

SEPTEMBER '12						
M	T	W	T	F	S	S
				1	2	
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

(iv)

Saturday

25-08-2012 - Date

25

August

238-128 - Days 35th - Week

Half life Period
for 2nd order reaction.

(a) Type I \rightarrow $A + A \rightarrow \text{Product}$.

$$k = \frac{1}{t} \frac{x}{a(a-x)}$$

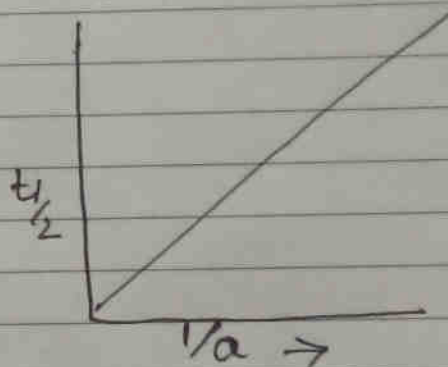
and at half life period $x = a/2$

$$t_{1/2} = \frac{1}{k} \frac{a/2}{a \cdot \frac{a}{2} (a - \frac{a}{2})}$$

$$= \frac{1 \cdot a/2}{k a \cdot a/2}$$

$$t_{1/2} = \frac{1}{ak}$$

$$t_{1/2} \propto 1/a$$



Effect of temperature on reaction rate:-

(Arrhenius Equation)

The rate of a reaction increases considerably with the increase of temperature. The temperature co-efficient of a chemical reaction is defined as the ratio of velocity constants of a reaction at two temperatures separated by 10 degrees centigrade (usually 25 & 35°C)

$$\text{Temperature coefficient} = \frac{k_{35^\circ}}{k_{25^\circ}}$$

Its value is generally between 2 and 3.

August

Arrhenius suggested a empirical relation between rate constant "K" and the absolute temperature "T".

According to Arrhenius

$$K = A e^{-E_a/RT} \rightarrow (1)$$

A = Frequency factor or Arrhenius factor, or pre exponential factor, and it is a constant for each reaction.

K = rate constant

E_a = Activation energy (Joule/mole)

R = Gas constant, ($8.314 \text{ J K}^{-1} \text{ mol}^{-1}$)

T = temperature (in Kelvin)

From the eqn (1)

$$\ln K = \ln A - E_a/RT$$

$$\ln K = \ln A - E_a/R \left(\frac{1}{T} \right)$$

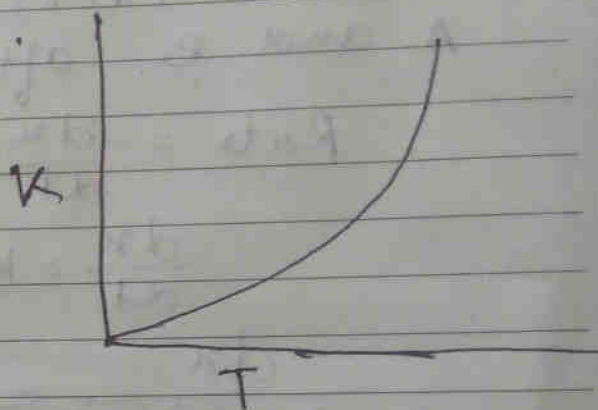


Fig I K vs T

Considering the reaction at two temperatures T_1 & T_2

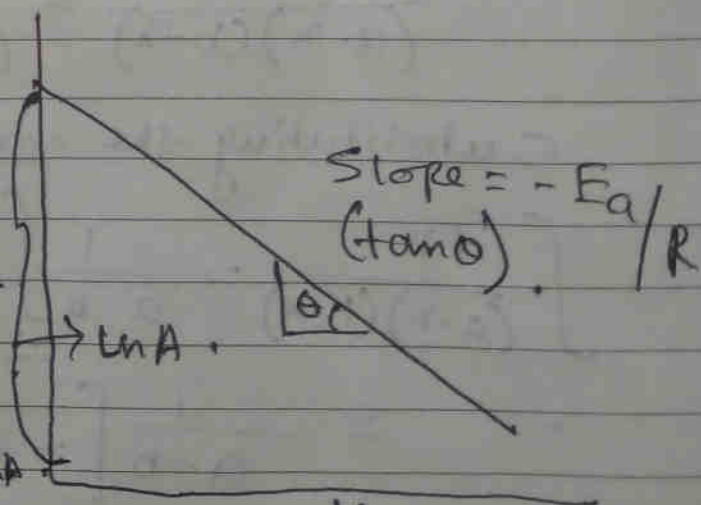
$$\ln K_1 = \ln A - E_a/RT_1 \rightarrow (2)$$

$$\ln K_2 = \ln A - E_a/RT_2 \rightarrow (3)$$

Now eqn (3) - (2)

$$\ln K_2 - \ln K_1 = -E_a/R \left(\frac{1}{T_2} - \frac{1}{T_1} \right)$$

$$\ln \frac{K_2}{K_1} = -E_a/R \left(\frac{1}{T_2} - \frac{1}{T_1} \right)$$



NOTES $\log \frac{K_2}{K_1} = -E_a/2.303R \left(\frac{1}{T_2} - \frac{1}{T_1} \right)$

Fig II $\ln K$ vs $1/T$