Science 30 - Unit B - Preparation of Esters QUICK LAB

Name: _____

Background Information:

Explain an esterification (condensation) reaction

Objective:

1. To synthesize several esters and try to identify the odor of each
2. To write the chemical equation for the formation of each ester using structural formulas

Materials:

4 test tubes in rack	Methanol
Plastic eye dropper	Ethanol
Scale	Propan-1-ol
4 beakers	Glacial acetic acid
2 graduated cylinders (10mL)	Salicylic acid
Thermometer	Concentrated sulfuric acid
Hot plate	Octan-1-ol

Procedure:

1. Label 4 test tubes 1,2,3,4
2. Into the appropriate test tube, pour the correct amount of alcohol and add the corresponding carboxylic acid as indicated in the table below:

Table 1: Reagents for Preparation of Esters

Test Tube	Carboxylic Acid	Alcohol
1	1 mL acetic acid	1 mL ethanol
2	1 mL acetic acid	1 mL propan-1-ol
3	1 mL acetic acid	1 mL octan-1-ol
4	1 g salicylic acid	1 mL methanol

1. To each test tube, add 3-5 drops of concentrated sulfuric acid.
2. Put ABOUT 150mL of water in a 250mL beaker. Place the test tubes in the water and heat the water on a plate to a temperature of about 60∞C. Leave the test tubes in the hot water bath for 15 min. DO NOT ALLOW THE WATER TO REACH ABOVE 70∞C.
3. Cool the test tubes by immersing them in cold water in another beaker.
4. Add 5mL of water to each test tube.
5. Carefully note the odor of the contents of each of by wafting.
6. Dispose of all materials into the waste bin.

Experimental Results:

Table 2: _____

Test Tube	*Name of Ester Formed*	*Odor*
1		
2		
3		
4		

Analysis of Results:

Using the structural formulas, write the equations for the reactions that occurred in each of the test tubes.

Your reactions should include the structural diagram, the name of the compounds and reaction arrows.

Test Tube 1:

Test Tube 2:

Test Tube 3:

Test Tube 4:

Follow Up Questions:

1. What is the name of the ester formed in each of the following combinations? (2marks)
    a. Ethanol + Hexanoic Acid

    b. Methanol + Pentanoic Acid

2. What are the reactants of the following esters?
    a. Hexyl octanoate

    b. Methyl butanoate

3. The ester methyl salicylate is also known as “oil of wintergreen”. Name 3 commercial products that contain this substance.

4. Identify the chemicals involved in the manufacture of the synthetic fiber POLYESTER. Explain how these chemicals permit the formation of a long chain of molecules joined by ester links.

5. Acid was used in this experiment to promote the formation of the ester, but if the base sodium hydroxide is added to an ester, the reverse process occurs and the ester undergoes hydrolysis (reaction with water) to reform its original alcohol and acid. Write the equation for the hydrolysis of the ester *n-propyl butanoate*