DPP
DAILY PRACTICE PROBLEMS

Class : XIIth

Date :

Subject : CHEMISTRY

DPP No. : 10

Topic :- Chemical Kinetics

1 **(b)**
For first reaction,

$$E_1 = \frac{2.303RT_1T_2}{(T_1 - T_2)} \log \frac{k_1'}{k_1} \qquad \text{...(i)}$$

For second reaction,

$$E_2 = \frac{2.303RT_1T_2}{(T_1 - T_2)} \log \frac{k_2'}{k_2} \qquad \text{...(ii)}$$

Given, $E_1 > E_2$

$$\Rightarrow \frac{2.303RT_1T_2}{(T_1 - T_2)} \log \frac{k_1'}{k_1} > \frac{2.303RT_1T_2}{(T_1 - T_2)} \log \frac{k_2'}{k_2}$$

$$\therefore \frac{k_1'}{k_1} > \frac{k_2'}{k_2}$$

2 **(d)**
These are the characteristics of effective collisions.

3 **(b)**
Pseudo first order rate constant is doubled as well as rate of reaction is doubled. It may be noted that in presence of acid, hydrolysis of ethyl acetate is a pseudo-unimolecular reaction but the actual value of k depends upon the concentration reaction but the actual value of k depends upon the concentration of H^+ ions, otherwise rate constant of a reaction is constant at constant temperature.

4 **(b)**
We know that, $\frac{(t_{1/2})}{(t_{1/2})'} = \left[\frac{a_2}{a_1}\right]^{n-1}$

Where, n=order of reaction
Given, $(t_{1/2}) = 0.1s, a_1 = 400$
$(t_{1/2}) = 0.8s, a_1 = 50$
On substituting the values

$$\frac{0.1}{08} = \left[\frac{50}{400}\right]^{n-1}$$

On taking log both sides

$$log \frac{0.1}{0.8} = (n-1) log \frac{50}{400}$$

$$log \frac{1}{8} = (n-1)log \frac{1}{8}$$

0.90=(n-1)0.90

n-1=1

n=2

6   **(a)**

For nth order reaction

$$k = \left(mol\ L^{-1}\right)^{1-n} s^{-1}$$

For Ist order reaction

Unit of $k = s^{-1}$

For zero order reaction

Unit of $k = mol\ L^{-1} s^{-1} = M\ s^{-1}$

7   **(b)**

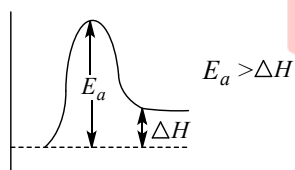For II order reaction, $t_{1/2} = \frac{1}{Ka}$

8   **(d)**

If $\frac{1}{[A]^2}$ vs times are a straight line then order of reaction is third.

9   **(c)**

For an endothermic reaction where ΔH represents the enthalpy of the reaction, the minimum value for the energy of activation is more than ΔH, ie, $E_a > \Delta H$

11   **(c)**

$$T_{\frac{1}{2}} = T_{50}, x = \frac{R}{2}$$

$$\therefore \quad T_{50} = \frac{R}{k_0}$$

So $T_{50} \propto R$

$$T_{50} \propto \frac{R}{k_0}$$

Therefore, the formula of $t_{1/2}$ for a zero order reaction is $\frac{[R]_0}{2k}$

12   **(b)**

The curve Y shows a gradual increase in the concentration with time.

13   **(a)**

Acid hydrolysis of sucrose is a pseudo unimolecular or pseudo first order reaction.

Hydrolysis of sucrose in presence of mineral acid is a biomolecular reaction. But as water is taken in large excess, so the rate of reaction only depends upon concentration of sucrose. Hence, order of the reaction is one.

Therefore, it is called a pseudo first order reaction.

14 **(c)**

For first order reaction

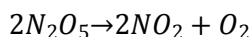$$\log[A] = -\frac{kt}{2.303} + \log[A]_0$$
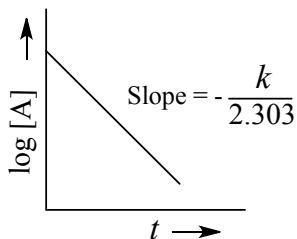
15 **(a)**

$r = K[A] = 4 \times 10^{-3} \times 0.02 = 8 \times 10^{-5} M \sec^{-1}$

16 **(b)**

For the first order reaction,

$2N_2O_5 \rightarrow 2NO_2 + O_2$

$rate \ \dfrac{dx}{dt} = k(N_2O_5) \quad ...(i)$

Given,

$\dfrac{dx}{dt} = 2.400 \times 10^{-5} mol \ L^{-1}s^{-1}$

$k = 3.0 \times 10^{-5}s^{-1}$

$[N_2O_5] = ?$

Substituting these values in (i)

$2.4 \times 10^{-5} = 3.0 \times 10^{-5}[N_2O_5]$

$or \ [N_2O_5] = \dfrac{2.4 \times 10^{-5}}{3.0 \times 10^{-5}}$

$= 0.8 mol \ L^{-1}$

17 **(c)**

The definition of activation energy.

18 **(d)**

$$2.303 \log \frac{K_2}{K_1} = \frac{E_a}{R} \frac{[T_2 - T_1]}{T_1 T_2}$$

$$\therefore 2.303 \log \frac{K_2}{K_1} = \frac{9}{2 \times 10^{-3}} \left[\frac{10}{298 \times 308}\right];$$

$$\therefore \frac{K_2}{K_1} = 1.63; i.e., 63\% \text{ increase}$$

19 **(c)**
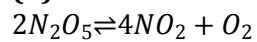
$r = K[A]^1$;

Thus, $7.5 \times 10^{-4} = K \times 0.5$;

$\therefore K = 15 \times 10^{-4} \text{sec}^{-1} = 1.5 \times 10^{-3} \text{sec}^{-1}$

20 **(d)**

$2N_2O_5 \rightleftharpoons 4NO_2 + O_2$

$$Rate = \pm \frac{1}{\substack{stoichiometrics \\ coefficient}} \frac{d[product \ or \ reactant}{dt}$$

$$\therefore Rate = \frac{-1}{2} \frac{d[N_2O_5]}{dt} = +\frac{1}{4} \frac{d[NO_2]}{dt} = \frac{d[O_2]}{dt}$$

$$Or \quad -\frac{d[N_2O_5]}{dt} = 2 \frac{d[O_2]}{dt}$$

$$Or \quad \frac{-2d[N_2O_5]}{dt} = 4 \frac{d[NO_2]}{dt}$$

$$Or \quad \frac{d[NO_2]}{dt} = \frac{4d[O_2]}{dt}$$

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	B	D	B	B	B	A	B	D	C	C
Q.	11	12	13	14	15	16	17	18	19	20
A.	C	B	A	C	A	B	C	D	C	D