Name _____ Date _____ Class _____

12 INTERPRETING GRAPHICS

Use with Section 12.3

Preparation of Salicylic Acid

Student #1

mass of flask	37.820 g
flask + $C_7H_6O_3$	39.961 g
volume of $C_4H_6O_3$	5.0 mL
mass of watch glass	22.744 g
watch glass + $C_9H_8O_4$	24.489 g

Student #2

mass of flask	37.979 g
flask + $C_7H_6O_3$	40.010 g
volume of $C_4H_6O_3$	5.0 mL
mass of watch glass	21.688 g
watch glass + $C_9H_8O_4$	24.197 g

Two students prepared aspirin according to the following reaction in which acetic anhydride, $C_4H_6O_3$, reacts with salicylic acid, $C_7H_6O_3$, to form aspirin, $C_9H_8O_4$, and acetic acid, $C_2H_4O_2$.

$$C_7H_6O_3 + C_4H_6O_3 \rightarrow C_9H_8O_4 + C_2H_4O_2$$

The procedure involved heating the reaction mixture in a water bath for 15 minutes at 75°C, not to exceed 80°C. The mixture was removed from the water bath, and distilled water was added to decompose any unreacted acetic anhydride. The mixture was then placed in an ice bath for 5 minutes to facilitate the formation of aspirin crystals. The aspirin crystals were collected using filtration. The aspirin crystals were dried and then transferred to a watch glass and massed.

Because their grades were partially based on accuracy, both students used their very best lab technique. Which student got the better grade and why?

1. Determine the molar masses of the following:

a. acetic anhydride, $C_4H_6O_3$ _____

b. salicylic acid, $C_7H_6O_3$ _____

c. aspirin, $C_9H_8O_4$ _____

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2. How many moles of salicylic acid were added to the reaction mixture?

Student 1 _____ Student 2 _____

3. Given the density of acetic anhydride to be 1.05 g/mL, what was the mass of the acetic anhydride added to the reaction? How many moles of acetic acid were added?

Student 1 _____ Student 2 _____

_____ _____

4. According to the mole ratios in the given reaction, what is the limiting reagent in this reaction?

_____

5. What is the theoretical yield, in grams, of aspirin in each reaction?

Student 1 _____ Student 2 _____

6. What was the actual yield, in grams, of aspirin in each reaction?

Student 1 _____ Student 2 _____

7. What was the percent yield in each reaction?

Student 1 _____ Student 2 _____

8. Evaluate your answers. Which student got the better grade and why?

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