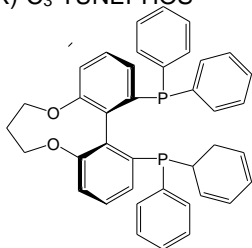
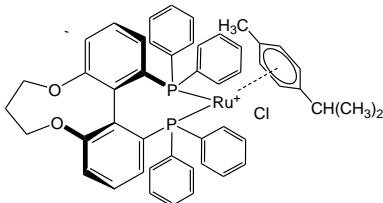
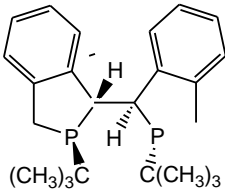
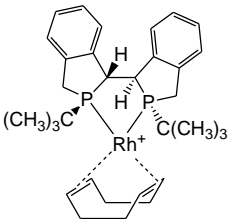


Kit# 96-5900

Contains 100mg of each of the items listed below.

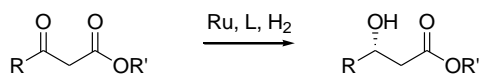
<p>Cat. # 15-0175 (R)-C₃-TUNEPHOS</p> 	<p>Cat. # 44-0109 (R)-C₃-TUNEPHOS-Ru</p> 
<p>Cat. # 15-0176 (S)-C₃-TUNEPHOS</p> <p>Cat. # 15-1060 (R,R,S,S)-DUANPHOS</p> 	<p>Cat. # 45-0663 (R,R,S,S)-DUANPHOS-Rh</p> 

Available in 100mg and 500mg standard sizes.

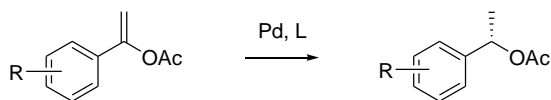
<p>15-0175 R-(-)-1,13-Bis(diphenylphosphino)-7,8-dihydro-6H-dibenzo[f,h][1,5]dioxonin, 97% (R)-C₃-TUNEPHOS [301847-89-2] C₃₉H₃₂O₂P₂; FW: 594.62; white powdr. <i>air sensitive</i> Note: US Patent No. 6,521,769; additional patents pending.</p>	<p>100mg 500mg</p>
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Technical Notes:

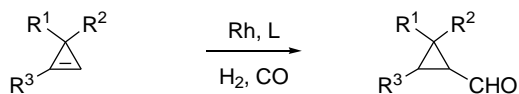
1. New generation of chiral biaryl phosphine ligands with tunable dihedral angles. The ability to modify the dihedral angle allows for the fine tuning of the catalyst system and optimization of enantioselectivity.
2. Ru-C₃-TUNEPHOS complexes are used for asymmetric hydrogenation of β-ketoesters¹, enol acetates², cyclic β-amino acids³, α-phthalimide ketones⁴, and α-keto esters⁵.
3. Rh-catalyzed hydroformylation of cyclopropenes.



Tech. Note (2)
Ref. (1)



Tech. Note (2)
Ref. (2)



Tech. Note (3)
Ref. (6)

References:

1. *J. Org. Chem.*, **2000**, 65, 6223.
2. *Org. Lett.*, **2002**, 4, 4495.
3. *J. Am. Chem. Soc.*, **2003**, 125, 9570.
4. *J. Am. Chem. Soc.*, **2004**, 126, 1626.
5. *Synlett.*, **2006**, 126, 1169.
6. *J. Am. Chem. Soc.*, **2008**, 130, 13804.

15-0176 (S)-(+)-1,13-Bis(diphenylphosphino)-7,8-dihydro-6H-dibenzo[f,h][1,5]dioxinin, 95% (S)-C₃-TUNEPHOS
 [486429-99-6] C₃₉H₃₂O₂P₂; FW: 594.62; white powdr.
air sensitive
 Note: US Patent No. 6,521,769; additional patents pending.

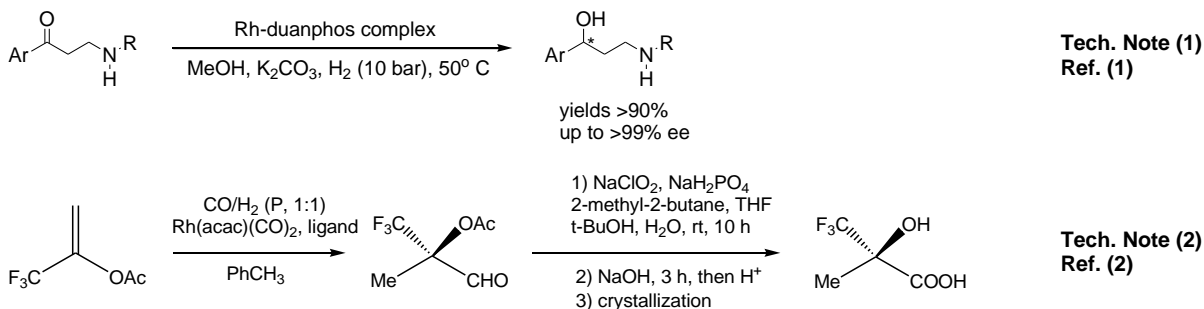
Technical Note:

1. See 15-0175.

15-1060 (1R,1'R,2S,2'S)-(+)-2,2'-Di-t-butyl-2,3,2',3'-tetrahydro-1,1'-bi-1H-isophosphindole, min. 98%
 (R,R,S,S)-DUANPHOS [528814-26-8]
 C₂₄H₃₂P₂; FW: 382.46; white xtl.; [α]_D +19.5
air sensitive
 Note: Patent pending, PCT/US02/35788.

Technical Notes:

1. As a highly electron-donating and conformationally rigid ligand, the rhodium complex of DuanPhos has exhibited remarkably high enantioselectivities and reactivities for the hydrogenation of a variety of functionalized olefins.
2. Rhodium/DUANPHOS catalyst used in the synthesis of 2-trifluoromethyl lactic acid by asymmetric hydroformylation.



References:

1. *Angew. Chem. Int. Ed.*, **2005**, *44*, 1687.
2. *J. Org. Chem.*, **2013**, *78*, 3429.

45-0663 (1R,1'R,2S,2'S)-(+)-2,2'-Di-t-butyl-2,3,2',3'-tetrahydro-1,1'-bi-1H-isophosphindole(1,5-cyclooctadiene)
 rhodium(I) tetrafluoroborate, min. 98% (R,R,S,S)-DUANPHOS-Rh
 [Rh(C₈H₁₂)(C₂₄H₃₂P₂)]⁺BF₄⁻; FW: 680.35; orange xtl.
air sensitive
 Note: US Patent No. 7105702, 7153809, 7169953.

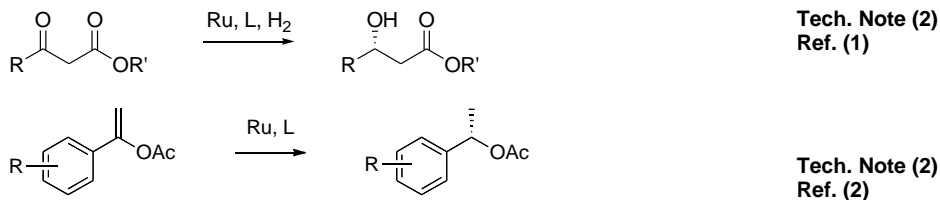
Technical Note:

1. See 15-1060.

44-0109 Chloro{(R)-(-)-1,13-bis(diphenylphosphino)-7,8-dihydro-6H-dibenzo[f,h][1,5]dioxinin}(p-cymene)
 ruthenium(II) chloride (R)-C₃-TUNEPHOS-Ru
 [RuCl(C₃₉H₃₂O₂P₂)(C₁₀H₁₄)]⁺Cl⁻; FW: 900.81; orange to brown powdr.
air sensitive
 Note: Patent US 6,521,769.

Technical Notes:

1. New generation of chiral biaryl phosphine ligands with tunable dihedral angles. The ability to modify the dihedral angle allows for the fine tuning of the catalyst system and optimization of enantioselectivity. See 15-0175 (page !_!blue15-0175!_!).
2. Ru-C₃-TUNEPHOS complexes are used for asymmetric hydrogenation of β-ketoesters¹, enol acetates², cyclic β-amino acids³, α-phthalimide ketones⁴, and α-keto esters⁵.



References:

1. *J. Org. Chem.*, **2000**, *65*, 6223.
2. *Org. Lett.*, **2002**, *4*, 4495.
3. *J. Am. Chem. Soc.*, **2003**, *125*, 9570.
4. *J. Am. Chem. Soc.*, **2004**, *126*, 1626.
5. *Synlett.*, **2006**, *126*, 1169.