Name: _____ Period: ____

Percentage of Carbon in Sodium Bicarbonate

In this experiment, you will determine the mass percent of carbon produced in the decomposition of sodium bicarbonate produced from the following chemical equation:

$$2\ NaHCO_3 + H_2SO_4 \rightarrow Na_2SO_4 + 2\ H_2O + 2\ CO_2$$

Reacting sodium bicarbonate (sodium hydrogen carbonate) with sulfuric acid will produce a salt, water, and carbon dioxide gas. According to the Law of Definite Composition, the mass percentage of carbon produced by the bicarbonate should be constant no matter how much sodium bicarbonate is being decomposed. The experiment should be performed two times and the results averaged.

Safety:

Wear safety goggles in the lab at all times. Wash your hands immediately upon contact with chemicals.

Procedure:

1. Place an empty, dry 50 mL beaker on the balance pan. Zero the balance.
2. Add approximately 0.70g of $NaHCO_3$ to the beaker and record the exact mass of $NaHCO_3$.
3. Remove the beaker and zero balance.
4. Place the entire cup containing pipets of 2M H_2SO_4 and the beaker with the $NaHCO_3$ on the balance. Record the mass as the initial total mass.
5. At your lab station SLOWLY add the H_2SO_4 to the beaker one drop at a time. Swirl the contents to insure complete mixing. Continue releasing the acid drops in this manner until effervescence ceases.
6. Return pipet to the acid cup.
7. Place the beaker and the acid cup on the balance. Record as the final total mass.
8. Discard the contents of the beaker in the sink, rinse and dry the beaker.
9. Repeat procedure for trial two.

Data:

	Trial 1	Trial 2
Mass $NaHCO_3$		
Initial **Total** Mass		
Final **Total** Mass		
Mass CO_2		

Calculations:

1.) Calculate the mass of CO_2 lost in each trial. (initial total mass – final total mass)

2.) Calculate the theoretical % C in CO_2. Remember to round all % to two digits after the decimal.

3.) Calculate the actual mass C for each trial. (%C as decimal X mass of CO_2)

4.) Calculate the %C for each trial. (mass C/mass $NaHCO_3$). Remember to round all % to two digits after the decimal.

5.) Calculate the average % C.

6.) Calculate the theoretical %C in $NaHCO_3$. Remember to round all % to two digits after the decimal.

7.) Calculate your % error. [(|actual-theoretical|/theoretical) x 100]

Questions:

1.) What effects would there be in your results if you did not decompose all of the sodium hydrogen carbonate in each of your trials? Would the percentage of C that you determine be lower or higher than it should have been?

2.) If we used this experiment to determine the % of C in various brands of sodas, would you expect the results to illustrate the Law of Definite Composition? Why or Why not?