

**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.**