Chem 108 (3rd quarter, organic chemistry)

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Class meets in: Givertz, room 1004, 10-10:50 am

Text: Organic Chemistry, by P.Y. Bruice; Prentice-Hall (3rd edition)

Exams: two midterms of 100 points each (exam 1: Friday, October 12; exam 2: Friday, November 9) plus final exam (Saturday, December 8, 8-11 am) worth 200 points
No makeup exams.
Topics for midterms - for 1st exam: through October 10th lecture; for 2nd exam: through November 2nd lecture; for final: entire quarter's materials plus selected items from quarters 1 and 2.

Holidays: 11/12 and 11/22-23
Instruction begins: Monday, September 24, 2001
Instruction ends: Wednesday, December 5, 2001

Topics: Begin by **reviewing** chapters 1-19. The two lists that follow are meant to help you focus upon items **I expect you to know**. If you don't, or have forgotten and need a **refresher**, then check the **index of your textbook** to determine the specific page(s) where you can read about the topic. Also, do not hesitate to head to the **library**. There are many other excellent texts; additional reading may prove helpful at times.
Terms/topics of which I expect you to have a good working knowledge: enol; enolate; conjugate addition; 1,2- and 1,4-addition to the carbonyl; tautomerism; regiochemistry; stereochemistry (relative and absolute; enantiomers and diastereomers; R/S-system; Newman projections); Fischer projection; sawhorse forms for acyclic systems; epimer; resonance; equilibria; Hammond postulate; reactivity/selectivity principle; simple nomenclature rules (E/Z; cis/trans; R/S; syn/anti); chirality center; meso; racemic mixture; racemate; racemic; electrophile; nucleophile; reaction profile (coordinate); geometry associated with the various hybrids and with reactive intermediates (*e.g.*, carbocations, carbanions, radicals); characteristics of elimination and substitution reactions (the E and S_N variety); antiperiplanar; gauche; eclipsed; staggered; equatorial; axial; chair-chair flip; conformer (conformational analysis); configuration (relative and absolute); NMR and IR spectroscopy and the terms associated with each (*e.g.*, chemical shift, coupling constant, wavenumber, *etc*); reduction and oxidation (reducing and oxidizing agents/reagents); oxidation state; workup; reflux; Markovnikov addition;

carbocation relative stability; mechanism; electron flow; single and double-headed mechanism arrows; steric effects; rate determining step; acid-base chemistry; pH, pKa; Lewis and Bronsted acids and bases; catalysis; allyl/allylic; benzyl/benzylic; aromatic; Lindlar catalyst; conjugation; s-cis and s-trans; polar and nonpolar solvents; retrosynthetic analysis; synthon; THF; DMF … various solvents and those whose name appears as an acronym; o-, m-, p-directors; addition/elimination (as to a carboxylic acid derivative)

Some reactions of particular note: those at the carbonyl (*lots* of chemistry); hydroboration/oxidation; Wittig; Diels-Alder; aldol condensation; epoxidation; rearrangements of carbocations; free radical chain reactions and the associated steps; hydrogenation; *all* those that proceed with stereo- and/or regiochemical control; substitution and elimination reactions; electrophilic aromatic substitution reactions; functional group manipulations (*e.g.*, reduction of a ketone to an alcohol or oxidation of a primary alcohol to an aldegyde or a carboxylic acid); alkylation of alkyne anions; Grignard reagents and Grignard chemistry; Williamson ether synthesis; Jones oxidation; Friedel-Crafts reactions; Sandmeyer reaction; Fischer esterification; Michael reaction (conjugate addition; C-centered nucleophile)

Topic/chapters to be covered this quarter & *approximate* timetable (28 lectures):

• Review (portions of chs 1-19; also, see the study guide formulated above to assist your review) – two lectures

• Carbohydrates (ch 20) – four lectures.
Problems from text: 1, 3, 4, 5a, 9-11,16-20, 22-27, 29-31.

• Heterocycles (ch 27) – three lectures
Problems from text: 2, 4, 5, 7, 8, 9, 11, 12, 13, 15, 22.

• Amino acids/proteins/peptides (ch 21) – four lectures
Problems from text: 1, 2, 4, 5, 8, 9, 16, 18, 19, 21, 24, 25, 26a, 27, 28.

• Nucleic acids (ch 25) – three lectures
Problems from text: 1, 2, 3, 4, 7, 8, 9, 11 (others *may* be added)

• Enzyme mechanisms & cofactors (ch 22-23) – three-four lectures
Problems from text - for Chapter 22: 2-7, 9, 11, 12, 13, 25-29; for Chapter 23: 2, 3 5, 7,10, 11, 13, 15, 20, 24.

• polymers (ch 26)- three lectures
Problems from text: 1, 2, 6, 7, 8-11, 14, 15, 17, 20.

• selected topics, *e.g.* 'organic synthesis' [as time permits]
Problems from text – in this case, nearly all of the problems will be those I make up and assign.