



$$\text{Rate of disappearance of R} = \frac{\text{Decrease in concentration of R}}{\text{Time taken}} = \frac{-\Delta[R]}{\Delta t}$$

$$\text{Rate of appearance of P} = \frac{\text{Increase in concentration of P}}{\text{Time taken}} = \frac{+\Delta[P]}{\Delta t}$$



Average Rate

Appearance of products or disappearance of reactants over a long time interval.

$$r_{av} = \frac{d[P]}{dt} = \text{slope}$$

$$r_{av} = -\frac{d[R]}{dt} = -\text{slope}$$

Instantaneous Rate

Rate of change in concentration of reactant/product at a particular time

$$r_{inst} = \frac{-d[R]}{dt} = \frac{+d[P]}{dt}$$

Chemical Kinetics

Rate of Chemical Reaction

Change in concentration of reactants or products in unit time;
 Unit : mol L⁻¹ s⁻¹ or atm s⁻¹

Rate Law

Expression in which reaction rate is given in terms of molar concentration of reactants with each term raised to power which may or may not be same as stoichiometric coefficient of reactants in a balanced chemical equation. aA + bB - cC + dD

$$\text{Rate} = K[A]^x[B]^y = \frac{d[R]}{dt}$$

Rate Constant: Rate of a reaction when concentration of each of the reactant in unity

Order	Unit
0	molL ⁻¹ s ⁻¹
1	s ⁻¹
2	mol ⁻¹ Ls ⁻¹

Factor Influencing

- Concentration:** Higher the concentration of reactants, faster is the rate of reaction.
- Temperature:** Increases with increase in temperature. becomes almost double with 10°C rise.
- Presence of Catalyst:** Increases with a catalyst.
- Surface Area:** Greater is the surface area, faster is the rate of reaction.
- Activation Energy:** Lower the activation energy, faster is the reaction.