Rate of Decomposition of Calcium Carbonate in Acid Rain

Lab Experiment-Week 2

Independent Experiment: Week 2

In next week's laboratory, you will be tasked to design a series of experiments to investigate the variables that affect the reaction rate of the decomposition of calcium carbonate, and determine the reaction order with respect to HCl.

To prepare for the experiment, your team is asked to:

Identify the measurements that must be made to determine the reaction order with respect to HCl.

Name the independent and dependent variables for each series of experiments, and choose suitable values for the independent variable.

Discuss what factors might affect the purpose or design of the experiments. What is the best way to control this variable so that it remains constant and does not affect the analysis?

Your experimental plan should contain the following:

- Write a step-by-step procedure for a series of experiments to investigate the effect of HCl concentration on the reaction of $CaCO_3$ with HCl.
- Propose how you will investigate the effect of at least one other variable that may affect the rate of decomposition of calcium carbonate with hydrochloric acid.
- Include the concentrations and amounts of reactants. How will you prepare those solutions (remember your dilution equation) from the acid solution you're given?
- Include the materials, glassware, and equipment that will be needed.
- Include the required safety precautions
- Review additional variables that may affect the accuracy or reproducibility of the experiments.

You will then carry out the experiments and record results in an appropriate data table. The materials you will have available to you are:

- 6M HCl
- Calcium carbonate marble chips
- 125 mL Erlenmeyer flask
- Gas collection apparatus (syringe with stopcock and adapter)
- Hot plate
- Ice bath

- Mortar and pestle
- Analytical balance
- Distilled water
- Thermometers
- All other common glassware