

Factors Affecting Rates Chemical Reactions

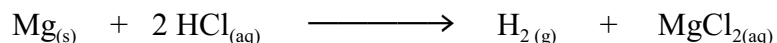
Introduction

The speed of chemical reactions vary tremendously, from very fast reactions, such as explosions to very slow reactions, such as the conversion of diamond to graphite at room temperature. The usefulness of a reaction depends very much on its rate. A reaction may give you the products you want, but if it takes years to do so, it isn't much help! Chemical kinetics is the study of the factors that control the rates of reactions and the mechanisms by which the reactions occur.

There are four general factors that affect the rate of a reaction... the nature, the concentration of the reactants, temperature and surface area.

In this experiment you are asked to investigate the general relationship between (1) the surface area of a reactant and the time required for a reaction to occur, (2) between the concentration of a reactant and the time required for a reaction to occur as well as (3) the general relationship between the temperature and the rate of a reaction.

Design a suitable method to study each of the above three factors using the following reaction:



You will be provided with the following:

Mg ribbon, Mg powder, various concentration of $\text{HCl}_{(aq)}$, ice cubes, hot plates and any other apparatus deemed reasonable, available and inexpensive.

If you wish to design any equipment, you must seek permission from your teacher so as to evacuate the lab area of all personnel first. Their safety is of concern to us!

Whilst performing the lab, you may wish to eat your lunch, or if you are thirsty $\text{HCl}_{(aq)}$ may seem like an appetizing thirst quencher, however you know the answers to these necessary functions! Find other suitable means of disposing of your chemicals and satisfying your hunger.

$\text{HCl}_{(aq)}$ is corrosive, you may wish to avoid contact with eyes, skin or any body parts that you may need for procreation, but then again as a member of a team... This is not a part of this lab!! Be careful with the glassware, unless you wish to enrich the science department with your generous financial donation!

From the Introduction, formulate three problems statements.

Provide a hypothesis as to how each of concentration, surface area and temperature will affect the rate of a reaction.

Design a procedure to test your hypothesis. Make sure to include controlled variables, manipulated variables, uncertainties and record measurements to sufficient number of sig. figs.

Analyze your data. State conclusions and evaluate your experiment.

Time: You will be given **one** class period to perform the experiment, so come prepared.

Write up to be determined.