

# CHEMISTRY 263 - Section B6

## Lecture Outline 1 & Assignment 1

TR 12:30-13:50  
January 10, 2006  
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Office: W5-09A

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### Read:

TWG Solomons and CB Fryhle "Organic Chemistry" 8th Edition (2004):

- Functional Group List on pp 70-71 and (Periodic Table) one page back from Inside Back Cover
- Relative Strength of Acids and Bases on Inside Front Cover - same table page 105
- Chemical Shift Ranges in NMR – inside back cover facing page
- Chapter 9 - Nuclear Magnetic Resonance (NMR) Spectroscopy
  - read all for overview
  - study sections 9.1 to 9.11
- Chapter 13 - Conjugated Unsaturated Systems

### Problems:

Do Not turn in, answers available in "Study Guide and Solutions Manual for Organic Chemistry " by Solomons and Fryhle.

#### Chapter 9:

9.1; 9.2; 9.4; 9.5; 9.7; 9.8; 9.11; 9.36

#### Chapter 13:

13.1 to 13.7; 13.9; 13.12; 13.13; 13.14; 13.29; 13.32

## Lecture Outline 1: Nuclear Magnetic Resonance (NMR) Spectroscopy, Conjugated Systems and Ultraviolet Spectroscopy

### 1. Nuclear Magnetic Resonance (NMR) Spectroscopy

- A. Electromagnetic Spectrum
- B. Principle of NMR and Instrumentation
- C. Proton Chemical Shift: Peak Position and Integration
  1. Shielding and Deshielding of Hydrogens – Chemical Shifts
  2. Tetramethylsilane (TMS) standard
  3. Equivalent and Non-equivalent Hydrogens
- D. Spin-Spin Splitting
- E. Basics of Carbon-13 NMR Spectroscopy
- F. Basics of 2D NMR Spectroscopy

### 2. Conjugated Systems and Resonance

- A. Nomenclature of Dienes and Allyl vs Vinyl
- B. Allyl Radical, Cation, and Anion - Stabilization and Resonance
- C. Addition Reactions of Dienes
- D. Allylic Radicals and Allylic Cations - Rubber and Polystyrene

### 3. Energy Characteristics of Allylic Systems

- A. Stability of Conjugated Dienes
  1. Bond Lengths
  2. Conformation

- B. Visible and Ultraviolet Spectroscopy
  - 1. Measurement of spectra
  - 2. Absorption energies
  - 3. Biological significance

#### 4. **Electrocyclic Reactions of Alkene Systems**

- A. Diels-Alder and Retro Diels-Alder
  - 1. General Form of reaction
  - 2. Stereochemistry