

①

$$\text{No. of Mole}_2 \quad \frac{\text{wt of Substane molar}}{\text{Atomic wt}}$$

CO_2
 $= 12 + 32 = 44$

$$= \frac{11}{44} = \frac{1}{4}$$

$$= 0.25$$
①

②

$$\text{pH} + \text{pOH} = 14$$

$$10 + \text{pOH} = 14$$

$$\boxed{\text{pOH} = 4}$$

$$[\text{OH}^-] = 10^{-\text{pOH}}$$

$$= 10^{-4}$$



③

$$\frac{1N}{10} \text{ NaOH}$$

$$[\text{OH}^-] = \frac{1}{10} = 10^{-1}$$

$$[\text{OH}^-] = 10^{-\text{pOH}}$$

$$\text{pOH} = 1$$

$$\text{pH} = 14 - 1$$

$$= 13$$



$$\textcircled{4} \quad \text{PH} + \text{POH} = 14$$

\textcircled{2}

$$\text{PH} + 4 = 14$$

$$\boxed{\text{PH} = 10}$$

\textcircled{5}

$$[\text{H}^+] = 2 \times 10^{-3}$$

$$\text{PH} = -\log([\text{H}^+])$$

$$= -\log(2 \times 10^{-3})$$

$$= -(\log 2 - 3 \log 10)$$

$$= -(0.3010 - 3)$$

$$= -(-2.6990)$$

$$\approx \underline{\underline{2.6990}}$$

$$K_w = [\text{H}^+][\text{OH}^-] = 10^{-14}$$

\textcircled{6}

$$K_a = 1.8 \times 10^{-5}$$

$$K_w = K_a \times K_h \rightarrow \text{hydrolysis const}$$

$$\frac{10^{-14}}{1.8 \times 10^{-5}} \rightarrow K_h$$

$$\boxed{K_h = 0.55 \times 10^{-9}}$$

⑦ 1.62 gm Metal

2.02 gm Oxide
Metal

③

$$\text{wt of Oxygen} = 2.02 - 1.62 = \underline{\underline{0.4}}$$

$$\text{Eq wt of Metal} = \frac{\text{Molar Mass of Metal}}{\text{Molar Mass of Oxygen}} \times \text{atomic mass of oxygen}$$
$$= \frac{1.62}{0.4} \times 8 = \underline{\underline{32}}$$

⑧ $6.3 \text{ gm Oxalic acid } (\text{C}_2\text{H}_2\text{O}_4)$

$$\text{Eq wt} = \frac{\text{Molar Mass}}{\text{Valency}} = \frac{126}{2}$$

$$V = \frac{500}{1000} = \frac{1}{2} \text{ l} \quad = 63$$

$$\text{Normality} = \frac{\text{wt of Solute in gm}}{\text{Equivalence wt} \times \text{Volume of soln (l)}}$$

$$= \frac{\frac{63}{2}}{10.63} \times \frac{1}{2}$$

$$= \frac{2}{10} = \underline{\underline{0.2}}$$



$$\textcircled{1} \cdot V_1 = 100 \text{ ml}$$

\textcircled{4}

$$T_{1,0} = 100 + 273 = 373 \text{ K}$$

Pressure Constant

$$T_2 = ?$$

$$V_2 = 200 \text{ ml}$$

$$\frac{V_1}{T_1} = \frac{V_2}{T_2}$$



$$\frac{100}{373} = \frac{200}{T_2}$$

$$T_2 = \underline{\underline{746 \text{ K}}}$$

$$T_2 = 746 - 273$$

$$\underline{\underline{-473^\circ\text{C}}}$$

(6)

400 ml $\frac{1N}{10}$ Na_2CO_3 soln CO_3^{2-} 2Na^+

(5)

$$N = \frac{1}{10} = 0.1$$

$$V, 400 \text{ ml} = \frac{400}{1000} = 0.4$$

$$\text{C atomic wt} = 23 \times 2 + 12 + 16 \times 3 = 106$$

$$\text{Eqwt} = \frac{106}{2} = 53$$



$$N = \frac{\text{Wt of Solute in gm}}{\text{Eqwt} \times \text{Volume of soln (l)}}$$

$$0.1 = \frac{\text{wt}}{53 \times 0.4}$$

$$\text{wt} = 21.2 \times 0.1$$

$$\boxed{\text{wt} = 2.12 \text{ gm}}$$

$$11) i = 3A$$

$$t = 20 \text{ min} = 20 \times 60 = 1200 \text{ sec}$$

$$m = 4 \text{ gm}$$

$$M = Tit$$

$$X = Z \times 3 \times 10^3$$

$$Z = \frac{1}{900} \text{ gm/Coulomb}$$

(6)

12)

$$\text{Eq wt} = \frac{\text{Atomic Wt}}{\text{Valency}}$$



$$M_o = \frac{\text{At wt}}{2}$$

$$\text{At wt} = 80$$

13)

$$2.46 \text{ gm NaOH}$$

$$V = 100 \text{ cm}^3 = \frac{100}{1000} = 0.1 \quad (\nu = 1000 \text{ cm}^3)$$

$$\text{At wt} = 23 + 16 + 1 \\ = 40$$

$$\text{Molarity } M = \frac{\text{Wt of Solute in gm}}{\text{Atomic wt} \times \text{Volume in l}}$$

$$M_2 = \frac{246}{40 \times 0.10}$$

(7)

$$\therefore \frac{246}{400} \times \frac{61.87}{100} = \underline{\underline{0.6127}}$$

$$= \underline{\underline{0.615}} \text{ gm/litre}$$

(14)

$$CH_4 = 12 + 4 = \underline{\underline{16}}$$



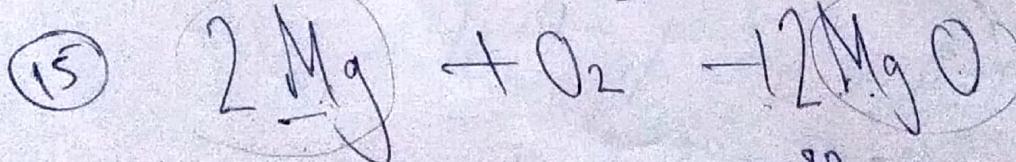
$$\text{wt} = 0.032 \text{ mg}$$

$$\therefore \frac{0.032}{1000 \times 1000} = \underline{\underline{32 \times 10^{-6} \text{ gm}}}$$

No. of
mole

$$\therefore \frac{\underline{\underline{32 \times 10^{-6}}}}{\underline{\underline{16}}} =$$

$$= \underline{\underline{2 \times 10^{-6}}}$$



$(24+16)^{1/2}$

$$48 \text{ gm Mg} \rightarrow 56 \text{ gm MgO}$$

$$1 \text{ gm Mg} \rightarrow \frac{56}{48} \text{ gm MgO}$$

$$3 \text{ gm} \rightarrow \frac{56}{48} \times 3 = \underline{\underline{5 \text{ gm}}}$$

(1)

Density of Water = 1 gm/ml.

1 gm \rightarrow 1 ml

(8)

$$V = 1 \text{ ml} = \frac{1}{1000} \text{ l}$$

$$\text{Actual wt of H}_2\text{O} = 2 + 16 = 18$$

$$M = \frac{\text{wt of solute in gm}}{\text{atomic wt} \times \text{Volume in l}} = \frac{1}{18 \times \frac{1}{1000}} = \frac{1000}{18} = 55.5$$

(2)

$$[H^+] = 0.00001 \approx 10^{-5}$$

$$[H^+] = 10^{-\text{pH}}$$

$\text{pH} = 5$

$$\therefore \text{pH} + \text{pOH} = 14$$

$$\text{pOH} = 14 - 5$$

$\text{pOH} = 9$

$$[\text{OH}^-] = 10^{-\text{pOH}}$$

$[\text{OH}^-] = 10^{-9}$



(18)

$$[H^+] = 5 \times 10^{-5}$$

(9)

$$pH = -\log [H^+]$$

$$= -\log(5 \times 10^{-5})$$

$$= -(\log 5 + 5 \log 10)$$

$$= -(0.6990 + 5)$$

$$\therefore -(-4.3010)$$

$pH = \underline{\underline{4.3010}}$

(19)

$$T_1 = -20 + 273 = 253 K$$

$$V_1 = 140 \text{ ml} \quad \frac{140}{253} = \frac{65}{T_2}$$

$$T_2 = ?$$

$$V_2 = 65 \text{ ml}$$

$$T_2 = \frac{253 \times 65}{140}$$

$$\frac{V_1}{T_1} = \frac{V_2}{T_2}$$

$T_2 = 117.46 K$

20.

$$i = ? , M = 10^{-3} \text{ kg} \\ t = 2 \text{ hrs} = 7200 \text{ sec}$$

10

$$M = Z i t$$

$$10^{-3} = 10^{-6} \times i \times 7200$$

$$i = \frac{10^{-3}}{10^{-6} \times 7200} = \frac{10^3}{7200} = \frac{1000}{7200} = \frac{5}{36}$$

$$i = \frac{5}{36} \text{ A}$$



21

0.001 M HCl

$$[H^+] = 0.001 = 10^{-3}$$

$$[H^+] = 10^{-\text{pH}}$$

$$\text{pH} = 3$$

$$i = 0.5 \text{ A}$$

$$t = 30 \times 60 = 1800 \text{ sec} , M = ?$$

$$\frac{\text{mass}}{\text{at wt}} \times \text{Charge} = \frac{it}{96500}$$

$$\frac{m}{63.6} \times 2 = \frac{0.5 \times 1800}{96500}$$

$$m = \frac{63.6 \times 9}{965 \times 2}$$

$$m = 0.296 \text{ g H}_2\text{O}$$

22

$$(23) \text{ Molar fraction of } A = \frac{n_A}{n_A + n_B + n_C} \quad \left. \begin{array}{c} (A) \\ (B) \\ (C) \end{array} \right\}$$

$$12 \text{ gm Water } n_1 = \frac{12^2}{183} = 0.67 \quad (11)$$

$$108 \text{ gm Oxalic acid } n_2 = \frac{108^9}{605} = 1.8$$

$$92 \text{ gm Ethyl alcohol } n_3 = \frac{92}{46} = 2$$



$$\begin{aligned} n_T &= n_1 + n_2 + n_3 \\ &= 0.67 + 1.8 + 2 = \underline{\underline{4.47}} \end{aligned}$$

$$\begin{aligned} \text{Mole fraction of Water} &\rightarrow \frac{n_1}{n_T} = \frac{0.67}{4.47} \\ &= \underline{\underline{0.14}} \end{aligned}$$

$$(24) \quad {}^2\text{He}^4 \quad P = 2 \\ C = 2 \\ n = 4 - 2 = 2$$

$$\begin{aligned} 2 \text{ mp} + 2 \text{ mn} &\rightarrow 2 \times 1.00815 + 2 \times 1.00867 \\ &= 4.0336 \text{ amu} \end{aligned}$$

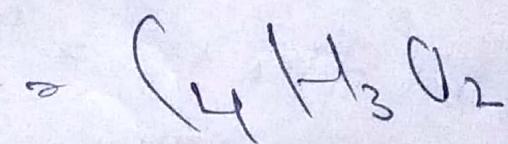
$$\text{Mass defect} = 4.0336 - 4.0026 = \underline{\underline{0.0310 \text{ amu}}}$$

(25)

(12)

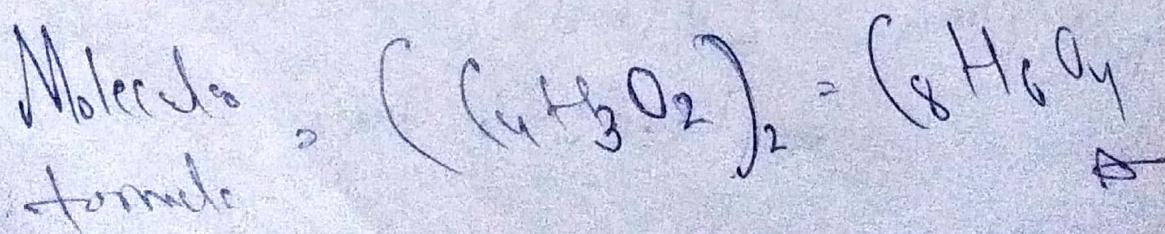
Element	Molar Mass	Wt.	$\frac{\text{Molar Mass}}{\text{Wt.}}$	Simple Ratio	Double wt.
C	57.8	12	$\frac{57.8}{12} = 4.81$	$\frac{4.81}{2.41} = 2$	4
H	3.6	1	$\frac{3.6}{1} = 3.6$	$\frac{3.6}{2.4} = 1.5$	3
O	38.6	16	$\frac{38.6}{16} = 2.41$	$\frac{2.41}{2.41} = 1$	2

Empirical formula



$$\begin{aligned}\text{Empirical wt.} &= 12 \times 4 + 3 + 16 \times 2 \\ &= 48 + 3 + 32 \\ &= 83\end{aligned}$$

$$n = \frac{166}{83} = 2$$



(26)

$$[H^+] = 3.3 \times 10^{-2}$$

(13)

$$pH = -\log[H^+]$$

$$= -\log(3.3 \times 10^{-2})$$

$$= -(\log 3.3 - 2 \log 10)$$



$$= -(0.5184 - 2)$$

$$= \underline{\underline{1.4816}} \quad B$$

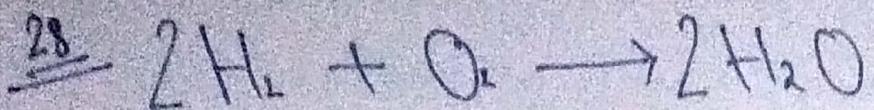
(27)

$$K_1 = 21.4 \times 10^{-5}$$

$$K_2 = 1.81 \times 10^{-5}$$

Strength

$$\begin{aligned} \left(\frac{C_1}{C_2}\right)^2 &= \sqrt{\frac{K_1}{K_2}} = \sqrt{\frac{21.4 \times 10^{-5}}{1.81 \times 10^{-5}}} \\ &\Rightarrow \sqrt{\frac{2140}{181}} = \sqrt{11.82} \\ &= 3.43 \quad B \end{aligned}$$

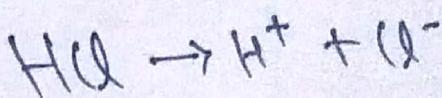
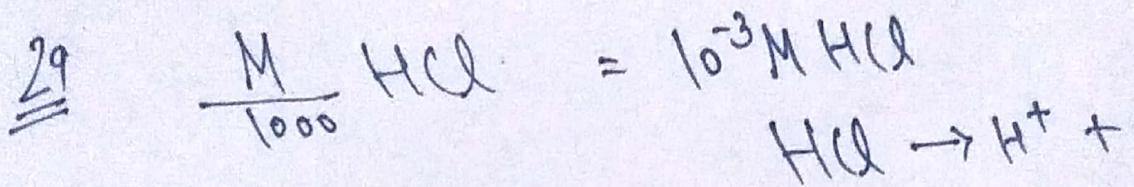


$$\begin{array}{rcl} 2x(2\times 1) & & 2x(2\times 1 + 16) \\ = 4 & & 36 \end{array}$$

$\therefore 4\text{ gm H}_2 \text{ gives } = 36\text{ gm H}_2\text{O}$

$$1\text{ gm } " \quad \cdot \frac{36}{4} = 9\text{ gm}$$

$$\text{So } 10\text{ gm } " \quad " = 9 \times 10 = \underline{90\text{ gm Ag}}$$



$$\text{So } [\text{H}^+] = 10^{-3}$$

$$\therefore [\text{H}^+] = 10^{-\text{pH}}$$

$$\text{So } \underline{\text{pH} = 3} \quad \underline{\text{Ag}}$$

30 $V_1 = 15\text{ ml}$
 $N_1 = 0.1$

$$V_2 = 10\text{ ml}$$

 $N_2 = ?$



$$N_1 V_1 = N_2 V_2$$

$$\frac{0.1}{10} \times 15 = N_2 \times 10$$

$$N_2 = \frac{15}{100} = \underline{0.15}$$



BY
— NISHANT GUPTA

Mob. no.
-7895124499