

## CHAPTER TWELVE

The following is a list of important topics for students taking Chemistry 30B, by chapters in the course textbook (Chemistry, An Introduction to General, Organic & Biological Chemistry 12th Ed by Karen C. Timberlake). Exams and assignments will focus on helping students achieve these goals. Additional topics may be added during the semester and not all will be tested for on any given exam or assignment. Students are encouraged to use this outline to review chapters, prepare for exams, and determine if Chemistry 30B meets the student's personal objectives in studying chemistry.

### CH 12: ALCOHOLS, THIOLS, ETHERS, ALDEHYDES & KETONES

2½ lectures

#### Alcohols, Phenols, Thiols & Ethers ( section 12.1 )

- Know what a functional group is and how it can be used to define a family of organic compounds.
- Draw structures for, and use IUPAC to name, alcohols.
- Recognize and provide the common names of simple alcohols.
- Name and draw the structure of substituted phenols.
- Know how the thiol functional group ( -SH ) defines the thiol family of compounds.
- Draw structures and use IUPAC to name thiols.
- Understand ethers are substances that contain an ether group ( -O- ) between two carbons.
- Draw and provide the common name of simple ethers.

#### Properties & Uses ( 12.2 )

- Be able to identify and give examples of primary, secondary, and tertiary alcohols and thiols.
- Understand how the hydroxyl group allows alcohols to participate in hydrogen bonding (-OH).
- Understand how the presence of hydroxyl groups effect relative solubility, boiling & melting points.
- Know the thiol group does not participate in hydrogen bonding.
- Predict which compounds may have harsh or pleasant odor, sweet or bitter taste by the presence of thiol or phenol groups.
- Give or identify examples of uses found for alcohols, phenols, thiols, and ethers.

#### Aldehydes & Ketones ( 12.3 )

- Know aldehydes, ketones, & carboxylic acids are substances containing a carbonyl group (-CO-).
- Use IUPAC to name and draw aldehydes and ketones.

#### Reactions of Alcohols, Thiols, Aldehydes, & Ketones ( 12.4 )

- Recognize an organic molecule gaining O-C bonds or losing H atoms is being oxidized.
- Recognize an organic molecule gaining H-C bonds or losing O atoms is being reduced.
- Predict the product of oxidizing or reducing an alkane, alcohol, aldehyde, or carboxylic acid.
- Understand tertiary alcohols cannot be oxidized.
- Predict the disulfide product of reducing thiols.
- Identify and write combustion reactions (an oxidation) of alcohols, using oxygen and heat.
- Identify and write dehydration reactions (a reduction) of alcohols, using acid and heat.
- Apply Tollen's test and describe how it can indicated the presence of aldehydes.
- Apply Benedict's test, describe how it can indicate the presence of aldehydes adjacent to alcohols.
- Identify the reaction or write the reaction for Tollen's test or Benedict's test.
- Know  $\text{NaBH}_4$  or  $\text{H}_2 + \text{catalyst (Pt or Ni)}$  is used to reduce aldehydes and ketones to alcohols.