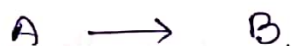


Rate of reaction—

$$r = \frac{dx}{dt}$$

Where, dx = uniform change in concentration in infinitesimal time dt sec.



$$-\frac{d[A]}{dt} = +\frac{d[B]}{dt}$$

rate of dissociation of A = $-\frac{d[A]}{dt}$

rate of formation of B = $+\frac{d[B]}{dt}$

rate of reaction —

$$r = \frac{dx}{dt}$$

Unit :-

$$r = \frac{dx}{dt} = \frac{\text{mol L}^{-1}}{\text{sec}} = \text{mol L}^{-1} \text{sec}^{-1}.$$

Rate constant :-

Let us consider a reaction —



$$r \propto [A]$$

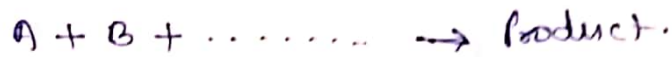
$$r = K \cdot [A]$$

where, K = rate constant

If $[A] = 1$

$r = k$

Again for the reaction —



$r = k [A] [B] \dots$

If $[A] = [B] = 1$

$r = k$

So, rate constant (k) may be defined as the rate of reaction when the concentration of each reactant is unity.

Unit



$r = k [A]^n$

$k = \frac{r}{[A]^n}$

$k = \frac{\text{mol l}^{-1} \text{sec}^{-1}}{(\text{mol l}^{-1})^n}$

$= \frac{\text{mol l}^{-1} \text{sec}^{-1}}{\text{mol}^n \text{l}^{-n}}$

$k = \text{mol}^{1-n} \text{l}^{n-1} \text{sec}^{-1}$

Molecularity -

Molecularity of a chemical reaction may be defined as the total number of molecules taking part in the elementary step of a chemical reaction.



$$\text{molecularity} = 1 + 1 = 2. \text{ (Bimolecular)}$$

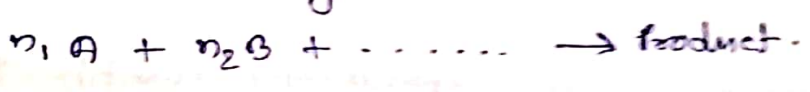
The molecularity doesnot exceed three or four values. This is due to the fact that simultaneous collision between more than three or four molecules is not probable.

Molecularity is a theoretical concept. So, it cannot be defined for complex reaction. (multistep reaction)

Molecularity can may be defined for simple reaction i.e. elementary step reaction - one step reaction.

Order of Reaction :-

Let us consider a general reaction -



then rate of reaction -

$$r = k [A]^{n_1} [B]^{n_2}$$

order of reaction -

$$n = n_1 + n_2 + \dots$$

where, n_1, n_2, \dots are determined experimentally.

so, order of reaction may be defined as the sum total of

