**Biochemistry- Review Ch 14 Test**

**Chapter 14 – Organic Compounds with Oxygen and Sulfur:**

**Alcohols, Thiols, Ethers**

***Definitions***

* + **Alcohols**
  + **Ethers**
  + **Thiols**
  + **Primary Alcohols**
  + **Secondary Alcohols**
  + **Tertiary Alcohols**
  + **Intermolecular hydrogen bonding**
  + **Dehydration Reactions**
  + **Alcohol Oxidation Reactions**
  + **Thiol Oxidation Reaction**
  + **Fermentation Reaction**

***Basic Concepts***

* + Draw and describe a primary, secondary, and tertiary alcohol
  + Alcohols are “bent” in shape and tetrahedral about the oxygen atom
  + Alcohols use hydrogen bonding with one another and thus have higher boiling and melting points than similar molecular weight hydrocarbons
  + The most important physical property of an alcohol is the polarity of the –OH group
  + Low molecular weight alcohols will dissolve in polar solvents (water) – high molecular weight alcohols will dissolve in organic solvents but will not be water soluble
  + Loss of water from an alcohol is known as dehydration (an **elimination reaction**). What catalyst is required?
  + **Zaitsev’s Rule (don’t have to know the name, just the rule):** The major product in al elimination reaction is the one that has more alkyl groups directly attached to the newly formed C=C bond
  + Primary alcohols oxidize into aldehydes which then can further oxidize into carboxylic acids
  + Secondary alcohols oxidize into ketones
  + Tertiary alcohols **do not oxidize**
  + Ethers are “bent” in shape and tetrahedral about the oxygen atom just like alcohols
  + Ethers have stronger intermolecular forces than hydrocarbons but much weaker intermolecular forces than alcohols thus boiling points are lowest for hydrocarbons, higher for ethers, and much higher for alcohols
  + Low molecular weight ethers will dissolve in polar solvents (water) – high molecular weight ethers will dissolve in organic solvents but will not be water soluble (just like alcohols)
  + Thiols are classified as primary, secondary, or tertiary following the same rules as alcohols
  + Thiols are reduced; disulfides are oxidized
  + Boiling and melting points for thiols are much lower than alcohols
  + Thiols have little hydrogen bonding; nonpolar and thus are always water insoluble!
  + Fermentation (anaerobic) produces ethyl alcohol

***Nomenclature***

* Alcohols:
  + Suffix = **-ol**
  + Longest carbon chain must contain the carbon bonded to the –OH group – this is given the lowest possible number
  + All other rules of nomenclature then apply
  + If the –OH group is bonded to a ring, that is automatically carbon #1 – do not put “1” in the name
  + What are diols and triols?
* Ethers:
  + Simple ethers are given common names
    - Alphabetize the two alkyl groups and add the word “ether” ex: Ethyl methyl ether
    - If two identical alkyl groups name as a “di-“ compound ex: Dimethyl ether
  + More complex ethers can be given alkoxy group names ex: 4-ethoxyoctane where 4 refers to the position on the octane chain that has the –OCH2CH3 (ethoxy group) bonded to it
* Phenyl group = Benzene ring attached to a parent compound; Phenol= benzene with -OH
* Thiols:
  + Named like alcohols, but end in –thiol
  + All other nomenclature rules apply