D. B. College (Jaynagar) Lect - 20
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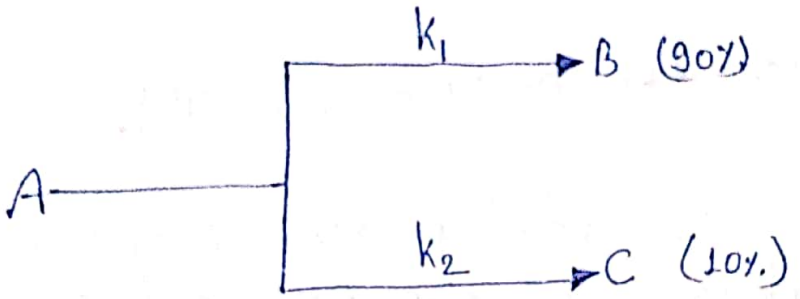
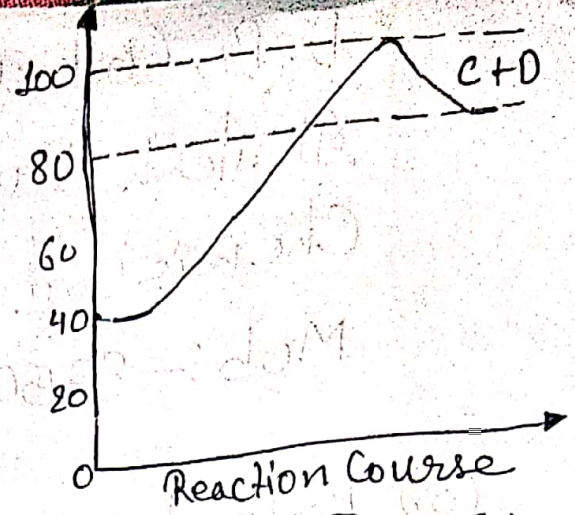
(8.) Rate law equation for reactions involving parallel reaction



$$\text{Rate} = \frac{d[A]}{[dt]} = k_1[A] + k_2[A] = [k_1 + k_2] = [A]$$

9 Degree of dissociation at any time $t = (1 - e^{-kt})$

Ex. 1 Find the activation energy [KJ/mol] for the reaction, $A(g) + B(g) \longrightarrow C(g) + D(g)$. From the plot given below:



[A] 20 [B] 60 [C] 40 [D] 80

Sol^n: $E_a = 100 - 40 = 60\ kJ\ mol^{-1}$

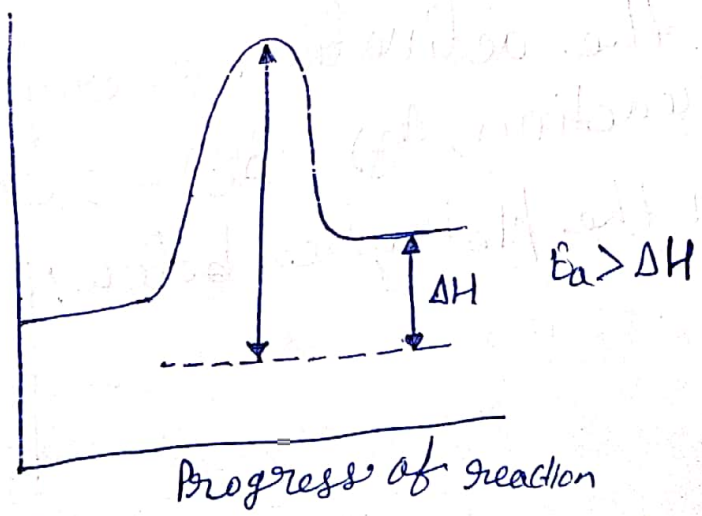
Hence the answer is [B].

Ex.2 In an endothermic reaction, ΔH represents the enthalpy of reaction in kJ/mol, the minimum value for the ~~the~~ energy of activation will be.

[A] less than ΔH [B] zero [C] more than ΔH

[D] equal to ΔH

Sol^n



Hence, (C) is the correct answer.

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Ex.3 Consider the following first order competing reactions

$A \longrightarrow B$, $C \longrightarrow D$,

the ratio of $\frac{k_1}{k_2}$, if only 25% of A have been reacted whereas 50% of C has been reacted, calculated the ratio of $\frac{k_1}{k_2}$

[A] 0.415 [B] 0.246 [C] 2.06 [D] 0.06

Sol^n $k_1 = \frac{2.303}{t_1} \log \frac{100}{75}$ for 25% [A] reacted

$k_2 = \frac{2.303}{t_2} \log \frac{100}{50}$ for 50% (C) reacted

$$\therefore \frac{k_1}{k_2} = \frac{t_2}{t_1} \times \frac{0.1249}{0.3010}$$

Since $t_2 = t_1$

$$\therefore \frac{k_1}{k_2} = \frac{0.1249}{0.3010} = 0.415$$

Hence, (A) is the correct answer.

Ex.4 For a reaction $A \xrightarrow{k_1} B \xrightarrow{k_2} C$. If the reactions are of 1st order then $\frac{d[B]}{dt}$ is equal to

[A] $-k_2[B]$ [B] $+k[A]$ [C] $k_1[A]-k_2[B]$ [D] $k_1[A]+k_2[B]$

Sol^n Rate of increase in [B] $= k_1[A]$

similary rate of decrease in [B] $= k_2[B]$

Hence the answer is [C]

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