Chemical kinetics

On Tip Notes

- The decrease in concentration of reactants or increase in the concentration of products per unit time is called rate of reaction.
- The factors that can affect the rate of reaction are: concentration of reactants, catalyst, temperature etc.
- Average rate : Average rate of a reaction is defined as the rate of change of concentration per unit time.
- Instantaneous rate of reaction: It is defined as the rate of change of concentration of any one of
- the reactants or products at a particular instant of time.
- The mathematical expression expressing the rate of a chemical reaction is called rate law. The
- rate law expression is determined experimentally.
- Order of a reaction with respect to a reactant is the power of its concentration which appears in
- the rate law expression. The order of reaction is the sum of all such powers of concentration-terms present in rate law expression.
- Elementary and complex reactions: The reaction taking place in one step is called elementary reaction.
- When a sequence of elementary reactions gives the products, the reaction is called complex reaction.
- Molecularity of a reaction is only significant for an elementary reaction. Molecularity can be 1, 2 or 3 whereas order
- of reaction can be -ve, 0, +ve or any fraction.
- Molecularity and order of an elementary chemical reaction is same.
- Arrhenius equation: K=A.e-ERT, where E, is the activation energy, 'A' is the pre exponential
- factor corresponds to the collision frequency.
- According to collision theory, steric factor (P) which refers to the orientation of molecules which
- collide, is important and contributes to effective collisions, thus modified Arrhenius equation can be given as K = P.ZERT
- Temperature coefficient: The ratio of the specific rate constant of a reaction at two temperatures
- differing by 10°C is known as temperature coefficient.
- Threshold energy: A collision will be effective if colliding molecules possess a minimum amount of energy which is called threshold energy.
- Activation energy: The additional energy which is absorbed by the molecules so that they achieve the threshold energy is called activation energy.
- Collision frequency: The number of collisions per second per unit volume of the reaction mixture is known as collision frequency.