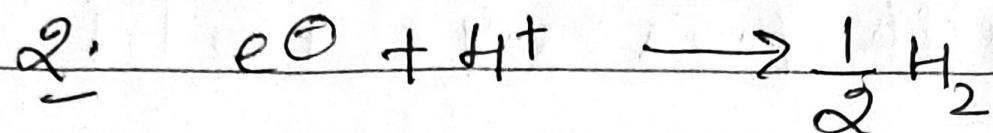


## O-2 Leader

1.  $E = 0.29 - \frac{0.059}{2} \log \frac{(0.01)^2 (0.01)}{(0.01)^2 (1)}$

$$E = 0.349 \approx 0.35 \text{ volt}$$



$$E_1 = 0 - \frac{0.059}{1} \log \frac{1}{1} = 0$$

$$E_2 = 0 - \frac{0.059}{1} \log \frac{1}{107} = -0.413$$

$$E_2 - E_1 = -0.413 \text{ volt}$$

3. Cu-anode will be a reactive electrode,  
so Cu itself oxidise at anode.  
As deposited mass on cathode is 2.5 gm  
then decrease in mass of anode is 1 gm  
more than 2.5 because some impurities  
also released by anode.

4.

$$\Delta m = I_{eq} \times V \cdot f$$

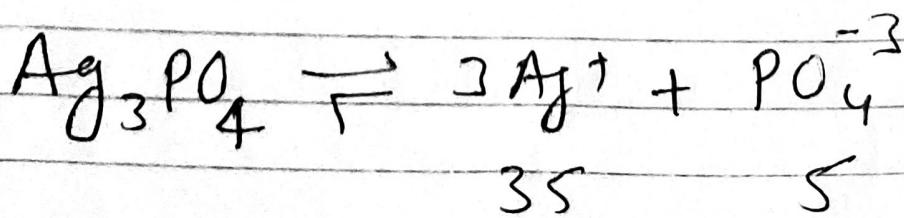
$$\Delta m = \cancel{9 \times 10^4} \quad 1.5 \times 10^4 \times 3$$

$$\Delta m = 4.5 \times 10^4$$

$$\Delta m = \frac{k}{5 \times 1000}$$

$$4.5 \times 10^4 = \frac{9 \times 10^4}{5 \times 1000}$$

$$5 = 2 \times 10^{-5} \text{ mol/lit}$$



$$K_{sp} = (35)^3 (5)$$

$$K_{sp} = 27 \times 5^4$$

$$= 27 (2 \times 10^{-5})^4$$

$$K_{sp} = 27 \times 16 \times 10^{-20}$$

$$K_{sp} = 4.32 \times 10^{-18}$$

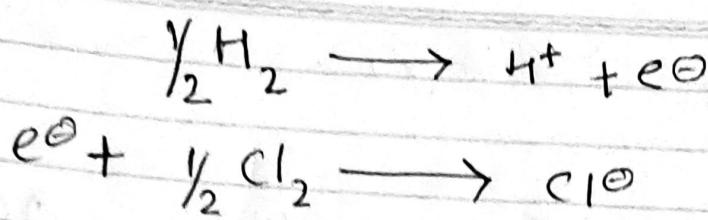
Q5. On mixing equal volume of  $\text{CH}_3\text{COONa}$  &  $\text{NaO}_4$  concentration of salt  $\text{CH}_3\text{COONa}$  becomes half of  $0.15$ .

$$[\text{CH}_3\text{COONa}] = \frac{0.15}{2}$$

$$\lambda_m = \frac{6 \cdot 3 \times 10^{-4} \times 1000}{0.15/2}$$

$$\lambda_m = 8.4 \text{ S} \cdot \text{m}^2 \text{ mol}^{-1}$$

(6)



$$\mathcal{E}_1 = \mathcal{E}^\circ - \frac{0.059}{1} \log \frac{[H^+][Cl^-]}{P_{H_2}^{Y_2} P_{Cl_2}^{Y_2}}$$

$$\mathcal{E}_2 = \mathcal{E}^\circ - \frac{0.059}{1} \log 100 \frac{[H^+][Cl^-]}{P_{H_2}^{Y_2} P_{Cl_2}^{Y_2}}$$

change in potential:

$$\mathcal{E}_2 - \mathcal{E}_1 = -0.059 \log \frac{100 [H^+][Cl^-]}{P_{H_2}^{Y_2} P_{Cl_2}^{Y_2}} + 0.059 \log \frac{[H^+][Cl^-]}{P_{H_2}^{Y_2} P_{Cl_2}^{Y_2}}$$

$$\Delta \mathcal{E} = -0.059 \log 100$$

$$\Delta G = -0.059 \times 2$$

$$= -0.118 \text{ volt}$$

Q. 7. Zn because Zn has higher highest value of oxidation potential

$$\text{Eq. A} = \text{Eq. H}_2$$

$$\frac{4.5}{27} \times 3 = n_{H_2} \times 2$$

$$n_{H_2} = \frac{1}{4} \text{ mol}$$

$$V_{H_2} = \frac{1}{4} \times 22.7 = 5.675 \text{ litre}$$

(9) Volume of A =  $10 \times 10 \times 10^2 \text{ cm}^3$   
= 1  $\text{cm}^3$

$$\text{mass of A} = 1 \times 10 = 10 \text{ gm}$$

Eq. A = no. of faraday

$$\frac{10}{193} \times 2 = \frac{Q}{96580}$$

$$Q = 10,000 \text{ C.}$$

(10)

$$k = \frac{1}{R} \cdot \frac{l}{A}$$

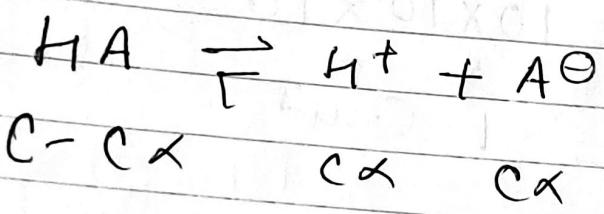
$$k = \frac{1}{50} \cdot \frac{2 \cdot 2 \times 10^{-2}}{4 \cdot 4 \times 10^{-4}} = 1 \text{ ohm}^{-1} \text{ m}^{-1}$$

$$I_m = \frac{k}{1000 \times M}$$

$$I_m = \frac{1}{1000 \times 0.5} = \frac{1}{500} = 0.002$$

(11)

$$\alpha = \frac{10}{200} = \frac{1}{20}$$



$$[\text{H}^+] = \text{C}\alpha$$

$$[\text{H}^+] = 0.1 \times \frac{1}{20} = \cancel{5 \times 10^{-3}} = \frac{1}{2} \times 10^{-2}$$

$$\text{pH} = 2 - \lg \frac{1}{2} = 2.3$$

(12)  $K_a$  for  $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$  is  $1.6 \times 10^{-5}$

$$\alpha = \sqrt{\frac{K_a}{C}}$$

$$\alpha = \sqrt{\frac{1.6 \times 10^{-5}}{0.1}} = 4 \times 10^{-2}$$

$$\alpha = \frac{1_m}{1_m^*}$$

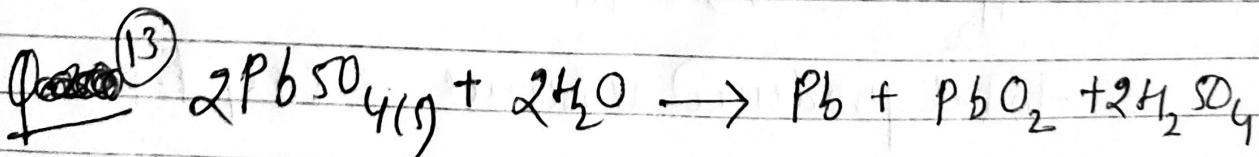
$$4 \times 10^{-2} = \frac{1_m}{380 \times 10^4}$$

$$1_m = 1.52 \times 10^3$$

$$1_m = \frac{k}{1000 \times M}$$

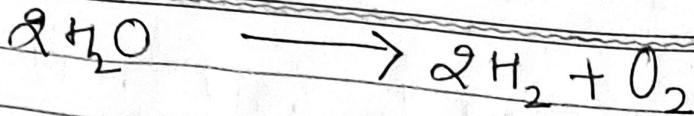
$$1.52 \times 10^3 = \frac{k}{1000 \times 80}$$

$$k = 1.52 \times 10^2 \text{ Sm}$$



$\text{H}_2\text{SO}_4$  will produce and density of solution increase

14



$$\frac{270}{18} = 15 \text{ mol}$$

$$15 \text{ mol } 7.5 \text{ mol}$$

$$V_{\text{O}_2} = \frac{7.5 \times 22.4}{1000} = 168 \text{ lit}$$

$$V_{\text{H}_2} = 15 \times 22.4 = 336 \text{ lit}$$

total produced volume = 504 lit

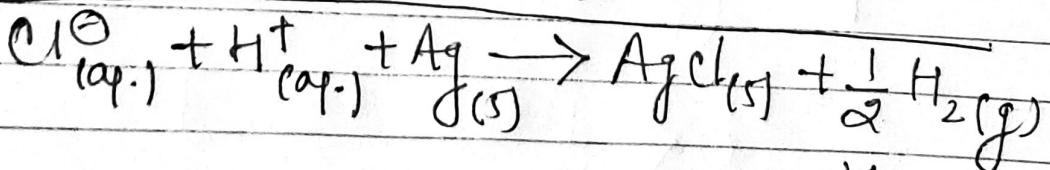
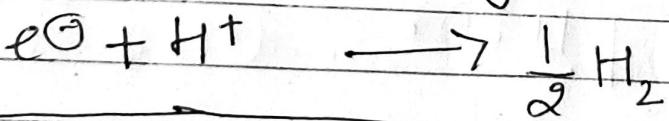
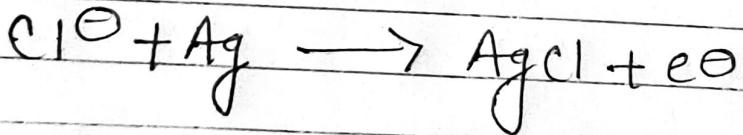
$$8\text{F} \cdot \text{H}_2\text{O} = \text{no. of faraday} \times \frac{75}{100}$$

$$15 \times 2 = \text{no. of faraday} \times \frac{75}{100}$$

$$\text{no. of faraday} = 40 \text{ F}$$

So option A, B & C are correct.

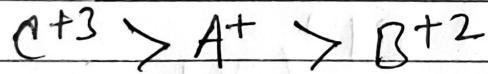
15.



$$E = E^\circ - \frac{0.0591}{1} \log \frac{P_{\text{H}_2} Y_2}{[\text{Cl}^\ominus][\text{H}^+]}$$

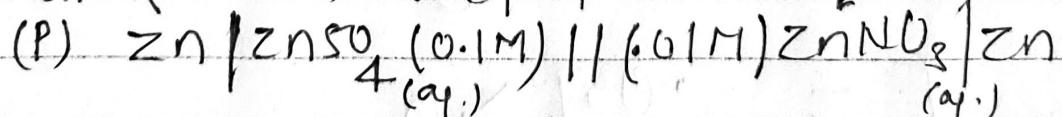
- (A) On increasing  $P_{H_2}$ , E.M.F of cell decrease
- (B) Increasing  $[Cl^-]$  in anodic compartment will increase E.M.F of cell
- (C) Increasing  $[H^+]$  in cathodic compartment will ~~not~~ increase E.M.F of cell
- (D) Decrease in  $[Cl^-]$  by KCl will decrease cell E.M.F.

(16) Species that have higher value of reduction potential will have higher oxidising power so order of oxidising power will be

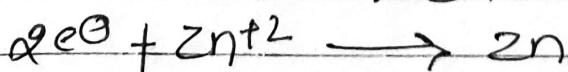
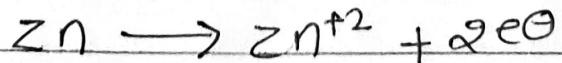


(17) We can not add electrode potential because it is an intensive property

Matrix match  $\Rightarrow 18, 19, 20$



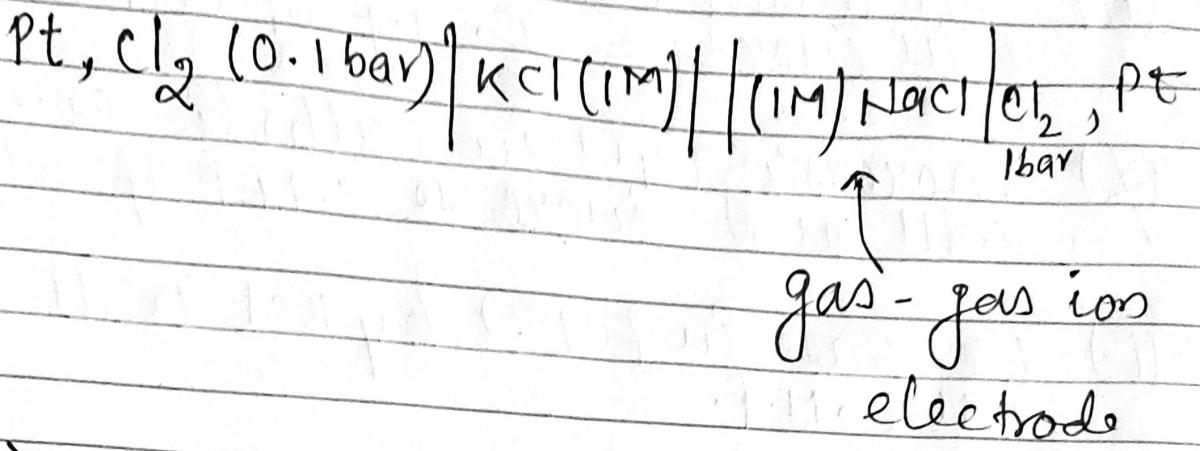
Electrolyte concentration cell



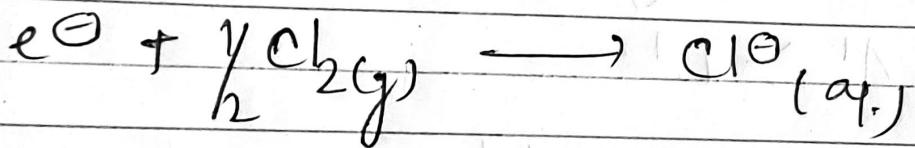
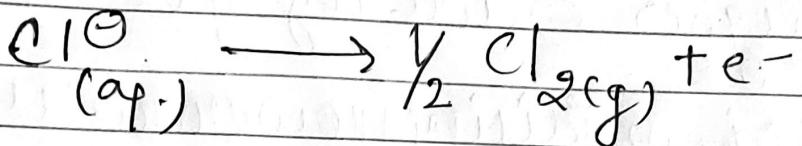
$$E = 0 - \frac{0.0529}{2} \log \frac{0.1}{0.01}$$

$$E = -\frac{0.059}{2} < 0$$

option Q

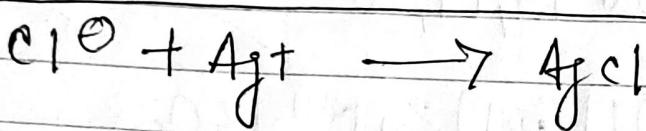
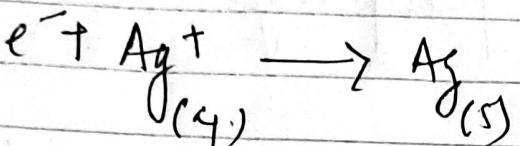
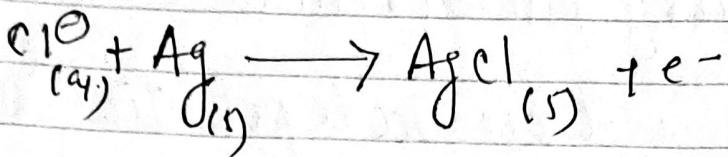
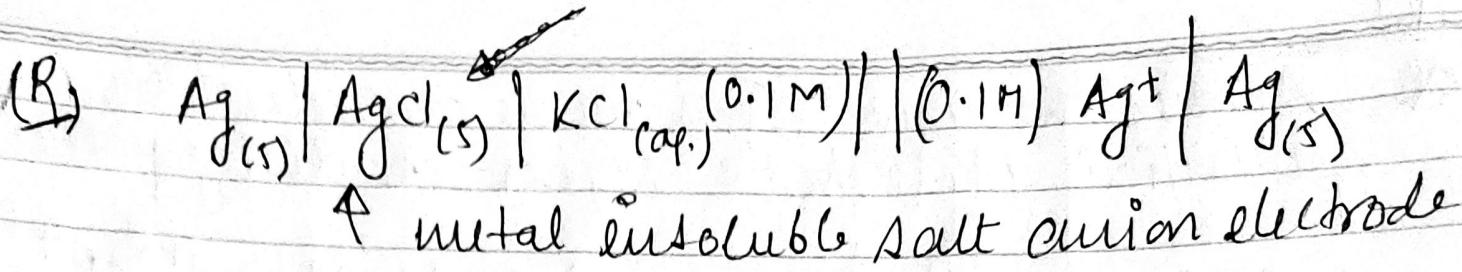


⇒ Electrode concentration cell



$$E = 0 - \frac{0.059}{2} \log \frac{0.1}{1}$$

$$E = \frac{0.059}{2} > 0$$



$$E_{\text{cell}} = E_{\text{cell}}^\circ - \frac{0.0591}{1} \log \frac{1}{[\text{Cl}^\ominus][\text{Ag}^+]}$$

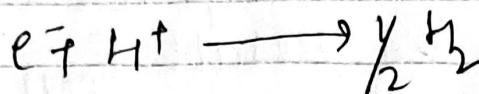
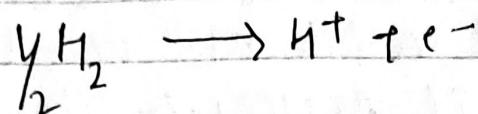
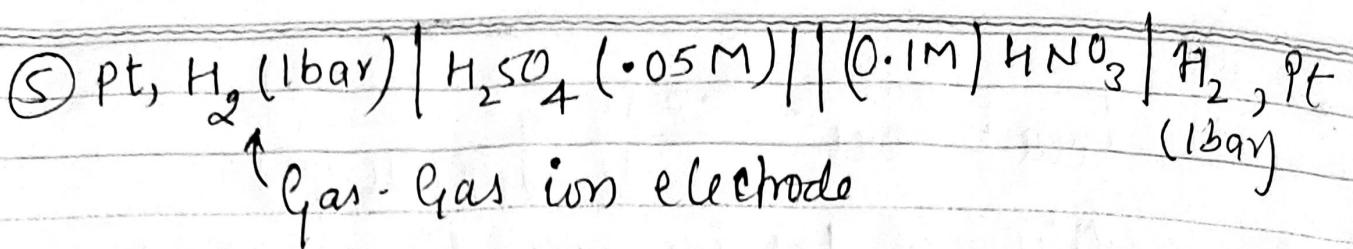
$$E_{\text{cell}} = \mathcal{E}^\circ_{\text{Ag}^+ \mid \text{AgCl} \mid \text{Cl}^\ominus} + \mathcal{E}^\circ_{\text{Ag}^+ \mid \text{Ag}} + \frac{0.0591}{1} \log (\text{Ag}^+) [\text{Cl}^\ominus]$$

$$E_{\text{cell}} = -\cancel{\mathcal{E}^\circ_{\text{Ag}^+ \mid \text{Ag}}} - \frac{0.0591}{1} \log K_{\text{sp}} + \cancel{\mathcal{E}^\circ_{\text{Ag}^+ \mid \text{Ag}}} + \frac{0.0591}{1} \log (\text{Ag}^+) [\text{Cl}^\ominus]$$

$$E_{\text{cell}} = 0.0591 \log \frac{[\text{Ag}^+][\text{Cl}^\ominus]}{K_{\text{sp}}}$$

$$= 0.0591 \log \frac{(0.1)(0.1)}{10^{-10}}$$

$$E_{\text{cell}} = 0.0591 \times 8 = 0.4728 > 0$$

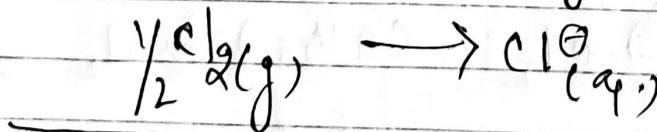
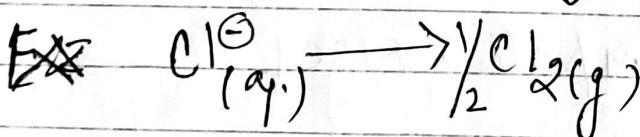


$$E_{\text{cell}} = 0 - \frac{0.0591}{1} \log \frac{0.1}{0.1}$$

$$E_{\text{cell}} = 0$$

~~18~~ 18 SD option (c) R-A-I is wrong

~~19~~ 19 for Q. on increasing concentration of KCl



$$E_{\text{cell}} = 0 - \frac{0.0591}{1} \log \frac{P_{\text{Cl}_2} Y_2 [\text{Cl}^\ominus]}{(\text{PCl}_2) P_{\text{Cl}_2} Y_2}$$

this  $\text{Cl}^\ominus$  increase

on increasing KCl  
 $E_{\text{cell}}$  will increase

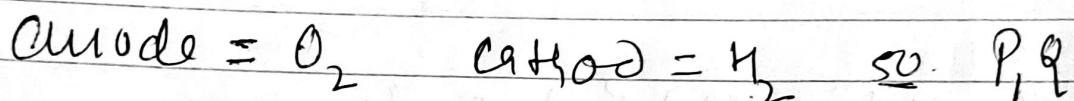
~~30~~ (20)

$$E_{\text{cell}} = E_{\text{cell}}^{\circ} - \frac{0.0591}{1} \log \frac{1}{[\text{Cl}^{\circ}] [\text{Ag}^{\dagger}]}$$

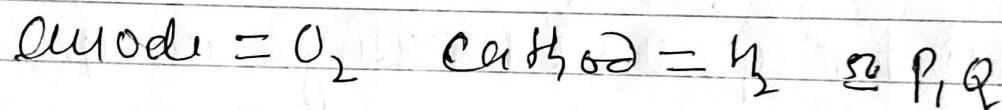
On addition of  $\text{Ag}^{\dagger}$  in anodic compartment it will react with  $\text{Cl}^{\circ}$  and form  $\text{AgCl}$  due to it concentration of  $\text{Cl}^{\circ}$  will decrease as result  $E_{\text{cell}}$  also decrease

$\Rightarrow$  (C)

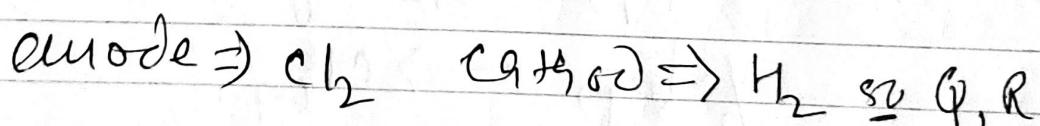
~~31.~~ (21)  $\text{H}_2$  (A) dilute  $\text{HCl}$  (aq.)



(B) dilute  $\text{NaCl}$



(C) concentrated  $\text{NaCl}$



(D)  $\text{AgNO}_3$  (aq.)

