Case = 9 ⇒ nth order of Rxn

$$nA \rightarrow B$$

$$R.O.R = K[A_t]^n$$

$$K = \frac{1}{(n-1)t}\left[\frac{1}{(A_t)^{n-1}} - \frac{1}{(A_0)^{n-1}}\right]$$

$n \geq 2 \rightarrow$ applicable

$n = 2$ (2nd order of rxn)

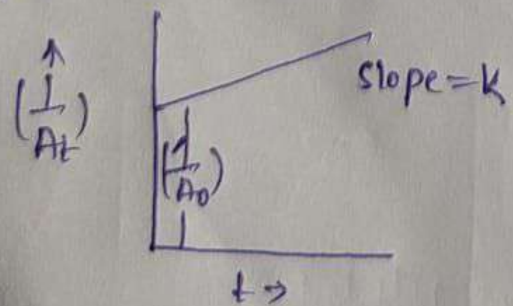
$$\boxed{K = \frac{1}{t}\left[\frac{1}{A_t} - \frac{1}{A_0}\right]}$$

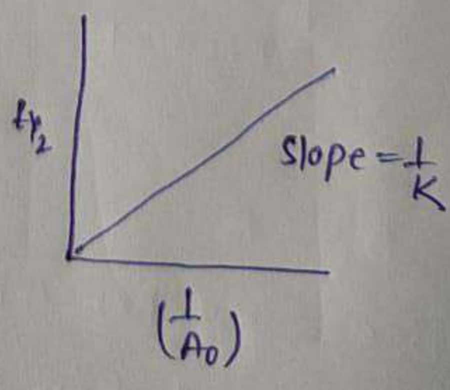
$$t_{1/2} = \frac{1}{(n-1)\times K} \times \frac{2^{n-1}-1}{(A_0)^{n-1}} \qquad t_{1/2} \propto (A_0)^{1-n}$$

$n = 2$ ($t_{1/2}$ of 2nd order rxn)

$$\boxed{t_{1/2} = \frac{1}{K} \times \left(\frac{1}{A_0}\right) = \frac{1}{K \times A_0}}$$

graph (2nd order of rxn)





CSD=10 Activation Energy or Effect of Temperature

(a) * $\frac{d \ln K}{dT} = \frac{E_a}{RT^2}$ → Vant's hoff Equation

(b) * $K = A e^{-E_a/RT}$ → Arrhenius Equation

Where → K = Rate const

E_a = Activation energy

T = temp.

R = universal Gas constant

= ~~8.3~~ 8.314 Joule $K^{-1} mole^{-1}$

≃ 1.99 ≃ 2 Calorie $K^{-1} mole^{-1}$

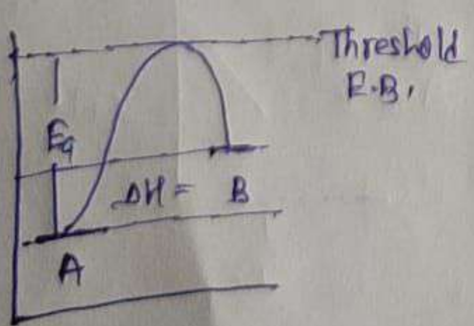
≃ 0.0821 atm×litre $K^{-1} mole^{-1}$

A = Arrhenius factor or Arrhenius Const

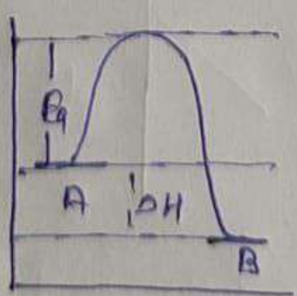
or pre exponential factor

(c)* Activation energy ⇒ Minimum energy required to reach activation complex (Threshold energy Barrier)

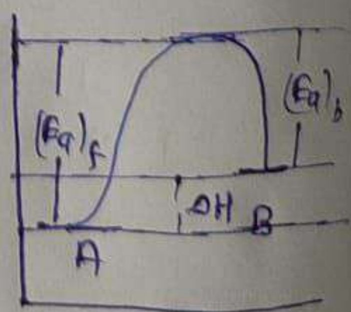
A → B



Endothermic
ΔH=+ve



exothermic
ΔH=-ve



Reversible Rxn
$\Delta H = (E_a)_f - (E_a)_b$