

Massachusetts Institute of Technology
Organic Chemistry 5.512

April 6, 2005
Prof. Rick L. Danheiser

Unit 3

Stereocontrolled Conjugate Addition

★ Catalytic Asymmetric Conjugate Addition I: *Unstabilized Nucleophiles*

Hayashi-Miyaura Rh-Catalyzed Conjugate Addition Reactions

Cu-Catalyzed Conjugate Addition of Organozinc Compounds

Organocatalytic Conjugate Addition of Activated Aromatic Compounds

★ Catalytic Asymmetric Conjugate Addition II: *Conjugate Reduction*

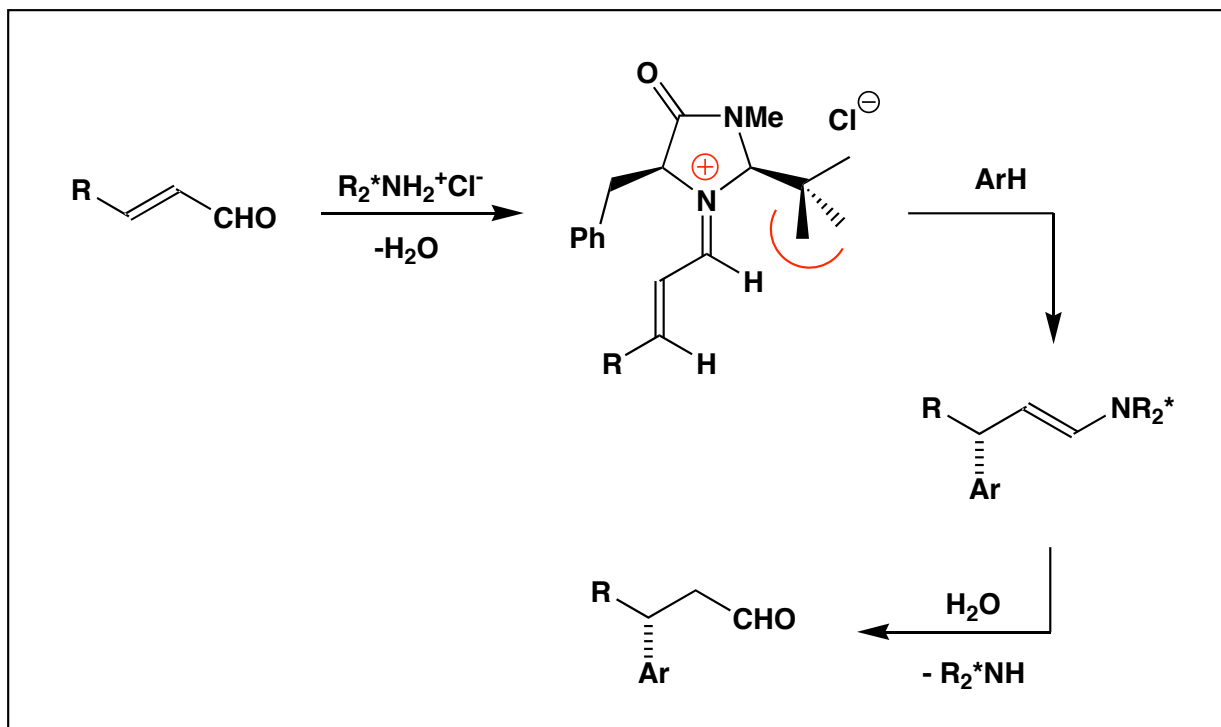
★ Catalytic Asymmetric Conjugate Addition III: *Stabilized Nucleophiles*

Michael Reactions Using Heterobimetallic Catalysts (Shibasaki)

Organocatalytic Michael Reactions (Jorgensen)

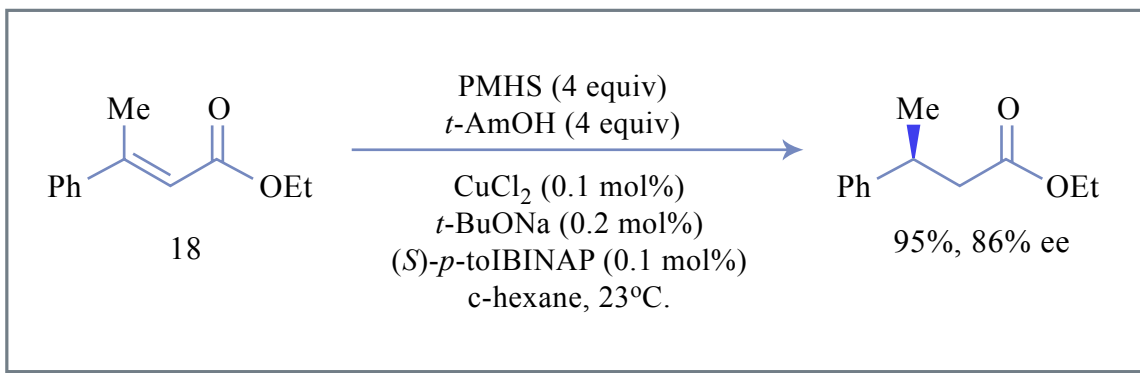
Organocatalytic Conjugate Addition of Activated Aromatic Compounds

Reviews: See Berkessel and Gröger

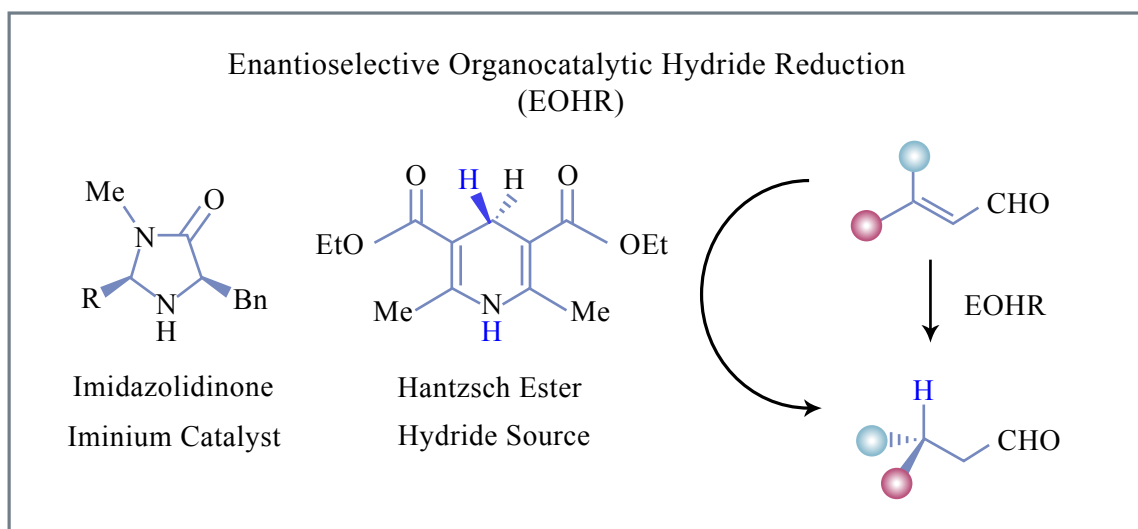


Catalytic Asymmetric Conjugate Reduction

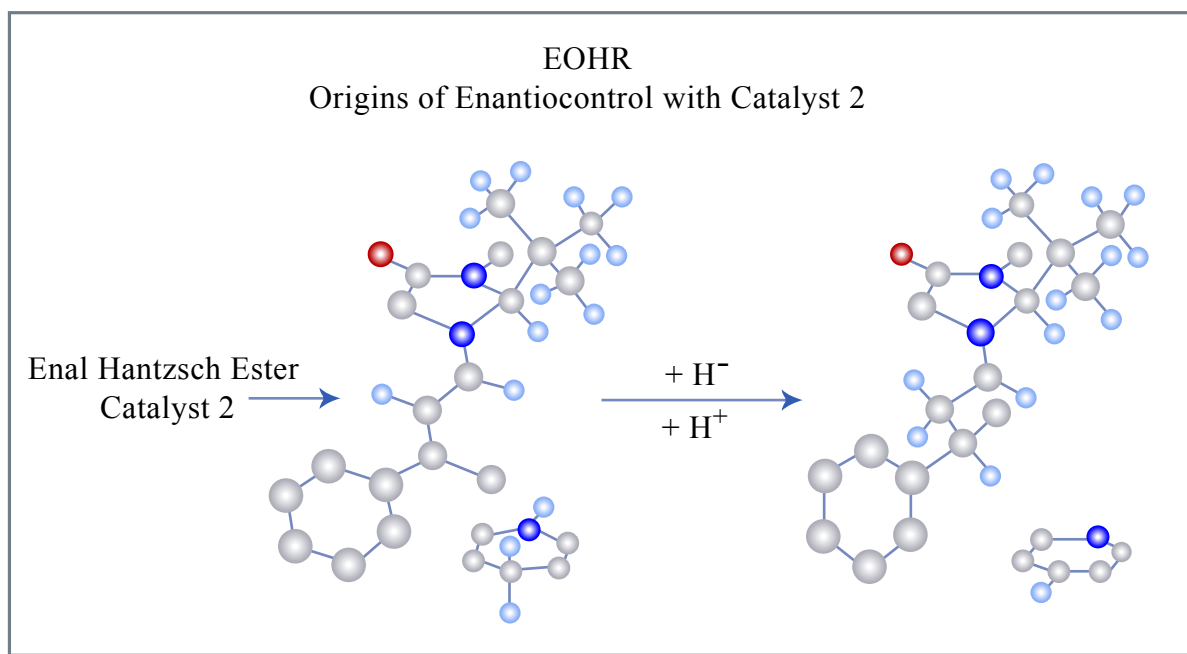
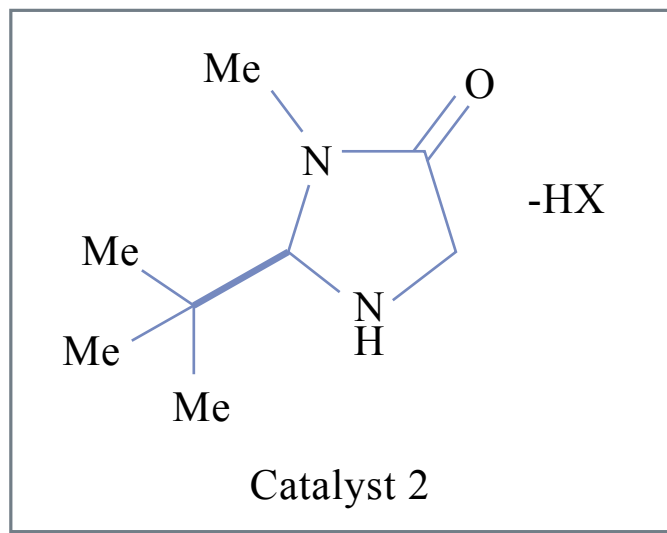
Buchwald Cu-Catalyzed Conjugate Reduction: *J. Am. Chem. Soc.* **2003**, *125*, 11,253 and refs cited



MacMillan Organocatalytic Conjugate Reduction: *J. Am. Chem. Soc.* **2005**, *127*, 32



Figures by MIT OCW.

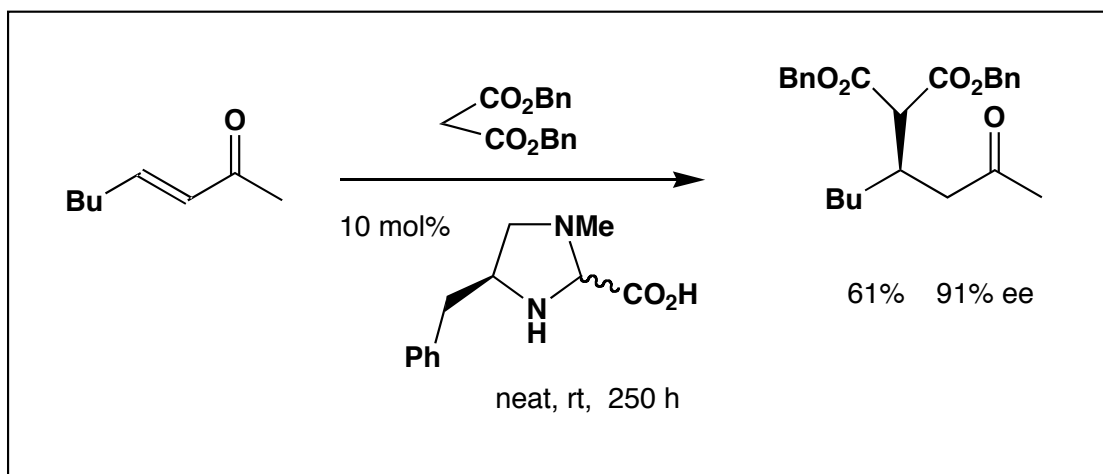


Figures by MIT OCW.

Catalytic Asymmetric Conjugate Addition of Stabilized Nucleophiles

I. Shibasaki: "Heterobimetallic Catalysts"

II. Jorgensen: Organocatalytic Conjugate Addition *Angew. Chem. Int. Ed.* **2003**, *42*, 661 and 4955

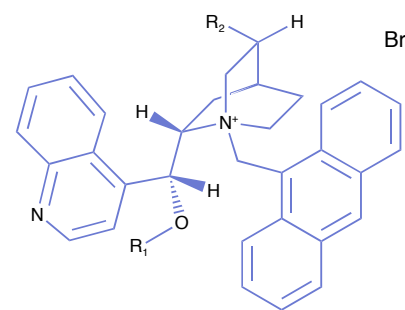
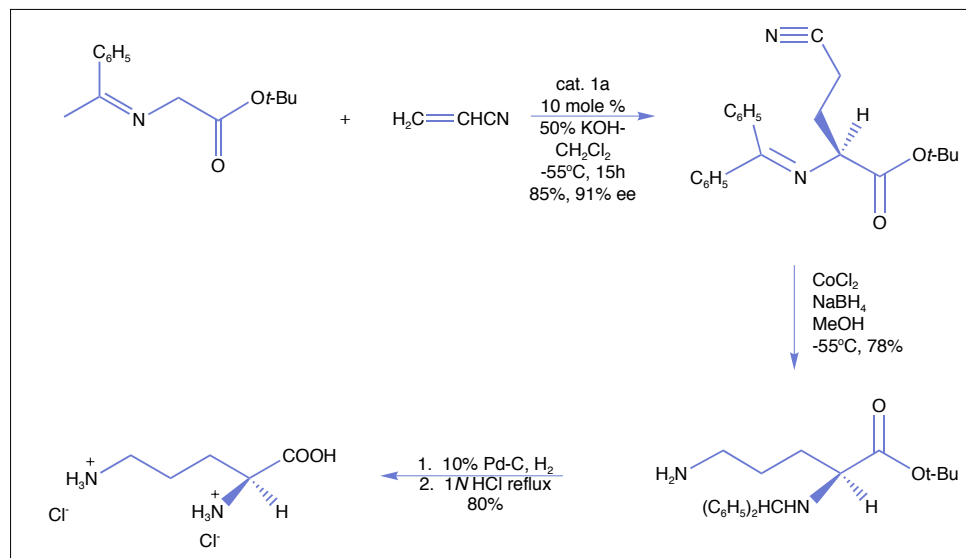


III. Jacobsen: Enantioselective Conjugate Additions Catalyzed by (Salen)Al Complexes

J. Am. Chem. Soc. **2005**, *127*, 1313

IV. Corey: Organocatalytic Conjugate Addition of Imino Esters

Org. Lett. **2000**, *2*, 1097.



1a R₁ = CH₂CH=CH₂, R₂ = H₂C=CH

Figure by OCW