# Chem 164/261 Assignment & Lecture Outline 5: Carbonyls & Addition Reactions, Intro to Carbohydrates

# Read

Organic Chemistry, W. Ogilvie et al. 1st Edition – 2018 – Nelson Ltd.

- Functional Group List (see Handout) and (Periodic Table (Inside Front Cover)
- Chapter 7 Reactions of Carbonyls
- Chapter 5 Reaction Mechanisms re-read
- Chapter 4 Section 4.12 Fischer Projections re-read
- Chapter 16 Acetals & Sugars Sections 16.1 to 16.3

## Problems

Do Not turn in, answers available in "Study Guide Student Solutions Manual " W. Ogilvie et al.

- Chapter 7: 7.1 to 7.3; 7.11; 7.13; 7.16; 7.21; 7.26; 7.42
- Chapter 16: 16.1; 16.6

# Lecture Outline #5

- I. Structure and Nomenclature of Alcohols and Ethers
  - A. Aliphatic Alcohols
    - 1. IUPAC system
    - 2. Common names carbinol system, "alcohol" names
  - B. Aromatic Alcohols (Phenols)
  - C. Ethers
    - 1. Common names
    - 2. IUPAC system "alkoxy"

#### **II. Physical Properties**

- A. Alcohols and Phenols general properties
  - 1. MP, BP, solubility, density hydrogen bonding
  - 2. Acidity of aliphatic alcohols (ROH) and ArOH
- B. Physical Properties of Ethers

#### III. Intgroduction to Structure, Nomenclature, Properties of Aldehydes and Ketones

- A. Nature of the Carbonyl Group Physical Properties
  - 1. Polarity and Reactivity
  - 2. Hybridization and shape (sp2, planar)
  - 3. Physical Properties BP, MP, solubility, smell
- B. Nomenclature of Aldehydes RCHO
  - 1. IUPAC alkane name, replace "e" with "al"
- C. Nomenclature of Ketones RCOR
  - 1. IUPAC alkane name replace "e" with "one"

## IV. Reactions of Aldehydes and Ketones

- A. Nucleophilic Additions at the Carbonyl Carbon Atom
  - 1. General considerations strong vs. weak nucleophiles
  - 2. Cyanohydrin formation
  - 3. Grignard reagent addition
  - 4. Reduction (hydride addition)
  - 5. Hemiacetal and Acetal formation

# V. Carbohydrates

- C. Monosaccharides
  - 1. Classification aldose, ketose, triose, tetrose, etc...
  - 2. Stereoisomerism
  - 3. Anomers and ring formation (hemiacetals, acetals)
  - 4. Properties and sweet taste
- D. Disaccharides and Polysaccharides
  - 1. Sucrose
  - 2. Cellulose, starch, glycogen