Organic Chemistry 212
Prof J. Walker
Notes: *Chapter Five – Alcohols, Ethers, and Thiols*

A new functional group is introduced in this chapter: thiol

A thiol is like an alcohol except that sulfur is where oxygen would be located. Thus the thiol functional group is represented as: R-SH

Alcohols

Alcohols have names ending in ol. Ethanol, 1-Propanol, 2-Propanol and Cyclohexanol are all examples. Draw these structures below:

Alcohols are classified as primary, secondary and tertiary. Draw one example of each type:

More than one –OH in an alcohol result in diols (two), triols (three) and other classes of compounds such as sugars (more on that in a later chapter). When the two –OH groups are on adjacent carbons then the compound is called a glycol.

The –OH group is polar and this significantly affects the properties of the organic molecule. Alcohols have higher melting points and boiling points than the alkanes, alkenes and alkynes of comparable molecular weight. Hydrogen bonding occurs.

What exactly is hydrogen bonding and when can it occur?

Small alcohols are also soluble in water.

Characteristic Reactions

Acid catalyzed dehydration of alcohol:

How do the reactivity of primary, secondary and tertiary alcohols compare for the dehydration reaction?

What is the product of a dehydration reaction?

What are the major and minor products of the dehydration of 2-butanol? Why?

Oxidation of Primary and Secondary Alcohols:

When a primary alcohol is oxidized – what is the product? If the reaction is halted using distillation, what is the product?

When a secondary alcohol is oxidized – what is the product?

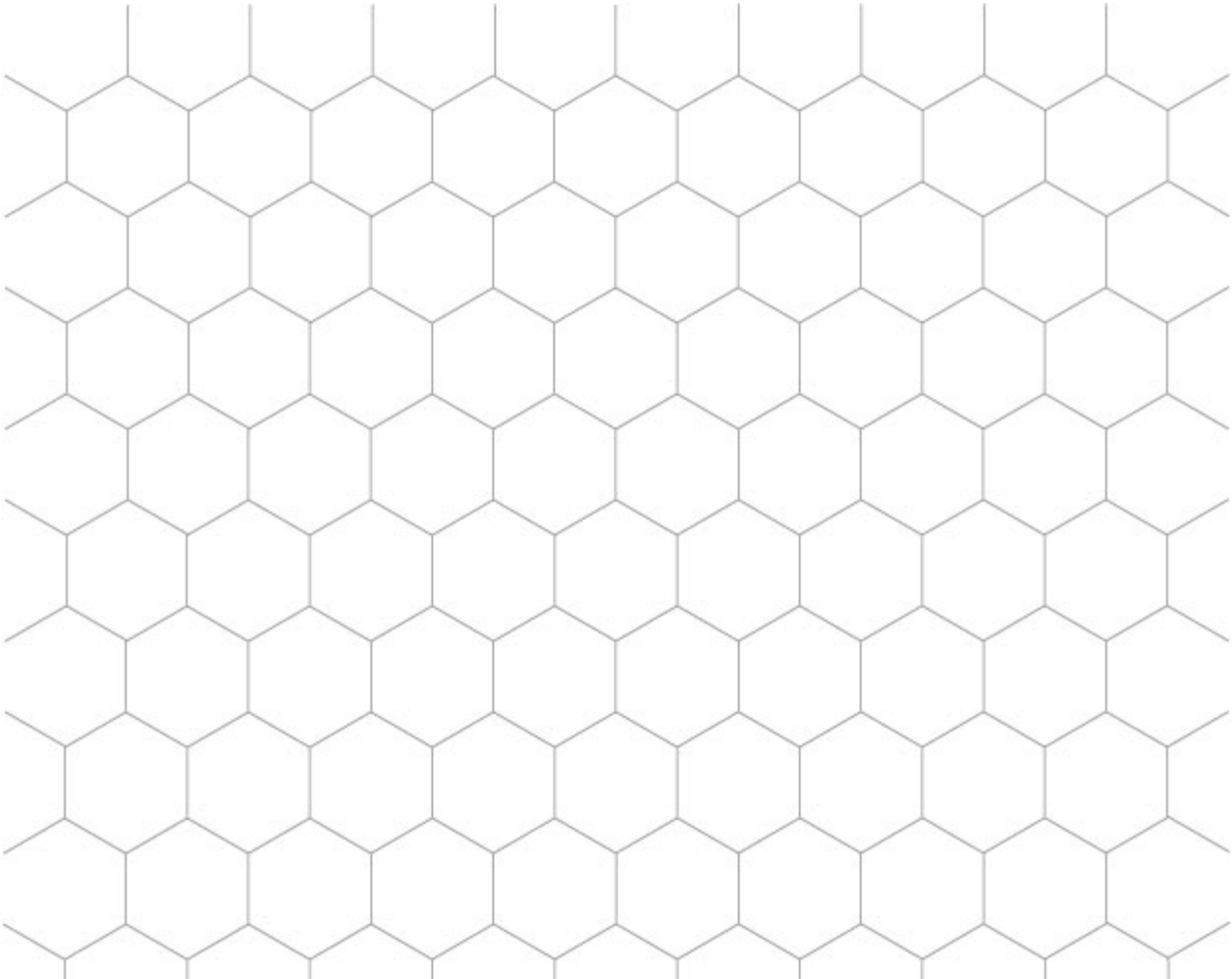
What conditions and what catalysts are used to carry out the oxidation of alcohols?

Why don't tertiary alcohols undergo oxidation? Could this be used to tell the difference between a tertiary alcohol and other alcohols in the laboratory?

Summarize how a breath-alcohol screening test works:

Ethers

Draw some common ethers and give their common names:



Ethylene oxide and Tetrhydrofuran are interesting ethers. Draw their structures and describe their uses:

Why do alcohols have higher melting points and boiling points when compared to ethers?

Describe the solubility of ethers in water:

Thiols

How does the term mercaptan relate to the term thiol?

The most common reaction of thiols is their oxidation to disulfides. Give an example:

Common molecules:

ethanol

isopropyl alcohol

glycerin

ethylene glycol