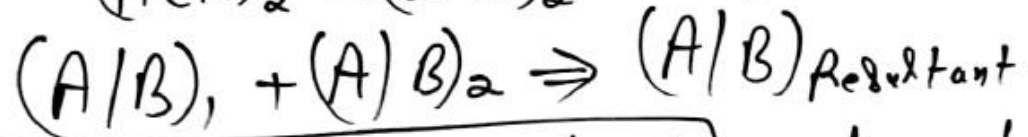


Normality of mixture:

(1) Mixture of Acid-Acid or Base-Base.

$$(Acid)_1 = (Base)_1 = N_1, V_1$$

$$(Acid)_2 = (Base)_2 = N_2, V_2$$



$$N_1 V_1 + N_2 V_2 = N_R \cdot V_R$$

$$V_R = V_1 + V_2 + V_3 + \dots$$

If Solⁿ is Acidic $N_R = [H^+]$
or

If Solⁿ is Basic $N_R = [OH^-]$

(2) Mixture of Acid-Base:

$$(N_1 V_1)_{\text{Acid}} \sim (N_2 V_2)_{\text{Base}} = N_R \cdot V_R ; \left\{ V_R = V_1 + V_2 + V_3 + \dots \right\}$$

Case I If $(N_1V_1)_{\text{Acid}} > (N_2V_2)_{\text{Base}} \Rightarrow \text{Soln is Acidic}$
 $\Rightarrow N_R = [H^+]$

$$(N_1V_1)_{\text{Acid}} - (N_2V_2)_{\text{Base}} = N_R V_R$$

Case II If $(N_1V_1)_{\text{Acid}} < (N_2V_2)_{\text{Base}} \Rightarrow \text{Soln is Basic}$
 $\Rightarrow N_R = [OH^-]$
 $(N_2V_2)_{\text{Base}} - (N_1V_1)_{\text{Acid}} = N_R V_R$

Case III If $(N_1V_1)_{\text{Acid}} = (N_2V_2)_{\text{Base}} \Rightarrow \text{Soln is Neutral.}$
 $N_R = 0$

Q.1. Cal. Normality of mixture -

(a) 300ml of 0.2M H_2SO_4 \rightarrow v.f. = 2 + 200ml of 0.5M HNO_3 \rightarrow v.f. = 1 +
 100ml of 0.6M HCl \rightarrow v.f. = 1 are mixed together & final

Volume made 1ltr by adding water then Cal.
 Normality of mixture also Cal. Normality of H_2SO_4

(b) 500ml of 0.5M H_2SO_4 + 100ml of 0.2M KOH + 50ml of
 0.2M HCl

(c) 100ml of 0.1M HCl + 50ml of 0.2M NaOH .

Sol. (a) $N_1V_1 + N_2V_2 + N_3V_3 = N_R \cdot V_R$
 $0.2 \times 2 \times 300 + 0.5 \times 1 \times 200 + 0.6 \times 1 \times 100 = N_R \cdot 1000$

$$100(1.2 + 1 + 0.6) = N_R \cdot 1000$$

$$N_R = \frac{2.8}{10} \Rightarrow \boxed{N_R = 0.28}$$

Sub Part Normality of $H_2SO_4 = \frac{\text{gm-ew. of } H_2SO_4}{\text{Total Volume}} = \frac{0.2 \times 2 \times 300}{1000}$
 $= 0.12 \text{ Ans.}$

(b) $\text{gm-ew. of Acid} = N_1V_1 + N_2V_2$
 $= 0.5 \times 2 \times 500 + 0.2 \times 50$
 $= \frac{1}{2} \times 2 \times 500 + \frac{2}{10} \times 50 \Rightarrow \text{gm-ew. Acid} = 510$

$\text{gm-ew. of Base} = 0.2 \times 1 \times 100 = 20$

$$(\text{gm-ew. of Acid}) - (\text{gm-ew. of Base}) = N_R \cdot (500 + 50 + 100)$$

$$510 - 20 = N_R \cdot 650$$

$$N_R = \frac{490}{650} \Rightarrow N_R = [H^+] = \frac{49}{65} = 0.75$$

Q.2. How many ml of water must be added to 200ml of 0.65M HCl to dilute free Solⁿ of 0.2 M.

Sol. $m_1 V_1 = m_2 V_2$
 $\Rightarrow 0.65 \times 200 = 0.2 \cdot V_2$
 $\frac{130}{0.2} = V_2 \Rightarrow \boxed{V_2 = 650 \text{ ml}}$

gm-eq. Before = gm-eq. After Dilution
 Total Volume = 650
 Volume of water = 650 - 200 = 450 ml.

Q.3. How many ml of 0.1 M NaOH to give a Solⁿ that has 50ml of 0.1 M NaOH to give a Solⁿ that has Concentration of 0.05 M H_2SO_4 v.f = 2

Sol. $(\text{gm-eq. of Acid}) - (\text{gm-eq. of Base}) = N_A V_A - N_B V_B$

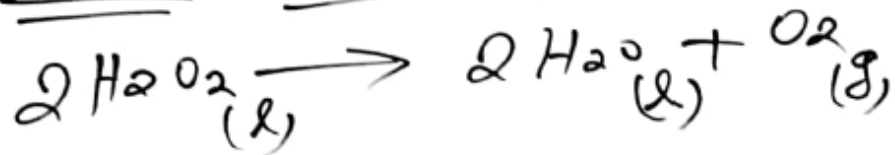
$$0.1 \times 2 \cdot V - 0.1 \times 1 \times 50 = 0.05 \times 2 \times (V + 50)$$

$$0.2V - 5 = 0.1(V + 50) \Rightarrow 0.2V - 5 = 0.1V + 5$$

$$0.2V - 0.1V = 5 + 5$$

$$0.1V = 10 \Rightarrow \boxed{V = 100 \text{ ml}}$$

** Strength of H_2O_2 Solution =



Ex: (i) '2 Vol^m' H_2O_2

2 ml or 2 ltr of $O_2(g)$ at STP is produced by decomposition

1 ml or 1 ltr of H_2O_2 solⁿ.

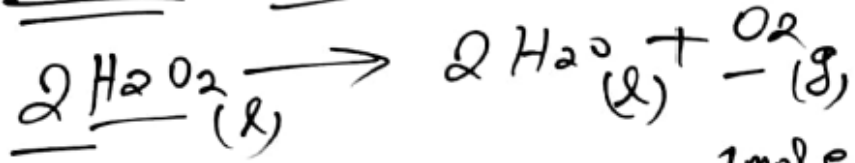
Ex(ii): '3 Vol^m' H_2O_2

3 ml of $O_2(g)$ at S.T.P. is produced by decomposition of

1 ml of H_2O_2 solⁿ.

Volume of $O_2(g)$ at S.T.P. is produced by Decomposition of
1 ml of H_2O_2 solⁿ is k/a Volume Strength.

** Strength of H₂O₂ Solution =



2 mole H₂O₂
OR
68 gm H₂O₂

1 mole O₂ (g)
OR
22400 ml O₂ (g)

$$\left. \begin{aligned} n &= \frac{w}{m.w.} \\ w &= n \cdot m.w. \\ &= 2 \times 34 \\ &= 68 \text{ gm} \end{aligned} \right\}$$

22400 ml of O₂ (g) at STP is produced by 68 gm decomp. of H₂O₂

$$\Rightarrow 1 \text{ ml } \text{O}_2 (\text{g}), \quad \text{---} \quad \text{---} \quad \text{---} \quad \frac{68}{22400} \text{ gm. H}_2\text{O}_2$$

$$\therefore x \text{ ml O}_2 (\text{g}), \quad \text{---} \quad \text{---} \quad \text{---} \quad \frac{68}{22400} \cdot x \text{ gm H}_2\text{O}_2 \text{ decomp.}$$

(i) Normality =

$$N = \frac{W}{E} \times \frac{1000}{V(\text{ml})}$$

$$N = \frac{\cancel{68} \cdot \alpha}{\cancel{2240} \cdot 17} \times \frac{1000}{1}$$

$$N = \frac{\alpha}{5.6} \times 10 \Rightarrow N = \frac{\alpha}{\left(\frac{5.6}{10}\right)} \Rightarrow \boxed{N = \frac{\alpha}{5.6}}$$

$$\left\{ V = 1 \text{ ml} \right\}$$

$$\left\{ E = \frac{m.w.}{v.f} = \frac{34}{2} \right\}$$

$$\left\{ E = 17 \right\}$$

$$\boxed{N = \frac{\alpha}{5.6}}$$

' α ml' H_2O_2
"10v" H_2O
 $\alpha = 10$

(ii) molarity = $N = M \cdot V \cdot f.$

$$\frac{\alpha}{5.6} = M \cdot 2 \Rightarrow \boxed{M = \frac{\alpha}{11.2}}$$

(iii) Strength =

$$S = N \cdot E. \Rightarrow S = \frac{\alpha}{5.6} \times 17 \Rightarrow \boxed{S = \frac{17 \cdot \alpha}{5.6}}$$

$\alpha \rightarrow \text{Volume.}$

(iv) % Strength :-

$$1000 \text{ ml Sol}^n \longrightarrow \frac{17x}{5.6}$$

$$1 \text{ ml } - \text{''} \longrightarrow \frac{17x}{5.6} \times \frac{1}{1000}$$

$$100 \text{ ml } - \text{''} - \text{''} \longrightarrow \frac{17x}{5.6} \times \frac{100}{1000}$$

$$\% S = \frac{17x}{5.6} \times \frac{1}{10} \Rightarrow \boxed{\% S = \frac{x}{5.6} \times \frac{17}{10}}$$

Q.1. In 'Qov' H₂O₂ Solⁿ Cal.

(i) N (ii) m (iii) S (iv) % S.