Nishant Jindal

O-I 48-51

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(37) $k = \frac{1}{60} \ln \frac{-3.8 - 13.1}{-3.8 - 11.6} = \frac{1}{t} \ln \frac{-3.8-13.1}{-3.8-0}$

R_t

R_∞

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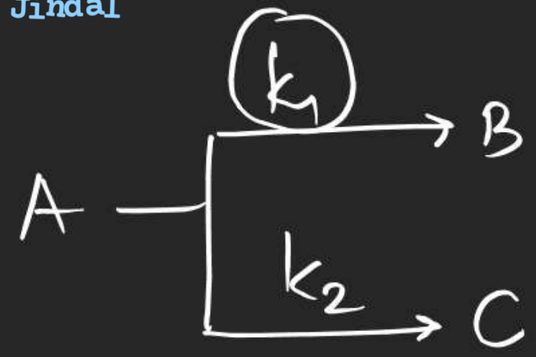
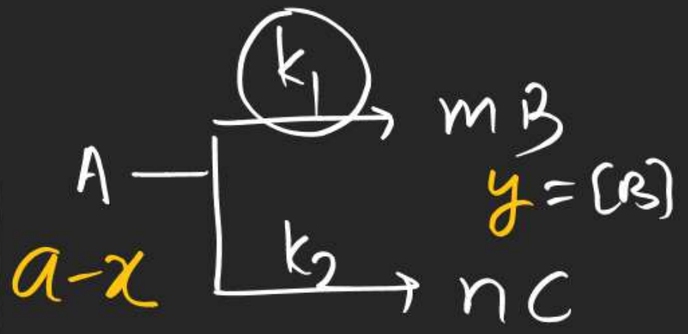


$$[A]_t = [A]_0 e^{-(k_1+k_2)t}$$

$$[B]_t = \frac{k_1}{k_1+k_2} x$$

$$[C]_t = \frac{k_2}{k_1+k_2} x$$



~~$x = my + nz$~~

$$x = \left(\frac{y}{m}\right) + \left(\frac{z}{n}\right)$$

$$\frac{dx}{dt} = \frac{1}{m}\frac{dy}{dt} + \frac{1}{n}\frac{dz}{dt}$$

$$-\frac{d[A]}{dt} = \frac{1}{m}\frac{d[B]}{dt} + \frac{1}{n}\frac{d[C]}{dt}$$

$$\frac{1}{m}\frac{d[B]}{dt} = k_1[A]$$

$$\frac{1}{n}\frac{d[C]}{dt} = k_2[A]$$

$$-\frac{d[A]}{dt} = (k_1+k_2)[A]$$

$$[A]_t = [A]_0 e^{-(k_1+k_2)t}$$

$$[B] = m \times \frac{k_1}{k_1+k_2} x$$

$$[C] = n \frac{k_2}{k_1+k_2} x$$

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$A \xrightarrow{k_1} B$ $\quad -\frac{d[A]}{dt} = k_1[A]$

$2A \xrightarrow{k_2 \neq k_1/2} 2B$ $\quad -\frac{1}{2}\frac{d[A]}{dt} = k_2[A]$

(A) $k_1 = k_2$ $\quad k_1 = 2k_2$

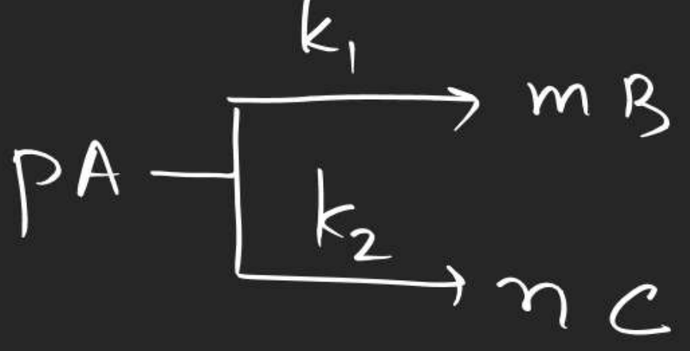
(B) $2k_1 = k_2$ $\quad k_{1/2} = k_2$

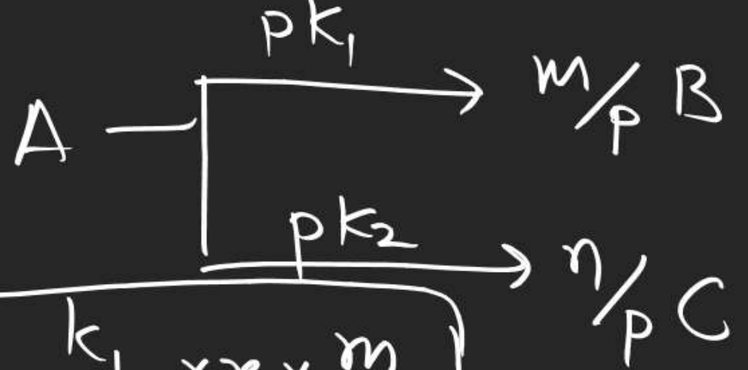
(C) $k_1 = 2k_2$

(D) $k_2 = k_1^2$

$A \to B$ $\quad \Delta H$ $\quad K_{eq}$ $\quad k_1$

$2A \to 2B$ $\quad 2\Delta H$ $\quad K_{eq}^2$ $\quad k_{1/2}$





$$[B] = \frac{k_1}{k_1+k_2} \times x \times \frac{m}{p}$$

Reversible Rxn

$$A \underset{k_b}{\overset{k_f}{\rightleftharpoons}} B$$

	A	B
	a	0
time 't'	$a-x$	x
at eq/lb^m	$a-x_e$	x_e

$$K_{eq} = \frac{k_f}{k_b} = \frac{[B]}{[A]} = \frac{x_e}{a-x_e}$$

$$k_f a = (k_f + k_b)\, x_e$$

$$-\frac{d[A]}{dt} = \text{RoD of A} - \text{RoA of A}$$

$$-\frac{d(A)}{dt} = k_f[A] - k_b[B]$$

$$\frac{dx}{dt} = k_f(a-x) - k_b x$$

$$= k_f a - x(k_f + k_b)$$

$$\frac{dx}{dt} = (k_f + k_b)(x_e - x)$$

$$\ln \frac{x_e}{x_e - x} = (k_f + k_b)\, t$$

$t_{1/2}$ when $x = x_e/2$

$$t_{1/2} = \frac{\ln 2}{k_f + k_b}$$

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Sequential reaction :→

$$A \xrightarrow{k_1} I \xrightarrow{k_2} P$$

for 'A'

$$-\frac{d[A]}{dt} = k_1[A]$$

$$[A]_t = [A]_0 e^{-kt}$$

for 'I'

$$\frac{d[I]}{dt} = R_0A - R_0D$$

$$= k_1[A] - k_2[I]$$

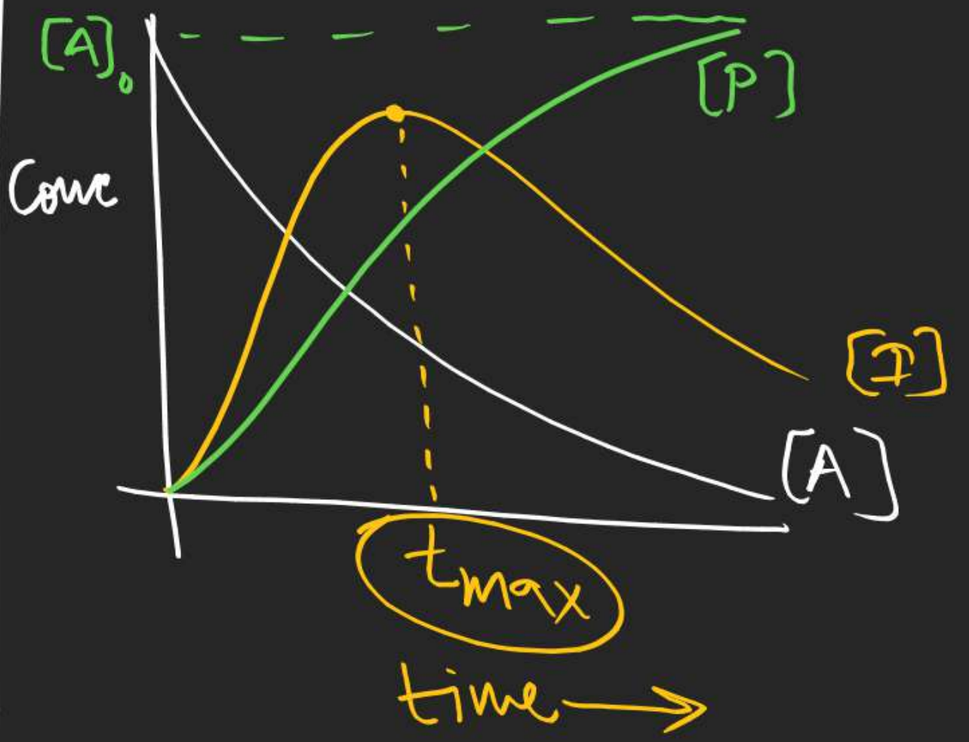
$$[I] = \frac{k_1}{k_2 - k_1}[A]_0\left\{e^{-k_1t} - e^{-k_2t}\right\}$$

for t_{max} $\quad \frac{d[I]}{dt} = 0$

$$t_{max} = \frac{\ln(k_2/k_1)}{k_2 - k_1}$$

$$\frac{d[P]}{dt} = k_2[I]$$

$$[P] = [A]_0\left[1 - \frac{k_2e^{-k_1t} - k_1e^{-k_2t}}{k_2 - k_1}\right]$$



Case-I $k_2 >> k_1$

$$[P] = [A]_0 \left\{ 1 - \frac{k_2 e^{-k_1 t}}{k_2 - k_1} + \frac{k_1 e^{-k_2 t}}{k_2 - k_1} \right\}$$

$$[I] = \frac{k_1}{k_2 - k_1} [A] \left\{ e^{-k_1 t} - e^{-k_2 t} \right\}$$

$$= \frac{k_1}{k_2} [A]_0 e^{-k_1 t}$$

$$[P] = [A]_0 \left\{ 1 - e^{-k_1 t} \right\} = x = \text{Amt of A reacted}$$

$$A \xrightarrow{k_1} I \xrightarrow{k_2} P$$

$a - x$ $\qquad$ x

$$A \xrightarrow{k_1} P$$

$a - x$ $\qquad$ x

Kinetics

O - I 52

S - I 39 - 41

→ T.D 1 & 2 JEE Adv