DPP
DAILY PRACTICE PROBLEMS

Class : XIIth
Date :

Solutions

Subject : CHEMISTRY
DPP No. : 6

Topic :- Chemical Kinetics

2 **(a)**

For zero order reaction, $t_{1/2} \propto [R]_0$

3 **(b)**

Effect of temperature on reaction rate is given by Arrhenius equation

$k = Ae^{-E_a/RT}$

4 **(b)**

This is Arrhenius equation.

5 **(b)**

Let ,initial concentration=a

Final concentration=a- $\frac{2}{3}$ a= $\frac{a}{3}$

$$t_{\frac{2}{3}} = \frac{2.303}{k} log \frac{a}{a/3}$$

$$= \frac{2.303}{5.48 \times 10^{-14}} \log 3$$

$=2.01 \times 10^{13}$s

6 **(c)**

Let the order with respect to A and B is x and y respectively.

Hence,

$Rate\ r = [A]^x[B]^y$ ...(i)

On doubling the concentration of A, rate increases 4 times,

$4r = [A]^x[B]^y$ ... (ii)

From Eqs. (i) and (ii)

$$\frac{1}{4} = \left(\frac{1}{2}\right)^x$$

$\therefore$ X=2

$\therefore$ order with respect to A is 2

If concentration of A and B both are doubled,

$8r = [2A]^x[2B]^y$ ... (iii)

From Eqs. (i) and (iii), we get

$$\frac{1}{8} = \frac{1}{(2)^x} \cdot \frac{1}{(2)^y} \qquad [\because x = 2]$$

$$\frac{1}{8} = \frac{1}{(2)^2} \cdot \frac{1}{(2)^y}$$

$$\frac{1}{8}=\frac{1}{4\times 2^{y}}$$
$2^{y}=2$
$\therefore$ Y=1
Hence , differential rate equation is
$r\propto[A]^{2}[B]^{1}$ or $\frac{dC}{dt}=kC_{A}^{2}\times C_{B}$
[Where, C_A and C_B=concentrations of A and B]

7 **(d)**

$r=k[A]^{n}$ ...(i)

When concentration is doubled then

$4r=k(2A)^{n}$ ...(ii)

Divide Eq. (ii) by (i)

$4=2^{n}$

$n=2$

8 **(a)**

$$t=\frac{0.693}{k}log\frac{[A]_0}{[A]}$$
$$=\frac{2.303}{60}log\frac{a}{\frac{a}{16}}=\frac{2.303}{60}\log 16$$
$$=\frac{2.303}{60}\times 1.204$$
$=0.0462s$
$=4.6\times 10^{-2}s$

9 **(a)**

From the unit of rate constant ($i.e.,s^{-1}$), it is clear that the reaction is of first order.
$2N_2O_5\rightarrow 4NO_2+O_2$
Hence, for first order reaction ,
$$k=\frac{2.303}{t}log\frac{p_0}{p_t}$$
$$\therefore 3.38\times 10^{-5}=\frac{2.303}{10\times 60}log\frac{500}{p_t}$$
Or $log\frac{500}{p_t}$=0.00880
$$\therefore \quad \frac{500}{p_t}=anti\log 0.00880$$
=1.02
$$p_t=\frac{500}{1.02}=490\ atm$$

11 **(b)**

$$t=\frac{2.303}{k}\log\frac{a}{a-x}$$

$$\because x=\frac{3}{4}\ a$$

$$\therefore\ t=\frac{2.303}{k}\log\frac{a}{a-\frac{3}{4}\ a}$$

$$=\frac{2.303}{k}\log 4$$

12 **(b)**

$2N_2O_5 \rightarrow 4NO_2+O_2$

Rate of decomposition of $N_2O_5=-\frac{1}{2}\frac{k[N_2O_5]}{dt}$

Rate of formation of $NO_2=\frac{1}{4}\frac{k[NO_2]}{dt}$

$$\therefore \frac{\text{rate of decompsition of } \mathrm{N_2O_5}}{\text{rate of formation of } \mathrm{NO_2}}=\frac{\frac{1}{2}\mathrm{k}\frac{[\mathrm{N_2O_5}]}{\mathrm{dt}}}{\frac{1}{4}\mathrm{k}\frac{[\mathrm{NO_2}]}{\mathrm{dt}}}$$

$$or\quad \frac{1}{2}k\frac{[N_2O_5]}{dt}\times\frac{4}{1}\frac{dt}{k[NO_2]}$$

$$=\frac{4}{2}=\frac{2}{1}=2:1$$

13 **(a)**

$$k=\frac{2.303}{t}\,log\frac{a}{a-x}$$

Given, reaction is75% completed is 32 min

A=100,x=75

$\therefore \qquad k=\frac{2.303}{32}log\frac{100}{100-75} \qquad$ ...(1)

For 50% completion of reaction

A=100, x=50

$\therefore \qquad k=\frac{2.303}{t}log\frac{100}{100-50} \qquad$ ...(2)

$\because \quad LHSof\ Eq.(1)=Eq.(2)$

$\therefore \quad RHSof\ Eq.(1)=Eq.(2)$

$$\therefore \quad \frac{2.303}{32}\,log\,\frac{100}{100-75}=\frac{2.303}{t}\,log\,\frac{100}{100-50}$$

$$or\,\frac{2.303}{32}\log 4=\frac{2.303}{t}\log 2$$

Or $\frac{t}{32}=\frac{\log 2}{\log 4}$ or $t=\frac{32\times\log 2}{2\log 2}$

$\therefore \quad t=16\ min$

$\therefore\ reaction\ will\ be\ 50\%\ completed\ in\ 16\ min$

14 **(b)**

Rate $\left(\frac{+d[C]}{dt}\right)=k[A][B]$

Thus, the order of reaction w.r.t. A=1
The order of reaction w.r.t.B=1
Total order of reaction=1+1=2

15 **(a)**

The intersection point indicates that half of the reactant X is converted into Y.

16 **(b)**

At $T_1 = 200\ K, T_2 = 400\ K, k_1 = k,\ k_2 = 10\ k$

$$\because \log\frac{k_2}{k_1} = \frac{E_a}{2.303R}\left(\frac{T_2 - T_1}{T_1 \cdot T_2}\right)$$

$$\log\frac{10\ k}{k} = \frac{E_a}{2.303R}\left(\frac{400 - 200}{400 \times 200}\right)$$

$$E_a = 921.2\ R$$

17 **(c)**

Zero order reactions occur with constant rate.

18 **(a)**

$t = \frac{2.303}{K}\log\frac{a}{(a-x)}$;

Thus, $K = \frac{2.303}{10}\log 8 = (2.303 \times 3\log 2)\ /10$

19 **(c)**

For the reaction $A \rightarrow B$

On increasing the concentration of reactant (i.e.,A) by 4 times , the rate of reaction becomes double ,hence order of reaction is $\frac{1}{2}$.

20 **(b)**

The rate of chemical reaction always decreases with time as reaction proceeds due to decrease in number of reactant molecules. Only for zero order reactions the rate of chemical reaction remains same.

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