Science Inquiry II – Midterm Outline

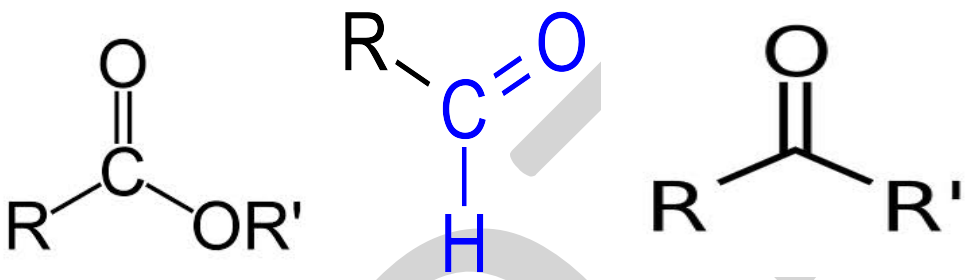
- Alcohols
  - Naming Structures
    - If looking at an alkanes
      - Look at longest chain: Name it
        - Meth, eth, prop, but, ___, hex + ane
      - Once you identified the longest chain, look at the location of the other stuff.
        - Write down those chains using yl
        - Note location of them. If you have a chain that repeats in several places, then simply write as follows: 2, 2, 3, Trimethly. Don't forget to put the TRI there because that tells you how many there are.
    - If looking at alchohol
      - Look at longest chain and name it:
        - Methanol, ethanol, propanol, butanol, hexanol etc. and write down location of the Alcohol group.
        - Follow above steps
  - Be able to discuss:
    - Polarity: As you increase the mass, the more non-polar it becomes. The OH gives it the polar functionality but C is non polar. So, as you increase the number of Carbons, the percent of non-polar to polar increases, which decreases the overall polarity.
    - Solubility: The rule is like dissolves like. The more polar something is, the more susceptible it is to being soluble in water.
    - Boiling Points:
      - Size: Because there are more atoms, there are more electrons. If there is more electrons, then the greater the London dispersion forces, making the boiling point even higher.
      - Shape: Long and stringy vs. Round and Fat. The premise behind this is that round and short one is LESS tangled. Thus, in order to untangle it, it requires more energy.
      - Intermolecular Forces: If we compared H-bond to a dipole dipole and London dispersion, we know that something that has an –ol would have a greater boiling point. The –ol group has a hydroxyl group which makes it polar as opposed to the ane group which doesn't
      - %London Dispersion Forces: Wouldn't it be simpler to say that the hydroxyl group causes polarity in the molecule, creating differences in electronegativity. However, in large molecules, as the amount of Carbon increases, which is inherently non polar, you increase the number of london dispersion forces. As a

result, the effect of the hydroxyl group is minimized. Therefore, as we increase the mass of a carbon structure with alchohol, we can state that polarity goes down as well

- Primary vs. Secondary. The primary has a higher boiling point as it is more likely to form an H-Bond. As a result, the boiling point of the primary increases.

❖ Organic Molecules
  ➢ Identification of Functional Groups

ESTER ALDEHYDE KETONE



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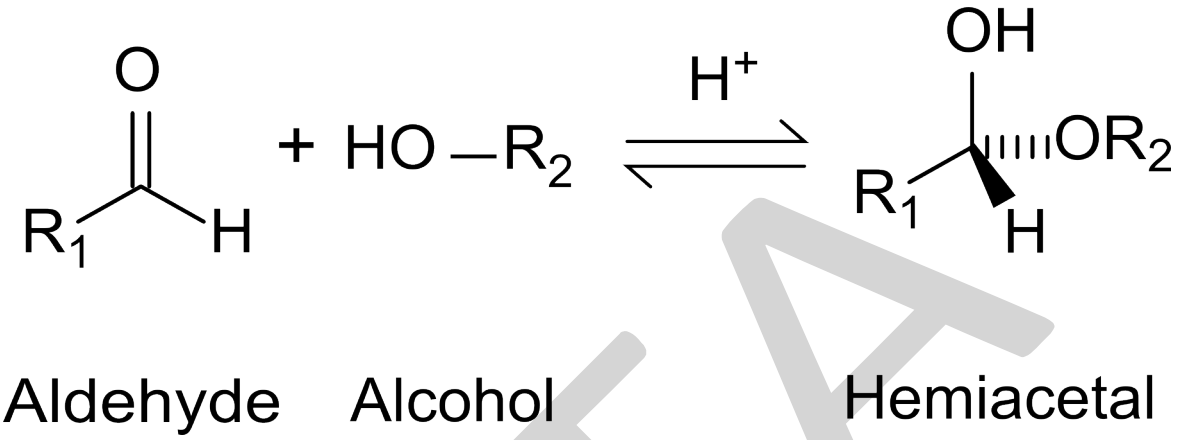
Carbonyl: C double bonded to an O. Carboxyl: C double bonded to an OH.

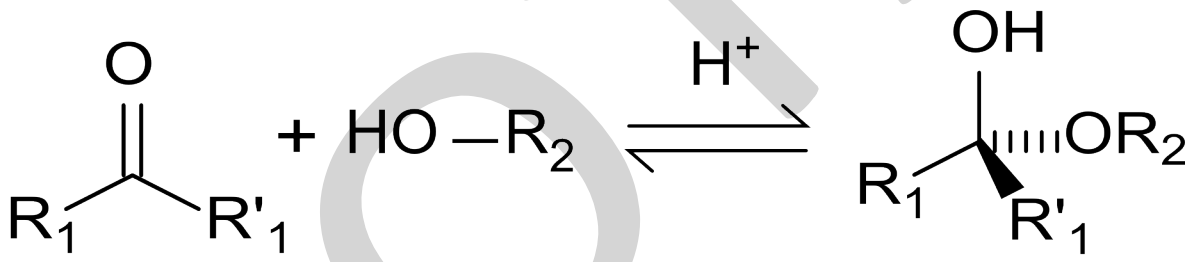
❖ Nucleophiles and Electrophiles
  ➢ Label
    ▪ General gist: O is the the nucleophile, C is the electrophile
  ➢ Define
    ▪ Nucleophile: Attracted to positive charges
    ▪ Why this occurs? Because of the pi bond and the way they share electrons makes the O partially negatively charged
    ▪ Electrophile: Attracted to electron rich centers.
❖ Complete Esterification Reactions
  ➢ Fatty Acid: Fatty Acid Chains are hydrophobic (non-polar). They are used for long-term energy storage. Can be found as unsaturated and saturated and are linked by ester linkages.
❖ Complete Saponification Reactions

- VERY SIMPLE. Look at where the O is. Cut it off and add an H. Put the other stuff away and add the other stuff on to it.

❖ Formations:
- EsterfiAldehyde + Alchohol = Hemi Acetyl
- Hemi Acetyl + Alchohol = Acetyl



Aldehyde Alcohol Hemiacetal



Ketone Alcohol Hemiketal

If you see an answer that doesn't have a double bond but has the Oxygen present, identify it as either a Ketal or Acetal.

Hemiketal + Alcohol yield ------- > Ketal.

To produce this, the first step is just closing a sugar, but the second on is an esterification.

- Sugars
  - Straight Chain to Ring
  - Ring to Straight Chain