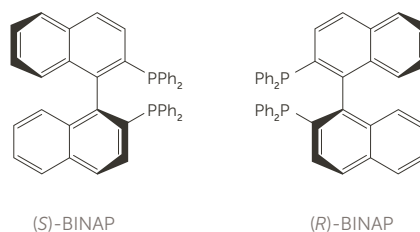


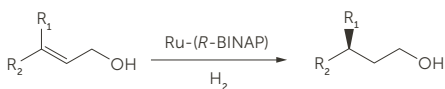
2,2'-Bis(diphenylphosphino)-1,1'-binaphthyl

Product number: 325 (*R*-isomer) and 459 (*S*-isomer) | Alternative name: BINAP | CAS numbers: *R*-isomer: 76189-55-4
S-isomer: 76189-56-5 | $C_{44}H_{32}P_2$ | Molecular weight: 622.67

Binap is a versatile chiral ligand used in a wide variety of chiral transformations that include asymmetric hydrogenation of cyclic and acyclic olefinic and ketonic substrates, which include resolutions and kinetic dynamic resolution of ketones, asymmetric isomerizations, asymmetric 1,4-additions of organoboronic acids, and enantioselective cyclizations.

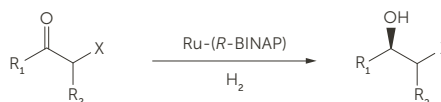


HYDROGENATION OF ALLYLIC ALCOHOLS¹⁻⁵



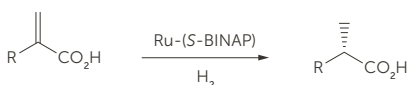
$R_1 = \text{Me}$, 95 – 98% ee
 $R_2 = \text{various alkyl substituents}$
 $R_1 = \text{various alkyl substituents}, R_2 = \text{Me}$
 Both *E*- and *Z*-olefin configurations result in the same chiral product.

HYDROGENATION OF β -KETO ESTERS⁹⁻¹²



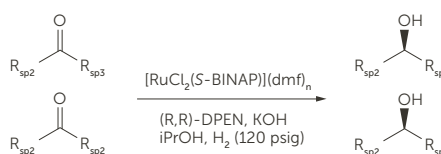
$X = \text{CO}_2R$; $R_1 = \text{alkyls}$; $R_2 = \text{H, alkyls, amides}$; ~94 – 99% ee (90 – 99% de)
 $P(O)(OR)_2$; $R_1 = \text{alkyls, aryl}$; 90 – 99% ee
 $R_2 = \text{H, alkyls, Br}$; 96 – 97% ee
 SO_3Na ; $R_1 = \text{alkyls, aryl}$
 $R_2 = \text{H}$

HYDROGENATION OF α,β -UNSATURATED CARBOXYLIC ACIDS⁶⁻⁸



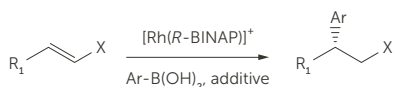
$R = \text{aryl, alkyl, } -\text{CH}_2\text{CO}_2\text{H, } \beta\text{-lactam}$ 88 – 98% ee

HYDROGENATION OF ARYL, ALIPHATIC, AND UNSATURATED KETONES¹³



$R_{sp2} = \text{aryls, alkenyl}$ 95 to >99% ee
 $R_{sp2} = \text{Me, Et, } i\text{Pr, CF}_3, \text{CH}_2\text{N(Me)Ac, CH}_2\text{CH}_2\text{NMe}_2$

1,4-ADDITION OF ORGANOBORONIC ACIDS TO ACTIVATED ALKENES¹⁴



$R_1 = H, \text{ alkyl, aryl}$ 90 to >99% ee

$X = CO_2R, P(O)(OR)_2, C(O)NHR, C(O)R$ (cyclic and acyclic)

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