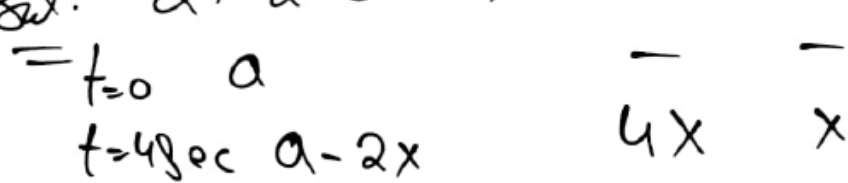
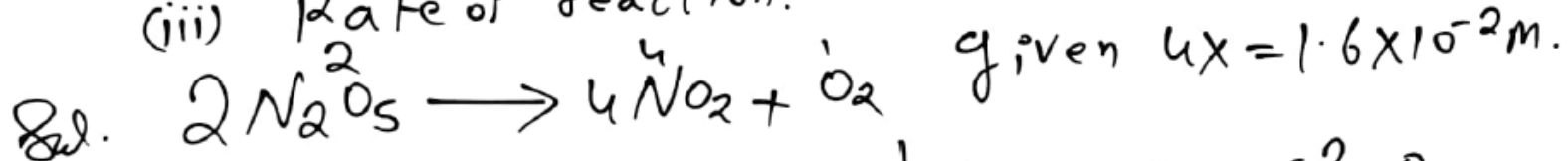


Q.4. The Reaction  $2N_2O_5 \rightarrow 4NO_2 + O_2$ . If the concentration of  $NO_2$  increases by  $1.6 \times 10^{-2} \text{ m}$  in 4 sec. Cal. the following-

- (i) Rate of formation of  $NO_2$  (ii) Rate of  $N_2O_5$   
 (iii) Rate of reaction.



$$(i) \gamma_{NO_2} = \frac{\Delta[NO_2]}{\Delta t}$$

$$\gamma_{NO_2} = \frac{[NO_2]_{t_2} - [NO_2]_{t_1}}{t_2 - t_1}$$

$$\gamma_{NO_2} = \frac{1.6 \times 10^{-2} - 0}{4 - 0} = 0.4$$

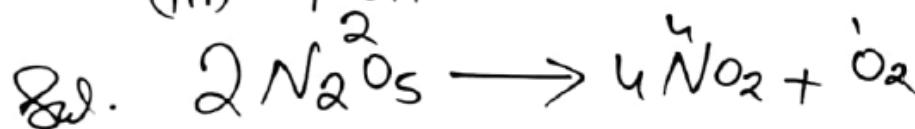
$$\gamma_{NO_2} = \frac{d[NO_2]}{dt} = \frac{1.6 \times 10^{-2}}{4}$$

$$\gamma_{NO_2} = \frac{d[NO_2]}{dt} = 4 \times 10^{-3} \text{ m/sec} \text{ Ans}$$

Q.4. The Reaction  $2\text{N}_2\text{O}_5 \rightarrow 4\text{NO}_2 + \text{O}_2$ . If the concentration of  $\text{NO}_2$  increases by  $1.6 \times 10^{-2} \text{ m}$  in 4 sec.

Cal. the following-

- (i) Rate of formation of  $\text{NO}_2$  (ii) Rate of  $\text{N}_2\text{O}_5 = -\frac{d[\text{N}_2\text{O}_5]}{dt}$   
 (iii) Rate of reaction.



given  $4x = 1.6 \times 10^{-2} \text{ m}$ .

(ii)  $-\frac{1}{2} \frac{d[\text{N}_2\text{O}_5]}{dt} = \frac{1}{4} \frac{d[\text{NO}_2]}{dt}$

$-\frac{d[\text{N}_2\text{O}_5]}{dt} = \frac{2}{4} \cdot \frac{d[\text{NO}_2]}{dt}$

$= \frac{1}{2} \times 2 \times 4 \times 10^{-3}$

$-\frac{d[\text{N}_2\text{O}_5]}{dt} = 2 \times 10^{-3} \text{ m/sec}$

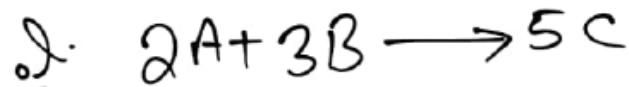
(iii) r.o.r. =  $\frac{1}{4} \frac{d[\text{NO}_2]}{dt}$

$= \frac{1}{4} \times 4 \times 10^{-3}$

r.o.r. =  $10^{-3} \text{ m/sec}$

Q.3. Given a rxn -  $2A + 3B \rightarrow 5C$   
 initial conc. of A is 10M which change to 5M  
 in 20sec. Cal.

(i) rate of A (ii) r.o.r. (iii) Value of  $\frac{d[C]}{dt}$



= 10 a -

= 20sec 10 - 2x a - 3x 5x

$\Rightarrow$  5M a - 3x 5x

$$\gamma_A = - \frac{\Delta[A]}{\Delta t} \Rightarrow \gamma_A = - \frac{[A]_{t_2} - [A]_{t_1}}{t_2 - t_1}$$

$$\gamma_A = - \left( \frac{5 - 10}{20 - 0} \right)$$

$$\gamma_A = - \left( \frac{-5}{20} \right) \Rightarrow \gamma_A = - \frac{d[A]}{dt} = \frac{1}{4} = 0.25 \text{ M/sec}$$

ii) r.o.r. =  $-\frac{1}{2} \frac{d[A]}{dt}$

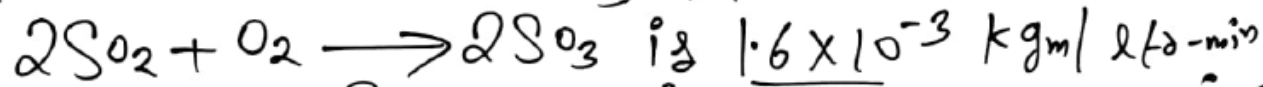
$$\text{r.o.r.} = \frac{1}{2} \times \frac{1}{4} = \frac{1}{8} \Rightarrow \text{r.o.r.} = 0.125 \text{ M/sec}$$

(iii)  $-\frac{1}{2} \frac{d[A]}{dt} = \frac{1}{5} \frac{d[C]}{dt}$

$$\frac{d[C]}{dt} = - \frac{5}{2} \frac{d[A]}{dt} \Rightarrow \frac{d[C]}{dt} = \frac{5}{2} \times \frac{1}{4}$$

$$\frac{d[C]}{dt} = 5 \times 0.125 = 0.625 \text{ M/sec}$$

Q6. Rate of formation of  $\text{SO}_3$  A/c to the reaction



Rate at which  $\text{SO}_2$  react is -

- (a)  $1.6 \times 10^{-3} \text{ kgm/ltr-min}$   
 (b)  $8 \times 10^{-4} \text{ -11-}$   
 (c)  $3.2 \times 10^{-3} \text{ -11-}$   
 (d)  $1.28 \times 10^{-3} \text{ -11-}$

given  $\frac{d[\text{SO}_3]}{dt} = 1.6 \times 10^{-3} \frac{\text{kgm}}{\text{ltr-min}}$

$$\left\{ \eta = \frac{w(\text{gm})}{m \cdot t} \right\}$$

$$\frac{d[\text{SO}_3]}{dt} = \frac{1.6 \times 10^{-3} \times 10^3 \text{ gm}}{\text{ltr-min}}$$

$$\left\{ w = \eta \cdot m \cdot t \right\}$$

$$\frac{d[\text{SO}_3]}{dt} = \frac{1.6 \times 10^{-3} \times 10^3}{80} \left( \frac{\text{mol}}{\text{ltr-min}} \right) \text{ - (1)}$$

$$-\frac{1}{2} \frac{d[\text{SO}_2]}{dt} = \frac{1}{2} \frac{d[\text{SO}_3]}{dt}$$

$$-\frac{d[\text{SO}_2]}{dt} = \frac{1.6 \times 10^{-3} \times 10^3}{80} \frac{\text{mol}}{\text{ltr-min}} \Rightarrow$$

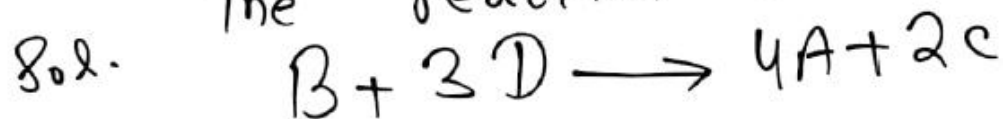
$$-\frac{d[\text{SO}_2]}{dt} = \frac{1.6 \times 10^{-3} \times 10^3}{80} \times \frac{64}{10^3} \frac{\text{kgm}}{\text{min-ltr}}$$

$$-\frac{d[\text{SO}_2]}{dt} = 1.28 \times 10^{-3} \text{ kgm/ltr-min}$$

Q.7. The rate of reaction is expressed in different ways follows

$$\frac{1}{2} \frac{d[C]}{dt} = -\frac{1}{3} \frac{d[D]}{dt} = \frac{1}{4} \frac{d[A]}{dt} = -\frac{d[B]}{dt}$$

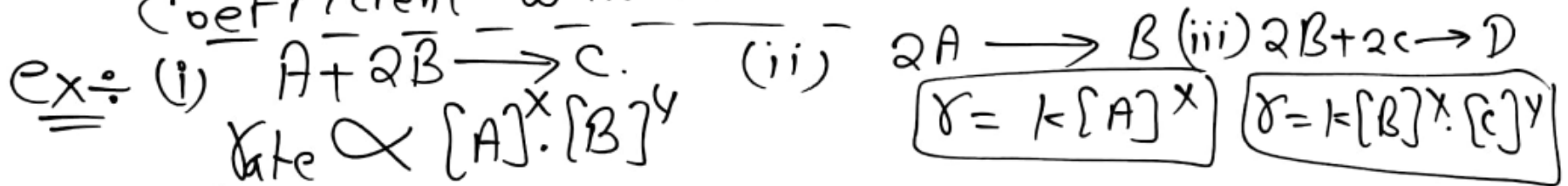
The reaction is -



Rate law  $\div$  It is a experimental expression.

A/c to rate law, rate is directly proportional to product of molar concentration of reactant.

And every term of reactant raised a power / coefficient which is totally experimentally.



$r = k[A]^x \cdot [B]^y$   $\rightarrow$  Rate law. O. of rxn =  $x + y$   
 $\rightarrow$  Here  $k$  is rate constant. O. of A =  $x$ ; O. of B =  $y$

Order of Reaction  $\div$  In rate law expression, sum of power of reactant is k/a Order of Reaction.