

Massachusetts Institute of Technology
Organic Chemistry 5.512

April 1, 2005
Prof. Rick L. Danheiser

Unit 3
Stereocontrolled Conjugate Addition

- ★ Intrinsic Stereochemistry in the Michael Reaction
- ★ Substrate Control: Asymmetric Induction by Molecular Framework
- ★ Substrate Control: Asymmetric Induction via Chiral Auxiliaries
- ★ Catalytic Asymmetric Conjugate Addition I: *Unstabilized Nucleophiles*
- ★ Catalytic Asymmetric Conjugate Addition II: *Conjugate Reduction*
- ★ Catalytic Asymmetric Conjugate Addition III:
Stabilized Nucleophiles (Michael Additions)

Definitions

Conjugate Addition

Addition of a nucleophile to an alkene or alkyne conjugated with an electron-withdrawing group

Michael Reaction

Addition of an enolate or related "stabilized" carbanionic species to an α,β -unsaturated carbonyl compound or related electron-deficient alkene or alkyne

General References

Conjugate Addition Reactions in Organic Synthesis", P. Perlmutter, Pergamon Press, 1992

Reviews:

"Enantioselective Conjugate Additions"; M. P. Sibi; S. Manyem *Tetrahedron* **2000**, 56, 8033.

"Recent Advances in Catalytic Enantioselective Michael Additions";

N. Krause; A. Hoffmann-Röder *Synthesis* **2001**, 171

Review Reading Assignment

Carey and Sundberg "Advanced Organic Chemistry" Part B

Section 1.10 (Alkylation of Carbon Nucleophiles by Conjugate Addition)

Section 7.3.1 (Organozinc Compounds)

Section 8.1 (Organocopper Intermediates)

Section 9.1.1 (Synthesis of Organoboranes)