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Q.1 Rate Constant of a reaction is (k) 3×10^{-2} mol ltr^{-1} sec^{-1} If Conc. of reactant after 25 sec is 0.75 m then initial Conc. is ?

Sol. given ÷ $k = 3\times10^{-2}$ mol ltr^{-1} sec^{-1}

$\Rightarrow$ order = Zero

$\Rightarrow t = 25$ sec, $[A]_t = 0.75$ M.

$\Rightarrow [A]_0 = ?$

$kt = [A]_0 - [A]_t$

$3\times10^{-2}\times25 = [A]_0 - 0.75$

$0.75 = [A]_0 - 0.75$

$[A]_0 = 0.75 + 0.75 = 1.5$ m Ans.

Q.2. $A \longrightarrow B$, for Zero order rexn initial Conc. of A is 0.01M. If [A] after 10 min is 0.008m then Cal. (i) k (ii) $t_{1/2}$

Sol. given – $[A]_0 = 0.01 = 10^{-2}$ m

$t = 10$ min

$[A]_t = 0.008 = 8\times10^{-3}$ m.

$kt = [A]_0 - [A]_t$

$k\cdot10 = 10^{-2} - 8\times10^{-3}$

$k\cdot10 = 10^{-2}[1 - 0.8]$

$k\cdot10 = 0.2\times10^{-2}$

$k = \frac{2\times10^{-3}}{10} \Rightarrow k = 2\times10^{-4}$

(ii) $t_{1/2} = \frac{[A]_0}{2k}$

$t_{1/2} = \frac{10^{-2}}{2\times2\times10^{-4}}$

$t_{1/2} = \frac{100}{2\times2} = 25$ min

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Q.3. The rate of Ist order rexn is 0.04 mol ltr^{-1} sec^{-1} in 10min & 0.03 mol ltr^{-1} sec^{-1} in 20min after initiation Cal. Half life period of reaction.

Sol. given ÷

$$k = \frac{2.303}{t_2 - t_1} \log\left(\frac{a-x_1}{a-x_2}\right)$$

$$r = k[A]^1 \rightarrow \text{Rate law}$$

$$\frac{r_1}{r_2} = \frac{[A]_1}{[A]_2}$$

$$\frac{[A]_1}{[A]_2} = \frac{0.04}{0.03}$$

$$\frac{[A]_1}{[A]_2} = \left(\frac{a-x_1}{a-x_2}\right) = 4/3$$

$$k = \frac{2.303}{20-10} \log\left(\frac{4}{3}\right)$$

$$k = \frac{2.303}{10}\left[\log 4 - \log 3\right]$$

$$k = \frac{2.303}{10}(0.60 - 0.48)$$

$$k = \frac{2.303 \times 0.12}{10}$$

$$t_{1/2} = \frac{0.693}{k} = \frac{0.693 \times 10}{2.303 \times 0.12} \Rightarrow t_{1/2} \simeq 25\,min$$

Ques.** $A_{(g)} \longrightarrow 2B_{(g)} + C_{(g)} + D_{(s)}$; follow I^{st} order kinetics initial pressure is P_0 & total pressure of gaseous mixture a time t is found to be P_t; then cal. rate constant in terms of P_0 & P_t.

Sol.

	$A_{(g)} \longrightarrow$	$2B_{(g)}$	$C_{(g)}$	$D_{(s)}$
$t=0$	P_0	–	–	–
$t=t_{min}$	P_0-x	$2x$	x	–

Total pressure of gaseous mixture at time t is $= P_0 - x + 2x + x$

(given) $P_t = P_0 - x + 2x + x$

$P_t = P_0 + 2x$

$2x = P_t - P_0 \Rightarrow \boxed{x = \frac{P_t - P_0}{2}}$

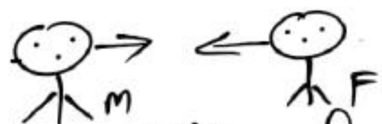
$k = \frac{2.303}{t} \log\left(\frac{a}{a-x}\right)$

$k = \frac{2.303}{t} \log \frac{P_0}{P_0 - \left(\frac{P_t - P_0}{2}\right)}$

$k = \frac{2.303}{t} \log \frac{2P_0}{2P_0 - P_t + P_0}$

$\boxed{k = \frac{2.303}{t} \log\left(\frac{2P_0}{3P_0 - P_t}\right)}$

Collision Theory ÷



Given by max Trautz and William lewis.

Collision Theory is Satisfactory for Bi-molecules Reaction.

A/c to it for a reaction to occur there must be Collision B/w reacting molecules.

Total no. of Collision Per Second in Unit Volume is Called Collision frequency (Z).

It's Value is very high for gaseous reaction ($10^{25}-10^{28}$ collision/sec-cm^3) But only a Small fraction of these molecules are Capable to convert reactant into Product.

These Collision are Called effective Collision.

For efective Collision Two Condition must be Satisfied.

(i) Reacting molecules must process a minimum Amount of energy.

(ii) Proper orientation of Collision.

Thershold energy :-