

CHEM 243 Organic Chemistry III

Course Syllabus - April 2007

Course Description: This course is a continuation of CHEM 242. Here you will learn more about the chemistry of aromatic compounds (material not covered in CHEM 242), aldehydes, ketones, amines, carboxylic acids, and acid derivatives: these are important classes of chemicals in the pharmaceutical and polymer industries. Reaction mechanisms and carbon-carbon bond forming reactions (time permitting) that are essential to modern organic chemistry will be covered. The chemistry of mono- and disaccharides may be covered if there is sufficient time, but this is unlikely.

Course Objectives: This course provides a solid foundation in the fundamentals of organic chemistry essential for the rational study of biochemistry, molecular biology, and materials applications of polymers.

Instructor: Peter Wade. Office: 12-508. Tel: 215-895-2652. e-mail: wadepa@drexel.edu. Office hours: Mon 3:00-4:00 p.m. in 12-508.

Required Text: "Organic Chemistry", 6th edition, L. G. Wade, Jr.

Recommended Supplement: any "Molecular Model Set" with at least 10 carbon atoms. Proteus or Prentice Hall models are good but others work as well.

Recommended Supplement: "Solutions Manual" to accompany the textbook; 6th edition to match text: J. W. Simek.

Archived Lecture Notes: Will be made available through Web-CT (video only).

Grading: a total of 500 points divided as follows:

1) three quizzes of 50 pts each (low score thrown out: no make-ups; 100 pts total). These will be given on the following dates: likely Apr. 16th, Apr. 27th, and May 18th (the 3rd, 4th, and 7th weeks of the term). Quiz dates might be modified with prior in-class notice.

2) two midterm exams - 100 pts each, 5th and 9th week, May 4th and June 1st; 200 points total.

3) comprehensive final - 200 pts.

Assigned problems are not graded but do show up on quizzes and exams. You need to do *all* of the assigned problems and understand the answers. Exams and quizzes are based on lecture material and the assigned problems. You need to get to lecture every day or get the notes on any day that you miss class. Grades are curved, typically > 240 pts is a "C" and > 430 pts is an "A".

Course Contents

Chapter 16. Aromatic Compounds. (If not covered in CHEM 242 by majority of class)

Chapter 17. Reactions of Aromatic Compounds.

Electrophilic aromatic substitution; Halogenation, nitration, and sulfonation-desulfonation; Reactivity and orientation in electrophilic substitution; Orientation with multiple substituents; Friedel-Crafts alkylation and

acylation; Nucleophilic aromatic substitution; Birch reduction; Side-chain oxidation; Side-chain halogenation; Benzyl and triphenylmethyl cations; Benzylic substitution reactions.

Chapter 18. Ketones and Aldehydes.

Nomenclature and properties; Sources of formaldehyde and acetaldehyde; Preparation of aldehydes from alcohols, aromatic compounds, acid chlorides, and nitriles; Preparation of ketones from alcohols, aromatic compounds, acid chlorides, carboxylic acids, and nitriles; Wittig olefination; Hydration of aldehydes; Carbonyl addition of cyanide, amines, hydrazines, hydroxylamine, etc.; Acetal formation and hydrolysis; Redox reactions of aldehydes and ketones; Spectroscopic analysis.

Chapter 19. Amines.

Structure, nomenclature, and properties of amines; Amine salts; Basicity of amines; Preparation from nitro compounds, azides, and amides; Reductive amination; Aromatic substitution reactions of aromatic amines; *N*-Alkylation, acylation, and sulfonylation reactions; Hofmann elimination; Nitrosation (diazotization) of amines; Substitution reactions of arenediazonium salts; Diazonium coupling.

Chapter 20. Carboxylic Acids.

Nomenclature, structure, and properties; Important diacids; Acidity concepts; Carboxylate salts; Conversion to acid chlorides, esters, and amides; Reduction; Spectroscopic analysis.

Chapter 21. Carboxylic Acid Derivatives.

Nomenclature of acid chlorides, anhydrides, esters, amides, and nitriles; Lactones and lactams; Nucleophilic acyl substitution; Interconversion of acids, acid chlorides, anhydrides, amides and nitriles; Reduction of acid derivatives; Reaction of acid derivatives with organometallic reagents; derivatives of carbonic acid.

Chapter 22. Alpha Substitutions and Condensations of Enols and Enolate Ions (time permitting; not usually covered) Enols and enolates; α -Halogenation of carbonyl compounds; Alkylation of enolates; Aldol condensations; Aldol cyclizations; Claisen condensations; Dieckmann reactions; Michael reactions.