

Pre-lab exercise **Preparation of Aspirin**
(Complete and check answers before coming to lab)

1. During the preparing aspirin lab activity, a student attempts to determine how much aspirin she made. She looked back at her data:

mass of flask	<u>73.86 g</u>
mass of flask and salicylic acid	<u>77.88 g</u>
mass of salicylic acid	<u>4.02 g</u>
mass of watch glass + filter paper	<u>34.63 g</u>
mass of watch glass, filter paper and aspirin	<u>38.29 g</u>

- a) How much aspirin did she generate?

$$\begin{array}{r} 38.29 \text{ g} \\ - 34.63 \text{ g} \\ \hline 3.66 \text{ g of aspirin} \end{array}$$

- b) This mass of aspirin she got by actually doing the experiment is called

Actual yield.

- c) The molar mass of salicylic acid is 138.12 g/mol. How many mols are there in 4.02g?

$$\frac{1 \text{ mol}}{138.12 \text{ g}} \times 4.02 \text{ g} = 0.0291 \text{ mols}$$

- d) **The limiting reactant in this reaction is salicylic acid.** The stoichiometry between salicylic acid and aspirin in the balanced chemical equation is 1:1. So, how many mols of aspirin are theoretically generated from the mols of salicylic acid used?

Since it is a 1:1 stoichiometry, the number of mols of aspirin theoretically produced will be same as number of mols of salicylic acid = 0.0291 mols

- e) The molar mass of aspirin is 180.16g/mol. What is the **theoretical yield** in grams, for the number of mols of aspirin she theoretically obtained above?

$$\frac{180.16 \text{ g}}{1 \text{ mol}} \times 0.0291 \text{ mols} = 5.24 \text{ g}$$

- f) What is the percent yield?

$$\text{Percent yield} = \frac{\text{actual yield}}{\text{Theoretical yield}} \times 100 = \frac{3.66 \text{ g}}{5.24 \text{ g}} \times 100 = 69.8\%$$

2. List any potentially harmful chemicals you will work with today. Explain why they are harmful, and what precautions you will take with them.

Phosphoric acid (used as a catalyst in this reaction) and acetic anhydride.

Both are extremely corrosive and damaging to skin. Handle with care and work in the fume hood. Alert instructor to any spills or drips.

3. What factors could lead to a low yield of aspirin during this activity? (Besides accidental spills or other similar human errors).

Adding water too quickly or too soon to the solution.

Adding incorrect amount of reactants

Not heating the mixture to required temperature, or over-heating

Having water impurities in your flask when you begin.

Using tap water, rather than distilled water.