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(35) $\left(\frac{mol}{lit}\right)^{1-n} time^{-1}$

$liter^{n-1}$

(31) $\log a - \underline{\log(a-x)} = \frac{kt}{2.303}$

$slope = -\frac{k}{2.303}$

(36) $X \longrightarrow Y$

$a - a/2 \quad a/2$

$= a/2$

(37) $A \longrightarrow nB$

$a-x \quad nx$

$a-x = nx$

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③ Initial rate method : $\rightarrow$

$$\underline{\underline{rate}} = k[A]^p[B]^q$$

[A]	[B]	initial rate
0.1	0.2	10^{-4}
0.2	0.2	2×10^{-4}
0.1	0.4	8×10^{-4}

$$10^{-4} = k[0.1]^p\,\cancel{(0.2)^q}$$

$$2\times10^{-4} = k(0.2)^p\,\cancel{(0.2)^q}$$

$$\frac{1}{2} = \left(\frac{1}{2}\right)^p$$

$p = 1$

$q = 3$

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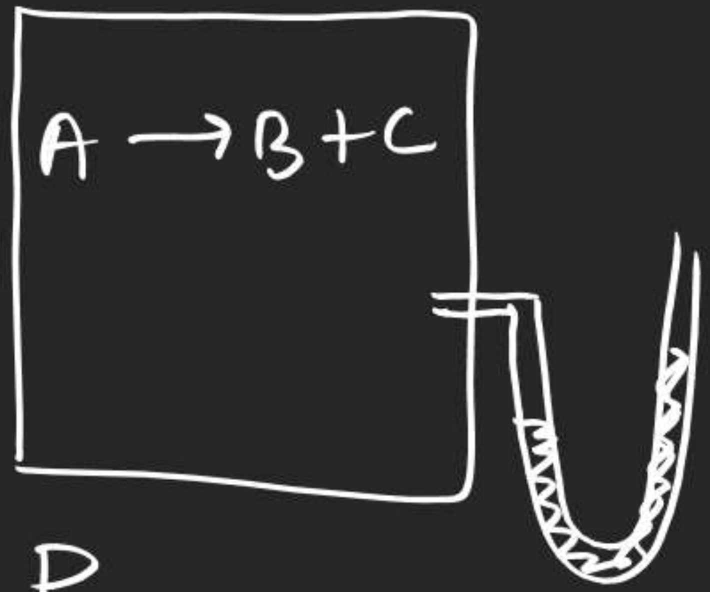
Calculation of 1st order rate constant :→

$$k = \frac{1}{t} \ln \frac{[A]_0}{[A]_t}$$

$$P = [C]RT$$



P_0

P_t

P_∞

(i) If pressure related information is given

$$k = \frac{1}{t} \ln \frac{(P_A)_0}{(P_A)_t} = \frac{1}{t} \ln \frac{(P_A)_0}{(P_A)_0 - x}$$

$$\Rightarrow \quad A \longrightarrow B + C$$

$\longrightarrow (P_A)_0 \qquad 0 \qquad 0$

$\longrightarrow (P_A)_0 - x \qquad x \qquad x$

$\longrightarrow 0 \qquad (P_A)_0 \qquad (P_A)_0$

$$\left[\begin{aligned} P_0 &= (P_A)_0 \\ P_\infty &= 2(P_A)_0 \\ P_t &= (P_A)_0 + x \end{aligned} \right.$$

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for the given 1st order Rxn . find $k=?$

$$A(g) \longrightarrow 2B(g) + C(g)$$

	$(P_A)_0$		
	$(P_A)_0-x$	$2x$	x
	0	$2(P_A)_0$	$(P_A)_0$
time		4.606 min	∞
Pressure		400	600

$P_\infty = 600 = 3(P_A)_0$ $\quad (P_A)_0 = 200$

$P_t = 400 = (P_A)_0 + 2x$ $\quad x = 100$

$400 = 200 + 2x$

$$k = \frac{2.303}{4.606} \log \frac{200}{100}$$

$$= \frac{1}{2}\log 2$$

$\frac{1}{2}\log 3$

$1/2$

$\log 3/2$

$1/2 \log 2$

$1/2 \log 3/2$

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$$
\begin{array}{cccc}
2A & \longrightarrow & 3B & + \quad C \\
(P_A)_0 & & 0 & 0 \\
(P_A)_0 - x & & 3x/2 & x/2 \\
0 & & \frac{3}{2}(P_A)_0 & \frac{1}{2}(P_A)_0
\end{array}
$$

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② By titration reading

ⓐ for the decomposition H_2O_2

Q. for the given 1st order rxn

$$2H_2O_2(aq) \rightarrow 2H_2O(l) + O_2(g)$$

time	0	t
Vol of $KMnO_4$ used	V_0	V_t

t=0 $H_2O_2(aq)$

$$k = \frac{1}{t}\ln\frac{[H_2O_2]_0}{[H_2O_2]_t} = \frac{1}{t}\ln\frac{V_0}{V_t}$$

5 ml

$$\Rightarrow [H_2O_2]_0 \times 5 \times n_1 = M \times V_0 \times n_2$$

$$[H_2O_2]_t \times 5 \times n_1 = M \times V_t \times n_2$$

$$\frac{[H_2O_2]_0}{[H_2O_2]_t} = \frac{V_0}{V_t}$$

(5) Acid catalysed hydrolysis of ester :→

rate = $k''[\text{ester}][H^+][H_2O] = k'[\text{ester}][H^+] = k[\text{ester}]$

$k = \frac{1}{t}\ln\frac{[\text{ester}]_0}{[\text{ester}]_t} = \frac{1}{t}\ln\frac{a}{a-x}$

Q. $CH_3COOC_2H_5(aq) + H_2O(l) \xrightarrow{[H^+]} CH_3COOH(aq) + C_2H_5OH(aq)$

$a \qquad\qquad\qquad\qquad 0$

$a-x \qquad\qquad\qquad\qquad x$

$0 \qquad\qquad\qquad\qquad a$

time	0	t	∞
Vol. of NaOH used	V_0 <	V_t <	V_∞
		$(V_t - V_0)$	$(V_\infty - V_0)$

$a \propto V_\infty - V_0$

$x \propto V_t - V_0$

$a-x \propto V_\infty - V_t$

$$\boxed{k = \frac{1}{t}\ln\frac{V_\infty - V_0}{V_\infty - V_t}}$$

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Kinetics

O – I	42 — 47
S – I	23 — 35
O – II	1 — 4