Massachusetts Institute of Technology

Organic Chemistry 5.512

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Prof. Rick L. Danheiser

Unit 3

Stereocontrolled Conjugate Addition

- ★ Intrinisic 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 conjugated with an electron-withdrawing group

Michael Reaction

Addition of an enolate or related "stabilized" carbanionic species to an a,b-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)