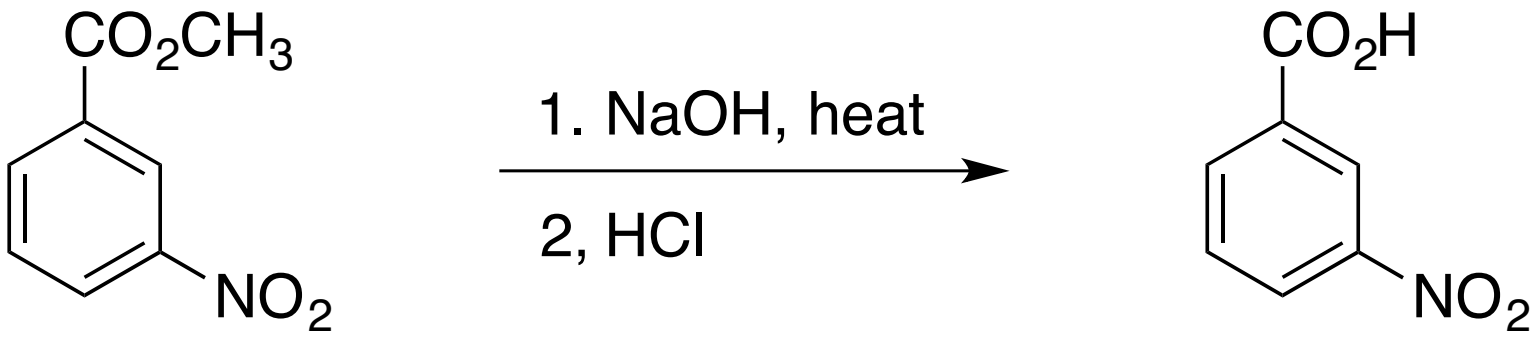
Week 7-9
Carboxylic Acids

Preparation of Methyl 3-Nitrobenzoate

Preparation of 3-Nitrobenzoic Acid

Preparation of 3-Nitrobenzamide

Preparation of 3-Nitrobenzoic Acid



Preparation of 3-Nitrobenzoic Acid Basic Hydrolysis Mechanism (Saponification)

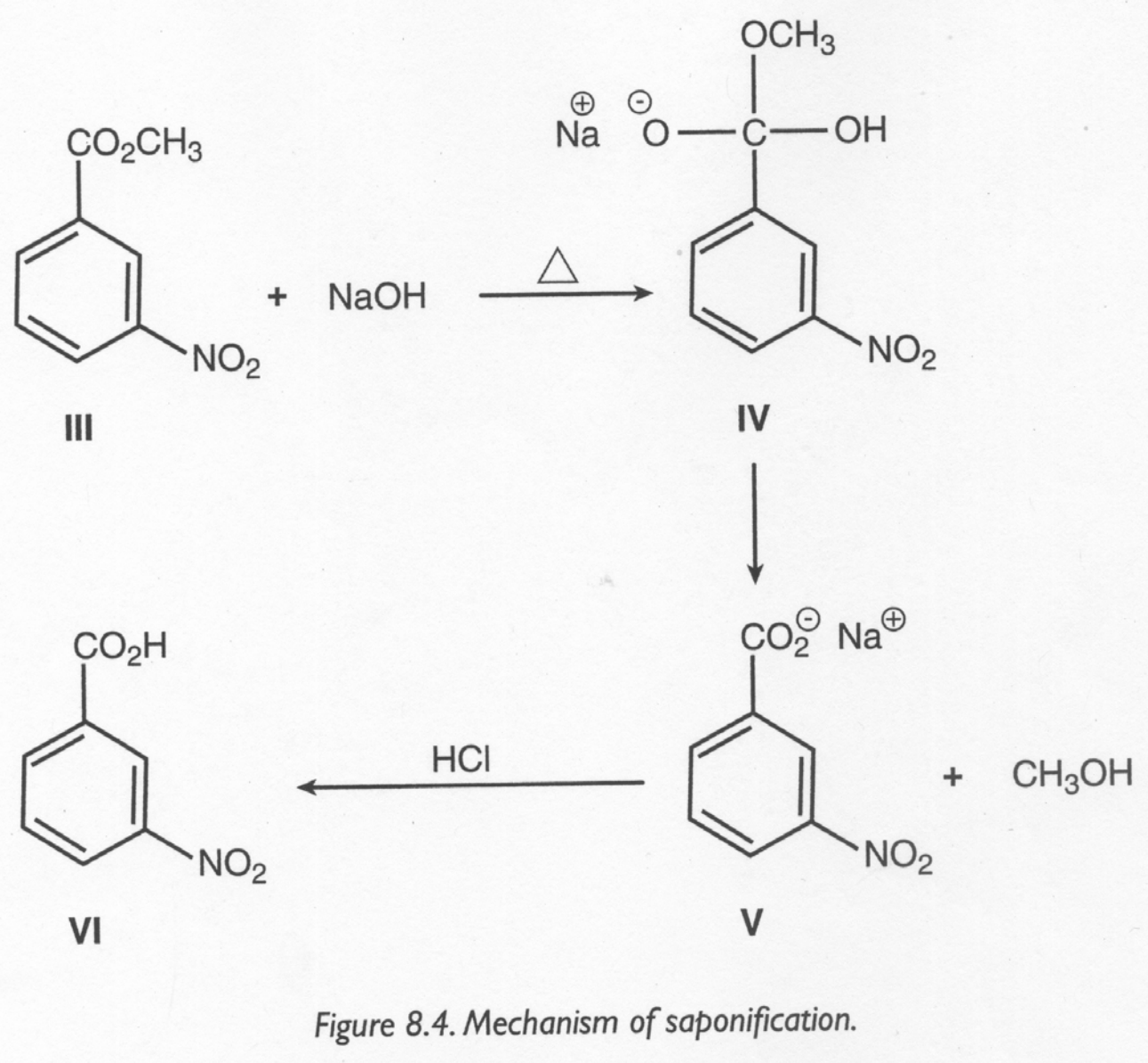
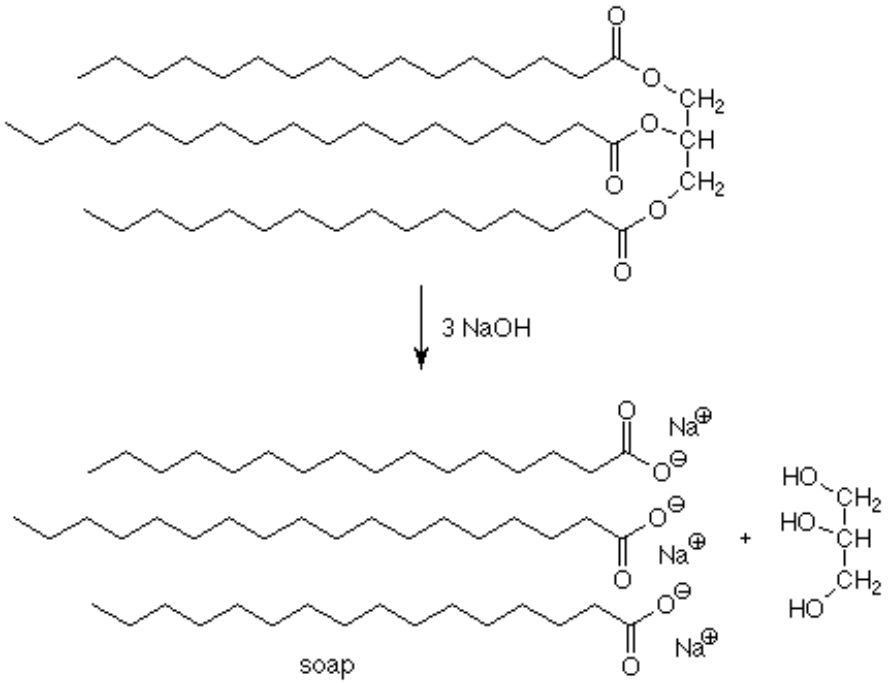
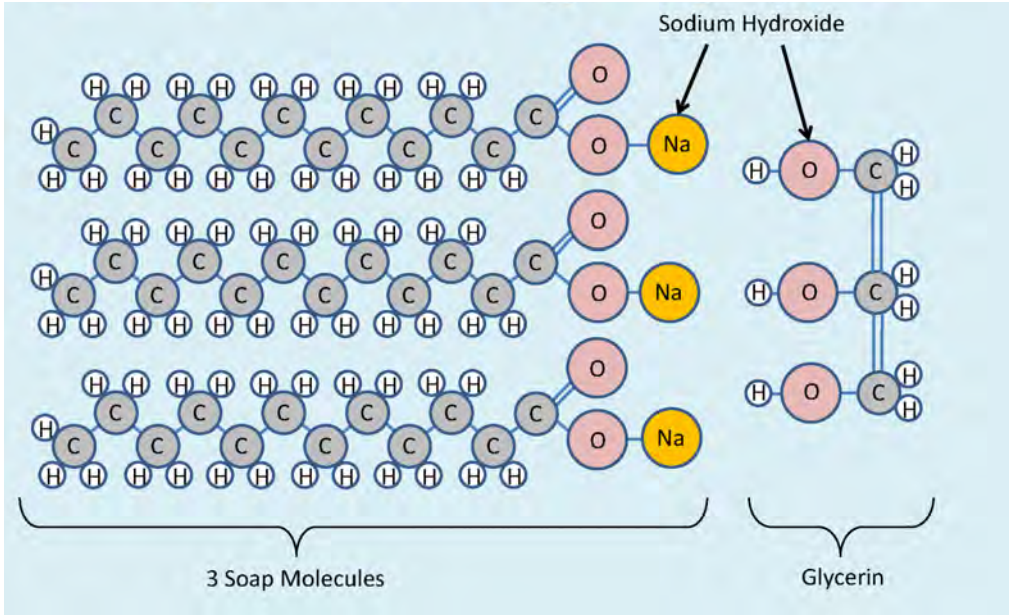
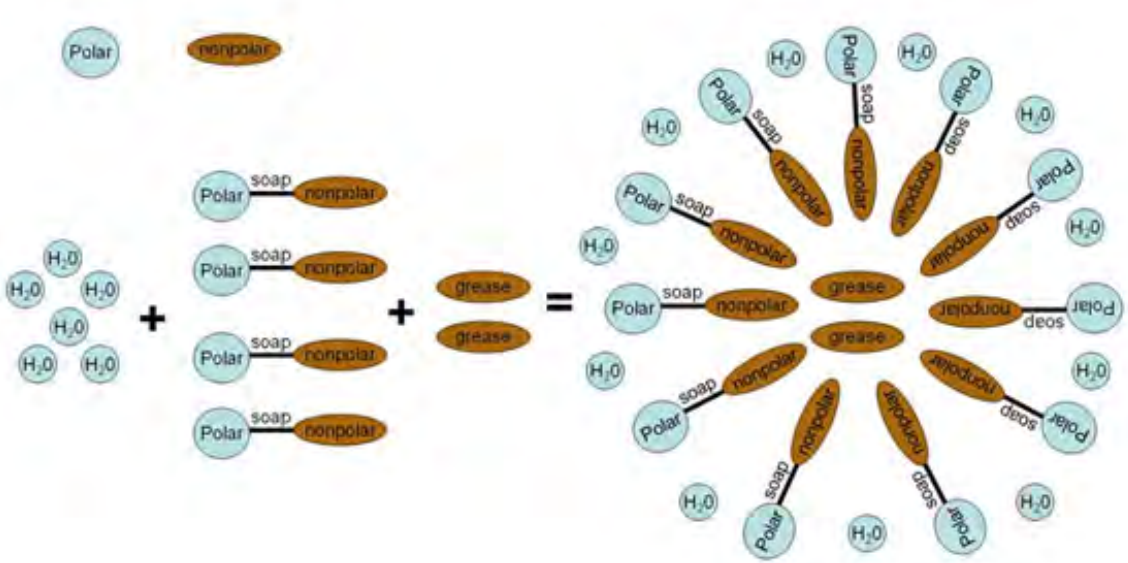


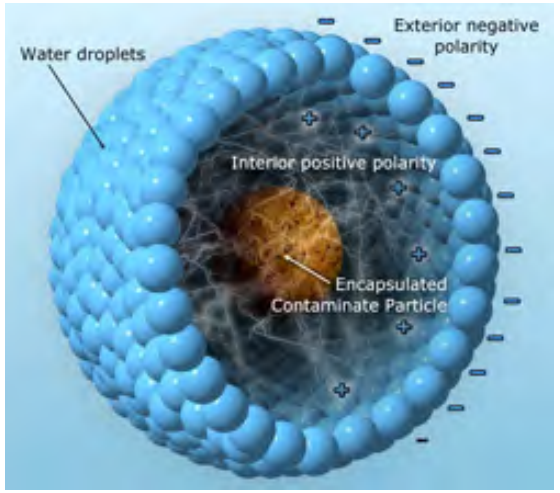
Figure 8.4. Mechanism of saponification.

Saponification
Hydrolysis of Triglycerides



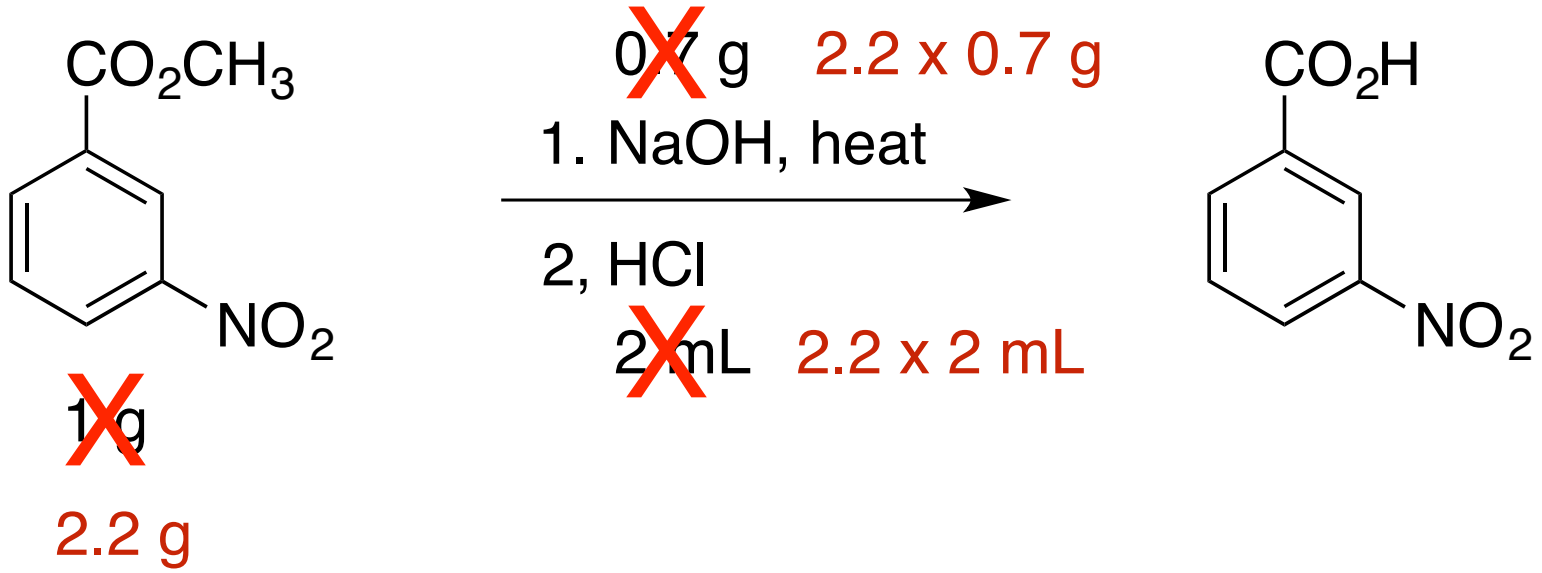






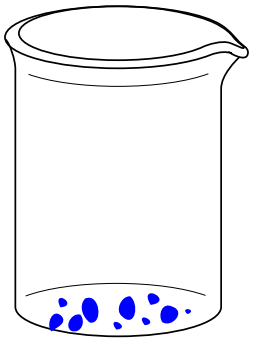
Overall….

- Get the methyl 3-nitrobenzoate you made last time.
- Keep a small amount to take mp.
- Use the rest of your ester to set up the next reaction. The procedure in the manual is written for 1 g of ester. You will NEED to ADJUST the amounts to correspond to your amount of ester.

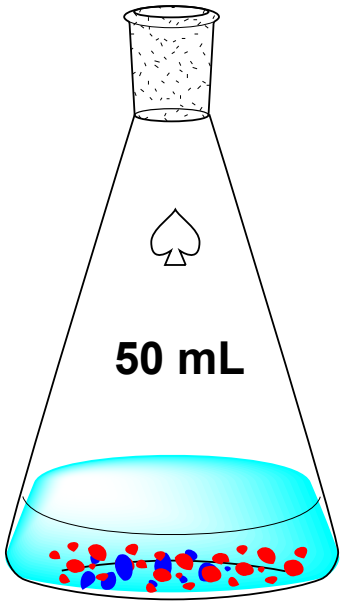


- NaOH is VERY hydroscopic and a very strong base (DON'T TOUCH IT with bare hands)

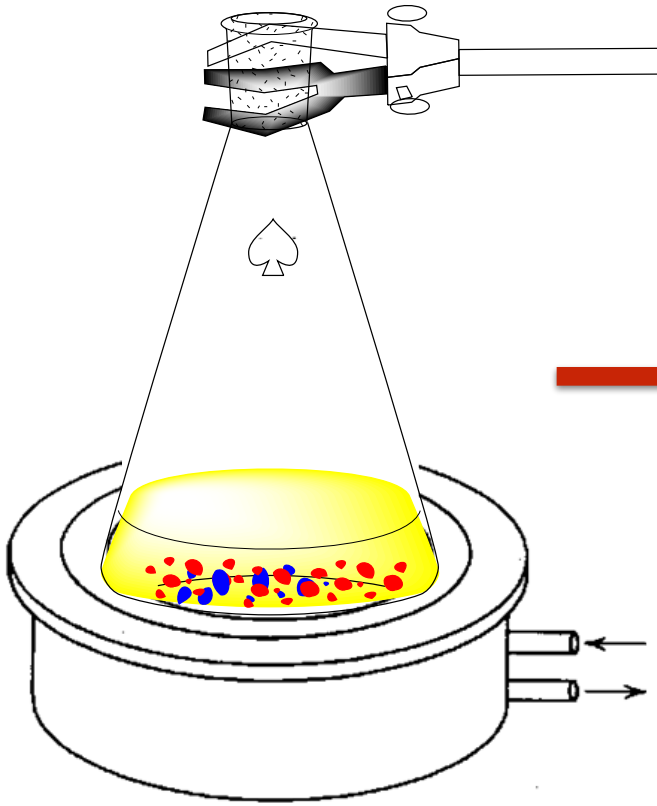
Preparation of 3-Nitrobenzoic Acid Procedure



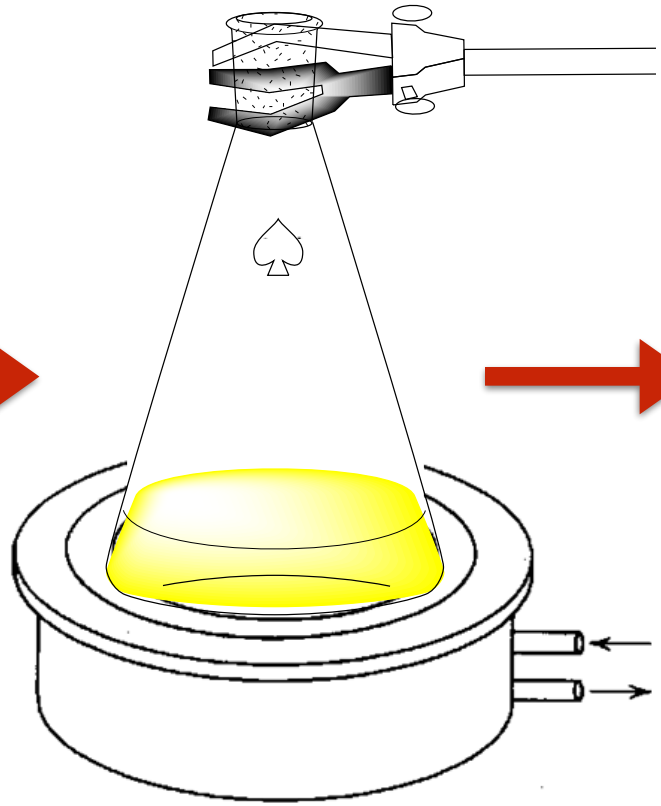
Weigh NaOH in a beaker!



Mix ester + water + NaOH

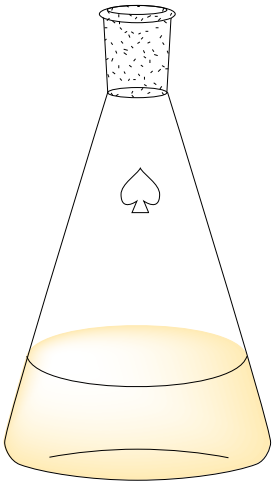


Heat over steam bath with CONTINUOUS SWIRLING until all crystals have melted and the solution turns pale yellow.

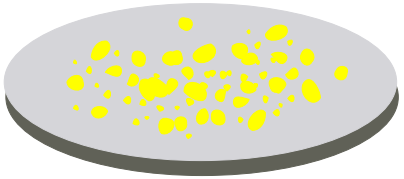


After the solution is transparent / pale yellow keep heating for 5 more minutes for the reaction to be completed.

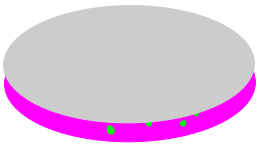
Preparation of 3-Nitrobenzoic Acid Procedure



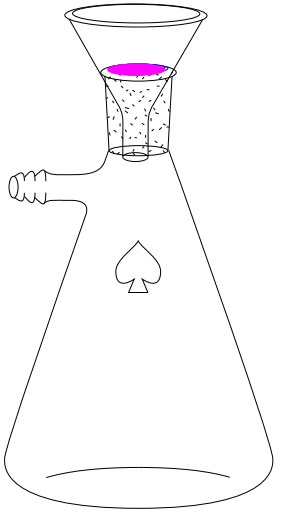
Dilute the solution with an equal volume of water



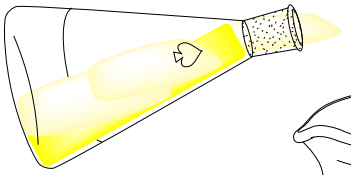
spread solid on watch glass



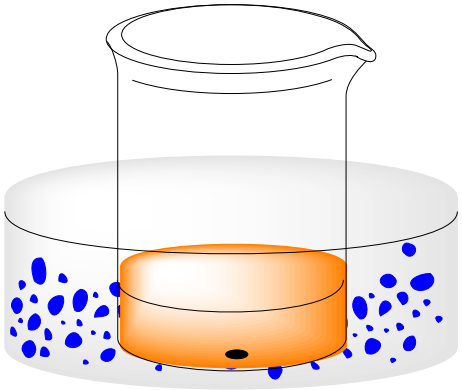
Dry filter



Vacuum Filtration



Add the diluted solution to a beaker containing 2 ml of concentrated HCl, while stirring.



Ice bath

Calculating Moles of Compounds

1. If a Solid

$$\text{Mole} = \frac{\text{g of Compound}}{\text{Molecular weight}}$$

2. If a Liquid

$$\text{Molarity (M)} = \frac{\text{Moles}}{\text{Liter}}$$

Mole = M x Liter

How many moles are there in 7.5 mL of concentrated sulfuric acid?

$$\text{M of concentrated Sufuric acid} = \frac{\text{Moles of sufuric acid}}{0.0075\ \text{L}} = 18$$

Moles of sulfuric acid = 18 moles/L x 0.0075 L = 0.135 moles

Also:

$$\text{Density (d)} = \frac{\text{Mass}}{\text{Volume}} = \frac{\text{grams}}{\text{mL}}$$

Mass = mL x d

mass of methyl benzoate = 2.1 mL x 1.09 g/mL = 2.29 g