**Chemical Kinetics**

**1.1 Chemical Kinetics:** Chemical kinetics is the branch of physical chemistry which deals with a study of the speed of chemical reactions. Such studies also enable us to understand the mechanism by which the reaction occurs. Thus, in chemical kinetics we can also determine the rate of chemical reaction. From the kinetic stand point the reactions are classified into two groups: a) homogeneous reactions which occur entirely in one phase b) heterogeneous reactions where the transformation takes place on the surface of a catalyst or the walls of a container.

**1.2 Rate of reaction**:The rate of reaction i.e. the velocity of a reaction is the amount of a chemical change occurring per unit time. The rate is generally expressed as the decrease in concentration of a reactant or as the increase in concentration of the product. If C the concentration of a reactant at any time t is, the rate is – $\frac{dC}{dt}$ or if the concentration of a product be x at any time t, the rate would be $\frac{dx}{dt}$ . The time is usually expressed in seconds. The rate will have units of concentration divided by time. The concentrations are taken in gm-moles/litre, hence rate is moles/litre/second.

***Factors influencing the rate of reaction-*** Rate of a chemical reaction are influenced by the following factors (i) Temperature (ii) Concentration of the reactants (iii) Nature of reactants (iv)Catalysts (v) Radiation

1. **Temperature:** In most cases, the rate of a reaction in a homogeneous reaction is approximately doubled or tripled by an increase in temperature of only 100 C. In some cases the rise in reaction rates are even higher.
2. **Concentration** **of the reactants**: At a fixed temperature and in the absence of catalyst, the rate of given reaction increases with increased concentration of reactants. With increasing concentration of the reactant 4 the number of molecules per unit volume is increased, thus the collision frequency is increased, which ultimately causes increased reaction rate.
3. **Nature of reactants**: A chemical reaction involves the rearrangement of atoms between the reacting molecules to the product. Old bonds are broken and new bonds are formed. Consequently, the nature and the strength of the bonds in reactant molecules greatly influence the rate of its transformation into products. The reaction in which involve lesser bond rearrangement proceeds much faster than those which involve larger bond rearrangement.
4. **Catalysts**: The rate of a chemical reaction is increased in presence of a catalyst which ultimately enhanced the speed of a chemical reaction.
5. **Radiation**: The rate of a number of chemical reactions increases when radiations of specific wave length are absorbed by the reacting molecules. Such reactions are called photochemical reactions. For example, chlorine may be mixed safely with hydrogen in dark, since the reaction between the two is very slow. However when the mixture is exposed to light, the reaction is explosive.

H2 +Cl2 (hv)→ 2HCl+188KJ

**SKILL TEST**

1. What do you mean by chemical kinetics?

2. What do you mean by rate of a reaction?

3. What is specific reaction rate or velocity constant (k)?

4. What are the factors that can change the value of K?