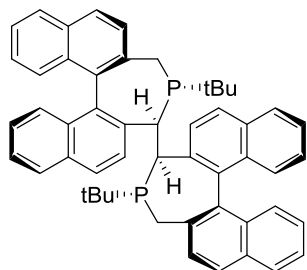


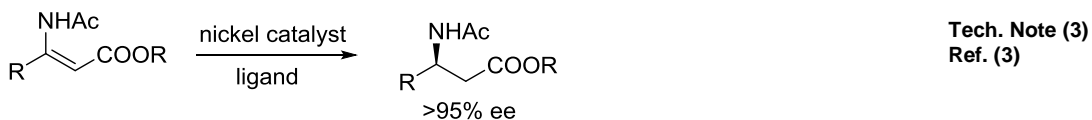
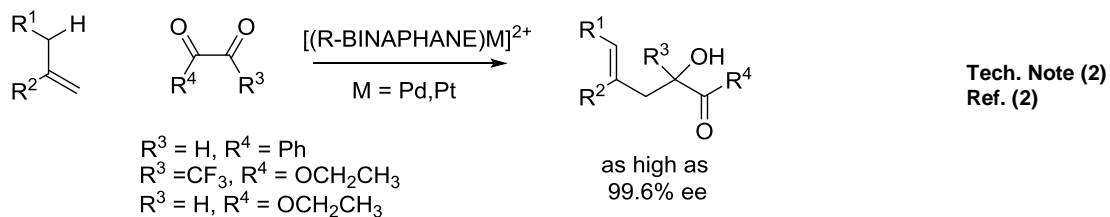
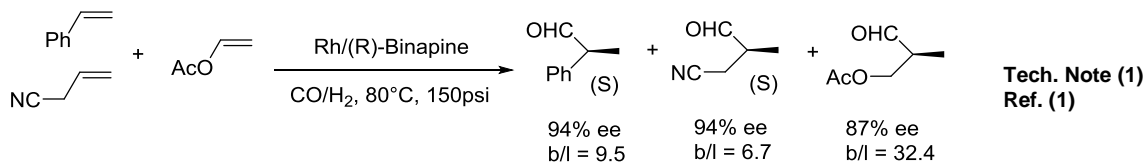
Catalog # 15-1053 (3S,3'S,4S,4'S,11bS,11'bS)-(+)-4,4'-Di-*t*-butyl-4,4',5,5'-tetrahydro-3,3'-bi-3H-dinaphtho [2,1-c:1',2'-e]phosphine, 97% (S)-BINAPINE

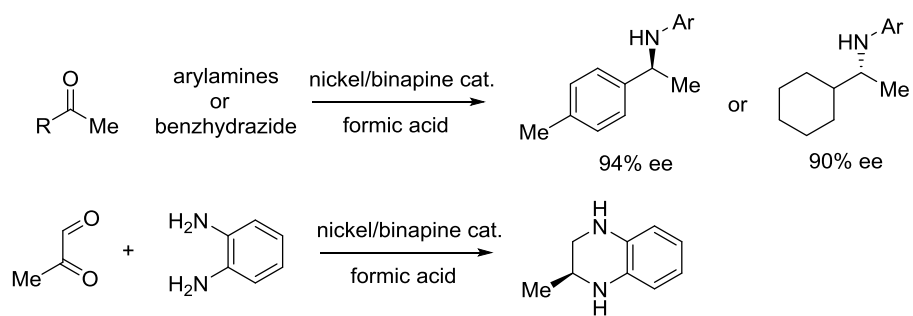


Note: Sold in collaboration with Chiral Quest for research purposes only. Patents pending. Chiral Quest Catalyst and Ligand Toolbox Kit component.

Technical Notes:

1. Rhodium complex used in asymmetric hydroformylation reactions.
2. Ligand-palladium complex used in enantioselective carbonyl-ene reactions.
3. Nickel-catalyzed asymmetric transfer hydrogenation of olefins for the synthesis of  $\alpha$ - and  $\beta$ - amino acids.
4. Nickel-catalyzed asymmetric transfer hydrogenation of hydrazones and other ketimines.
5. Nickel/ligand catalyst used in the enantioselective reductive amination of ketones with both arylamines and benzhydrazide,
6. Rh-Binapine and Pd-Binapine complexes form excellent catalysts for asymmetric (transfer) hydrogenation of aryl substituted olefins to form  $\beta$ -amino acids.





Tech. Note (5)  
Ref. (5)

References:

1. *Organometallics*, **2006**, 25, 5003.
2. *Adv. Synth. Catal.*, **2010**, 352, 1356.
3. *Angew. Chem. Int. Ed.*, **2014**, 53, 12210.
4. *Angew. Chem. Int. Ed.*, **2015**, 54, 5112.
5. *Angew. Chem. Int. Ed.*, **2016**, 55, 12083.