

BINAP

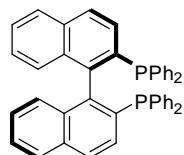
BINAP is a chiral ligand that has been used in a variety of asymmetric reactions since 1980. Especially BINAP-Ru catalyst affords high enantioselectivities in asymmetric hydrogenations of a wide range of olefins and functionalized ketones.

(R)-(+)-BINAP

CAS No. 76189-55-4

Formula C₄₄H₃₂P₂

M.W. 622.69

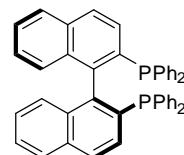


(S)-(-)-BINAP

CAS No. 76189-56-5

Formula C₄₄H₃₂P₂

M.W. 622.69

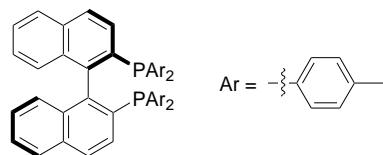


(R)-(+)-TolBINAP

CAS No. 99646-28-3

Formula C₄₈H₄₀P₂

M.W. 678.79

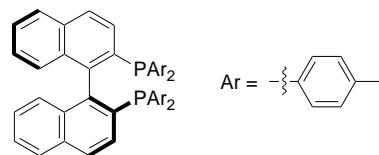


(S)-(-)-TolBINAP

CAS No. 100165-88-6

Formula C₄₈H₄₀P₂

M.W. 678.79

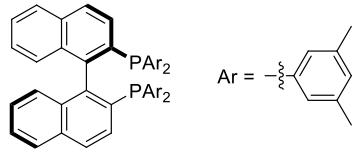


(R)-(+)-XyIBINAP

CAS No. 137219-86-4

Formula C₅₂H₄₈P₂

M.W. 734.91

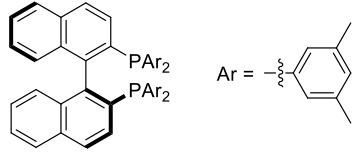


(S)-(-)-XyIBINAP

CAS No. 135139-00-3

Formula C₅₂H₄₈P₂

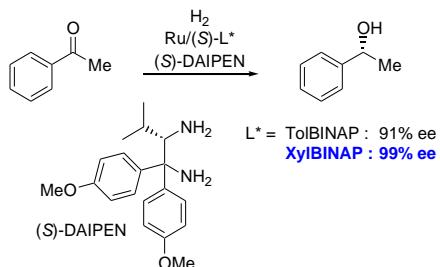
M.W. 734.91



Tech Note

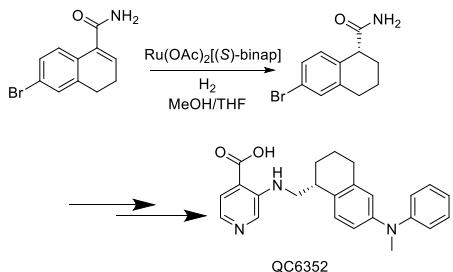
1 Ru Catalyzed Asymmetric Hydrogenation

1.1 Asymmetric Hydrogenation of Simple Ketones



Noyori, R.; Ohkuma, T. *Angew. Chem. Int. Ed.* **2001**, *40*, 40.
doi. [10.1002/1521-3773\(20010105\)40:1<40::AID-ANIE40>3.0.CO;2-5](https://doi.org/10.1002/1521-3773(20010105)40:1<40::AID-ANIE40>3.0.CO;2-5)

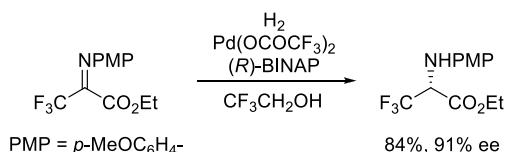
1.2 Asymmetric Hydrogenation of olefin



Chen, Y. K. *ACS Med. Chem. Lett.* **2017**, *8*, 869.
doi. [10.1021/acsmedchemlett.7b00220](https://doi.org/10.1021/acsmedchemlett.7b00220)

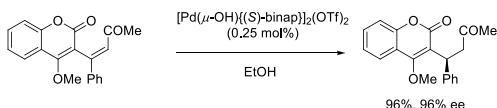
2 Pd Catalyzed Asymmetric Reaction

2.1 Asymmetric Hydrogenation



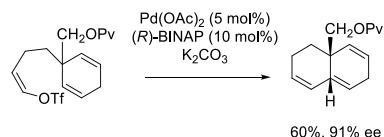
Uneyama, K. *Org. Lett.* **2001**, *3*, 313.
doi. [10.1021/o10002471](https://doi.org/10.1021/o10002471)

2.2 Conjugate Reduction



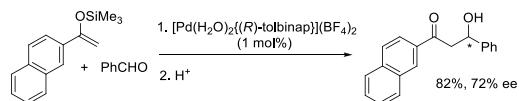
Sodeoka, M. *Org. Lett.* **2006**, *8*, 4851.
doi. [10.1021/o10619157](https://doi.org/10.1021/o10619157)

2.3 Heck Reaction



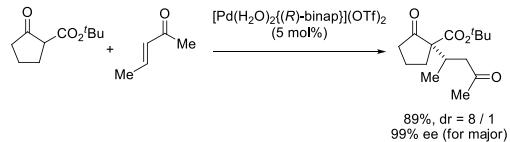
Shibasaki, M. *J. Org. Chem.* **1989**, *54*, 4738.
doi. [10.1021/jo00281a007](https://doi.org/10.1021/jo00281a007)
Tetrahedron Lett. **1992**, *33*, 2589.
doi. [10.1016/S0040-4039\(00\)92251-2](https://doi.org/10.1016/S0040-4039(00)92251-2)

2.4 Aldol-Type Reaction

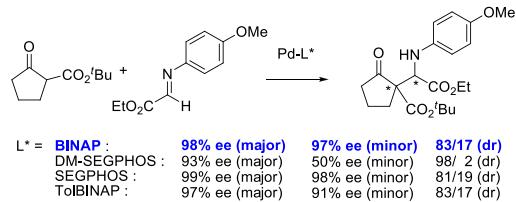


Sodeoka, M. *Pure Appl. Chem.* **1998**, *70*, 411.
doi. [10.1351/pac199870020411](https://doi.org/10.1351/pac199870020411)

2.5 Michael-Type Reaction

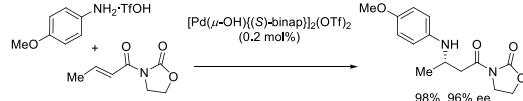


Sodeoka, M. *J. Am. Chem. Soc.* **2002**, *124*, 11240.
doi. [10.1021/ja027075i](https://doi.org/10.1021/ja027075i)



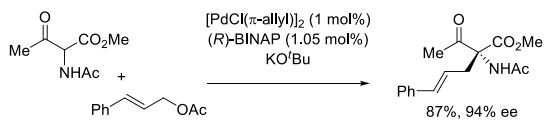
Sodeoka, M. *Angew. Chem. Int. Ed.* **2005**, *44*, 1525.
doi. [10.1002/anie.200462202](https://doi.org/10.1002/anie.200462202)

2.6 Aza-Michael Addition



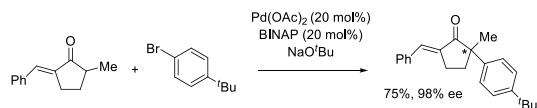
Sodeoka, M. *Org. Lett.* **2004**, *6*, 1861.
doi. [10.1021/o10493711](https://doi.org/10.1021/o10493711)

2.7 π -Allylic Alkylation



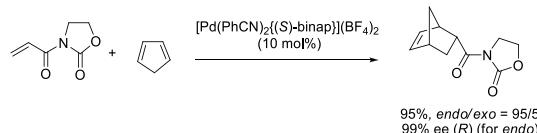
Ito, Y. *J. Am. Chem. Soc.* **1999**, *121*, 3236.
doi. [10.1021/ja9900104](https://doi.org/10.1021/ja9900104)

2.8 Arylation



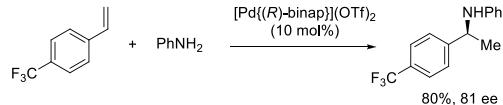
Buchwald, S. L. *J. Am. Chem. Soc.* **1998**, *120*, 1918. doi. [10.1021/ja973794z](https://doi.org/10.1021/ja973794z)

2.9 Diels-Alder / Hetero Diels-Alder Reaction



Inoue, Y. *Tetrahedron Lett.* **1998**, *39*, 6253.
doi. [10.1016/S0040-4039\(98\)01288-X](https://doi.org/10.1016/S0040-4039(98)01288-X)

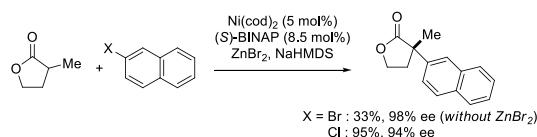
2.10 Hydroamination



Hartwig, J. F. *J. Am. Chem. Soc.* **2000**, *122*, 9546.
doi. [10.1021/ja002284t](https://doi.org/10.1021/ja002284t)

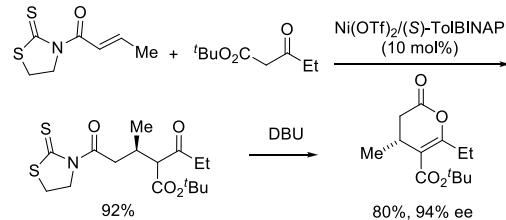
3 Ni Catalyzed Asymmetric Reaction:

3.1 Arylation



Buchwald, S. L. *J. Am. Chem. Soc.* **2002**, *124*, 3500.
doi. [10.1021/ja017545t](https://doi.org/10.1021/ja017545t)

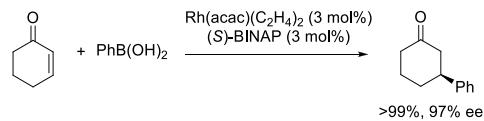
3.2 Michael Addition



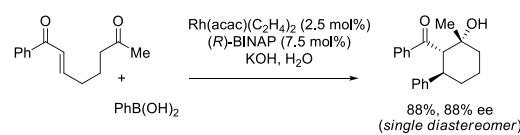
Evans, D. A. *J. Am. Chem. Soc.* **2005**, *127*, 10816.
doi. [10.1021/ja053820q](https://doi.org/10.1021/ja053820q)

4 Rh Catalyzed Asymmetric Reaction

4.1 1,4-Addition

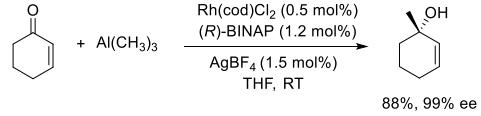


Miyaura, N. *J. Am. Chem. Soc.* **1998**, *120*, 5579.
doi. [10.1021/ja980666h](https://doi.org/10.1021/ja980666h)



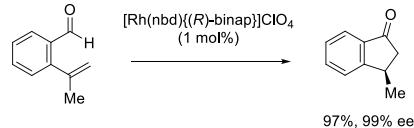
Krische, M. J. *J. Am. Chem. Soc.* **2003**, *125*, 1110.
doi. [10.1021/ja0211095](https://doi.org/10.1021/ja0211095)

4.2 1,2-Addition



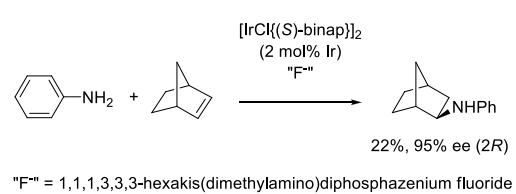
von Zezschwitz, P. *Chem. Eur. J.* **2013**, *19*, 16366.
doi. [10.1002/chem.201303061](https://doi.org/10.1002/chem.201303061)

4.3 Hydroacylation



Morehead, Jr. *J. Am. Chem. Soc.* **2005**, *127*, 16042.
doi. [10.1021/ja0564416](https://doi.org/10.1021/ja0564416)

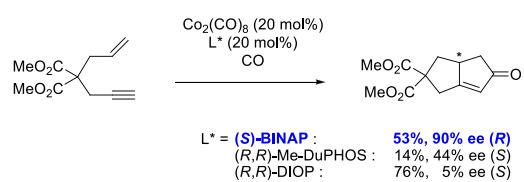
5 Ir Catalyzed Asymmetric Reaction: Hydroamination



Togni, A. *J. Am. Chem. Soc.* **1997**, *119*, 10857.
doi. [10.1021/ja972594k](https://doi.org/10.1021/ja972594k)

6 Co Catalyzed Asymmetric Reaction:

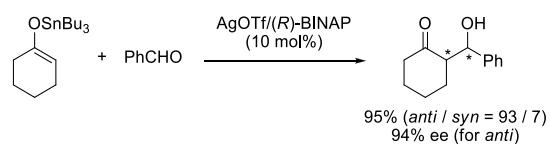
6.1 Pauson-Khand Reaction



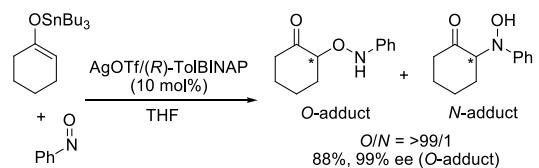
Hiroi, K. *Tetrahedron Lett.* **2000**, *41*, 891.
doi. [10.1016/S0040-4039\(99\)02141-3](https://doi.org/10.1016/S0040-4039(99)02141-3)

7 Ag Catalyzed Asymmetric Reaction:

7.1 Aldol-Type Reaction



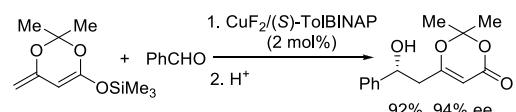
Yamamoto, H. *J. Am. Chem. Soc.* **1997**, *119*, 9319.
doi. [10.1021/ja970203w](https://doi.org/10.1021/ja970203w)



Yamamoto, H. *J. Am. Chem. Soc.* **2004**, *126*, 5360.
doi. [10.1021/ja039103i](https://doi.org/10.1021/ja039103i)

8 Cu Catalyzed Asymmetric Reaction

8.1 Aldol Type Reaction



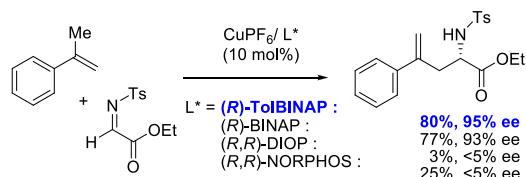
Carreira, E. M. *J. Am. Chem. Soc.* **1998**, *120*, 837.
doi. [10.1021/ja973331t](https://doi.org/10.1021/ja973331t)

8.2 Friedel-Crafts Reaction



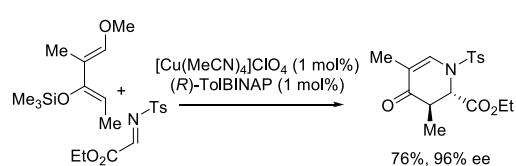
Johannsen, M. *Chem. Commun.* **1999**, 2233.
doi. [10.1039/A906758B](https://doi.org/10.1039/A906758B)

8.3 Imino-Ene Reaction



Jørgensen, K. A. *Chem. Commun.* **1998**, 2547.
doi. [10.1039/A808019D](https://doi.org/10.1039/A808019D)

8.4 Hetero-Diels-Alder Reaction



Jørgensen, K. A. *Angew. Chem. Int. Ed.* **1998**, *37*, 3121.
doi.
[10.1002/\(SICI\)1521-3773\(19981204\)37:22<3121::AID-ANIE3121>3.0.CO;2-J](https://doi.org/10.1002/(SICI)1521-3773(19981204)37:22<3121::AID-ANIE3121>3.0.CO;2-J)