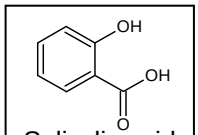
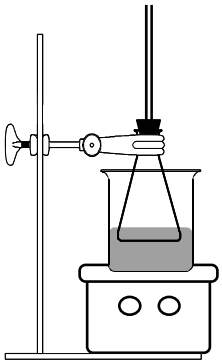
Making esters

In today's lab, the following chemicals will be available: methanol, isoamyl alcohol (3-methyl-1-butanol), isobutyl alcohol (2-methyl-1-propanol), propanoic acid, acetic acid (ethanoic acid), and salicylic acid (shown to the right).



Salicylic acid

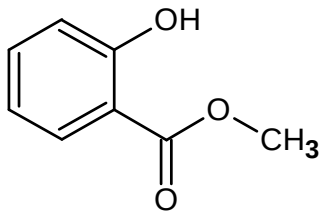
1. Half fill a 600 mL beaker with hot water (from the tap at the front of the room). Get a hotplate. Place the beaker (with water) on the hot plate and begin heating.
2. Obtain, from your instructor, a piece of paper with a diagram of the ester that you will be making. Based on the structure of the ester, determine the acid and alcohol required to make your ester.
3. There is one pipette for each reagent. Do not to mix the pipettes. You will need goggles when dispensing chemicals. Be especially careful when handling acetic acid, propanoic acid, and H_2SO_4. These are concentrated, corrosive acids. If any of these acids comes in contact with your skin, flush immediately with water.
4. Measure 10 mL of alcohol into a clean 250 mL Erlenmeyer flask. Add 10 mL of acid (or in the case of a solid acid, 3 small scoops). Carefully add 8 drops of H_2SO_4. Swirl to mix.
5. Stopper the flask firmly with a cork stopper (and glass tubing). Heat the flask in the water bath as illustrated. The contents should be kept just below their boiling point. If boiling occurs or if liquid begins to rise up the glass tubing, adjust the flask so it is not as deep in the water. Heat for 10 minutes, then remove the flask and allow it to cool. While you are waiting you can start on the question below.
6. Add about 15-20 mL of distilled H_2O to dilute and sequester the acid. Swirl to mix.
7. Smell the product by fanning the fumes toward your nose (do not inhale directly over the flask. Leave the diagram of your ester beside your flask. Circulate through the lab. Smell the products of other groups.
8. Finally, clean up. All reagents should be placed in the organic waste container provided. Wash glassware with soap and water; rinse well.



Question:

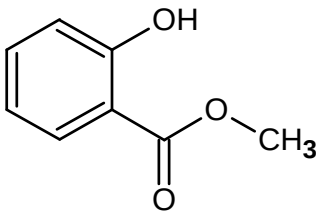
Draw the four esterification reactions that occurred (draw and name all reactants and products).

1)



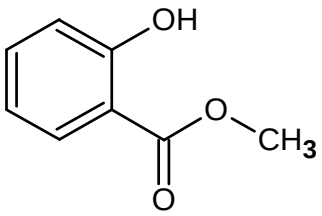
methyl salicylate
“wintergreen”

1)



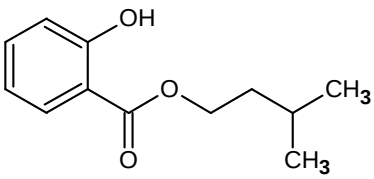
methyl salicylate
“wintergreen”

1)



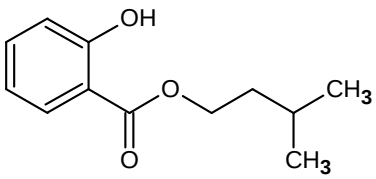
methyl salicylate
“wintergreen”

2)



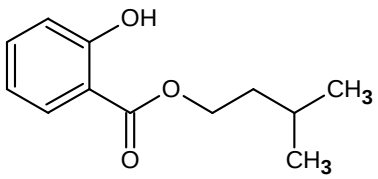
isoamyl salicylate
“pineapple”

2)



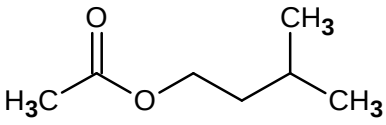
isoamyl salicylate
“pineapple”

2)



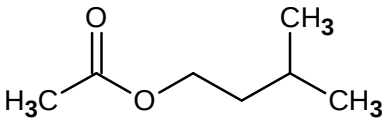
isoamyl salicylate
“pineapple”

3)



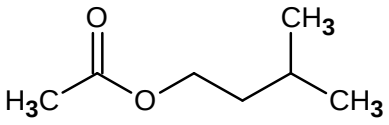
isoamyl acetate
“Banana”

3)



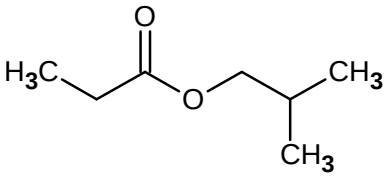
isoamyl acetate
“Banana”

3)



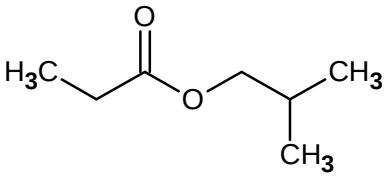
isoamyl acetate
“Banana”

4)



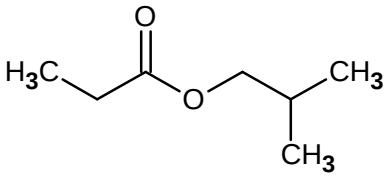
isobutyl propionate
“Rum”

4)



isobutyl propionate
“Rum”

4)



isobutyl propionate
“Rum”