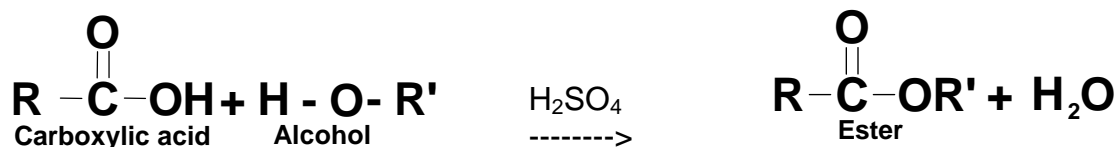


ESTERS:

Those Wonderfully Odoriferous Chemicals

INTRODUCTION

In this experiment, you will carry out examples of acid-catalyzed esterification. The reaction is called a condensation reaction and it involves the combination of a carboxylic acid with an alcohol to form an ester with simultaneous formation of a water molecule. Today's procedure is called the Fischer esterification method.



R is used by chemists to represent a general hydrocarbon chain that is considered unreactive in a chemical reaction.

TECHNIQUES

To determine the odor of a volatile compound, it is most appropriate to wave the fragrance toward your nose with your hand. This technique is known as **wafting**, don't stick your nose in the container until you are certain of the potency of the odor.

SAFETY AND DISPOSAL

- Concentrated sulfuric acid is used in this laboratory and causes severe burns on skin and clothing. If any is spilled, first add water, then wipe up.
- The butyric acid is to remain in the hood **at all times**. Use the plastic condenser provided for the butyric acid reaction to contain odors. (Leave in the hood when finished for others to use.)
- The "water bath" is obtained from coffee pots using Styrofoam™ cups. A Bunsen burner and a beaker of water could be used to make a hot water bath, but, due to the flammable nature of the alcohols, this is not advisable. Please put the Styrofoam™ cups back on the counter when finished.

EXPERIMENTAL PROCEDURE



will appear to indicate helpful hints, additional information, or interesting facts.



will appear to remind you of potential dangers and hazards.

I. Preparation of isoamyl acetate

- A. Describe the odor of the reactants before you begin the reactions.
- B. Mix 1 mL (20 drops) of isoamyl alcohol with 1 mL (20 drops) of acetic acid in a small test tube and cautiously add 10 drops of concentrated sulfuric acid.



Acetic acid and concentrated H_2SO_4 must be handled with care!

- C. Place the test tube in the water bath for 5 - 10 minutes.
- D. Pour the mixture into a beaker and carefully determine the odor of the products using the wafting technique.
- E. Complete the equation and give the name of each organic compound under its formula.

II. Preparation of methyl salicylate

- A. Describe the odor of the reactants before you begin the reactions.
- B. Place 0.2 g of salicylic acid in a test tube and dissolve it in 1 mL (20 drops) of methyl alcohol. Add 10 drops of concentrated sulfuric acid and place in water bath for 5 - 10 minutes.
- C. Pour the mixture into a beaker and carefully determine its odor.
- D. Complete the equation and give the name of each organic compound under its formula.

III. Preparation of ethyl butyrate

PERFORM UNDER HOOD ONLY. CAREFULLY assess the odors of the reactants before you begin the reactions.



Butyric acid is responsible for the odor of rancid butter.

- A. Place 3-4 drops of butyric acid in a test tube. Add 1 mL (20 drops) of ethyl alcohol and then 10 drops of concentrated sulfuric acid.
- B. Place the plastic condenser over the top of the test tube and place in the water bath for 5 - 10 minutes. Remove the condenser and carefully determine the odor.
- C. Complete the equation and give the name of each organic compound (reactants and products) under its formula.