CHEMICAL KINETICS

Introduction

The branch of chemistry which deals with the study of reaction rates and their mechanisms is called Chemical Kinetics.

The reaction's average rate can be determined by measuring the decrease in the concentration of a reactant or the increase in the concentration of a product over time. In the case of a hypothetical reaction,

$A \longrightarrow B$

$$\text{Rate of reaction} = -\frac{\Delta[A]}{\Delta T} = \frac{\Delta[B]}{\Delta T}$$

Variables such as concentration, temperature, and the presence of a catalyst influence the speed of a reaction. Throughout this unit, you will acquire knowledge about methods for assessing reaction rates and investigating how concentration and temperature impact the rate of a reaction.

In any chemical reaction, reactants are consumed, and new products are formed. This means that we can measure the rate of a reaction in terms of the rate at which the reactants are consumed or the rate at which the products are obtained. Rate of a reaction is defined as the rate of change in concentration of any of the reactants or products at a particular moment of time.

Before we take up study of any such reaction, let us recapitulate about rates of reactions and factors influencing it.

Factors affecting rate of a reaction

There are a number of factors which influence the rate of a reaction. These are:

1. **Concentration of the reactants:** Higher concentrations of reactants often lead to increased collision frequency, resulting in a faster reaction rate.
2. **Temperature:** Elevated temperatures generally accelerate chemical reactions by providing more energy to the reacting particles, increasing their kinetic energy and collision frequency.
3. **Nature of the reacting substances:** The type of substances involved can impact the rate. Reactions involving ions or small molecules may proceed more rapidly than those with larger or more complex molecules.
4. **Presence of catalyst:** Catalysts are substances that speed up reactions without being consumed. They provide an alternative reaction pathway with lower activation energy, making the reaction faster.
5. **Exposure to radiations:** Exposure to radiation can accelerate or decelerate the rate of a chemical reaction by influencing the energy levels and collision dynamics of reacting particles. The impact depends on the specific nature of the reactants and the type of radiation involved.