

Name: _____

Date: _____

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Investigation 10.3: Synthesis of an Ester

REPORT CHECKLIST

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|----------------------------------|---|---|
| <input type="radio"/> Purpose | <input type="radio"/> Design | <input checked="" type="radio"/> Analysis |
| <input type="radio"/> Problem | <input type="radio"/> Materials | <input type="radio"/> Evaluation |
| <input type="radio"/> Hypothesis | <input type="radio"/> Procedure | |
| <input type="radio"/> Prediction | <input checked="" type="radio"/> Evidence | |

Purpose

The purpose of this investigation is to use the esterification generalization and diagnostic tests to synthesize and observe the properties of two esters.

Problem

What are some physical properties of ethyl ethanoate (ethyl acetate) and methyl salicylate?

Design

The esters are produced by the reaction of appropriate alcohols and acids, using sulfuric acid as a catalyst. The solubility and the odours of the esters are observed.

Materials

- Lab apron
- Eye protection
- Dropper bottles of:
 - Ethanol
 - Methanol,
 - Glacial ethanoic (acetic) acid
 - Concentrated sulfuric acid
- Vial of salicylic acid (2-hydroxybenzoic acid)
- Two 25 × 250 mm test tubes
- 250 ml beaker or polystyrene cup
- Two 50 ml beakers
- Two 10 ml graduated cylinders
- Laboratory scoop
- Balance
- Hot plate or hot tap water
- Thermometer
- Ring stand with test tube clamp



Concentrated ethanoic and sulfuric acids are dangerously corrosive. Protect your eyes, and do not allow the acids to come into contact with skin, clothes, or lab desks.

Both methanol and ethanol are flammable; do not use near an open flame.

Excessive inhalation of the products may cause headaches or dizziness. Use your hand to waft the odour from the beaker away from your nose. The laboratory should be well ventilated.

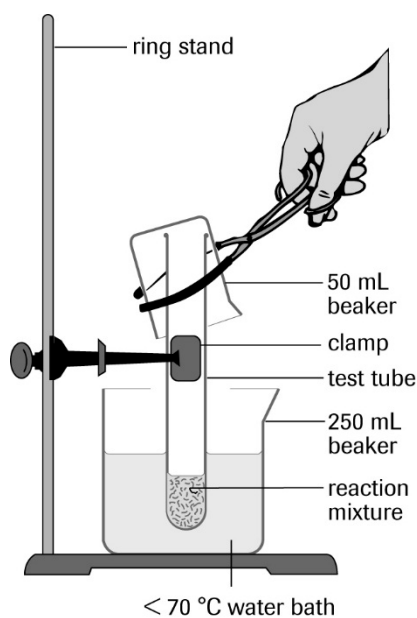


Figure 3
Set-up for synthesis of an ester

Procedure

1. Add about 5 mL of ethanol and 6 mL of ethanoic acid to one of the test tubes.
2. Ask your teacher to add 8 to 10 drops of concentrated sulfuric acid to the mixture.
3. Set up a hot water bath using the 250 mL beaker. (The temperature of the water should not exceed 70 °C.)
4. Clamp the test tube so that the reaction mixture is completely immersed in hot water (**Figure 3**).
5. As a safety precaution to block any eruption of the volatile mixture, invert a 50 mL beaker above the end of the test tube (Figure 3).
6. After the reaction mixture heats for about 10 min, rinse the second 50 mL beaker with cold tap water and add about 30 mL of cold water to this beaker.
7. Cool the test tube by running cold tap water on the outside of the tube.
8. Pour the contents of the test tube into the cold water in the 50 mL beaker. Observe and smell the mixture carefully, using the correct technique for smelling chemicals.
9. Repeat steps 1 to 7, using 3.0 g of salicylic acid, 10 mL of methanol, and 20 drops of sulfuric acid.
10. Dispose of all mixtures into the sink with lots of cold running water.

Evidence/Analysis

Table 1 Esterification Reactions

Reactants	Observations	Possible product
<ul style="list-style-type: none">• Ethanol• Ethanoic acid• Sulfuric acid		
<ul style="list-style-type: none">• Methanol• Salicylic acid• Sulfuric acid		

Random Notes Here: