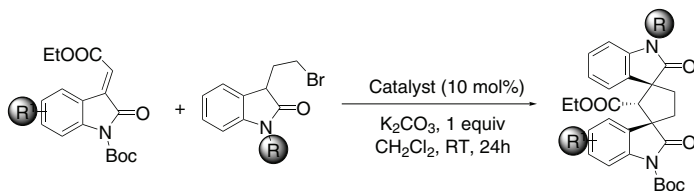
100mg

Technical Note:

- Michael/Alkylation Cascade Reaction:** A rapid and efficient organocatalytic cascade sequence for the direct construction of spirocyclopentane bioindoles has been carried out by using a chiral squaramide catalyst in the presence of a base.

## NITROGEN (Compounds)

**07-7128** 3-[[3,5-Bis(trifluoromethyl)phenyl]amino]-4-[[[(1S,2S)-2-(dimethylamino)cyclohexyl]amino]-3-cyclobutene-1,2-dione, 95%, (99% ee) (1263205-96-4)  
(continued)



Tech. Note (1)  
Ref. (1)

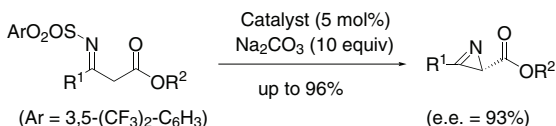
References:

1. *Chem. Eur. J.*, **2012**, *18*, 6737-6741.

**07-7129** 3-[[3,5-Bis(trifluoromethyl)phenyl]amino]-4-[[[(1R,2R)-2-(dimethylamino)cyclohexyl]amino]-3-cyclobutene-1,2-dione, 98%, (99% ee) (1211565-07-9) 100mg  
**NEW**  
 $C_{20}H_{21}F_6N_3O_2$ ; FW: 449.40; white to yellow powdr.  
Note: Sold in collaboration with Daicel for research purposes only.

Technical Note:

1. **Neber Reaction:** The first enantioselective Neber reaction of  $\beta$ -ketoxime sulfonates catalyzed by a bifunctional thiourea has been developed.

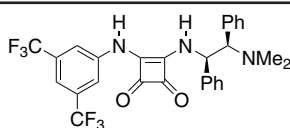


Tech. Note (1)  
Ref. (1)

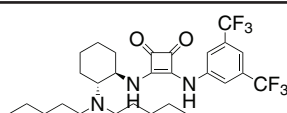
References:

1. *Org. Lett.*, **2011**, *13*, 6374-6377.

**07-1025** 3-[[3,5-Bis(trifluoromethyl)phenyl]amino]-4-[[[(1R,2R)-2-(dimethylamino)-1,2-diphenylethyl]amino]-3-cyclobutene-1,2-dione, 98%, (99% ee) (1223105-89-2) 50mg  
**NEW**  
 $C_{26}H_{23}F_6N_3O_2$ ; white to yellow powdr.  
Note: Sold in collaboration with Daicel for research purposes only.

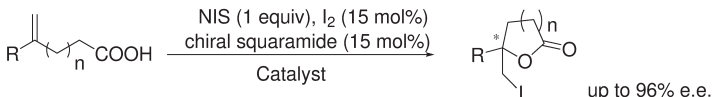


**07-8510** 3-[[3,5-Bis(trifluoromethyl)phenyl]amino]-4-[[[(1R,2R)-2-(dipentylamino)cyclohexyl]amino]-3-cyclobutene-1,2-dione, 98%, (99% ee) (1411983-40-8) 50mg  
**NEW**  
 $C_{28}H_{37}F_6N_3O_2$ ; FW: 561.60; white to yellow powdr.  
Note: Sold in collaboration with Daicel for research purposes only.



Technical Note:

1. **Iodolactonization:** Asymmetric iodolactonization of  $\gamma$ - and  $\delta$ -unsaturated carboxylic acids has been explored in the presence of six different chiral organocatalysts.



Tech. Note (1)  
Ref. (1)

References:

1. *Angew. Green Chem.*, **2014**, *16*, 1521-1526.

**07-8511** 3-[[3,5-Bis(trifluoromethyl)phenyl]amino]-4-[[[(1S,2S)-2-(dipentylamino)cyclohexyl]amino]-3-cyclobutene-1,2-dione, 98%, (99% ee) (1411983-41-9) 50mg  
**NEW**  
 $C_{28}H_{37}F_6N_3O_2$ ; FW: 561.60; white to yellow powdr.  
Note: Sold in collaboration with Daicel for research purposes only.

## NITROGEN (Compounds)

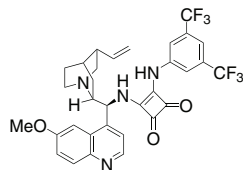
07-8436

NEW

3-[[[3,5-Bis(trifluoromethyl)phenyl]amino]-4-[[[(8 $\alpha$ ,9S)-6'-methoxycinchonan-9-yl]amino]-3-cyclobutene-1,2-dione, 95%, (99% ee)  
(1256245-84-7)

C<sub>32</sub>H<sub>28</sub>F<sub>6</sub>N<sub>4</sub>O<sub>3</sub>; FW: 630.60; white to yellow powdr.

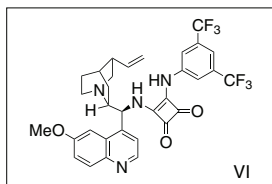
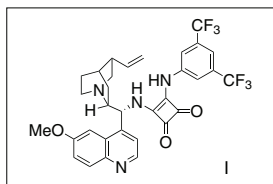
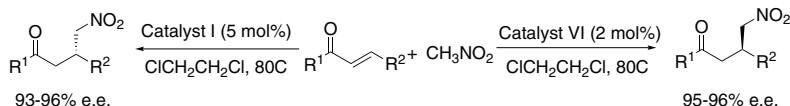
Note: Sold in collaboration with Daicel for research purposes only.



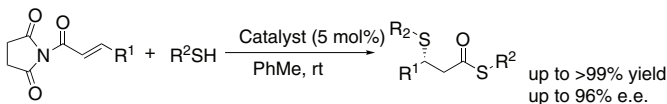
50mg

### Technical Notes:

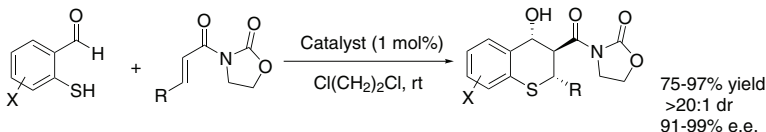
- Michael Addition:** A series of squaramide-based organocatalysts were facilely synthesized and applied as hydrogen bonding organocatalysts in the enantioselective Michael addition of nitroalkanes to chalcones.
- Sulfa-Michael Addition/Thioesterification:** A novel highly enantioselective one-pot dithiolation through sulfa-Michael addition/thioesterification of thiols with  $\alpha,\beta$ -unsaturated N-acylated succinimides catalysed by squaramide has been developed.
- Michael-Aldol Reaction:** Highly enantio- and diastereoselective tandem Michael-aldol reactions, efficiently catalyzed by a cinchona alkaloid thiourea via synergistic noncovalent hydrogen-bonding activation of both the Michael donor and acceptor, have been developed.
- Sulfa-Michael/Aldol Cascade Reaction:** A bifunctional squaramide catalyzed sulfa-Michael/aldol cascade reaction between 1,4-dithiane-2,5-diol and chalcones with a low catalyst loading has been developed.
- The organocatalyzed enantioselective synthesis of a series of chiral 2-amino-5,6,7,8-tetrahydro-5-oxo-4H-chromene-3-carbonitriles was achieved using bifunctional squaramides as the catalysts.
- Cascade Reaction:** The reaction features a new activation mode of organocatalytic dynamic kinetic resolution involving a Michael-retro-Michael-Michael-Michael cascade.
- A powerful cascade reaction was developed for the synthesis of chromeno[4,3-b]pyrrolidines with high yields and excellent stereoselectivities.



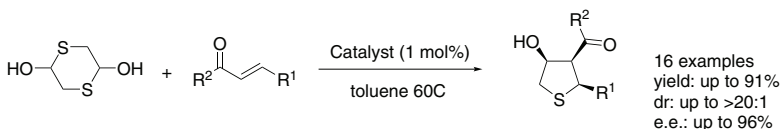
Tech. Note (1)  
Ref. (1)



Tech. Note (2)  
Ref. (2)



Tech. Note (3)  
Ref. (3)

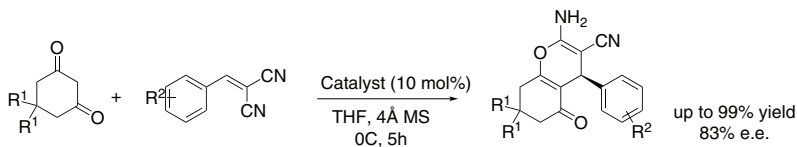


Tech. Note (4)  
Ref. (4)

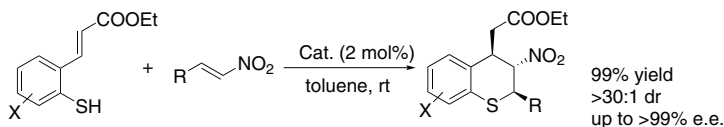
## NITROGEN (Compounds)

07-8436  
(continued)

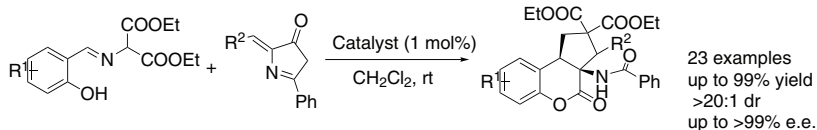
3-[[3,5-bis(trifluoromethyl)phenyl]amino]-4-[[[(8*S*,9*S*)-6'-methoxycinchonan-9-yl]amino]-3-cyclobutene-1,2-dione, 95%, (99% ee) (1256245-84-7)



Tech. Note (5)  
Ref. (5)



Tech. Note (6)  
Ref. (6)



Tech. Note (7)  
Ref. (7)

### References:

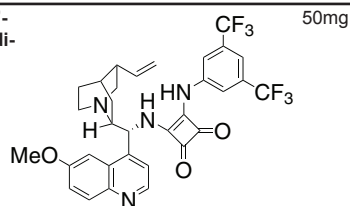
1. *Org. Lett.*, **2010**, 12, 5450-5453.
2. *Org. Biomol. Chem.*, **2014**, 12, 1585-1594.
3. *J. Am. Chem. Soc.*, **2007**, 129, 1036-1037.
4. *Org. Lett.*, **2012**, 14, 1090-1093.
5. *Tetrahedron: Asymmetry*, **2012**, 23, 1343-1349.
6. *Angew. Chem. Int. Ed.*, **2008**, 47, 4177-4179.
7. *Chem. Commun.*, **2014**, 50, 2428-2430.

07-8435

NEW

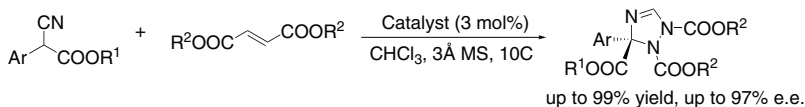
3-[[3,5-bis(trifluoromethyl)phenyl]amino]-4-[[[(9*R*)-6'-methoxycinchonan-9-yl]amino]-3-cyclobutene-1,2-dione, 98%, (99% ee) (1256245-79-0)

C<sub>32</sub>H<sub>28</sub>F<sub>6</sub>N<sub>4</sub>O<sub>3</sub>; FW: 630.60; white to yellow powdr.  
Note: Sold in collaboration with Daicel for research purposes only.



### Technical Notes:

1. See 07-8436
2. **Hydrazination/Cyclization Cascade Reaction:** An efficient enantioselective hydrazination/cyclization cascade reaction of  $\alpha$ -substituted isocyanacetates to azodicarboxylates catalyzed by cinchona alkaloid derived squaramide catalysts has been investigated.
3. **Michael-Michael Cascade Reaction:** An organocatalytic Michael-Michael cascade for the enantioselective construction of spirocyclopentane bioindoles was developed in moderate to good yield with good diastereoselectivities and excellent enantioselectivities.



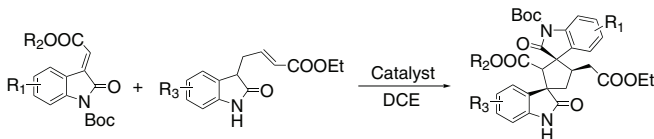
Tech. Note (1)  
Ref. (1)

## NITROGEN (Compounds)

07-8435

(continued)

3-[[[3,5-Bis(trifluoromethyl)phenyl]amino]-4-[[[(9R)-6'-methoxycinchonan-9-yl]amino]-3-cyclobutene-1,2-dione, 98%, (99% ee) (1256245-79-0)



16 examples  
up to 76% yield,  
15:1 dr,  
>99% e.e.

Tech. Note (2)  
Ref. (2)

### References:

1. *J. Org. Chem.*, **2013**, 78, 9377-9382.
2. *Org. Lett.*, **2014**, 16, 544-547.

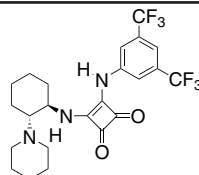
07-5610

NEW

3-[[[3,5-Bis(trifluoromethyl)phenyl]amino]-4-[[[(1R,2R)-2-(1-piperidinyl)cyclohexyl]amino]-3-cyclobutene-1,2-dione, 98% (1211565-11-5)

C<sub>23</sub>H<sub>25</sub>F<sub>6</sub>N<sub>3</sub>O<sub>2</sub>; FW: 489.50; orange powdr.

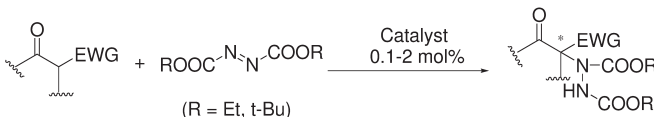
Note: Sold in collaboration with Daicel for research purposes only.



50mg

### Technical Notes:

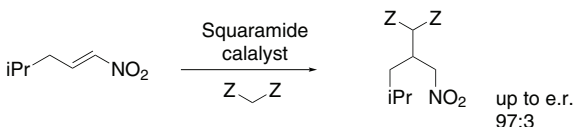
1.  **$\alpha$ -Hydrazination:** Catalytic enantioselective  $\alpha$ -hydrazination of 1,3-dicarbonyl compounds with azodicarboxylates was investigated in the presence of our newly developed hydrogen bonding catalyst.
2. **Michael Addition:** Asymmetric organocatalytic 1,4-additions provide access to a large number of biologically relevant compounds.



(R = Et, t-Bu)

15 examples 88-98% e.e.

Tech. Note (1)  
Ref. (1)



up to e.e.  
97:3

Tech. Note (2)  
Ref. (2)

### References:

1. *Org. Lett.*, **2010**, 12, 2028-2031.
2. *Org. Biomol. Chem.*, **2013**, 11, 7705-7711.

07-5611

NEW

3-[[[3,5-Bis(trifluoromethyl)phenyl]amino]-4-[[[(1S,2S)-2-(1-pyrrolidinyl)cyclohexyl]amino]-3-cyclobutene-1,2-dione, 98%, (99% ee) (1346683-42-8)

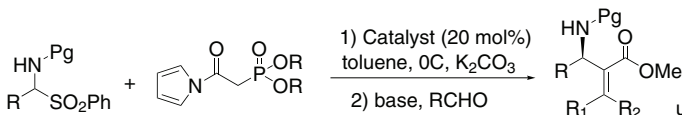
C<sub>22</sub>H<sub>23</sub>F<sub>6</sub>N<sub>3</sub>O<sub>2</sub>; FW: 475.40; white to yellow powdr.

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

50mg

### Technical Note:

1. **Mannich Reaction:** The asymmetric addition of the present HWE reagents to N-carbamoyl imines generated in situ was achieved. The corresponding Mannich adducts can be further transformed to aza-MBH type products in good to excellent enantioselectivities.



up to 96% e.e.

Tech. Note (1)  
Ref. (1)

### References:

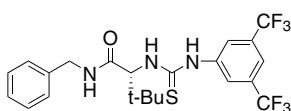
1. *Chem. Sci.*, **2011**, 2, 1918-1921.

## NITROGEN (Compounds)

**07-0630** (2R)-2-[[[3,5-Bis(trifluoromethyl)phenyl]amino]thioxomethyl]amino]-3,3-dimethyl-N-(phenylmethyl)butanamide, 98%, (99% ee)

NEW

C<sub>22</sub>H<sub>23</sub>F<sub>6</sub>N<sub>3</sub>OS; FW: 491.50; white to yellow powdr.  
Note: Sold in collaboration with Daicel for research purposes only.



50mg

**07-0631** (2S)-2-[[[3,5-Bis(trifluoromethyl)phenyl]amino]thioxomethyl]amino]-3,3-dimethyl-N-(phenylmethyl)butanamide, 98%, (99% ee) (1490388-03-8)

NEW

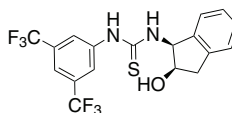
C<sub>22</sub>H<sub>23</sub>F<sub>6</sub>N<sub>3</sub>OS; FW: 491.50; white to yellow powdr.  
Note: Sold in collaboration with Daicel for research purposes only.

50mg

**07-6300** N-[3,5-Bis(trifluoromethyl)phenyl]-N'-[(1S,2R)-2,3-dihydro-2-hydroxy-1H-inden-1-yl]thiourea, 95%, (99% ee) (949480-57-3)

NEW

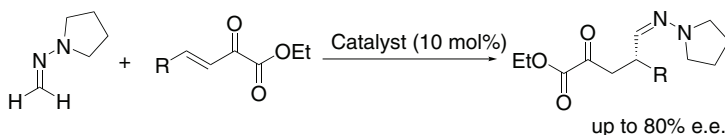
C<sub>18</sub>H<sub>14</sub>F<sub>6</sub>N<sub>2</sub>OS; FW: 420.4; white to yellow powdr.  
Note: Sold in collaboration with Daicel for research purposes only.



100mg

### Technical Notes:

- Nucleophilic Conjugate Addition:** (1S,2R)-1-Aminoindan-2-ol-derived thioureas behave as efficient H-bonding organocatalysts for the nucleophilic conjugate addition of formaldehyde hydrazones to  $\beta,\gamma$ -unsaturated  $\alpha$ -keto esters as enolate surrogates, affording the corresponding adducts in good yields and enantioselectivities.
- Friedel-Crafts Alkylation:** A novel study on the influence of external Bronsted acids on thiourea catalysts in the asym. Friedel-Crafts alkylation of indoles with nitroalkenes is reported.



Tech. Note (1)  
Ref. (1)

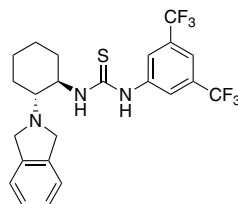
### References:

- Org. Lett., 2007, 9, 3303-3306.
- Eur. J. Org. Chem., 2011, (20-21), 3700-3705.

**07-8418** N-[3,5-Bis(trifluoromethyl)phenyl]-N'-[(1R,2R)-2-(1,3-dihydro-2H-isoindol-2-yl)cyclohexyl]thiourea, 95%, (99% ee) (620960-27-2)

NEW

C<sub>23</sub>H<sub>23</sub>F<sub>6</sub>N<sub>2</sub>S; FW: 487.50; white to yellow powdr.  
Note: Sold in collaboration with Daicel for research purposes only.



50mg

**07-8419** N-[3,5-Bis(trifluoromethyl)phenyl]-N'-[(1S,2S)-2-(1,3-dihydro-2H-isoindol-2-yl)cyclohexyl]thiourea, 98%, (99% ee)

NEW

C<sub>23</sub>H<sub>23</sub>F<sub>6</sub>N<sub>2</sub>S; FW: 487.50; white to yellow powdr.  
Note: Sold in collaboration with Daicel for research purposes only.

50mg

**07-1336** N-[3,5-Bis(trifluoromethyl)phenyl]-N'-[(1S,2S)-2-(dimethylamino)cyclohexyl]urea, 95%, (99% ee) (1221442-12-1)

NEW

C<sub>17</sub>H<sub>21</sub>F<sub>6</sub>N<sub>3</sub>O; FW: 397.4; white to yellow powdr.  
Note: Sold in collaboration with Daicel for research purposes only.

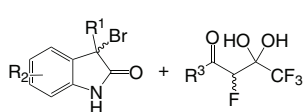
100mg

### Technical Note:

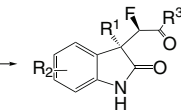
- Monofluoroalkylation:** A new practical organocatalytic asymmetric protocol for the introduction of a monofluoroalkyl group into the oxindole framework has been successfully developed.

## NITROGEN (Compounds)

**07-1336** **N-[3,5-Bis(trifluoromethyl)phenyl]-N'-[(1S,2S)-2-(dimethylamino)cyclohexyl]urea, 95%, (99% ee) (1221442-12-1)**



Catalyst (20 mol%)  
DIPEA (2.5 equiv)  
MTBE, rt



**Tech. Note (1)**  
**Ref. (1)**

17 examples up to 82% yield,  
>20:1 dr, 99% e.e.

References:

1. *Org. Lett.*, **2014**, *16*, 1960-1963.

**07-1337** **N-[3,5-Bis(trifluoromethyl)phenyl]-N'-[(1R,2R)-2-(dimethylamino)cyclohexyl]urea, 98%, (99% ee) (820242-14-6)** 100mg

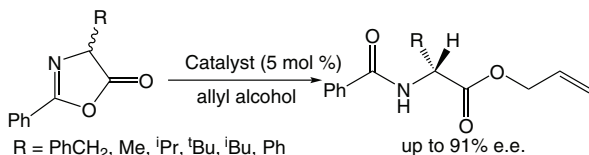
**NEW**

C<sub>17</sub>H<sub>21</sub>F<sub>6</sub>N<sub>3</sub>O; FW: 397.4; white to yellow powdr.

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

Technical Note:

- Dynamic Kinetic Resolution:** Bifunctional organocatalysts of the tpe shown, with a quasi Lewis acidic urea or thiourea unit and a Brønsted basic amine functionality, effect the dynamic kinetic resolution of azlactones with high enantioselectivity.



up to 91% e.e.

**Tech. Note (1)**  
**Ref. (1)**

References:

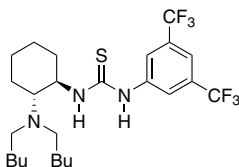
1. *Angew. Chem. Int. Ed.*, **2005**, *44*, 807-811.

**07-1345** **N-[3,5-Bis(trifluoromethyl)phenyl]-N'-[(1R,2R)-2-(dipentylamino)cyclohexyl]thiourea, 98%, (99% ee)** 50mg

**NEW**

C<sub>28</sub>H<sub>37</sub>F<sub>6</sub>N<sub>3</sub>S; FW: 525.60; white to yellow powdr.

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



**07-1346** **N-[3,5-Bis(trifluoromethyl)phenyl]-N'-[(1S,2S)-2-(dipentylamino)cyclohexyl]thiourea, 98%, (99% ee) (1429516-79-9)** 50mg

**NEW**

C<sub>28</sub>H<sub>37</sub>F<sub>6</sub>N<sub>3</sub>S; FW: 525.60; white to yellow powdr.

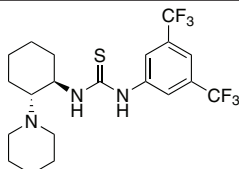
Note: Sold in collaboration with Daicel for research purposes only.

**07-6318** **N-[3,5-Bis(trifluoromethyl)phenyl]-N'-[(1R,2R)-2-(1-piperidinyl)cyclohexyl]thiourea, 98%, (99% ee) (1289514-24-4)** 50mg

**NEW**

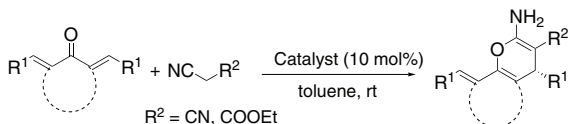
C<sub>29</sub>H<sub>25</sub>F<sub>6</sub>N<sub>3</sub>S; FW: 453.50; light red xtl.

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



Technical Note:

- Conjugate Addition:** Organocatalytic conjugate addition of malononitrile to conformationally restricted dienones has been studied. A series of chiral primary and tertiary amine catalysts were screened.



R<sup>2</sup> = CN, COOEt

23 examples  
up to 99% yield  
99% e.e.

**Tech. Note (1)**  
**Ref. (1)**

References:

1. *Tetrahedron Lett.*, **2011**, *76*, 3797-3804.



## NITROGEN (Compounds)

**07-6319** **N-[3,5-Bis(trifluoromethyl)phenyl]-N'-[(1S,2S)-2-(1-piperidinyl)cyclohexyl]thiourea, 98%, (99% ee) (1244061-69-5)** 50mg

**NEW**

$C_{20}H_{25}F_6N_3S$ ; FW: 453.50; white to yellow powdr.

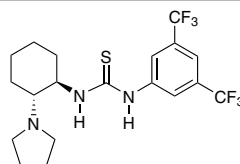
Note: Sold in collaboration with Daicel for research purposes only.

**07-1350** **1-[3,5-Bis(trifluoromethyl)phenyl]-3-[(1R,2R)-2-(pyrrolidin-1-yl)cyclohexyl]thiourea, 98%, (99% ee) (1314743-49-1)** 50mg

**NEW**

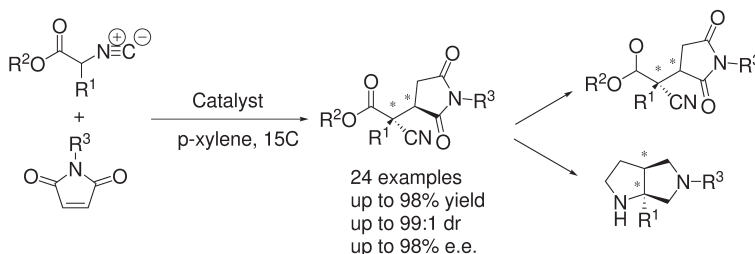
$C_{19}H_{23}F_6N_3S$ ; FW: 439.50; white to yellow powdr.

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



Technical Note:

- Michael Addition:** A highly diastereoselective and enantioselective Michael addition of  $\alpha$ -substituted isocyanoacetates with maleimides catalyzed by bifunctional tertiary amine thioureas has been developed.



**Tech. Note (1)  
Ref. (1)**

References:

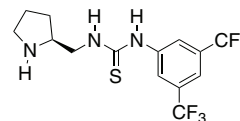
- J. Org. Chem.*, **2012**, *77*, 2947-2953.

**07-0912** **N-[3,5-Bis(trifluoromethyl)phenyl]-N'-[(2S)-2-pyrrolidinylmethyl]thiourea, 98% (904928-30-9)** 100mg

**NEW**

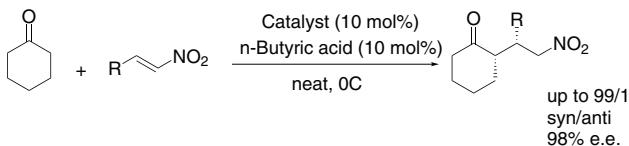
$C_{14}H_{15}F_6N_3S$ ; FW: 371.30; white to yellow powdr.

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



Technical Note:

- Michael Addition:** Asymmetric Michael additions of cyclohexanone to both aryl and alkyl nitroolefins in the presence of 20 mol% of organocatalyst and 10 mol% of n-butyric acid afford adducts with high diastereoselectivities and enantioselectivities.



**Tech. Note (1)  
Ref. (1)**

References:

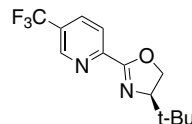
- Org. Lett.*, **2006**, *8*, 2901-2904.

**07-7173** **2-[(4R)-4-tert-Butyl-4,5-dihydro-2-oxazolyl]-5-(trifluoromethyl)pyridine, 98%, (99% ee) (1428537-19-2)** 50mg

**NEW**

$C_{15}H_{15}F_3N_3O$ ; FW: 272.30; white to yellow powdr.

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



**07-7124** **2-[(4S)-4-tert-Butyl-4,5-dihydro-2-oxazolyl]-5-(trifluoromethyl)pyridine, 98%, (99% ee) (1416819-91-4)** 100mg

**NEW**

$C_{15}H_{15}F_3N_3O$ ; FW: 272.30; white to yellow powdr.

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

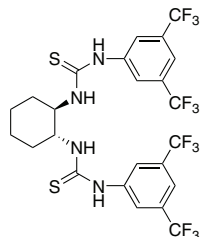
## NITROGEN (Compounds)

07-6312

NEW

**N,N'-(1R,2R)-1,2-Cyclohexanediylbis[N'-(3,5-bis(trifluoromethyl)phenyl)thiourea], 98%, (99% ee)**  
(743458-79-9)

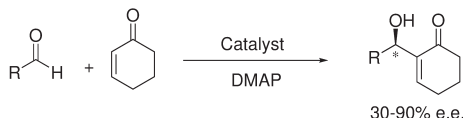
C<sub>24</sub>H<sub>20</sub>F<sub>12</sub>N<sub>4</sub>S<sub>2</sub>; FW: 656.6; white to yellow powd.  
Note: Sold in collaboration with Daicel for research purposes only.



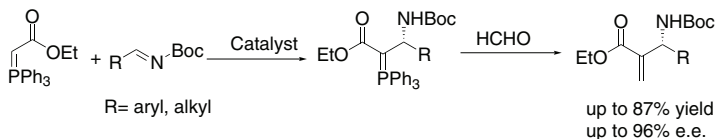
100mg

### Technical Notes:

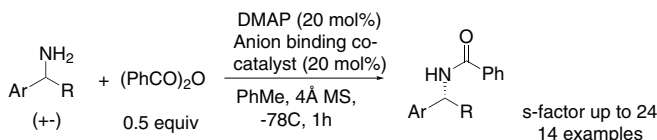
- Baylis-Hillman Reaction:** A new chiral bis-thiourea-type organocatalyst developed for the Baylis-Hillman reaction provided a drastic rate enhancement. Allylic alcohols were obtained with up to 90% ee in the case of cyclohexanecarboxaldehyde.
- Mannich Reaction:** The first asymmetric Mannich-type reaction of stabilized phosphorus ylides and N-Boc aldimines was described promoted by a readily available and recyclable chiral bithiourea organocatalyst.
- Benzoylation:** A new concept for asymmetric nucleophilic catalysis is presented. Acyl pyridinium salts derived from 4-(dimethylamino)pyridine (DMAP) and benzoic anhydride are rendered chiral via interaction with a chiral thiourea anion receptor.



**Tech. Note (1)**  
**Ref. (1)**



**Tech. Note (2)**  
**Ref. (2)**



**Tech. Note (3)**  
**Ref. (3)**

### References:

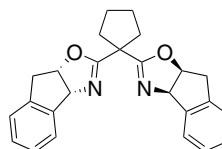
- Tetrahedron Lett.*, **2004**, 45, 5589-5592.
- J. Am. Chem. Soc.*, **2008**, 130, 2456-2457.
- J. Am. Chem. Soc.*, **2009**, 131, 17060-17061.

07-7220

NEW

**(3aR,3'aR,8aS,8'aS)-2,2'-Cyclopentylidenebis[3a,8a-dihydro-8H-indeno[1,2-d]oxazole] 98%, (99% ee)**  
(2005443-90-1)

FW: 384.5; white to Light yellow powd.  
Note: Sold in collaboration with Daicel for research purposes only.



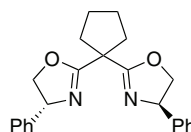
100mg

07-7210

NEW

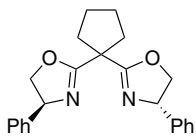
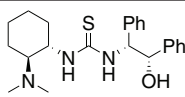
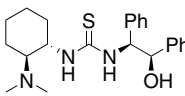
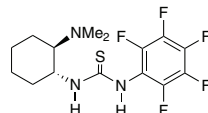
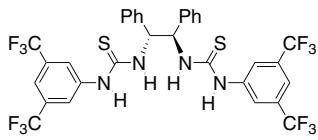
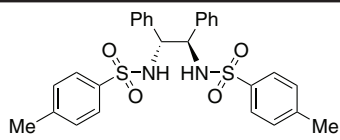
**(4R,4'R)-2,2'-Cyclopentylidenebis[4,5-dihydro-4-phenyloxazole], 95% (99% ee)**  
(1246401-49-9)

FW: 360.4; white to Light yellow powd.  
(store cold)  
Note: Sold in collaboration with Daicel for research purposes only.



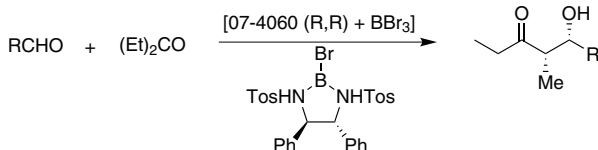
100mg

## NITROGEN (Compounds)

07-7218	<b>(4S,4'S)-2,2'-Cyclopentylidenebis[4,5-dihydro-4-phenyloxazole], 98%, (99% ee) (1639791-77-7)</b> FW: 360.4; white to light yellow powdr. (store cold) Note: Sold in collaboration with Daicel for research purposes only.		100mg
07-6326	<b>N-[(1S,2S)-2-(Dimethylamino)cyclohexyl]-N'-[(1R,2S)-2-hydroxy-1,2-diphenylethyl]thiourea, 98%, (99% ee)</b> $C_{23}H_{31}N_3OS$ ; FW: 397.60; white to yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		50mg
07-6325	<b>N-[(1S,2S)-2-(Dimethylamino)cyclohexyl]-N'-[(1S,2R)-2-hydroxy-1,2-diphenylethyl]thiourea, 98%, (99% ee)</b> $C_{23}H_{31}N_3OS$ ; FW: 397.60; white to yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		50mg
07-2063	<b>1-[(1R,2R)-2-(Dimethylamino)cyclohexyl]-3-(perfluorophenyl)thiourea, 98%, (99% ee)</b> $C_{15}H_{18}F_5N_2S$ ; FW: 367.40; white to yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		100mg
07-2064	<b>1-[(1S,2S)-2-(Dimethylamino)cyclohexyl]-3-(perfluorophenyl)thiourea, 98%, (99% ee)</b> $C_{15}H_{18}F_5N_2S$ ; FW: 367.40; white to yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		100mg
07-8020	<b>N,N'-[(1S,2S)-1,2-Diphenyl-1,2-ethanediyl]bis[N'-[3,5-bis(trifluoromethyl)phenyl]thiourea], 95%, (99% ee) (1416334-72-9)</b> $C_{32}H_{22}F_{12}N_4S_2$ ; FW: 754.70; white to yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		100mg
07-0821	<b>N,N'-[(1R,2R)-1,2-Diphenyl-1,2-ethanediyl]bis[N'-[3,5-bis(trifluoromethyl)phenyl]thiourea], 98%, (99% ee) (1012051-90-9)</b> $C_{32}H_{22}F_{12}N_4S_2$ ; FW: 754.70; white to yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		100mg
07-7234	<b>(R)-Diphenylprolinol trimethyl silyl ether, 95% (99% ee) (943757-71-9)</b> See page 54		
07-4060	<b>(1R,2R)-N,N'-Di-p-tosyl-1,2-diphenyl-1,2-ethylenediamine, min. 98% (121758-19-8)</b> $C_{28}H_{28}N_2O_4S_2$ ; FW: 520.67; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		500mg 1g

### Technical Notes:

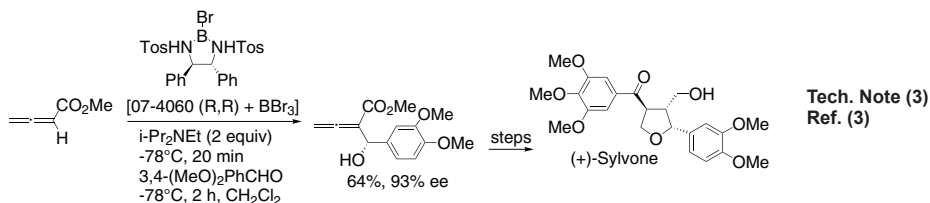
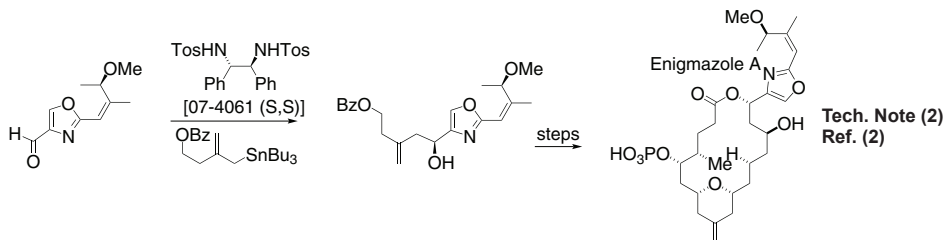
- Chiral reagent used the natural product synthesis of the rice and corn weevil aggregation pheromone sitophilure
- Chiral reagent used in the total synthesis of enigmazole A
- Chiral reagent used in the enantioselective synthesis of Furan Lignan (+)-Sylvone



Tech. Note (1)  
Ref. (1)

## NITROGEN (Compounds)

**07-4060** (1R,2R)-N,N'-Di-p-tosyl-1,2-diphenyl-1,2-ethylenediamine, min. 98% (121758-19-8)  
(continued)



### References:

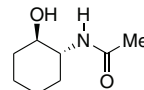
1. *J. Am. Chem. Soc.*, **1989**, *111*, 5493
2. *J. Am. Chem. Soc.*, **2010**, *132*, 10286
3. *J. Org. Chem.*, **2015**, *80*, 10359

<b>07-4061</b>	(1S,2S)-N,N'-Di-p-tosyl-1,2-diphenyl-1,2-ethylenediamine, min. 98% (170709-41-8) C <sub>28</sub> H <sub>28</sub> N <sub>2</sub> O <sub>4</sub> S <sub>2</sub> ; FW: 520.67; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	500mg 1g
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### Technical Note:

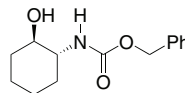
1. See 07-4060 (page 16)

<b>07-0785</b>	N-[(1R,2R)-2-Hydroxycyclohexyl]acetamide, min. 98% (214348-95-5) C <sub>8</sub> H <sub>15</sub> NO <sub>2</sub> ; FW: 157.21; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	1g 5g
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<b>07-0786</b>	N-[(1S,2S)-2-Hydroxycyclohexyl]acetamide, min. 98% (190848-36-3) C <sub>8</sub> H <sub>15</sub> NO <sub>2</sub> ; FW: 157.21; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	1g 5g
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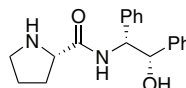
<b>07-1005</b>	[(1R,2R)-2-Hydroxycyclohexyl]carbamic Acid Phenylmethyl Ester, min. 98% (134108-76-2) C <sub>14</sub> H <sub>19</sub> NO <sub>3</sub> ; FW: 249.31; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	1g 5g
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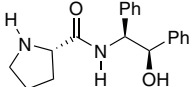
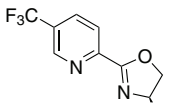
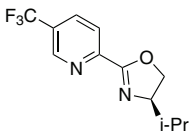
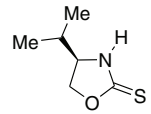
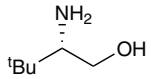
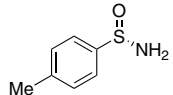
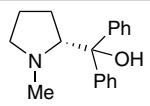
<b>07-1006</b>	[(1S,2S)-2-Hydroxycyclohexyl]carbamic Acid Phenylmethyl Ester, min. 98% (198422-64-9) C <sub>14</sub> H <sub>19</sub> NO <sub>3</sub> ; FW: 249.31; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	1g 5g
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<b>07-0984</b>	(2S)-N-[(1R,2S)-2-Hydroxy-1,2-diphenylethyl]-2-pyrrolidinecarboxamide, 98%, (99% ee) (529486-23-5) C <sub>19</sub> H <sub>22</sub> N <sub>2</sub> O <sub>2</sub> ; FW: 310.40; white to yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	100mg
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**NEW**

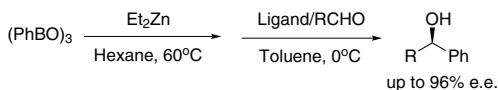


## NITROGEN (Compounds)

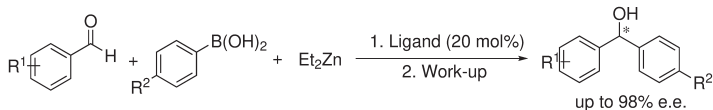
07-0983 <b>NEW</b>	<b>(2S)-N-[(1S,2R)-2-Hydroxy-1,2-diphenylethyl]-2-pyrrolidinecarboxamide, 98%, (99% ee)</b> (529486-25-7) C <sub>19</sub> H <sub>22</sub> N <sub>2</sub> O <sub>2</sub> ; FW: 310.40; white to yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		100mg
07-1040 <b>NEW</b>	<b>2-[(4R)-4-Isobutyl-4,5-dihydro-2-oxazolyl]-5-(trifluoromethyl)pyridine, 98%, (99% ee)</b> C <sub>13</sub> H <sub>15</sub> F <sub>3</sub> N <sub>2</sub> O; FW: 272.30; white to yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		50mg
07-7058 <b>NEW</b>	<b>2-[(4R)-4-Isopropyl-4,5-dihydro-2-oxazolyl]-5-(trifluoromethyl)pyridine, 98%, (99% ee)</b> C <sub>12</sub> H <sub>13</sub> F <sub>3</sub> N <sub>2</sub> O; FW: 258.20; white to yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		100mg
07-0615	<b>(R)-4-Isopropyl-2-oxazolidinethione, min. 98% (1217463-35-8)</b> C <sub>6</sub> H <sub>11</sub> NOS; FW: 145.22; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		500mg 2g
07-0616	<b>(S)-4-Isopropyl-2-oxazolidinethione, min. 98% (104499-08-3)</b> C <sub>6</sub> H <sub>11</sub> NOS; FW: 145.22; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		500mg 2g
07-7224 <b>NEW</b>	<b>L-tert-Leucinol, 98% (99% ee) (13374-31-7)</b> FW: 117.2; white to light yellow solid Note: Sold in collaboration with Daicel for research purposes only.		1g
07-7228 <b>NEW</b>	<b>(S)-4-Methylbenzenesulfonamide, 95% (99% ee) (188447-91-8)</b> FW: 155.2; white to Light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		1g
07-1170	<b>(2R)-(-)-N-Methyl-α,α-diphenyl-2-pyrrolidinemethanol, min. 98% (144119-12-0)</b> C <sub>18</sub> H <sub>21</sub> NO; FW: 267.37; white to light yellow powdr.; m.p. 68-71° Note: Sold in collaboration with Daicel for research purposes only.		100mg 250mg

### Technical Notes:

- Chiral amino alcohol assisted asymmetric, enantioselective, aryl transfer of triphenylboroxin to a set of aryl aldehydes in the presence of chiral amino alcohols derived from (S)-proline.
- Pyrrolidinylmethanol compound used for the zinc-catalyzed addition of arylboronic acids to aromatic aldehydes, proceeding in high yields and high enantioselectivities (up to 98% ee).



**Tech. Note (1)**  
**Ref. (1)**



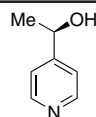
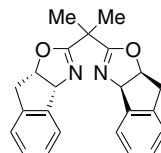
**Tech. Note (2)**  
**Ref. (2)**

### References:

- Tetrahedron Asymmetry* **2005**, 16, 2299
- Tetrahedron Lett.*, **2005**, 46, 7827

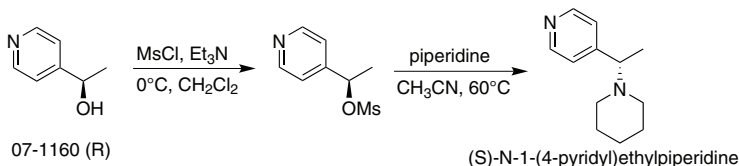
## NITROGEN (Compounds)

07-1171	(2S)-(+)-N-Methyl- $\alpha,\alpha$ -diphenyl-2-pyrrolidinemethanol, min. 98% (110529-22-1) C <sub>18</sub> H <sub>21</sub> NO; FW: 267.37; white to pale-yellow powdr.; m.p. 66-69° Note: Sold in collaboration with Daicel for research purposes only.	100mg 250mg
07-1035 <b>NEW</b>	(3aR,3'aR,8aR,8'aS)-2,2'-(1-Methylethylidene)bis[3a,8a-dihydro-8H-indeno[1,2-d]oxazole], 95%, (99% ee) (189623-45-8) C <sub>23</sub> H <sub>22</sub> N <sub>2</sub> O <sub>2</sub> ; FW: 358.40; white to yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	100mg
07-1034 <b>NEW</b>	(3aS,3'aS,8aR,8'aR)-2,2'-(1-Methylethylidene)bis[3a,8a-dihydro-8H-indeno[1,2-d]oxazole], 98%, (99% ee) (175166-51-5) C <sub>23</sub> H <sub>22</sub> N <sub>2</sub> O <sub>2</sub> ; FW: 358.40; gray powdr. Note: Sold in collaboration with Daicel for research purposes only.	100mg
07-1160	(R)-(+)- $\alpha$ -Methyl-4-pyridinemethanol, min. 98% (27854-88-2) C <sub>7</sub> H <sub>9</sub> NO; FW: 123.15; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg 100mg

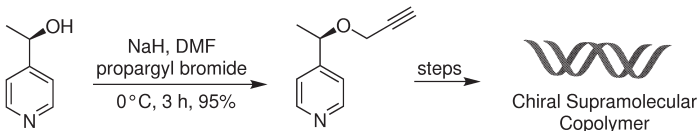


### Technical Notes:

- Used for the synthesis of chiral 1-(4-pyridinyl)ethylamines
- Precursor for intermediates of highly stable chiral (A)6-B Supramolecular Copolymers



Tech. Note (1)  
Ref. (1)



Tech. Note (2)  
Ref. (2)

### References:

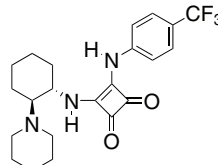
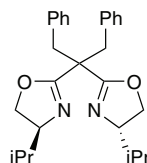
- J. Org. Chem., **2004**, 69, 6781
- J. Am. Chem. Soc., **2011**, 133, 11124

07-1161	(S)-(-)- $\alpha$ -Methyl-4-pyridinemethanol, min. 98% (54656-96-1) C <sub>7</sub> H <sub>9</sub> NO; FW: 123.15; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg 100mg
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### Technical Note:

- See 07-1160 (page 19)

07-7105 <b>NEW</b>	(4S,4'S)-2,2'-[2-Phenyl-1-(phenylmethyl)ethylidene]bis[4-(1-methylethyl)-4,5-dihydrooxazole], 95%, (99% ee) (444575-98-8) C <sub>27</sub> H <sub>34</sub> N <sub>2</sub> O <sub>2</sub> ; FW: 418.60; white to yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg
07-0905 <b>NEW</b>	3-[[[(1S,2S)-2-(1-Piperidinyl)cyclohexyl]amino]-4-[[4-(trifluoromethyl)phenyl]amino]-3-cyclobutene-1,2-dione, 95%, (99% ee) (1312991-08-4) C <sub>22</sub> H <sub>26</sub> F <sub>3</sub> N <sub>3</sub> O <sub>2</sub> ; FW: 421.50; white to yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg



## NITROGEN (Compounds)

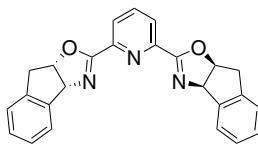
07-7212

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)

FW: 393.4; white to Light yellow powdr.  
(store cold)

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



500mg

07-7226

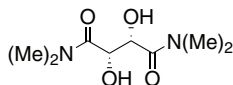
NEW

N,N,N',N'-Tetramethyl-D-tartaramide, 98% (99% ee)

(63126-52-3)

FW: 204.2; white to Light yellow powdr.

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



5g

## OXYGEN (Compounds)

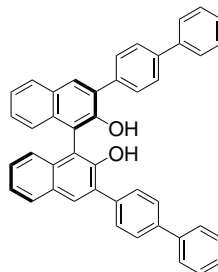
08-1090

NEW

(R)-3,3'-Bis([1,1'-biphenyl]-4-yl)-[1,1'-binaphthalene]-2,2'-diol, 98% (99% ee) (215433-52-6)

C<sub>44</sub>H<sub>30</sub>O<sub>2</sub>; FW: 590.72; white to light yellow powdr.

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



100mg

08-0460

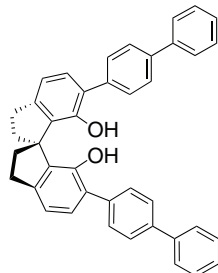
NEW

(S)-6,6'-Bis([1,1'-biphenyl]-4-yl)-2,2',3,3'-tetrahydro-1,1'-spirobi[1H-indene]-7,7'-diol, 98% (99% ee)

(1258327-00-2)

C<sub>41</sub>H<sub>32</sub>O<sub>2</sub>; FW: 556.71; white to light yellow powdr.

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



10mg

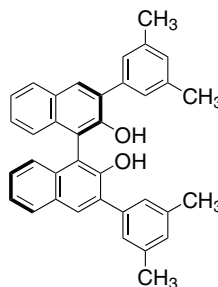
08-1040

NEW

(R)-3-3'-Bis[3,5-bis(methyl)phenyl]-1,1'-bi-2-naphthol, 98% (99% ee) (215433-51-5)

C<sub>36</sub>H<sub>30</sub>O<sub>2</sub>; FW: 494.63; white to light yellow powdr.

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



100mg

08-1041

NEW

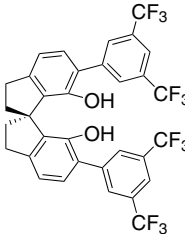
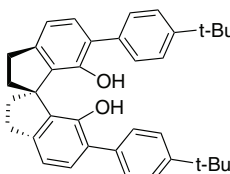
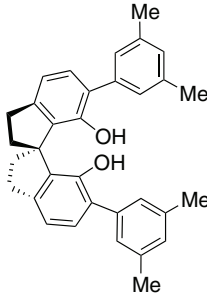
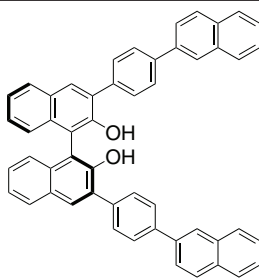
(S)-3-3'-Bis[3,5-bis(methyl)phenyl]-1,1'-bi-2-naphthol, 98% (99% ee) (435327-17-6)

C<sub>36</sub>H<sub>30</sub>O<sub>2</sub>; FW: 494.63; white to light yellow powdr.

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

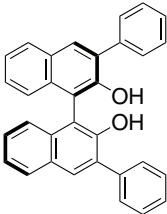
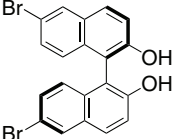
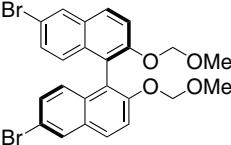
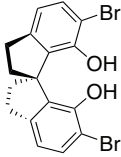
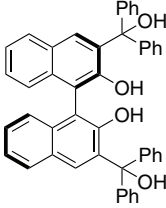
100mg

## OXYGEN (Compounds)

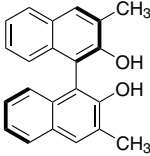
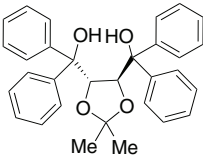
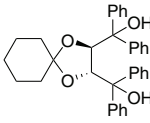
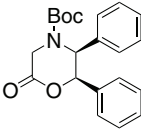
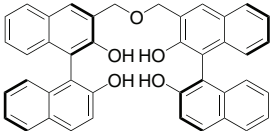
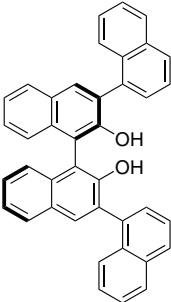
08-0163	(1R)-6,6'-Bis[3,5-bis(trifluoromethyl)phenyl]-2,2',3,3'-tetrahydro-1,1'-spirobi[1H-indene]-7,7'-diol, min. 98% (1286189-16-9) $C_{33}H_{20}F_{12}O_2$ ; FW: 676.49; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		25mg 100mg
08-0164	(1S)-6,6'-Bis[3,5-bis(trifluoromethyl)phenyl]-2,2',3,3'-tetrahydro-1,1'-spirobi[1H-indene]-7,7'-diol, min. 98% (1258327-01-3) $C_{33}H_{20}F_{12}O_2$ ; FW: 676.49; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		25mg 100mg
08-0441 <b>NEW</b>	(R)-6,6'-Bis4-(1,1-dimethylethyl)phenyl)-2,2',3,3'-tetrahydro-1,1'-spirobi[1H-indene]-7,7'-diol, 98% (99% ee) $C_{37}H_{40}O_2$ ; FW: 516.73; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		50mg
08-0440 <b>NEW</b>	(S)-6,6'-Bis4-(1,1-dimethylethyl)phenyl)-2,2',3,3'-tetrahydro-1,1'-spirobi[1H-indene]-7,7'-diol, 98% (99% ee) $C_{37}H_{40}O_2$ ; FW: 516.73; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		50mg
08-0470 <b>NEW</b>	(R)-6,6'-Bis(3,5-dimethylphenyl)-2,2',3,3'-tetrahydro-1,1'-spirobi[1H-indene]-7,7'-diol, 98% (99% ee) (930784-56-8) $C_{33}H_{32}O_2$ ; FW: 460.61; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		50mg
08-0471 <b>NEW</b>	(S)-6,6'-Bis(3,5-dimethylphenyl)-2,2',3,3'-tetrahydro-1,1'-spirobi[1H-indene]-7,7'-diol, 98% (99% ee) $C_{33}H_{32}O_2$ ; FW: 460.61; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		50mg
08-1080 <b>NEW</b>	(S)-3,3'-Bis[4-(2-naphthalenyl)phenyl]-[1,1'-binaphthalene]-2,2'-diol, 95% (99% ee) (309934-87-0) $C_{52}H_{34}O_2$ ; FW: 690.84; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		25mg



## OXYGEN (Compounds)

08-1030 <b>NEW</b>	<b>(R)-3,3'-Bis(phenyl)-1,1'-bi-2-naphthol, 98% (99% ee)</b> (75684-93-4) $C_{32}H_{22}O_2$ ; FW: 438.53; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		100mg
08-1031 <b>NEW</b>	<b>(S)-3,3'-Bis(phenyl)-1,1'-bi-2-naphthol, 98% (99% ee)</b> (102490-05-1) $C_{32}H_{22}O_2$ ; FW: 438.53; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		100mg
08-0185	<b>(R)-(-)-6,6'-Dibromo-1,1'-bi-2-naphthol, 98% (99% ee)</b> (65283-60-5) $C_{20}H_{12}Br_2O_2$ ; FW: 444.12; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		500mg 2g
08-0186	<b>(S)-(+)-6,6'-Dibromo-1,1'-bi-2-naphthol, 98% (99% ee)</b> (80655-81-8) $C_{20}H_{12}Br_2O_2$ ; FW: 444.12; white to light-yellow solid Note: Sold in collaboration with Daicel for research purposes only.		500mg 2g
08-0152	<b>(R)-(+)-6,6'-Dibromo-2,2'-bis(methoxymethoxy)-1,1'-binaphthalene, min. 98% (99% ee)</b> (179866-74-1) $C_{24}H_{20}Br_2O_4$ ; FW: 532.22; white to light yellow powdr.; m.p. 133° Note: Sold in collaboration with Daicel for research purposes only.		100mg 500mg
08-0153	<b>(S)-(-)-6,6'-Dibromo-2,2'-bis(methoxymethoxy)-1,1'-binaphthalene, min. 98% (99% ee)</b> (211560-97-3) $C_{24}H_{20}Br_2O_4$ ; FW: 532.22; white to light yellow powdr.; m.p. 133° Note: Sold in collaboration with Daicel for research purposes only.		100mg 500mg
08-1252 <b>NEW</b>	<b>(R)-6,6'-Dibromo-2,2',3,3'-tetrahydro-1,1'-spirobi[1H-indene]-7,7'-diol, 95% (99 ee)</b> (1286189-15-8) FW: 410.1; white to Light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		250mg
08-2520 <b>NEW</b>	<b>(R)-2,2'-Dihydroxy-α,α,α',α'-tetraphenyl-[1,1'-binaphthalene]-3,3'-dimethanol, 95% (99% ee)</b> (336185-31-0) $C_{46}H_{34}O_4$ ; FW: 650.76; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		50mg
08-2521 <b>NEW</b>	<b>(S)-2,2'-Dihydroxy-α,α,α',α'-tetraphenyl-[1,1'-binaphthalene]-3,3'-dimethanol, 95% (99% ee)</b> (309269-73-6) $C_{46}H_{34}O_4$ ; FW: 650.76; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		50mg

## OXYGEN (Compounds)

08-1021	<b>(1S)-3,3'-Dimethyl-[1,1'-binaphthalene]-2,2'-diol, 95% (99% ee)</b> (55515-99-6) $C_{22}H_{16}O_2$ ; FW: 314.38; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	100mg
<b>NEW</b>		
08-1020	<b>(1R)-3,3'-Dimethyl-[1,1'-binaphthalene]-2,2'-diol, 98% (99% ee)</b> (55515-98-5) $C_{22}H_{16}O_2$ ; FW: 314.38; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	100mg
<b>NEW</b>		
		
08-1258	<b>(4S,5S)-2,2-Dimethyl-<math>\alpha,\alpha,\alpha',\alpha'</math>-tetraphenyl-1,3-dioxolane-4,5-dimethanol, 98% (99% ee)</b> (93379-49-8) FW: 466.6; white to Light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	1g
<b>NEW</b>		
		
08-0611	<b>(2R,3R)-1,4-Dioxaspiro[4.5]decane-2,3-diylbis(diphenylmethanol), min. 98%</b> (114026-76-5) $C_{34}H_{34}O_4$ ; FW: 506.63; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	500mg 2g
		
08-0612	<b>(2S,3S)-1,4-Dioxaspiro[4.5]decane-2,3-diylbis(diphenylmethanol), min. 98%</b> (123287-35-4) $C_{34}H_{34}O_4$ ; FW: 506.63; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	500mg 2g
08-1262	<b>(2R,3S)-6-Oxo-2,3-diphenyl-4-morpholinecarboxylic acid t-butyl ester, 98% (99% ee)</b> (112741-49-8) FW: 353.4; white to Light yellow powdr. (store cold) Note: Sold in collaboration with Daicel for research purposes only.	1g
<b>NEW</b>		
		
08-1256	<b>(1R,1'R)-3,3'-[Oxybis(methylene)]bis-[1,1'-binaphthalene]-2,2'-diol, 95% (99% ee)</b> (265116-85-6) FW: 614.7; white to Light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	100mg
<b>NEW</b>		
		
08-1070	<b>(R)-[1,3':1',1'':3'',1'''-Quaternaphthalene]-2',2''-diol, 98% (99% ee)</b> (851615-07-1) $C_{40}H_{26}O_2$ ; FW: 538.65; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	100mg
<b>NEW</b>		
		
08-1071	<b>(S)-[1,3':1',1'':3'',1'''-Quaternaphthalene]-2',2''-diol, 98% (99% ee)</b> (863659-88-5) $C_{40}H_{26}O_2$ ; FW: 538.65; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	100mg
<b>NEW</b>		

## OXYGEN (Compounds)

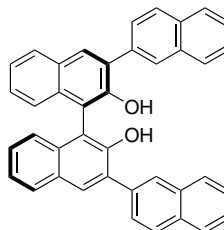
08-1060

NEW

(R)-[2,3':1',1'':3'',2'''-Quaternaphthalene]-2',2''-diol, 98% (99% ee) (215433-53-7)

C<sub>40</sub>H<sub>26</sub>O<sub>2</sub>; FW: 538.65; white to light yellow powdr.

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



100mg

08-1061

NEW

(S)-[2,3':1',1'':3'',2'''-Quaternaphthalene]-2',2''-diol, 98% (99% ee) (863659-89-6)

C<sub>40</sub>H<sub>26</sub>O<sub>2</sub>; FW: 538.65; white to light yellow powdr.

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

100mg

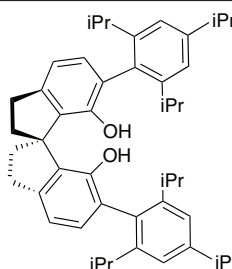
08-1254

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)

FW: 657; white to Light yellow powdr.

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



50mg

08-0450

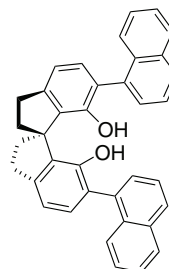
NEW

(R)-2,2',3,3'-Tetrahydro-6,6'-di(1-naphthalenyl)-1,1'-spirobi[1H-indene]-7,7'-diol, 98% (99% ee) (1292849-40-1)

C<sub>37</sub>H<sub>28</sub>O<sub>2</sub>; FW: 504.63; white to light yellow powdr.

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

10mg



08-0451

NEW

(S)-2,2',3,3'-Tetrahydro-6,6'-di(1-naphthalenyl)-1,1'-spirobi[1H-indene]-7,7'-diol, 98% (99% ee) (1258327-02-4)

C<sub>37</sub>H<sub>28</sub>O<sub>2</sub>; FW: 504.63; white to light yellow powdr.

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

10mg

08-8025

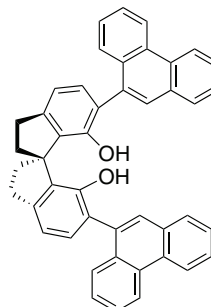
NEW

(R)-2,2',3,3'-Tetrahydro-6,6'-di-9-phenanthrenyl-1,1'-spirobi[1H-indene]-7,7'-diol, 98% (99% ee) (1372719-96-4)

C<sub>46</sub>H<sub>32</sub>O<sub>2</sub>; FW: 604.73; white to light yellow powdr.

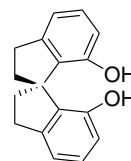
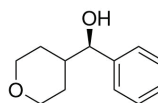
Note: Sold in collaboration with Daicel for research purposes only.

10mg



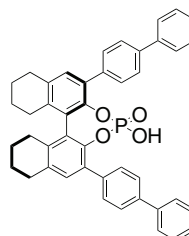
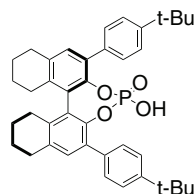
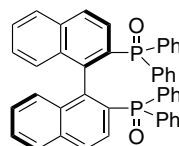
## OXYGEN (Compounds)

08-8026 <b>NEW</b>	(S)-2,2',3,3'-Tetrahydro-6,6'-di-9-phenanthrenyl-1,1'-spirobi[1H-indene]-7,7'-diol, 98% (99% ee) $C_{45}H_{32}O_2$ ; FW: 604.73; white to light yellow pwdr. Note: Sold in collaboration with Daicel for research purposes only.	10mg
08-1260 <b>NEW</b>	(αR)-Tetrahydro-α-phenyl-2H-pyran-4-methanol, 98% (99% ee) (1800345-36-1) FW: 192.3; white to light yellow pwdr. Note: Sold in collaboration with Daicel for research purposes only.	500mg
08-2066 <b>NEW</b>	(S)-2,2',3,3'-Tetrahydro-1,1'-spirobi[indene]-7,7'-diol, 98% (99% ee) (223259-63-0) $C_{17}H_{16}O_2$ ; FW: 252.31; white to light yellow pwdr. Note: Sold in collaboration with Daicel for research purposes only.	250mg
08-2065	(R)-2,2',3,3'-Tetrahydro-1,1'-spirobi[indene]-7,7'-diol, 99% (223259-62-9) $C_{17}H_{16}O_2$ ; FW: 252.31; white solid Note: Sold in collaboration with Daicel for research purposes only.	250mg 1g

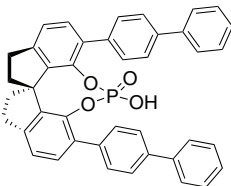
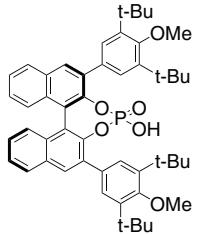
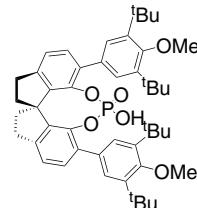
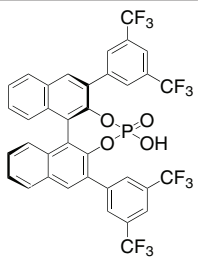


## PHOSPHORUS (Compounds)

15-0312 <b>NEW</b>	(R)-[1,1'-Binaphthalene]-2,2'-diylbis[1,1-diphenyl-1,1'-phosphine oxide], 98% (99% ee) (94041-16-4) $C_{44}H_{32}O_2P_2$ ; FW: 654.69; white to light yellow pwdr. Note: Sold in collaboration with Daicel for research purposes only.	1g
15-0313 <b>NEW</b>	(S)-[1,1'-Binaphthalene]-2,2'-diylbis[1,1-diphenyl-1,1'-phosphine oxide], 98% (99% ee) (94041-16-4) $C_{44}H_{32}O_2P_2$ ; FW: 654.69; white to light yellow pwdr. Note: Sold in collaboration with Daicel for research purposes only.	1g
15-0392 <b>NEW</b>	(11bR)-2,6-Bis[4-(tert-butyl)phenyl]-8,9,10,11,12,13,14,15-octahydro-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98% (1569807-27-7) $C_{40}H_{45}O_4P$ ; FW: 620.8; white to light yellow pwdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg
15-0568 <b>NEW</b>	(11bS)-2,6-Bis[4-(tert-butyl)phenyl]-8,9,10,11,12,13,14,15-octahydro-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98% $C_{40}H_{45}O_4P$ ; FW: 620.8; white to light yellow pwdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg
15-0418 <b>NEW</b>	(11bR)-2,6-Bis([1,1'-biphenyl]-4-yl)-8,9,10,11,12,13,14,15-octahydro-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98% (99% ee) (861909-35-5) $C_{44}H_{37}O_4P$ ; FW: 660.7; white to light yellow pwdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg



## PHOSPHORUS (Compounds)

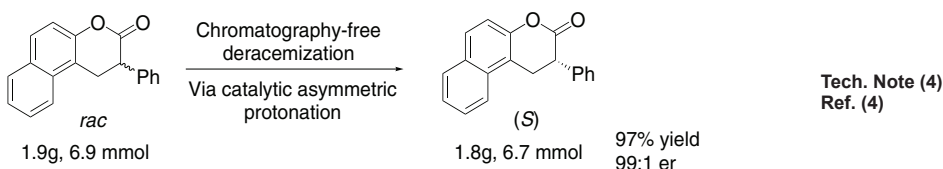
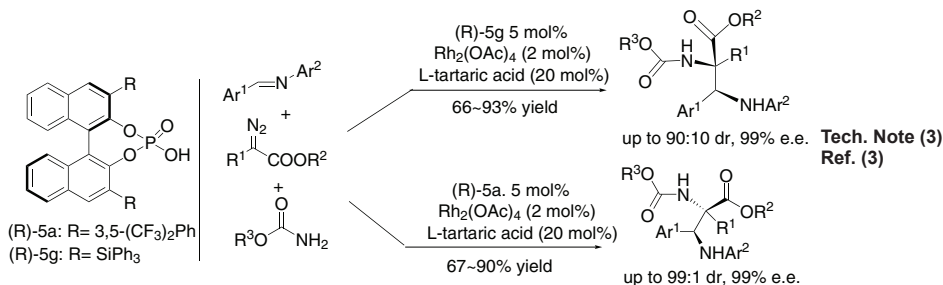
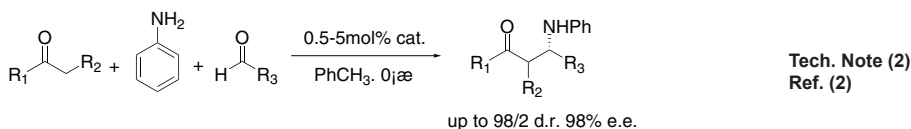
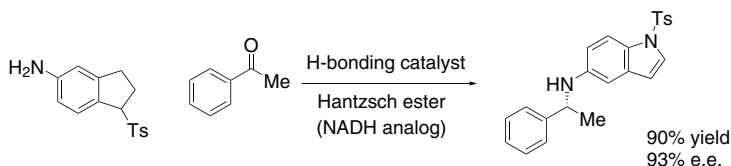
15-0422 <b>NEW</b>	<p><b>(11bS)-2,6-Bis([1,1'-biphenyl]-4-yl)-8,9,10,11,12,13,14,15-octahydro-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphopin, 98% (99% ee)</b>  <math>C_{44}H_{37}O_4P</math>; FW: 660.7; white to light yellow powdr.                      Note: Sold in collaboration with Daicel for research purposes only.</p>	50mg	
15-0293 <b>NEW</b>	<p><b>(11aR)-3,7-Bis([1,1'-biphenyl]-4-yl)-10,11,12,13-tetrahydro-5-hydroxy-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98%, (99% ee) (1297613-77-4)</b>  <math>C_{41}H_{31}O_4P</math>; FW: 618.67; white to yellow powdr.                      Note: Sold in collaboration with Daicel for research purposes only.</p>	25mg	
15-0294 <b>NEW</b>	<p><b>(11aS)-3,7-Bis([1,1'-biphenyl]-4-yl)-10,11,12,13-tetrahydro-5-hydroxy-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98%, (99% ee) (1258327-06-8)</b>  <math>C_{41}H_{31}O_4P</math>; FW: 618.67; white to yellow powdr.                      Note: Sold in collaboration with Daicel for research purposes only.</p>	25mg	
15-0554 <b>NEW</b>	<p><b>(11bR)-2,6-Bis([3,5-bis(1,1-dimethylethyl)-4-methoxyphenyl]-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphopin, 98% (99% ee) (957790-93-1)</b>  <math>C_{50}H_{57}O_6P</math>; FW: 785.0; white to light yellow powdr.                      Note: Sold in collaboration with Daicel for research purposes only.</p>	50mg	
15-0352 <b>NEW</b>	<p><b>(11bS)-2,6-Bis([3,5-bis(1,1-dimethylethyl)-4-methoxyphenyl]-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphopin, 98% (99% ee)</b>  <math>C_{50}H_{57}O_6P</math>; FW: 785.0; white to light yellow powdr.                      Note: Sold in collaboration with Daicel for research purposes only.</p>	50mg	
15-0532 <b>NEW</b>	<p><b>(11aR)-3,7-Bis([3,5-bis(tert-butyl)-4-methoxyphenyl]-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98% (99% ee)</b>  <math>C_{47}H_{59}O_6P</math>; FW: 750.9; white to light yellow powdr.                      Note: Sold in collaboration with Daicel for research purposes only.</p>	50mg	
15-0534 <b>NEW</b>	<p><b>(11aS)-3,7-Bis([3,5-bis(tert-butyl)-4-methoxyphenyl]-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98% (99% ee)</b>  <math>C_{47}H_{59}O_6P</math>; FW: 750.9; white to light yellow powdr.                      Note: Sold in collaboration with Daicel for research purposes only.</p>	50mg	
15-1366 <b>NEW</b>	<p><b>(11bR)-2,6-Bis([3,5-bis(trifluoromethyl)phenyl]-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphopin, 98%, (99% ee) (791616-62-1)</b>  <math>C_{36}H_{17}F_{12}O_4P</math>; FW: 772.5; white to light yellow powdr.                      Note: Sold in collaboration with Daicel for research purposes only.</p>	100mg	

## PHOSPHORUS (Compounds)

15-1366 (11bR)-2,6-Bis[3,5-bis(trifluoromethyl)phenyl]-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphospherin, 98%, (99% ee) (791616-62-1)  
(continued)

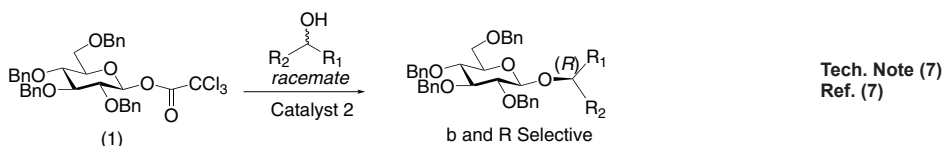
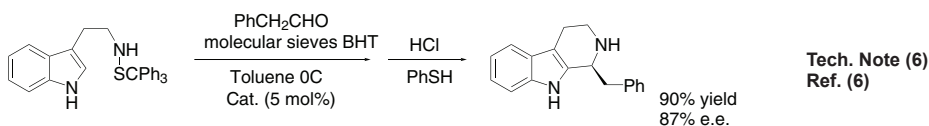
### Technical Notes:

- Reductive Amination Reaction:** The first enantioselective organocatalytic reductive amination reaction has been accomplished.
- Mannich Reaction:** In the presence of a catalytic amt. of the phosphoric acid, anti-selective Mannich reactions of cyclic ketones with a wide scope of aldimines were obtained.
- The diastereoselectively switchable enantioselective trapping of protic carbamate ammonium ylides with imines is reported. The  $\text{Rh}_2(\text{OAc})_4$  and chiral Brønsted acid cocatalyzed three-component Mannich-type reaction of a diazo compound, a carbamate, and an imine provides rapid and efficient access to both syn- and anti- $\alpha$ -substituted  $\alpha,\beta$ -diamino acid derivatives.
- Protonation:** A catalytic asymmetric protonation of ketene dithioacetals is described. Various racemic  $\alpha$ -aryl hydrocoumarin derivatives are transformed into enantioenriched dithioacetal-protected hydrocoumarins in the presence of a chiral Brønsted acid catalyst.
- Povarov Cyclization:** Tetrahydroquinolines containing two quaternary stereogenic centers were synthesized with excellent ee and dr via a four-component cyclization reaction catalyzed by a chiral phosphoric acid.
- Pictet-Spengler Reaction:**  $\beta$ -Carbolines could be synthesized with good enantioselectivity by the Pictet-Spengler reaction catalyzed by a chiral binol-derived Brønsted acid.
- In the glycosylation of racemic alcohols with 1 using the chiral phosphoric acid as an activator, one enantiomer of the racemic alcohol selectively reacts with 1 to give the corresponding glycoside with good to excellent  $\alpha/\beta$ -stereo- and diastereoselectivity in high yield.



## PHOSPHORUS (Compounds)

**15-1366** (11bR)-2,6-Bis[3,5-bis(trifluoromethyl)phenyl]-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (791616-62-1)  
(continued)



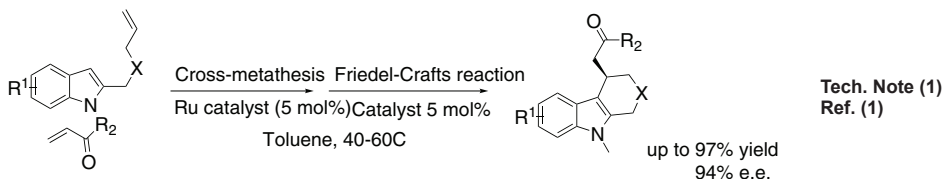
### References:

1. *J. Am. Chem. Soc.*, **2006**, 128, 84-86.
2. *J. Am. Chem. Soc.*, **2007**, 129, 3790-3791.
3. *J. Am. Chem. Soc.*, **2011**, 133, 8428-8431.
4. *J. Am. Chem. Soc.*, **2012**, 134, 18245-18248.
5. *J. Am. Chem. Soc.*, **2013**, 135, 8193-8196.
6. *Angew. Chem. Int. Ed.*, **2007**, 46, 7485-7487.
7. *Angew. Chem. Int. Ed.*, **2013**, 52, 12131-12134.

**15-1367** (11bS)-2,6-Bis[3,5-bis(trifluoromethyl)phenyl]-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (878111-17-2) 100mg  
**NEW**  
C<sub>36</sub>H<sub>17</sub>F<sub>12</sub>O<sub>4</sub>P; FW: 772.5; white to light yellow powdr.  
Note: Sold in collaboration with Daicel for research purposes only.

### Technical Note:

1. **Friedel-Crafts Alkylation:** Chiral phosphoric acids were used as catalysts for the Friedel-Crafts alkylations of indolyl enones while both a ruthenium complex and chiral phosphoric acids were used as catalysts for sequential olefin cross-metathesis and Friedel-Crafts alkylations of allyloxymethyl or allylaminomethyl indoles and enones.



### References:

1. *Angew. Chem. Int. Ed.*, **2009**, 48, 7428-7431.

## PHOSPHORUS (Compounds)

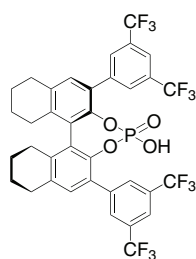
15-1376

NEW

(11bR)-2,6-Bis[3,5-bis(trifluoromethyl)phenyl]-8,9,10,11,12,13,14,15-octahydro-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (1011465-24-9)

$C_{36}H_{25}F_{12}O_4P$ ; FW: 780.5; white to light yellow powdr.

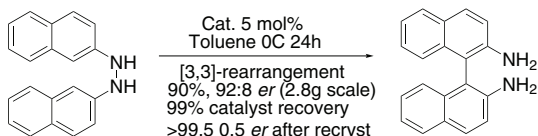
Note: Sold in collaboration with Daicel for research purposes only.



25mg  
100mg

### Technical Notes:

- The preparation of binaphthol monophosphoric acid derivatives.
- Sigmatropic Rearrangements:** Used in the organocatalytic aryl-aryl bond-forming process for the regio- and atroposelective synthesis of 2,2'-diamino-1,1'-binaphthalenes (BINAMs). In the presence of catalytic amounts of axially chiral phosphoric acids, achiral N,N'-binaphthyl hydrazines undergo a facile [3,3]-sigmatropic rearrangement to afford enantiomerically enriched BINAM derivatives in good to excellent yield.



Tech. Note (2)  
Ref. (1)

### References:

- JP 4725757, EP 1038877, US 6274745, 2000-3-21.
- J. Am. Chem. Soc.*, **2013**, 135, 7414-7417.

15-1377

NEW

(11bS)-2,6-Bis[3,5-bis(trifluoromethyl)phenyl]-8,9,10,11,12,13,14,15-octahydro-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee)

$C_{36}H_{25}F_{12}O_4P$ ; FW: 780.5; white to light yellow powdr.

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

25mg  
100mg

### Technical Note:

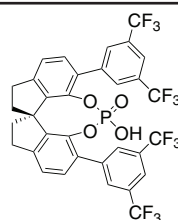
- See 15-1376 (page 29)

15-0527

(11aR)-3,7-Bis[3,5-bis(trifluoromethyl)phenyl]-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, min. 98% (1297613-76-3)

$C_{33}H_{19}F_{12}O_4P$ ; FW: 738.46; white to light yellow powdr.

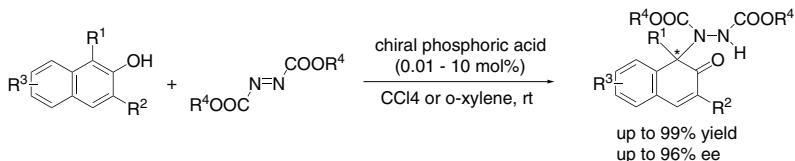
Note: Sold in collaboration with Daicel for research purposes only.



25mg  
100mg

### Technical Note:

- Asymmetric dearomatization of  $\beta$ -naphthols through an amination reaction catalyzed by a chiral phosphoric acid.



Tech. Note (1)  
Ref. (1)

### References:

- Angew. Chem. Int. Ed.*, **2015**, 54, 647.

15-0528

(11aS)-3,7-Bis[3,5-bis(trifluoromethyl)phenyl]-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, min. 98% (1258327-07-9)

$C_{33}H_{19}F_{12}O_4P$ ; FW: 738.46; white to light yellow powdr.

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

25mg  
100mg



## PHOSPHORUS (Compounds)

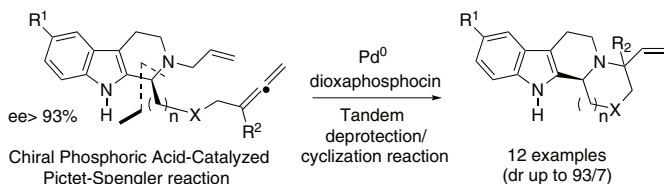
**15-0528** (11aS)-3,7-Bis[3,5-bis(trifluoromethyl)phenyl]-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, min. 98% (1258327-07-9)  
(continued)

### Technical Notes:

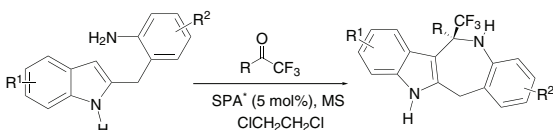
1. Organocatalytic asymmetric multicomponent reactions of aromatic aldehydes and anilines with  $\beta$ -ketoesters: facile and atom-economical access to chiral tetrahydropyridines.
2. Pd(0)-catalyzed tandem deprotection/cyclization of tetrahydro- $\beta$ -carbolines on allenes: application to the synthesis of indolo[2,3-*q*]quinolizidines.
3. Enantioselective synthesis of benzazepinoindoles bearing trifluoromethylated quaternary stereocenters, catalyzed by chiral spirocyclic phosphoric acids.



**Tech. Note (1)**  
**Ref. (1)**



**Tech. Note (2)**  
**Ref. (2)**



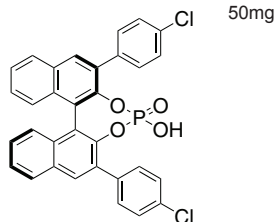
**Tech. Note (3)**  
**Ref. (3)**

### References:

1. *Chem Commun.*, **2013**, 49, 1401.
2. *Org. Lett.*, **2014**, 16, 1924.
3. *Chem Commun.*, **2014**, 50, 7538.

**15-0368** (11bR)-2,6-Bis(4-chlorophenyl)-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphin, 98% (99% ee)  
**NEW**

C<sub>32</sub>H<sub>19</sub>Cl<sub>2</sub>O<sub>4</sub>P; FW: 569.4; white to light yellow powdr.  
Note: Sold in collaboration with Daicel for research purposes only.



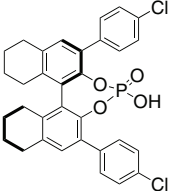
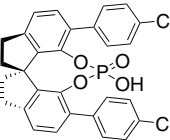
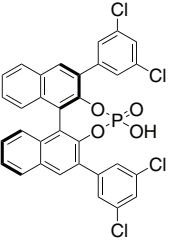
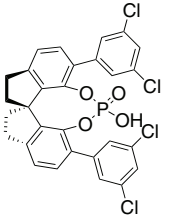
50mg

**15-0372** (11bS)-2,6-Bis(4-chlorophenyl)-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphin, 98% (99% ee)  
**NEW**

C<sub>32</sub>H<sub>19</sub>Cl<sub>2</sub>O<sub>4</sub>P; FW: 569.4; white to light yellow powdr.  
Note: Sold in collaboration with Daicel for research purposes only.

50mg

## PHOSPHORUS (Compounds)

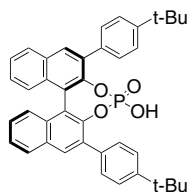
15-0384 <b>NEW</b>	<p><b>(11bR)-2,6-Bis(4-chlorophenyl)-8,9,10,11,12,13,14,15-octahydro-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphopin, 98% (99% ee)</b> (915038-16-3)</p> <p><math>C_{32}H_{27}Cl_2O_4P</math>; FW: 577.4; white to light yellow powdr.</p> <p>Note: Sold in collaboration with Daicel for research purposes only.</p>		50mg
15-0386 <b>NEW</b>	<p><b>(11bS)-2,6-Bis(4-chlorophenyl)-8,9,10,11,12,13,14,15-octahydro-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphopin, 98% (99% ee)</b></p> <p><math>C_{32}H_{27}Cl_2O_4P</math>; FW: 577.4; white to light yellow powdr.</p> <p>Note: Sold in collaboration with Daicel for research purposes only.</p>		50mg
15-0276 <b>NEW</b>	<p><b>(11aR)-3,7-Bis(4-chlorophenyl)-10,11,12,13-tetrahydro-5-hydroxy-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98%, (99% ee)</b></p> <p><math>C_{29}H_{21}Cl_2O_4P</math>; FW: 535.36; white to yellow powdr.</p> <p>Note: Sold in collaboration with Daicel for research purposes only.</p>		50mg
15-0275 <b>NEW</b>	<p><b>(11aS)-3,7-Bis(4-chlorophenyl)-10,11,12,13-tetrahydro-5-hydroxy-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98%, (99% ee)</b> (1258327-05-7)</p> <p><math>C_{29}H_{21}Cl_2O_4P</math>; FW: 535.36; white to yellow powdr.</p> <p>Note: Sold in collaboration with Daicel for research purposes only.</p>		50mg
15-0362 <b>NEW</b>	<p><b>(11bR)-2,6-Bis(3,5-dichlorophenyl)-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphopin, 95% (99% ee)</b> (1191451-24-7)</p> <p><math>C_{32}H_{17}Cl_4O_4P</math>; FW: 638.3; white to light yellow powdr.</p> <p>Note: Sold in collaboration with Daicel for research purposes only.</p>		50mg
15-0366 <b>NEW</b>	<p><b>(11bS)-2,6-Bis(3,5-dichlorophenyl)-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphopin, 98% (99% ee)</b> (1374030-20-2)</p> <p><math>C_{32}H_{17}Cl_4O_4P</math>; FW: 638.3; white to light yellow powdr.</p> <p>Note: Sold in collaboration with Daicel for research purposes only.</p>		50mg
15-0514 <b>NEW</b>	<p><b>(11aR)-3,7-Bis(3,5-dichlorophenyl)-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98% (99% ee)</b></p> <p><math>C_{29}H_{19}Cl_4O_4P</math>; FW: 604.2; white to light yellow powdr.</p> <p>Note: Sold in collaboration with Daicel for research purposes only.</p>		50mg
15-0516 <b>NEW</b>	<p><b>(11aS)-3,7-Bis(3,5-dichlorophenyl)-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98% (99% ee)</b></p> <p><math>C_{29}H_{19}Cl_4O_4P</math>; FW: 604.2; white to light yellow powdr.</p> <p>Note: Sold in collaboration with Daicel for research purposes only.</p>		50mg

## PHOSPHORUS (Compounds)

15-3280

NEW

(11bR)-2,6-Bis[4-(1,1-dimethylethyl)phenyl]-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (861909-30-0)  
 $C_{40}H_{37}O_4P$ ; FW: 612.71; white to yellow powdr.  
 Note: Sold in collaboration with Daicel for research purposes only.



50mg

15-0342

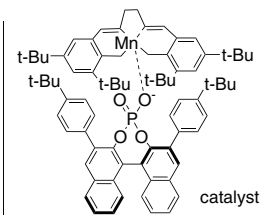
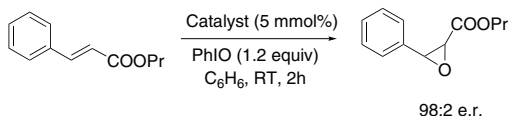
NEW

(11bS)-2,6-Bis[4-(1,1-dimethylethyl)phenyl]-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (1217901-32-0)  
 $C_{40}H_{37}O_4P$ ; FW: 612.7; white to light yellow powdr.  
 Note: Sold in collaboration with Daicel for research purposes only.

50mg

Technical Note:

- Epoxidation:** A highly active and enantioselective ion-pair epoxidation catalyst, consisting of an achiral Mn-salen complex and a chiral phosphate counteranion, mediates the epoxidization of a wide range of alkenes with high yields and enantioselectivities.



Tech. Note (1)  
 Ref. (1)

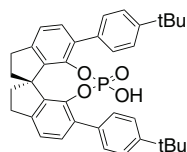
References:

- Angew. Chem. Int. Ed.*, **2010**, 49, 628-631.

15-0339

NEW

(11aR)-3,7-Bis[(4-(1,1-dimethylethyl)phenyl)-10,11,12,13-tetrahydro-5-hydroxy-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98%, (99% ee)  
 $C_{37}H_{39}O_4P$ ; FW: 578.7; white to yellow powdr.  
 Note: Sold in collaboration with Daicel for research purposes only.



25mg

15-0338

NEW

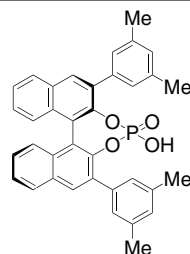
(11aS)-3,7-Bis[(4-(1,1-dimethylethyl)phenyl)-10,11,12,13-tetrahydro-5-hydroxy-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98%, (99% ee)  
 $C_{37}H_{39}O_4P$ ; FW: 578.70; white to yellow powdr.  
 Note: Sold in collaboration with Daicel for research purposes only.

25mg

15-1368

NEW

(11bR)-2,6-Bis(3,5-dimethylphenyl)-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (861909-53-7)  
 $C_{36}H_{29}O_4P$ ; FW: 556.6; white to light yellow powdr.  
 Note: Sold in collaboration with Daicel for research purposes only.



100mg

Technical Note:

- Catalyst for the enantioselective cyanosilylation of aromatic ketones using chiral lithium salts of (R)-BINOL- or (S)-BINAM-derived phosphoric acid compounds.

References:

- Angew. Chem. Int. Ed.*, **2009**, 48, 7428-7431.

## PHOSPHORUS (Compounds)

15-1369

NEW

(11bS)-2,6-Bis(3,5-dimethylphenyl)-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (1170736-59-0)

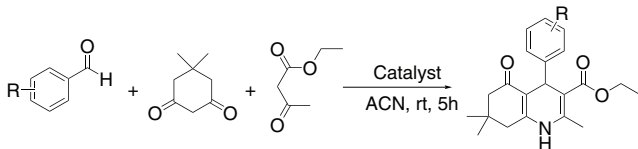
$C_{36}H_{29}O_4P$ ; FW: 556.6; white to light yellow powdr.

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

100mg

Technical Note:

- Hantzsch Reaction:** The four-component Hantzsch reaction provides access to pharmaceutically important dihydropyridines.



69~94%  
up to 94% e.e.

Tech. Note (1)  
Ref. (1)

References:

- Org. Lett.*, **2009**, *11*, 2957-2959.

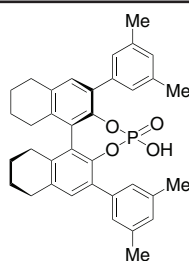
15-1373

NEW

(11bR)-2,6-Bis(3,5-dimethylphenyl)-8,9,10,11,12,13,14,15-octahydro-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (1065214-95-0)

$C_{36}H_{37}O_4P$ ; FW: 564.7; white to light yellow powdr.

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



25mg  
100mg

Technical Note:

- The preparation of binaphthol monophosphoric acid derivatives.

References:

- JP 4725757, EP 1038877, US 6274745, 2000-3-21.

15-1374

NEW

(11bS)-2,6-Bis(3,5-dimethylphenyl)-8,9,10,11,12,13,14,15-octahydro-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee)

$C_{36}H_{37}O_4P$ ; FW: 564.7; white to light yellow powdr.

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

25mg  
100mg

Technical Note:

- The preparation of binaphthol monophosphoric acid derivatives.

References:

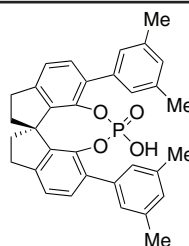
- JP 4725757, EP 1038877, US 6274745, 2000-3-21.

15-0542

(11aR)-3,7-Bis(3,5-dimethylphenyl)-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, min. 98% (1297613-75-2)

$C_{33}H_{31}O_4P$ ; FW: 522.57; white to light yellow powdr.

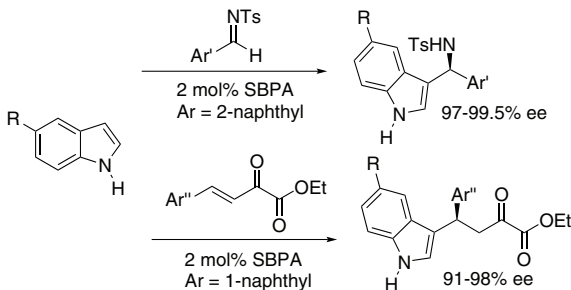
Note: Sold in collaboration with Daicel for research purposes only.



25mg  
100mg

Technical Note:

- Spinol-based phosphoric acid (SBPA) as a highly enantioselective catalyst for asymmetric organocatalysis.



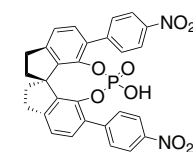
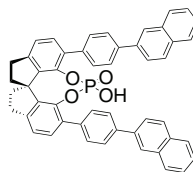
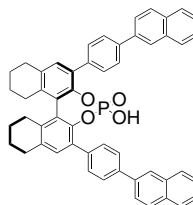
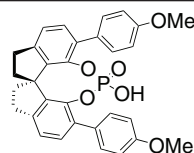
Tech. Note (1)  
Ref. (1)

References:

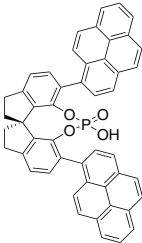
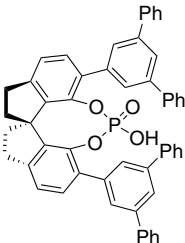
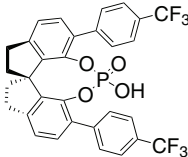
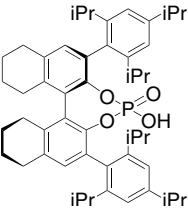
- J. Org. Chem.*, **2011**, *76*, 4125.

## PHOSPHORUS (Compounds)

15-0543	(11aS)-3,7-Bis(3,5-dimethylphenyl)-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, min. 98% (1412439-82-7) $C_{33}H_{31}O_4P$ ; FW: 522.57; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	25mg 100mg
15-0494 <b>NEW</b>	(11aR)-3,7-Bis(4-methoxyphenyl)-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98% (99% ee) $C_{31}H_{27}O_5P$ ; FW: 526.5; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg
15-0508 <b>NEW</b>	(11aS)-3,7-Bis(4-methoxyphenyl)-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98% (99% ee) $C_{31}H_{27}O_5P$ ; FW: 526.5; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg
15-0388 <b>NEW</b>	(11bR)-2,6-Bis[4-(2-naphthalenyl)phenyl]-8,9,10,11,12,13,14,15-octahydro-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98% (99% ee) $C_{52}H_{41}O_4P$ ; FW: 760.9; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg
15-0390 <b>NEW</b>	(11bS)-2,6-Bis[4-(2-naphthalenyl)phenyl]-8,9,10,11,12,13,14,15-octahydro-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98% (99% ee) $C_{52}H_{41}O_4P$ ; FW: 760.9; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg
15-0546 <b>NEW</b>	(11aR)-3,7-Bis[4-(2-naphthalenyl)phenyl]-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98% (99% ee) $C_{49}H_{35}O_4P$ ; FW: 718.8; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg
15-0548 <b>NEW</b>	(11aS)-3,7-Bis[4-(2-naphthalenyl)phenyl]-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98% (99% ee) $C_{49}H_{35}O_4P$ ; FW: 718.8; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg
15-0576 <b>NEW</b>	(11aR)-3,7-Bis(4-nitrophenyl)-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 95% (99% ee) (1352810-37-7) $C_{29}H_{21}N_2O_5P$ ; FW: 556.5; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg
15-0512 <b>NEW</b>	(11aS)-3,7-Bis(4-nitrophenyl)-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98% (99% ee) (1412439-84-9) $C_{29}H_{21}N_2O_5P$ ; FW: 556.5; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg



## PHOSPHORUS (Compounds)

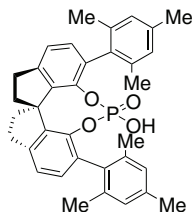
15-0277 <b>NEW</b>	<p>(11aR)-3,7-Bis(1-pyrenyl)-10,11,12,13-tetrahydro-5-hydroxy-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 95%, (99% ee)  <math>C_{48}H_{31}O_4P</math>; FW: 714.7; white to yellow powdr.                      Note: Sold in collaboration with Daicel for research purposes only.</p>		25mg
15-0278 <b>NEW</b>	<p>(11aS)-3,7-Bis(1-pyrenyl)-10,11,12,13-tetrahydro-5-hydroxy-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98%, (99% ee)  <math>C_{48}H_{31}O_4P</math>; FW: 714.7; white to yellow powdr.                      Note: Sold in collaboration with Daicel for research purposes only.</p>		25mg
15-0526 <b>NEW</b>	<p>(11aR)-3,7-Bis([1,1':3',1''-terphenyl]-5'-yl)-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98% (99% ee) (1352810-38-8)  <math>C_{53}H_{39}O_4P</math>; FW: 770.8; white to light yellow powdr.                      Note: Sold in collaboration with Daicel for research purposes only.</p>		50mg
15-0530 <b>NEW</b>	<p>(11aS)-3,7-Bis([1,1':3',1''-terphenyl]-5'-yl)-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98% (99% ee)  <math>C_{53}H_{39}O_4P</math>; FW: 770.8; white to light yellow powdr.                      Note: Sold in collaboration with Daicel for research purposes only.</p>		50mg
15-0484 <b>NEW</b>	<p>(11aR)-3,7-Bis(4-(trifluoromethyl)phenyl)-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98% (99% ee)  <math>C_{31}H_{21}F_6O_4P</math>; FW: 602.5; white to light yellow powdr.                      Note: Sold in collaboration with Daicel for research purposes only.</p>		50mg
15-0492 <b>NEW</b>	<p>(11aS)-3,7-Bis(4-(trifluoromethyl)phenyl)-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98% (99% ee)  <math>C_{31}H_{21}F_6O_4P</math>; FW: 602.5; white to light yellow powdr.                      Note: Sold in collaboration with Daicel for research purposes only.</p>		50mg
15-1395 <b>NEW</b>	<p>(R)-3,3'-Bis(2,4,6-triisopropylphenyl)-5,5',6,6',7,7',8,8'-octahydro-1,1'-binaphthyl-2,2'-diyl Hydrogenphosphate, 98%, (99% ee) (929294-27-9)  <math>C_{50}H_{65}O_4P</math>; FW: 761; white to light yellow powdr.                      Note: Sold in collaboration with Daicel for research purposes only.</p>		25mg 100mg
15-1394 <b>NEW</b>	<p>(S)-3,3'-Bis(2,4,6-triisopropylphenyl)-5,5',6,6',7,7',8,8'-octahydro-1,1'-binaphthyl-2,2'-diyl Hydrogenphosphate, 98%, (99% ee) (878111-20-7)  <math>C_{50}H_{65}O_4P</math>; FW: 761; white to light yellow powdr.                      Note: Sold in collaboration with Daicel for research purposes only.</p>		25mg 100mg

## PHOSPHORUS (Compounds)

15-0538

NEW

(11aR)-3,7-Bis(2,4,6-trimethylphenyl)-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98% (99% ee) (1801196-27-9)  
 $C_{35}H_{35}O_4P$ ; FW: 550.6; white to brown powdr.  
 Note: Sold in collaboration with Daicel for research purposes only.



50mg

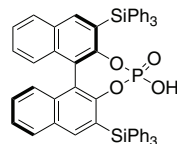
15-0544

NEW

(11aS)-3,7-Bis(2,4,6-trimethylphenyl)-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98% (99% ee)  
 $C_{35}H_{35}O_4P$ ; FW: 550.6; white to light yellow powdr.  
 Note: Sold in collaboration with Daicel for research purposes only.

15-0340

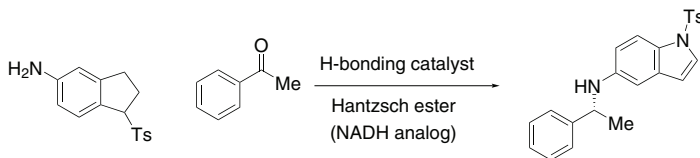
(R)-(-)-3,3'-Bis(triphenylsilyl)-1,1'-binaphthyl-2,2'-diyl hydrogen phosphate, min. 98% [(R)-TiPSY] (791616-55-2)  
 $C_{56}H_{41}O_4PSi_2$ ; FW: 865.07; white to light yellow powdr.;  
 m.p. 329-335°  
 Note: Sold in collaboration with Daicel for research purposes only.



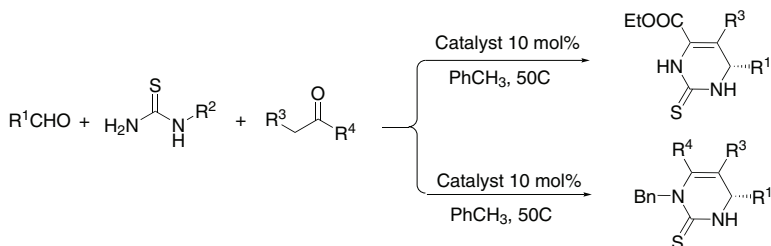
10mg  
100mg

### Technical Notes:

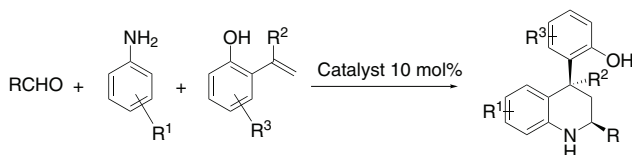
- See 15-1366. Catalyst used in:
- Reductive Amination:** The development of a new chiral phosphoric acid catalyst has provided a convenient strategy for the enantioselective construction of protected primary amines and provided a highly stereoselective method for the reductive amination of heterocyclic amines.
- Biginelli and Biginelli-like Reaction:** Organocatalytic enantioselective Biginelli and Biginelli-like reactions by chiral phosphoric acids derived from 3,3'-disubstituted binaphthols
- Povarov Reaction:** An organocatalytic asymmetric three-component Povarov reaction involving 2-hydroxystyrenes to give cis-disubstituted tetrahydroquinolines in high stereoselectivities of up to >99:1 dr and 97% ee.
- Cascade Spirocyclization:** The gold/chiral Brønsted acid relay catalysis enabled a highly stereoselective three-component reaction of salicylaldehydes, anilines, and alkynols to give aromatic spiroacetals in high yields and stereoselectivities.
- aza-Pinacol Cyclization:** The first highly enantioselective catalytic protocol for the reductive coupling of ketones and hydrazones is reported.



Tech. Note (2)  
Ref. (1)



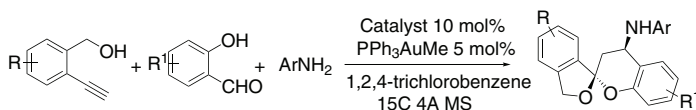
Tech. Note (3)  
Ref. (2)



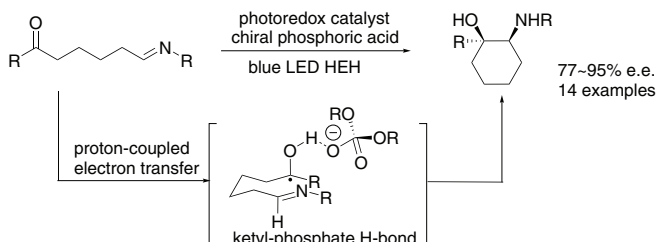
Tech. Note (4)  
Ref. (3)

## PHOSPHORUS (Compounds)

**15-0340** (R)-(-)-3,3'-Bis(triphenylsilyl)-1,1'-binaphthyl-2,2'-diyl hydrogen phosphate, min. 98%  
(continued) [(R)-TIPSY] (791616-55-2)



Tech. Note (5)  
Ref. (4)



Tech. Note (6)  
Ref. (5)

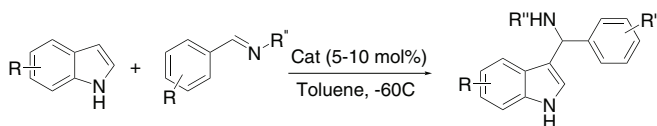
### References:

1. *J. Am. Chem. Soc.* **2006**, *128*, 84-86
2. *J. Am. Chem. Soc.* **2009**, *131*, 15301-15310.
3. *J. Am. Chem. Soc.* **2012**, *77*, 6970-6979.
4. *Org. Lett.*, **2013**, *15*, 460-463.
5. *J. Am. Chem. Soc.* **2013**, *135*, 17735-17738.

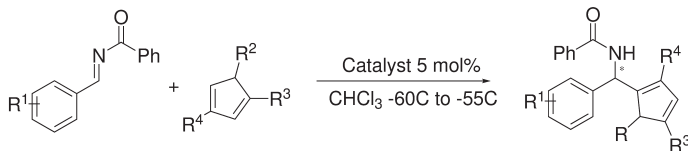
**15-0341** (S)-(+)-3,3'-Bis(triphenylsilyl)-1,1'-binaphthyl-2,2'-diyl hydrogen phosphate, 10mg  
min. 98% [(S)-TIPSY] (929097-92-7) 100mg  
 $C_{56}H_{41}O_3PSi_2$ ; FW: 865.07; white to light-yellow solid; m.p. 329-335°  
Note: Sold in collaboration with Daicel for research purposes only.

### Technical Notes:

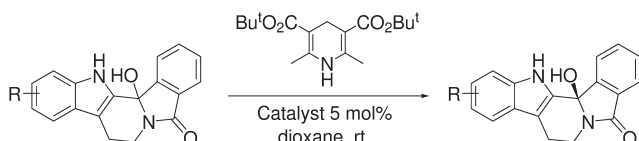
1. **Friedel-Crafts Reaction:** Catalyst for the highly enantioselective Friedel-Crafts reactions of indoles with imines.
2. Catalyst used in the highly enantioselective Friedel-Crafts reaction of pyrrole derivatives with N-acyl imines.
3. **Transfer Hydrogenation:** Chiral phosphoric acid catalyzed enantioselective transfer hydrogenation of hydroxylactams to provide enantioenriched tetrahydro-β-carbolines in dioxane at room temperature (up to 94% yield, 90% ee).
4. **Multicomponent Reaction:** Catalyzed by  $[Rh_2(OAc)_4]$  and a chiral phosphoric acid, an enantioselective symmetric three-component reaction of diazo compounds with imines and water is reported to give β-amino-α-hydroxy acid derivatives.



Tech. Note (1)  
Ref. (1)



Tech. Note (2)  
Ref. (2)

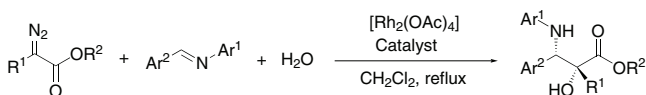


Tech. Note (3)  
Ref. (3)



## PHOSPHORUS (Compounds)

**15-0341** (S)-(+)-3,3'-Bis(triphenylsilyl)-1,1'-binaphthyl-2,2'-diyl hydrogen phosphate, min. 98%  
(continued) [(S)-TIPSY] (929097-92-7)

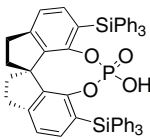
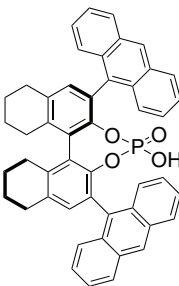
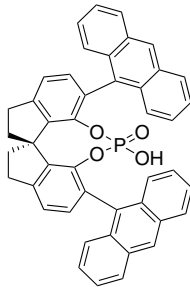


16 examples  
up to 86% yield  
98:2 dr, 97% e.e.

**Tech. Note (4)**  
**Ref. (4)**

### References:

1. *J. Am. Chem. Soc.* **2007**, *129*, 1484-1485.
2. *Org. Lett.*, **2007**, *9*, 4065-4068.
3. *Org. Lett.*, **2013**, *15*, 2688-2691.
4. *ChemCatChem*, **2011**, *3*, 653-656.

<b>15-0520</b> <b>NEW</b>	<b>(11aR)-3,7-Bis(triphenylsilyl)-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98% (99% ee) (1372719-94-2)</b> $C_{53}H_{43}O_5PSi_2$ ; FW: 831.1; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		50mg
<b>15-0524</b> <b>NEW</b>	<b>(11aS)-3,7-Bis(triphenylsilyl)-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98% (99% ee)</b> $C_{53}H_{43}O_5PSi_2$ ; FW: 831.1; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		50mg
<b>15-0378</b> <b>NEW</b>	<b>(11bR)-2,6-Di-9-anthracenyl-8,9,10,11,12,13,14,15-octahydro-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphopin, 95% (99% ee) (1011465-29-4)</b> $C_{48}H_{37}O_4P$ ; FW: 708.8; white to yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		50mg
<b>15-0382</b> <b>NEW</b>	<b>(11bS)-2,6-Di-9-anthracenyl-8,9,10,11,12,13,14,15-octahydro-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphopin, 98% (99% ee)</b> $C_{48}H_{37}O_4P$ ; FW: 708.8; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		50mg
<b>15-0334</b> <b>NEW</b>	<b>(11aR)-3,7-Di-9-anthracenyl-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98% (99% ee) (1345628-08-1)</b> $C_{48}H_{31}O_4P$ ; FW: 666.71; white to yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		25mg
<b>15-0335</b> <b>NEW</b>	<b>(11aS)-3,7-Di-9-anthracenyl-10,11,12,13-tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98% (99% ee) (1393527-23-5)</b> $C_{48}H_{31}O_4P$ ; FW: 666.71; white to yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		25mg

## PHOSPHORUS (Compounds)

15-0552

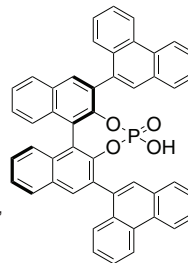
NEW

(11bR)-2,6-Di-9-phenanthrenyl-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin,  
(864943-22-6)

C<sub>48</sub>H<sub>29</sub>O<sub>4</sub>P; FW: 700.7; white to light yellow powdr.

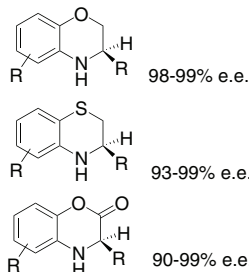
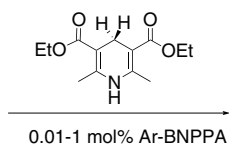
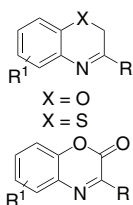
Note: Sold in collaboration with Daicel for research purposes only.

50mg

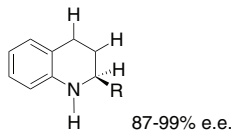
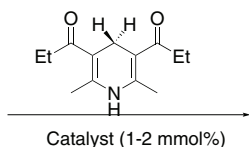
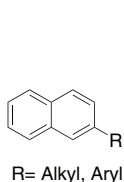


### Technical Notes:

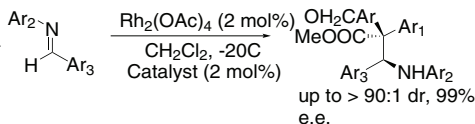
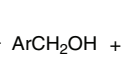
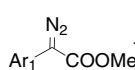
- Hydrogenation:** A highly efficient transfer hydrogenation of benzoxazines, benzothiazines, and benzoxazinones with as low as 0.01 mol% BINOL phosphate catalyst furnishes the dihydro-2H-benzoxazines, -benzothiazines, and -benzoxazinones
- A Brønsted acid catalyzed cascade transfer hydrogenation provides direct access to 2-aryl- and 2-alkyl-substituted tetrahydroquinolines with excellent enantioselectivities under mild conditions and using very low amounts of catalyst.
- Three-Component Reaction:** An asymmetric three-component reaction of diazo compounds and alcohols with imines catalyzed cooperatively by a rhodium complex and a chiral Brønsted acid provides a general and efficient entry to β-amino-α-hydroxyl acid derivatives.
- Diels-Alder Reaction:** A mild, enantioselective Diels-Alder reaction, catalyzed by a chiral magnesium phosphate species, has been developed for the synthesis of various chiral spirooxindoles.



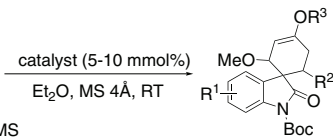
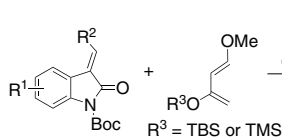
Tech. Note (1)  
Ref. (1)



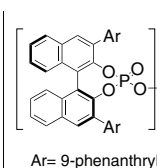
Tech. Note (2)  
Ref. (2)



Tech. Note (3)  
Ref. (3)



up to 99% yield  
99% e.e. and 99:1 d.r.



Tech. Note (4)  
Ref. (4)

## PHOSPHORUS (Compounds)

**15-0552** (11bR)-2,6-Di-9-phenanthrenyl-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, (864943-22-6)

(continued)

References:

1. *Angew. Chem. Int. Ed.*, **2006**, 45, 6751-6755.
2. *Angew. Chem. Int. Ed.*, **2006**, 45, 3683-3686.
3. *J. Am. Chem. Soc.*, **2008**, 130, 7782-7783.
4. *Angew. Chem. Int. Ed.*, **2013**, 52, 4628-4632.

**15-0837** (11bS)-2,6-Di-9-phenanthrenyl-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, **98%** (1043567-32-3)

50mg

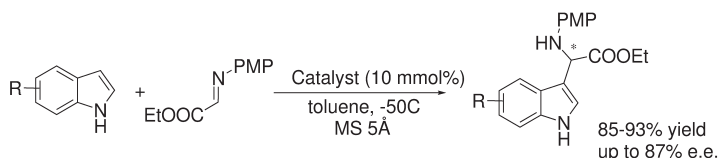
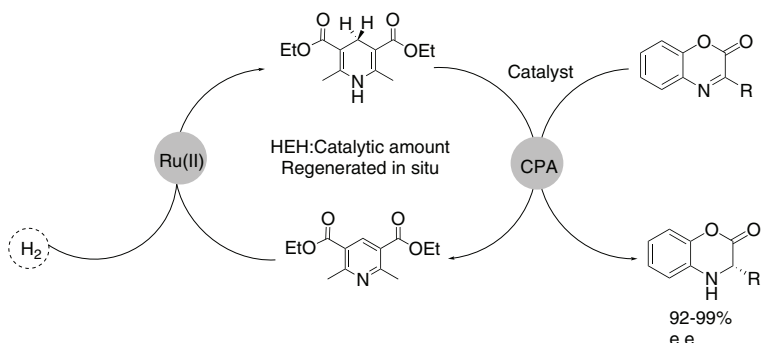
**NEW**

$C_{48}H_{29}O_4P$ ; FW: 700.71; red brown powdr.

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

Technical Notes:

1. **Hydrogenation:** A catalytic amount of Hantzsch ester that could be regenerated in situ by Ru complexes under hydrogen gas has been employed in the biomimetic asymmetric hydrogenation of benzoxazinones with up to 99% ee in the presence of chiral phosphoric acid.
2. **Friedel-Crafts Reaction:** Chiral phosphoric acid-catalyzed enantioselective Friedel-Crafts reaction of indoles with ethyl glyoxylate imines was developed. With 10 mol% of the catalyst.



References:

1. *J. Am. Chem. Soc.*, **2011**, 133, 16432-16435.
2. *Tetrahedron. Lett.*, **2009**, 65, 1603-1607.

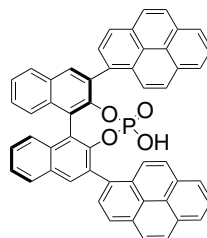
**15-0364** (11bR)-2,6-Di-1-pyrenyl-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, **98%**, (**99% ee**)

50mg

**NEW**

$C_{52}H_{31}O_4P$ ; FW: 748.80; white to yellow powdr.

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



**15-0365** (11bS)-2,6-Di-1-pyrenyl-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, **98%**, (**99% ee**)

50mg

**NEW**

$C_{52}H_{31}O_4P$ ; FW: 748.8; white to yellow powdr.

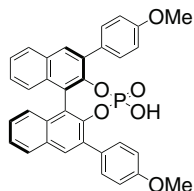
Note: Sold in collaboration with Daicel for research purposes only.

## PHOSPHORUS (Compounds)

15-0309

NEW

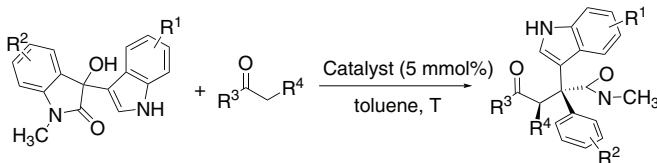
**(11bR)-4-Hydroxy-2,6-bis(4-methoxyphenyl)-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (695162-88-0)**  
 $C_{34}H_{25}O_6P$ ; FW: 560.50; white to yellow powdr.  
 Note: Sold in collaboration with Daicel for research purposes only.



50mg

Technical Note:

- Alkylation:** A Brønsted acid catalyzed alkylation of ketones is described.



up to 98% yield  
 99:1 d.r. 97%  
 e.e.  
 25 examples

Tech. Note (1)  
 Ref. (1)

References:

- Angew. Chem. Int. Ed.*, **2012**, 51, 1899-1902.

15-0308

NEW

**(11bS)-4-Hydroxy-2,6-bis(4-methoxyphenyl)-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (1374030-19-9)**  
 $C_{34}H_{25}O_6P$ ; FW: 560.5; white to yellow powdr.  
 Note: Sold in collaboration with Daicel for research purposes only.

50mg

Technical Note:

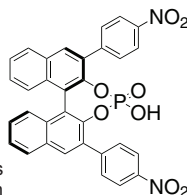
- See 15-0309 (page 41)

15-0344

NEW

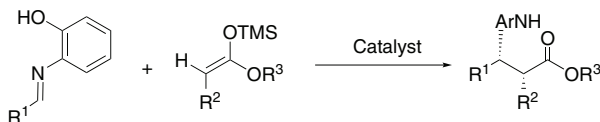
**(11bR)-4-Hydroxy-2,6-bis(4-nitrophenyl)-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (695162-89-1)**  
 $C_{32}H_{19}N_2O_8P$ ; FW: 590.5; white to yellow powdr.  
 Note: Sold in collaboration with Daicel for research purposes only.

50mg

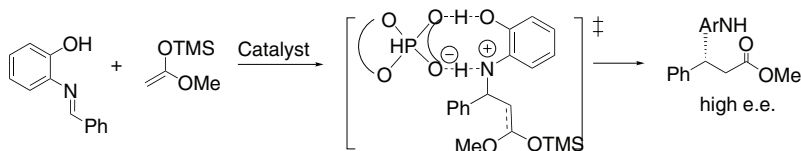


Technical Notes:

- Mannich Reaction:** The Mannich-type reaction of ketene silyl acetals with aldimines proceeded highly enantioselectively to afford the syn isomer of  $\beta$ -aminoesters 3 with up to 96% ee under the influence of the catalyst.
- Mannich-type reaction of ketene silyl acetals with aldimines proceeded catalytically by means of a phosphoric acid diester with good diastereoselectivity and high enantioselectivity (up to 96% ee). The highest enantioselectivity was achieved by the phosphoric acid diester bearing 4-nitrophenyl groups on the 3,3'-positions of BINOL.
- Self-Coupling Reaction:** The enantioselective BINOL-phosphate catalyzed formation of a quaternary carbon center, bearing a N-atom has been achieved through the self-coupling reaction of enamides
- Hydrocyanation:** A first organocatalytic enantioselective route was developed for the conversion of readily prepared and air stable aliphatic hydrazones to synthetically valuable  $\alpha$ -hydrazinonitriles.
- See 15-1386.



Tech. Note (1)  
 Ref. (1)

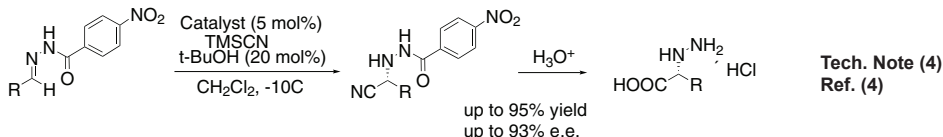
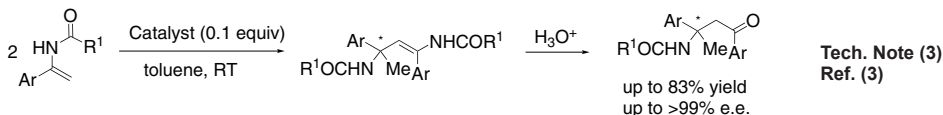


Zwitterionic TS in dicoordination pathway

Tech. Note (2)  
 Ref. (2)

## PHOSPHORUS (Compounds)

**15-0344** (11bR)-4-Hydroxy-2,6-bis(4-nitrophenyl)-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (695162-89-1)



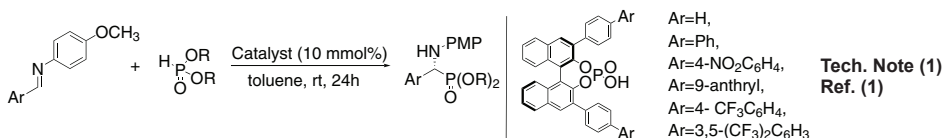
### References:

1. *Angew. Chem. Int. Ed.*, **2004**, 43, 1566-1568.
2. *J. Am. Chem. Soc.*, **2007**, 129, 6756-6764.
3. *Chem. Commun.*, **2008**, (38), 4637-4639
4. *Org. Lett.*, **2010**, 12, 188-191.

<b>15-0346</b> <b>NEW</b>	<b>(11bS)-4-Hydroxy-2,6-bis(4-nitrophenyl)-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98% (99% ee)</b> (878111-16-1) C <sub>32</sub> H <sub>19</sub> N <sub>2</sub> O <sub>8</sub> P; FW: 590.5; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg
<b>15-0348</b> <b>NEW</b>	<b>(11bR)-4-Hydroxy-2,6-bis([1,1':3',1''-terphenyl]-5'-yl)-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98% (99% ee)</b> (361342-55-4) C <sub>56</sub> H <sub>37</sub> O <sub>4</sub> P; FW: 804.9; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg
<b>15-0317</b> <b>NEW</b>	<b>(11bS)-4-Hydroxy-2,6-bis([1,1':3',1''-terphenyl]-5'-yl)-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee)</b> (1496637-05-8) C <sub>56</sub> H <sub>37</sub> O <sub>4</sub> P; FW: 804.90; white to yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg
<b>15-1392</b> <b>NEW</b>	<b>(11bR)-4-Hydroxy-2,6-bis[4-(trifluoromethyl)phenyl]-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 95%, (99% ee)</b> (791616-59-6) C <sub>34</sub> H <sub>19</sub> F <sub>6</sub> O <sub>4</sub> P; FW: 636.5; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	100mg

### Technical Note:

1. **Hydrophosphonylation:** Catalyst for the highly enantioselective hydrophosphonylation reaction of diisopropyl phosphite with aldimine to give α-amino.



### References:

1. *Tetrahedron Lett.*, **2009**, 65, 4950-4956.

## PHOSPHORUS (Compounds)

**15-1393** (11bS)-4-Hydroxy-2,6-bis[4-(trifluoromethyl)phenyl]-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 95%, (99% ee) (1264573-23-0) 100mg

**NEW**

$C_{34}H_{19}F_6O_4P$ ; FW: 636.5; white to light yellow pwdr.

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

**15-3713** (11bS)-4-Hydroxy-2,6-bis(2,4,6-trimethylphenyl)-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin (878111-18-3) 50mg

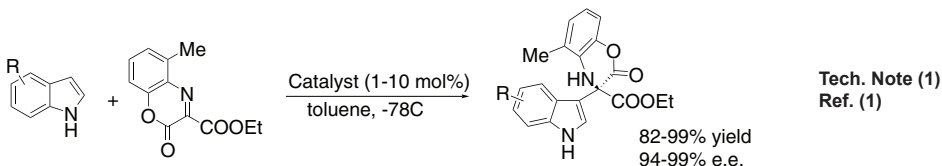
**NEW**

$C_{38}H_{33}O_4P$ ; FW: 584.64; white to yellow pwdr.

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

Technical Note:

- Addition:** Catalyst for the enantioselective addition of indoles to ketamine.



References:

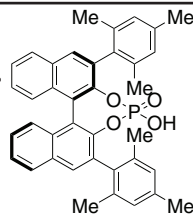
- Org. Biomol. Chem.*, **2014**, 12, 724-727.

**15-3712** (11bR)-4-Hydroxy-2,6-bis(2,4,6-trimethylphenyl)-4-oxide-dinaphtho[2,1-d:1'-d':1'',2''-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (695162-87-9) 50mg

**NEW**

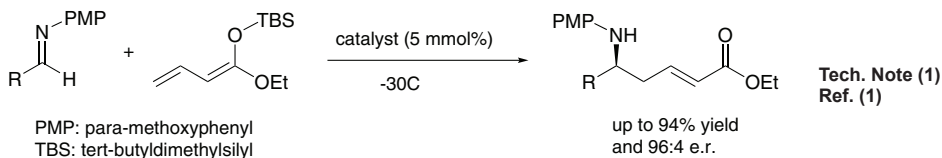
$C_{38}H_{33}O_4P$ ; FW: 584.64; white to yellow pwdr.; m.p. 224-230.5°

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

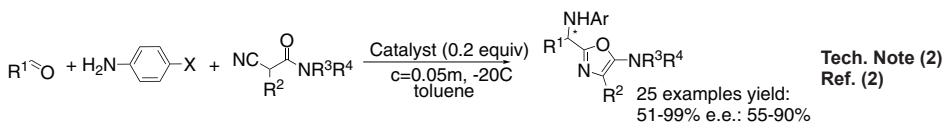


Technical Notes:

- Mannich Reaction:** Catalyst for the enantioselectively highly-regioselective addition of a silyl dienolate to imines in good yields to give  $\alpha,\beta$ -unsaturated  $\delta$ -amino carboxylic esters in one step.
- Reactions of aldehydes, anilines, and  $\alpha$ -isocyanoacetamides in the presence of a catalytic amount of chiral phosphoric acid afforded the 5-(1-aminoalkyl)-5-aminooxazole.



PMP: para-methoxyphenyl  
TBS: tert-butyldimethylsilyl



References:

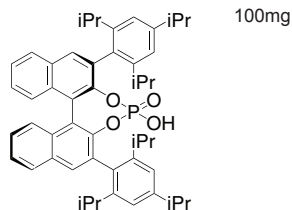
- Angew. Chem. Int. Ed.*, **2008**, 47, 3631-3634.
- Angew. Chem. Int. Ed.*, **2009**, 48, 6717-6721.

## PHOSPHORUS (Compounds)

15-1381

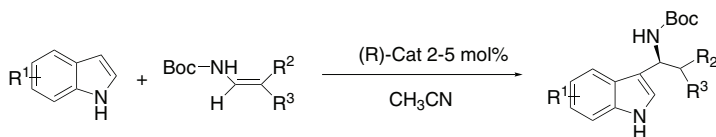
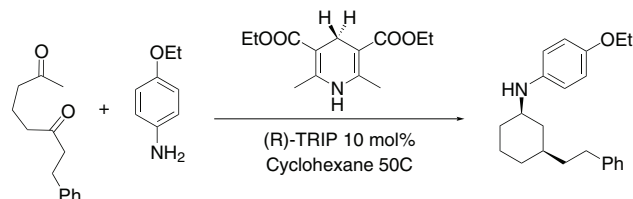
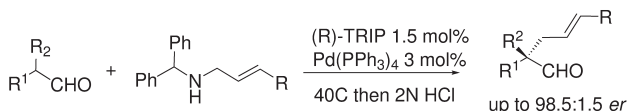
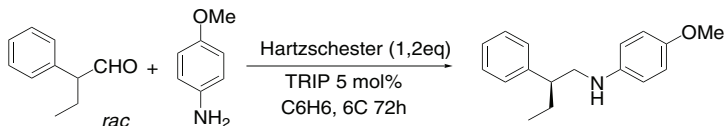
NEW

(11bR)-4-Hydroxy-2,6-bis[2,4,6-tris(1-methylethyl)phenyl]-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (791616-63-2)  
 $C_{50}H_{57}O_4P$ ; FW: 753.0; white to light yellow powdr.  
 Note: Sold in collaboration with Daicel for research purposes only.



### Technical Notes:

- Reductive Amination:** Catalyst for the organocatalytic asymmetric reductive amination of aldehydes. Treating racemic  $\alpha$ -branched aldehydes with p-anisidine and a Hantzsch ester in the presence of catalyst, TRIP, gave  $\beta$ -branched secondary amines.
- $\alpha$ -Allylation:** Highly enantioselective Pd/chiral acid-catalyzed  $\alpha$ -allylation of  $\alpha$ -branched aldehydes with an allyl amine as the allylating species, that creates all-carbon quaternary stereogenic centers in high yields and enantioselectivities.
- Hydrogenation:** A achiral amine in combination with a catalytic amount of a chiral Brønsted acid can accomplish an aldol addition-dehydration-conjugate reduction-reductive amination to provide potential intermediates of pharmaceutically active compounds in good yields and excellent enantioselectivities.
- Friedel-Crafts Reaction:** The first enantioselective catalysis of the Friedel-Crafts reaction via activation of electron-rich multiple bonds by a chiral Brønsted acid.
- Allylboration:** A new high-yielding and highly enantioselective chiral Brønsted acid-catalyzed allylboration of aldehydes.
- Aza-Darzens Reaction:** Aza-Darzens reaction of ethyl diazoacetate with aldimines, derived from phenyl glyoxal, furnished cis-aziridine carboxylates with excellent enantioselectivities by means of a chiral phosphoric acid.
- Intramolecular Aldol Condensation:** Transformation applicable to a wide variety of substrates to give chiral cyclohexenones in high yields and with excellent enantioselectivity.

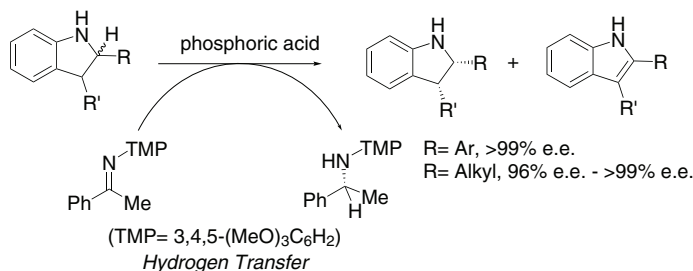


## PHOSPHORUS (Compounds)

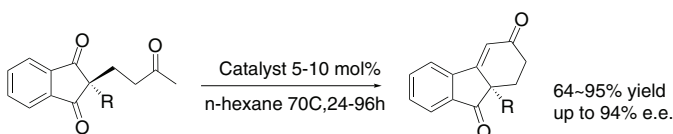
**15-1381** (11bR)-4-Hydroxy-2,6-bis[2,4,6-tris(1-methylethyl)phenyl]-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (791616-63-2)



**Tech. Note (5)**  
**Ref. (5)**



**Tech. Note (6)**  
**Ref. (6)**



**Tech. Note (7)**  
**Ref. (7)**

### References:

1. *J. Am. Chem. Soc.*, **2006**, 128, 13074-13075.
2. *J. Am. Chem. Soc.*, **2007**, 129, 11336-11337.
3. *J. Am. Chem. Soc.*, **2007**, 129, 7498-7499.
4. *J. Am. Chem. Soc.*, **2007**, 129, 292-293.
5. *J. Am. Chem. Soc.*, **2010**, 132, 11884-11886.
6. *J. Am. Chem. Soc.*, **2013**, 135, 11740-11743.
7. *Angew. Chem. Int. Ed.*, **2009**, 48, 9652-9654.

**15-1382** (11bS)-4-Hydroxy-2,6-bis[2,4,6-tris(1-methylethyl)phenyl]-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (874948-63-7)

**NEW**

100mg

C<sub>50</sub>H<sub>57</sub>O<sub>4</sub>P; FW: 753.0; white to light yellow powdr.

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

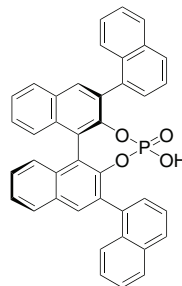
**15-1388** (11bR)-4-Hydroxy-2,6-di-1-naphthalenyl-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (864943-23-7)

**NEW**

100mg

C<sub>40</sub>H<sub>25</sub>O<sub>4</sub>P; FW: 600.6; white to light yellow powdr.

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





## PHOSPHORUS (Compounds)

15-1389

NEW

(11bS)-4-Hydroxy-2,6-di-1-naphthalenyl-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (929097-93-8)

C<sub>40</sub>H<sub>25</sub>O<sub>4</sub>P; FW: 600.6; white to light yellow powdr.

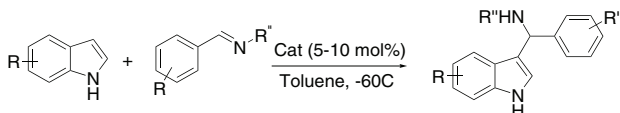
Note: Sold in collaboration with Daicel for research purposes only.

25mg

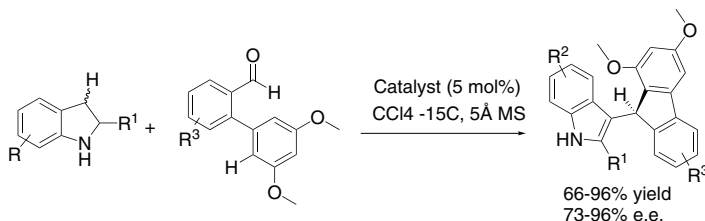
100mg

Technical Notes:

- Friedel-Crafts Reaction:** Catalyst for the Highly enantioselective Friedel-Crafts reactions of indoles with imines.
- Chiral phosphoric acid catalyzed tandem double Friedel-Crafts reactions between indoles and 2-formylbiphenyls were realized under mild conditions.



Tech. Note (1)  
Ref. (1)



Tech. Note (2)  
Ref. (2)

References:

- J. Am. Chem. Soc.*, **2007**, 129, 1484-1485.
- Chem. Eur. J.*, **2009**, 15, 8709-8712.

15-1390

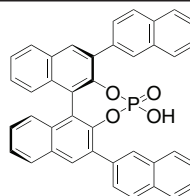
NEW

(11bR)-4-Hydroxy-2,6-di-2-naphthalenyl-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (791616-56-3)

C<sub>40</sub>H<sub>25</sub>O<sub>4</sub>P; FW: 600.6; white to light yellow powdr.

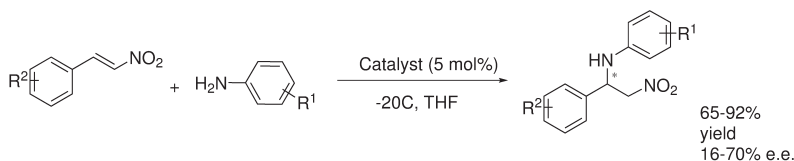
Note: Sold in collaboration with Daicel for research purposes only.

100mg

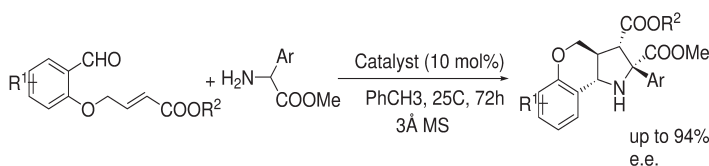


Technical Notes:

- aza-Michael Addition:** Catalyst for the enantioselective aza-Michael addition of aromatic amines to nitroolefins.
- Cycloaddition:** A chiral phosphoric acid-catalyzed intramolecular 1,3-dipolar cycloaddition of 4-(2-formylphenoxy)butenoates with amino esters provides hexahydromeno[4,3-b]pyrrolidine derivatives in high enantioselectivity (up to 94% ee).



Tech. Note (1)  
Ref. (1)



Tech. Note (2)  
Ref. (2)

References:

- Chinese J Catal*, **2011**, 32, 1573-1576.
- Org. Biomol. Chem.*, **2010**, 8, 2016-2019.

## PHOSPHORUS (Compounds)

15-1391

NEW

(11bS)-4-Hydroxy-2,6-di-2-naphthalenyl-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (874948-60-4)

C<sub>40</sub>H<sub>26</sub>O<sub>4</sub>P; FW: 600.6; white to light yellow powdr.

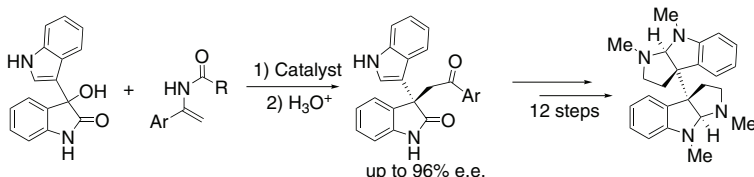
Note: Sold in collaboration with Daicel for research purposes only.

25mg

100mg

Technical Note:

- Nucleophilic Substitution:** Catalyst for the nucleophilic substitution involving 3-hydroxyoxindoles giving 3,3'-disubstituted oxindoles with concomitant generation of an all-carbon quaternary stereogenic center in high yield and excellent enantioselectivity.



Tech. Note (1)  
Ref. (1)

References:

- Angew. Chem. Int. Ed., **2012**, 51, 1046-1050.

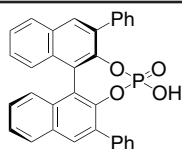
15-1386

NEW

(11bR)-4-Hydroxy-2,6-diphenyl-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (695162-86-8)

C<sub>32</sub>H<sub>21</sub>O<sub>4</sub>P; FW: 500.5; white to light yellow powdr.

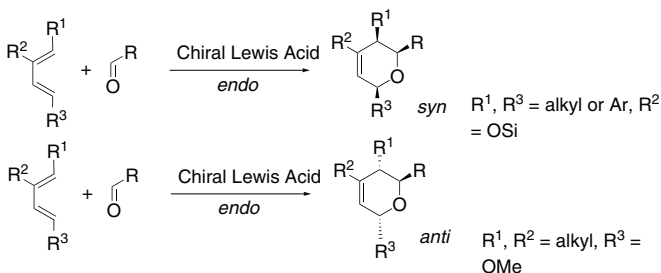
Note: Sold in collaboration with Daicel for research purposes only.



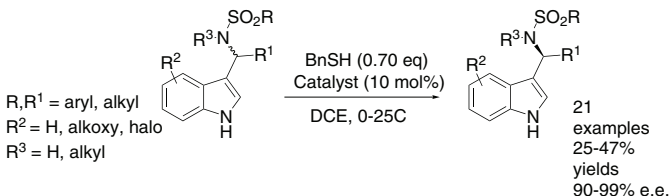
100mg

Technical Notes:

- Diels-Alder Reaction:** A highly enantioselective anti-diastereoselective hetero-Diels-Alder reaction between a glyoxylate and siloxy- or methoxydienes using a chiral phosphoric acid catalyst that possesses less bulky phenyl groups at the 3 and 3' positions of binaphthyl has been developed.
- Kinetic Resolution:** In the presence of 10 mol% of a chiral phosphoric acid, a variety of racemic N-benzyl sulfonamides having N-(3-indolyl)methyl groups smoothly undergo kinetic resolution with benzyl thiol at 0 °C or at room temperature and the remaining sulfonamides are recovered in moderate to excellent yields and with excellent ee.



Tech. Note (1)  
Ref. (1)

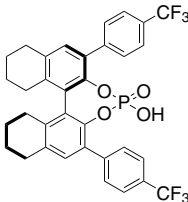
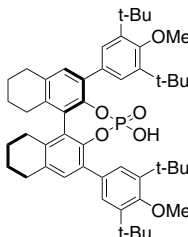
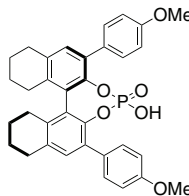
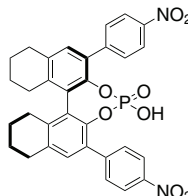


Tech. Note (2)  
Ref. (2)

References:

- J. Am. Chem. Soc., **2009**, 131, 12882-12883.
- Chem. Commun., **2012**, 48, 898-900.

## PHOSPHORUS (Compounds)

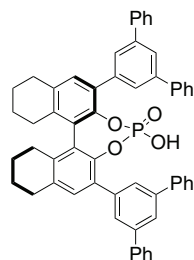
15-1387 <b>NEW</b>	(11bS)-4-Hydroxy-2,6-diphenyl-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (874948-59-1) C <sub>32</sub> H <sub>21</sub> O <sub>4</sub> P; FW: 500.5; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		100mg
15-0404 <b>NEW</b>	(11bR)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-2,6-bis[4-(trifluoromethyl)phenyl]-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98% (99% ee) (791616-70-1) C <sub>34</sub> H <sub>27</sub> F <sub>6</sub> O <sub>4</sub> P; FW: 644.5; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		50mg
15-0406 <b>NEW</b>	(11bS)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-2,6-bis[4-(trifluoromethyl)phenyl]-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98% (99% ee) C <sub>34</sub> H <sub>27</sub> F <sub>6</sub> O <sub>4</sub> P; FW: 644.5; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		50mg
15-0436 <b>NEW</b>	(11bR)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-2,6-bis(3,5-di-tert-butyl-4-methoxyphenyl)-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98% (99% ee) C <sub>50</sub> H <sub>65</sub> O <sub>6</sub> P; FW: 793.0; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		50mg
15-0438 <b>NEW</b>	(11bS)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-2,6-bis(3,5-di-tert-butyl-4-methoxyphenyl)-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98% (99% ee) C <sub>50</sub> H <sub>65</sub> O <sub>6</sub> P; FW: 793.0; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		50mg
15-0408 <b>NEW</b>	(11bR)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-2,6-bis(4-methoxyphenyl)-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98% (99% ee) (1011465-27-2) C <sub>34</sub> H <sub>33</sub> O <sub>6</sub> P; FW: 568.6; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		50mg
15-0412 <b>NEW</b>	(11bS)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-2,6-bis(4-methoxyphenyl)-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98% (99% ee) C <sub>34</sub> H <sub>33</sub> O <sub>6</sub> P; FW: 568.6; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		50mg
15-0414 <b>NEW</b>	(11bR)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-2,6-bis(4-nitrophenyl)-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98% (99% ee) (791616-68-7) C <sub>32</sub> H <sub>27</sub> N <sub>2</sub> O <sub>6</sub> P; FW: 598.5; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		50mg
15-0416 <b>NEW</b>	(11bS)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-2,6-bis(4-nitrophenyl)-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98% (99% ee) C <sub>32</sub> H <sub>27</sub> N <sub>2</sub> O <sub>6</sub> P; FW: 598.5; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.		50mg

## PHOSPHORUS (Compounds)

15-0394

NEW

(11bR)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-2,6-bis([1,1':3',1''-terphenyl]-5'-yl)-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98% (99% ee) (1569807-15-3)  
 $C_{56}H_{45}O_4P$ ; FW: 812.9; white to light yellow pwdr.  
 Note: Sold in collaboration with Daicel for research purposes only.



50mg

15-0396

NEW

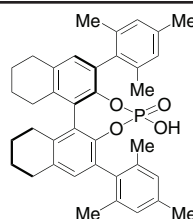
(11bS)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-2,6-bis([1,1':3',1''-terphenyl]-5'-yl)-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98% (99% ee) (1496637-09-2)  
 $C_{56}H_{45}O_4P$ ; FW: 812.9; white to light yellow pwdr.  
 Note: Sold in collaboration with Daicel for research purposes only.

50mg

15-0424

NEW

(11bR)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-2,6-bis(2,4,6-trimethylphenyl)-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98% (99% ee) (1011465-23-8)  
 $C_{38}H_{41}O_4P$ ; FW: 592.7; white to light yellow pwdr.  
 Note: Sold in collaboration with Daicel for research purposes only.



50mg

15-0434

NEW

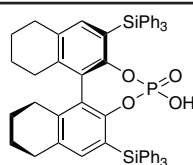
(11bS)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-2,6-bis(2,4,6-trimethylphenyl)-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98% (99% ee)  
 $C_{38}H_{41}O_4P$ ; FW: 592.7; white to light yellow pwdr.  
 Note: Sold in collaboration with Daicel for research purposes only.

50mg

15-0820

NEW

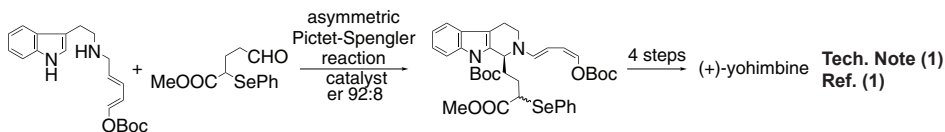
(11bR)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-2,6-bis(triphenylsilyl)-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (957790-94-2)  
 $C_{56}H_{49}O_4PSi_2$ ; FW: 873.13; white to yellow pwdr.; m.p. >264°  
 Note: Sold in collaboration with Daicel for research purposes only.



50mg

### Technical Note:

- Pictet-Spengler Reaction:** The binolphosphoric acid-catalyzed Pictet-Spengler reaction of an N-(5-oxy-2,4-pentadienyl)tryptamine derivative with methyl 5-oxo-2-(phenylseleno)pentanoate leads to the tetrahydro-β-carboline in a 92:8 enantiomeric ratio.



### References:

- J. Org. Chem., 2011, 76, 8907-8912.

15-0821

NEW

(11bS)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-2,6-bis(triphenylsilyl)-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (1157989-25-7)  
 $C_{56}H_{49}O_4PSi_2$ ; FW: 873.13; white to yellow pwdr.  
 Note: Sold in collaboration with Daicel for research purposes only.

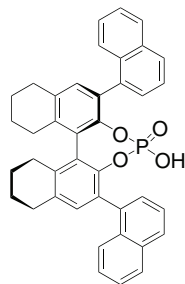
50mg

## PHOSPHORUS (Compounds)

15-1383

NEW

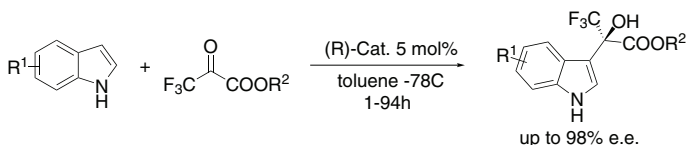
(11bR)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-2,6-di-1-naphthalenyl-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (1242066-20-1)  
 $C_{40}H_{33}O_4P$ ; FW: 608.7; white to light yellow powdr.  
 Note: Sold in collaboration with Daicel for research purposes only.



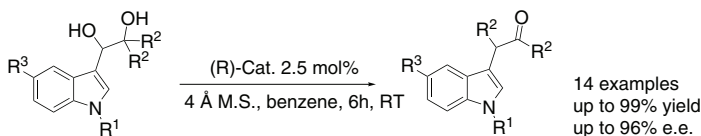
25mg  
100mg

### Technical Notes:

- Friedel-Crafts Alkylation:** Chiral phosphoric acid catalyzed Friedel-Crafts alkylation of indoles with 3,3,3-trifluoropropylpyruvate gave the corresponding adducts in excellent yields with high enantioselectivities.
- Pinacol Rearrangement:** It has been found that indolyl diols can be treated with chiral phosphoric acids to effect a regio- and enantioselective pinacol rearrangement with high efficiency.



Tech. Note (1)  
Ref. (1)



Tech. Note (2)  
Ref. (2)

### References:

- Asian J. Chem.*, **2010**, 5, 470-472.
- Angew. Chem. Int. Ed.*, **2010**, 49, 9734-9736.

15-1384

NEW

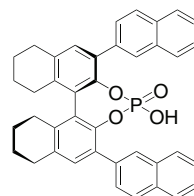
(11bS)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-2,6-di-1-naphthalenyl-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee)  
 $C_{40}H_{33}O_4P$ ; FW: 608.7; white to light yellow powdr.  
 Note: Sold in collaboration with Daicel for research purposes only.

25mg  
100mg

15-1378

NEW

(11bR)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-2,6-di-2-naphthalenyl-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee) (922711-75-9)  
 $C_{40}H_{33}O_4P$ ; FW: 608.7; white to light yellow powdr.  
 Note: Sold in collaboration with Daicel for research purposes only.



25mg  
100mg

### Technical Notes:

- The preparation of binaphthol monophosphoric acid derivatives.
- Organocatalyst developed for the diastereo- and enantioselective 1,4-conjugate addn. of a variety of  $\beta$ -ketoesters to nitroolefins, employed in the addn. reaction, providing the corresponding nitroalkanes in high yield (up to 97%) with moderate diastereoselectivities (up to 2.6:1 dr) and enantioselectivities (up to 58% ee).

### References:

- JP 4725757, EP 1038877, US 6274745, 2000-3-21.
- Lett. in Org. Chem.*, **2010**, 7, 219-225.

15-1379

NEW

(11bS)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-2,6-di-2-naphthalenyl-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphepin, 98%, (99% ee)  
 $C_{40}H_{33}O_4P$ ; FW: 608.7; white to light yellow powdr.  
 Note: Sold in collaboration with Daicel for research purposes only.

25mg  
100mg

### Technical Note:

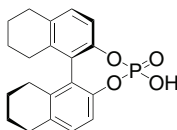
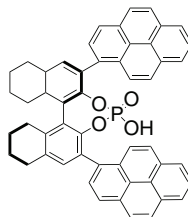
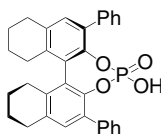
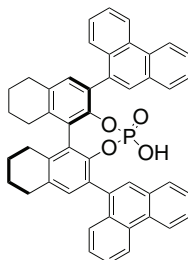
- The preparation of binaphthol monophosphoric acid derivatives.

### References:

- JP 4725757, EP 1038877, US 6274745, 2000-3-21.

## PHOSPHORUS (Compounds)

15-0376 <b>NEW</b>	(11bS)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-2,6-di-9-phenanthrenyl-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphopin, 95% (99% ee) (1028416-47-8) $C_{48}H_{37}O_4P$ ; FW: 708.8; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg
15-0566 <b>NEW</b>	(11bR)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-2,6-di-9-phenanthrenyl-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphopin, 98% (99% ee) (934201-93-1) $C_{48}H_{37}O_4P$ ; FW: 708.8; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg
15-1396 <b>NEW</b>	(11bR)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-2,6-diphenyl-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphopin, 98%, (99% ee) (791616-65-4) $C_{32}H_{29}O_4P$ ; FW: 508.5; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	100m
15-1397 <b>NEW</b>	(11bS)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-2,6-diphenyl-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphopin, 98%, (99% ee) (945852-48-2) $C_{32}H_{29}O_4P$ ; FW: 508.5; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	100mg
15-0444 <b>NEW</b>	(11bR)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-2,6-di-1-pyrenyl-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphopin, 98% (99% ee) (1225195-02-7) $C_{52}H_{37}O_4P$ ; FW: 756.8; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg
15-0446 <b>NEW</b>	(11bS)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-2,6-di-1-pyrenyl-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphopin, 98% (99% ee) $C_{52}H_{37}O_4P$ ; FW: 756.8; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg
15-1370 <b>NEW</b>	(11bR)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphopin, 98%, (99% ee) (297752-25-1) $C_{20}H_{21}O_4P$ ; FW: 356.4; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	100mg
15-1371 <b>NEW</b>	(11bS)-8,9,10,11,12,13,14,15-Octahydro-4-hydroxy-4-oxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphopin, 98%, (99% ee) (1193697-61-8) $C_{20}H_{21}O_4P$ ; FW: 356.4; white to light yellow powdr. Note: Sold in collaboration with Daicel for research purposes only.	100mg



### Technical Note:

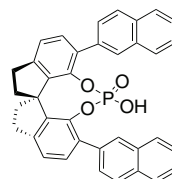
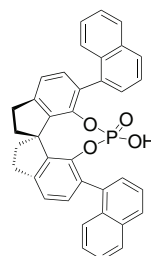
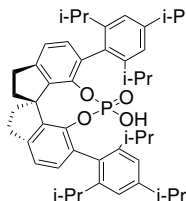
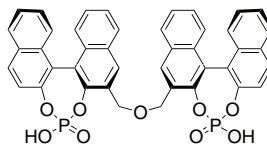
1. The preparation of binaphthol monophosphoric acid derivatives.

### References:

1. JP 4725757, EP 1038877, US 6274745, 2000-3-21.

## PHOSPHORUS (Compounds)

15-0356 <b>NEW</b>	(11bS,11'bS)-2,2'-[Oxybis(methylene)]bis[4-hydroxy-4,4'-dioxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphopin], 95% (99% ee) (1447217-75-5) $C_{42}H_{28}O_8P_2$ ; FW: 738.6; white to light yellow pwdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg
15-0354 <b>NEW</b>	(11bR,11'bR)-2,2'-[Oxybis(methylene)]bis[4-hydroxy-4,4'-dioxide-dinaphtho[2,1-d:1',2'-f][1,3,2]dioxaphosphopin], 98% (99% ee) (1022915-09-8) $C_{42}H_{28}O_8P_2$ ; FW: 738.6; white to light yellow pwdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg
15-0574 <b>NEW</b>	(11aR)-10,11,12,13-Tetrahydro-5-hydroxy-3,7-bis[2,4,6-trisopropylphenyl]-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 95% (99% ee) (1372719-95-3) $C_{47}H_{59}O_5P$ ; FW: 718.9; white to light yellow pwdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg
15-0464 <b>NEW</b>	(11aS)-10,11,12,13-Tetrahydro-5-hydroxy-3,7-bis[2,4,6-trisopropylphenyl]-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98% (99% ee) (1258276-28-6) $C_{47}H_{59}O_5P$ ; FW: 718.9; white to light yellow pwdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg
15-0377 <b>NEW</b>	(11aR)-10,11,12,13-Tetrahydro-5-hydroxy-3,7-di-1-naphthalenyl-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98%, (99% ee) (1297613-73-0) $C_{37}H_{27}O_5P$ ; FW: 566.59; white to yellow pwdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg
15-2185 <b>NEW</b>	(11aS)-10,11,12,13-Tetrahydro-5-hydroxy-3,7-di-1-naphthalenyl-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin 98% (99% ee) (1258327-08-0) $C_{37}H_{27}O_5P$ ; FW: 566.59; white to light yellow pwdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg
15-2190 <b>NEW</b>	(11aR)-10,11,12,13-Tetrahydro-5-hydroxy-3,7-di-2-naphthalenyl-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98% (99% ee) (1297613-74-1) $C_{37}H_{27}O_5P$ ; FW: 566.59; white to light yellow pwdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg
15-0290 <b>NEW</b>	(11aS)-10,11,12,13-Tetrahydro-5-hydroxy-3,7-di-2-naphthalenyl-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98%, (99% ee) $C_{37}H_{27}O_5P$ ; FW: 566.59; white to yellow pwdr. Note: Sold in collaboration with Daicel for research purposes only.	50mg

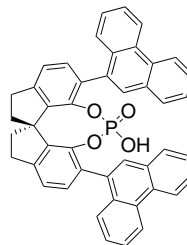


## PHOSPHORUS (Compounds)

15-1363

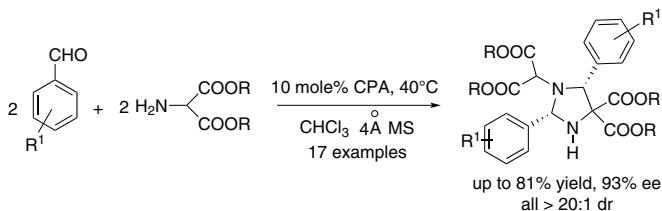
(11aR)-10,11,12,13-Tetrahydro-5-hydroxy-3,7-di-9-phenanthrenyl-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, min. 98% (1372719-93-1)  
 $C_{45}H_{31}O_2P$ ; FW: 666.70; white to light yellow powd.  
 Note: Sold in collaboration with Daicel for research purposes only.

25mg  
100mg

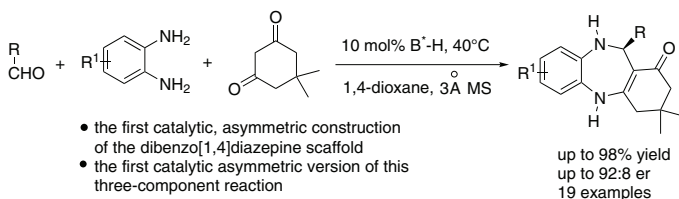


### Technical Notes:

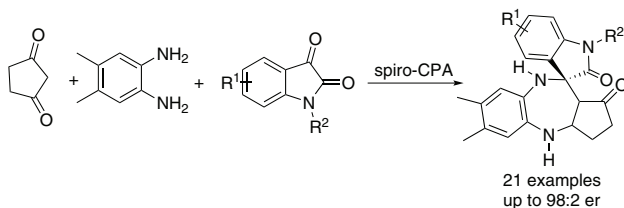
1. Catalytic asymmetric homo-1,3-dipolar cycloadditions of azomethine ylides: diastereo and enantioselective synthesis of imidazolidines.
2. Enantioselective construction of the biologically significant dibenzo[1,4]diazepine scaffold via organocatalytic asymmetric three-component reactions.
3. Enantioselective construction of the biologically important cyclopenta[1,4]diazepine framework enabled by asymmetric catalysis by chiral spiro-phosphoric acid.
4. Triply hydrogen-bond-directed enantioselective assembly of pyrrolobenzo-1,4-diazine skeletons with quaternary stereocenters.



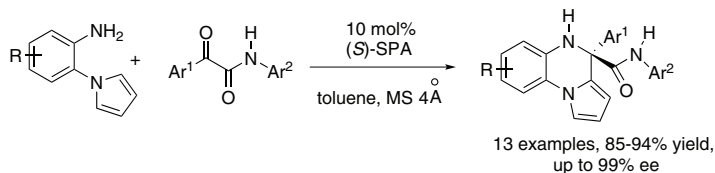
Tech. Note (1)  
Ref. (1)



Tech. Note (2)  
Ref. (2)



Tech. Note (3)  
Ref. (3)



Tech. Note (4)  
Ref. (4)

### References:

1. *Tetrahedron Asymmetry*, **2014**, 25, 617.
2. *Adv. Synth. Catal.*, **2009**, 356, 2009.
3. *Eur. J. Org. Chem.*, **2015**, 2015, 7926.
4. *Chem-Eur. J.*, **2015**, 21, 9039.

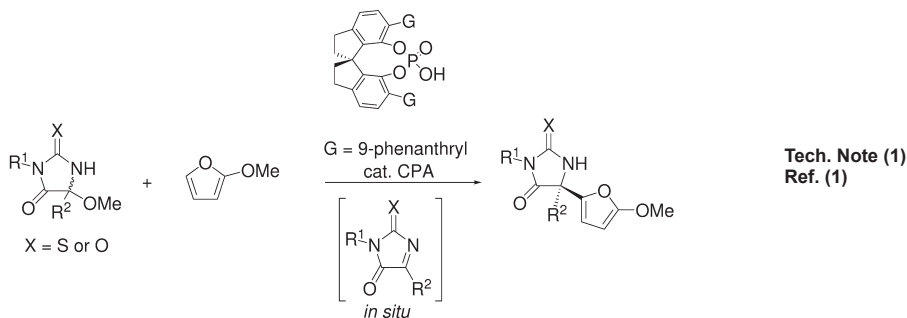


## PHOSPHORUS (Compounds)

- 15-1364** (11aS)-10,11,12,13-Tetrahydro-5-hydroxy-3,7-di-9-phenanthrenyl-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, min. 98% (1585988-92-6) 25mg  
100mg  
 $C_{46}H_{31}O_4P$ ; FW: 666.70; white to light yellow powdr.  
Note: Sold in collaboration with Daicel for research purposes only.

Technical Note:

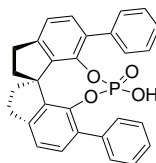
- Chiral Bronsted, acid-catalyzed, enantioselective Friedel-Crafts reaction of 2-methoxyfuran with aliphatic ketimines generated in situ.



References:

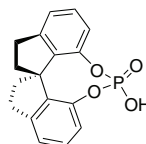
- Chem. Sci.*, **2016**, 7, 1057.

- 15-2170** (11aR)-10,11,12,13-Tetrahydro-5-hydroxy-3,7-diphenyl-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98% (99% ee) (1297613-72-9) 50mg  
**NEW**  
 $C_{29}H_{23}O_4P$ ; FW: 466.46; white to light yellow powdr.  
Note: Sold in collaboration with Daicel for research purposes only.



- 15-2171** (11aS)-10,11,12,13-Tetrahydro-5-hydroxy-3,7-diphenyl-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98% (99% ee) (1258327-04-6) 50mg  
**NEW**  
 $C_{29}H_{23}O_4P$ ; FW: 446.46; white to light yellow powdr.  
Note: Sold in collaboration with Daicel for research purposes only.

- 15-5965** (11aR)-10,11,12,13-Tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98%, (99%) (1352810-35-5) 100mg  
**NEW**  
 $C_{17}H_{15}O_4P$ ; FW: 314.27; white to yellow powdr.  
Note: Sold in collaboration with Daicel for research purposes only.



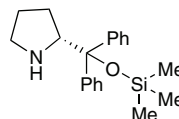
- 15-5966** (11aS)-10,11,12,13-Tetrahydro-5-hydroxy-5-oxide-diindeno[7,1-de:1',7'-fg][1,3,2]dioxaphosphocin, 98%, (99% ee) (1258327-03-5) 100mg  
**NEW**  
 $C_{17}H_{15}O_4P$ ; FW: 314.27; orange powdr.  
Note: Sold in collaboration with Daicel for research purposes only.

## SILICON (Compounds)

- 14-5023** (R)-3,3'-Bis(triphenylsilyl)-5,5',6,6',7,7',8,8'-octahydro-1,1'-bi-2,2'-naphthol, 98% (99% ee) (1041186-22-4) 50mg  
**NEW**  
 $C_{56}H_{50}O_2Si_2$ ; FW: 811.17; white to light yellow powdr.  
Note: Sold in collaboration with Daicel for research purposes only.

- 14-5024** (S)-3,3'-Bis(triphenylsilyl)-5,5',6,6',7,7',8,8'-octahydro-1,1'-bi-2,2'-naphthol, 98% (99% ee) 50mg  
**NEW**  
 $C_{56}H_{50}O_2Si_2$ ; FW: 811.17; white to light yellow powdr.  
Note: Sold in collaboration with Daicel for research purposes only.

- 07-7234** (R)-Diphenylprolinol trimethyl silyl ether, 95% (99% ee) (943757-71-9) 1g  
**NEW**  
FW: 325.5; white to light brown viscous liq.  
(store cold)  
Note: Sold in collaboration with Daicel for research purposes only.



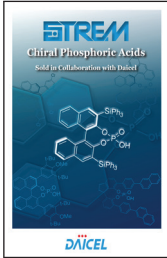
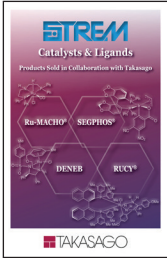
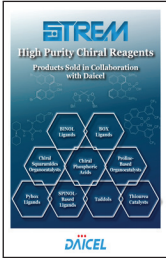
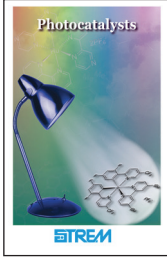
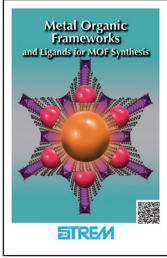
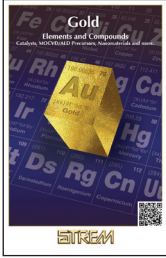
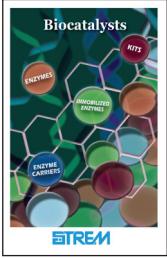
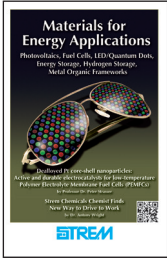
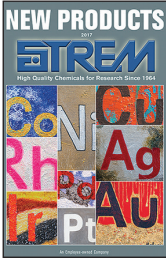
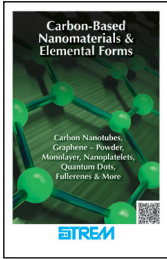
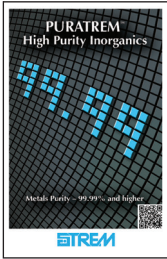
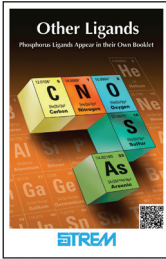
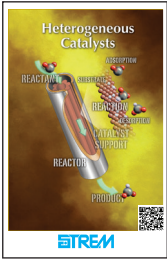
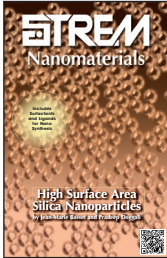
The background of the entire page is a grayscale, semi-transparent image of a periodic table of elements. The elements are arranged in their standard periodic layout, with symbols, atomic numbers, and names visible. The text is overlaid on this background.

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