

Chemistry 483a
Topics in Mechanistic Organic Chemistry

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Lectures: Monday, Wednesday and Friday, 9:30 a.m., room 115

Topics: Chemical kinetics and thermodynamics:
rate laws, steady state approximation, pseudo-first-order reactions
experimental determination of rate and equilibrium constants
Eyring and Arrhenius equations, temperature effects on rate constants
transition states, Hammond postulate, reaction coordinate diagrams
principle of microscopic reversibility

Application of kinetic methods in the study of reaction mechanism
the rate law and the stoichiometry of the transition state
pH rate profiles
kinetic isotope effects
structure-reactivity relationships, linear free energy relationships
Hammett equation, Brønsted catalysis law
solvent and medium effects

Aromaticity, pericyclic reactions and orbital symmetry:
aromaticity, Hückel rule, antiaromaticity
FMO theory, Woodward-Hoffmann rules, Hückel-Möbius model
pericyclic reactions: sigmatropic rearrangements, electrocyclic reactions,
cycloadditions

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| Assessment: | Problems sets | 10% |
| | Two tests | 35% |
| | Final examination | 55% |

Text: There is no required textbook
The following texts are recommended for further study and reference:
T.H. Lowry and K S. Richardson, *Mechanism and Theory in Organic Chemistry*, (3rd ed.), Harper and Row, 1987.
N.S. Isaacs, *Physical Organic Chemistry*, Longmans, 1995.
F.A. Carey and R.A. Sundberg, *Advanced Organic Chemistry*(3rd ed.), Plenum, 1990,
esp. Part A.
F.A. Carroll *Perspectives on Structure and Mechanism in Organic Chemistry* , Brooks-Cole,
1998
E. V. Anslyn and D. A. Dougherty *Modern physical organic chemistry* ,
University Science, 2006.