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O-I	40 – 45	
S-I	31 – 37	

$Ag \longrightarrow Ag^+ + e^-$

$$E^0_{oxid} = E^0_{Ag/Ag^+} - \frac{0.06}{1}\log\frac{K_{sp}}{[Cl^-]=1}$$

(44)

$E^0_{Ag/Ag^+} = -0.799$

$E^0_{Ag,Cl^-/AgCl} = -0.209$ E^0_{oxd}

$K_{sp} = ?$

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$Pt \mid H_2 \mid \text{Base} \parallel \text{Acid} \mid H_2 \mid Pt$

$\frac{0.5}{500} = 10^{-3} M$

$K_b = 10^{-9}$

$[OH^-] = 10^{-6}$

$[H^+] = 10^{-8}$

$\frac{50}{500} = 0.1 M$

$= [H^+]$

33 0.042

$= 0.06 \times 0.7$

$= 0.042$

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Effect of temperature on electrode potential

$$-nFE = \Delta G = \Delta H - T\Delta S$$

Assuming $\underline{\Delta H \ \& \ \Delta S}$ to be temperature independent

$$-nF\left(\frac{dE}{dT}\right) = 0 - \Delta S$$

$$\boxed{nF\left(\frac{dE}{dT}\right) = \Delta S}$$

temperature gradient

If $\Delta S > 0$ As $T\uparrow$ $E\uparrow$

$\Delta S < 0$ As $T\uparrow$ $E\downarrow$

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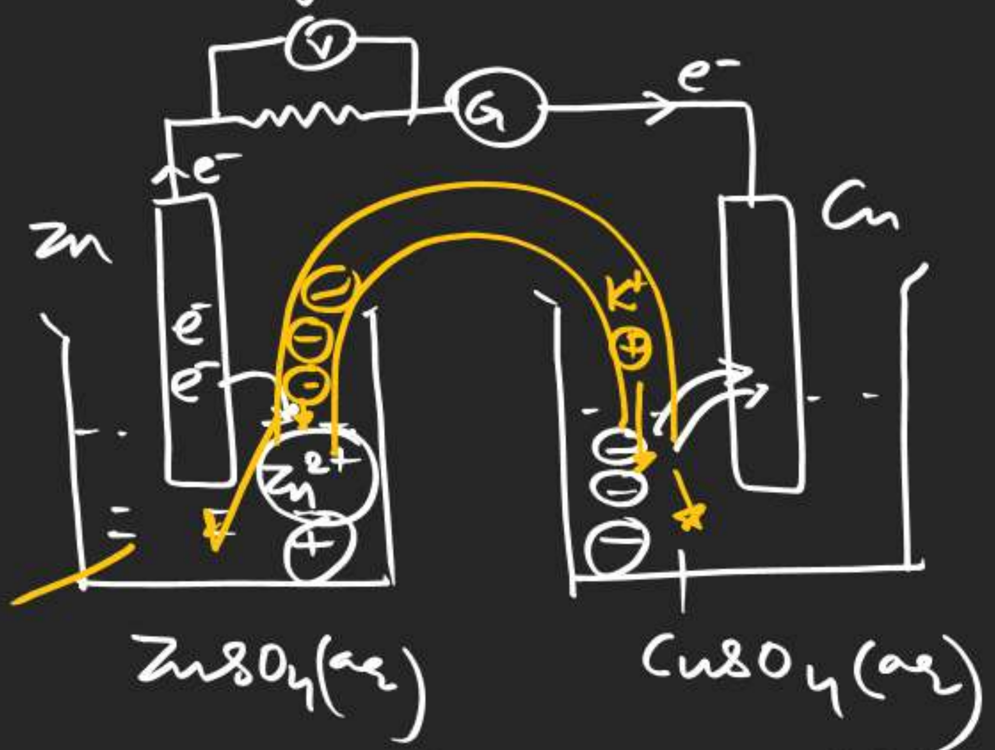
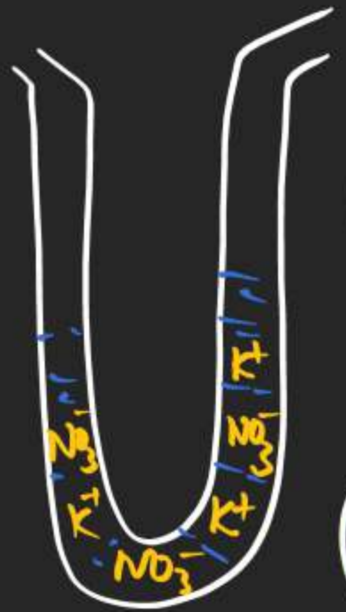
Salt bridge :→

Ag^+



$Zn \rightarrow Zn^{2+} + 2e^-$ $Cu^{2+} + 2e \rightarrow Cu$



molten

Gelatin or agar-agar (algae)

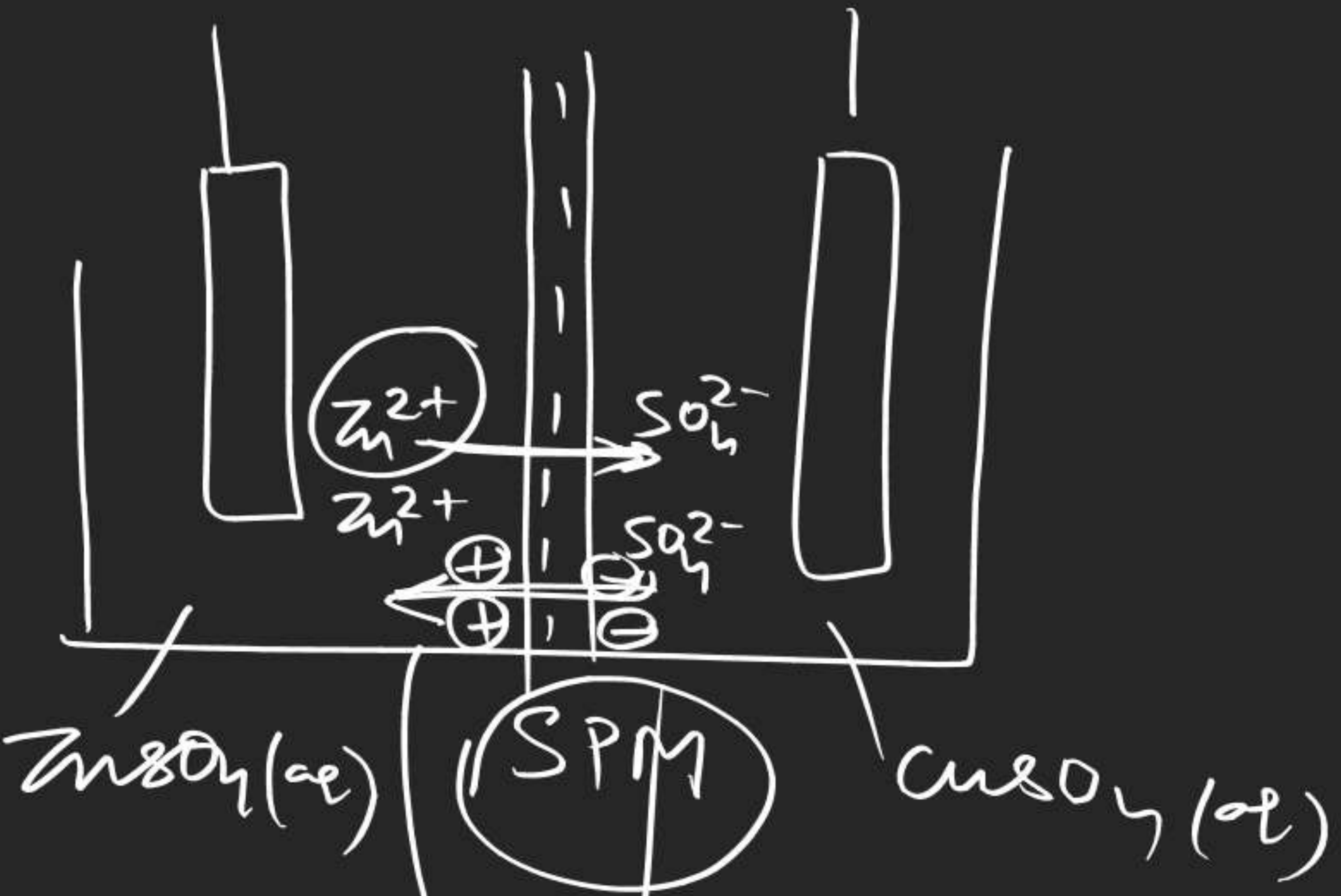
KNO_3 or NH_4NO_3

strong electrolyte

Application of salt bridge: It is used to maintain the electrical neutrality of solⁿ.

⇒ Electrolytes should be strong & inert in nature

⇒ Ionic mobility of the ions should be high as well be equal



Salt bridge prevents → Liquid junction potential

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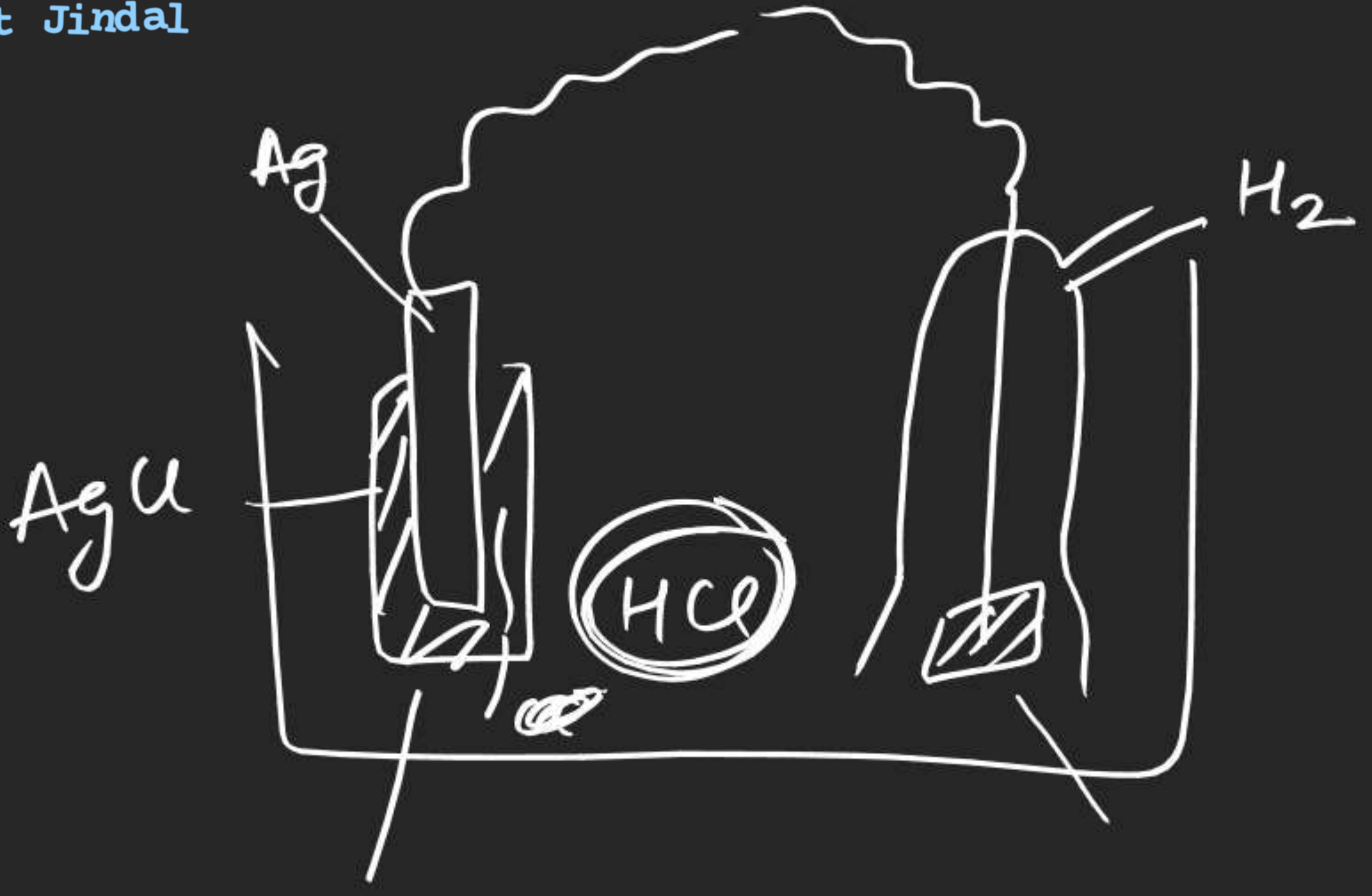
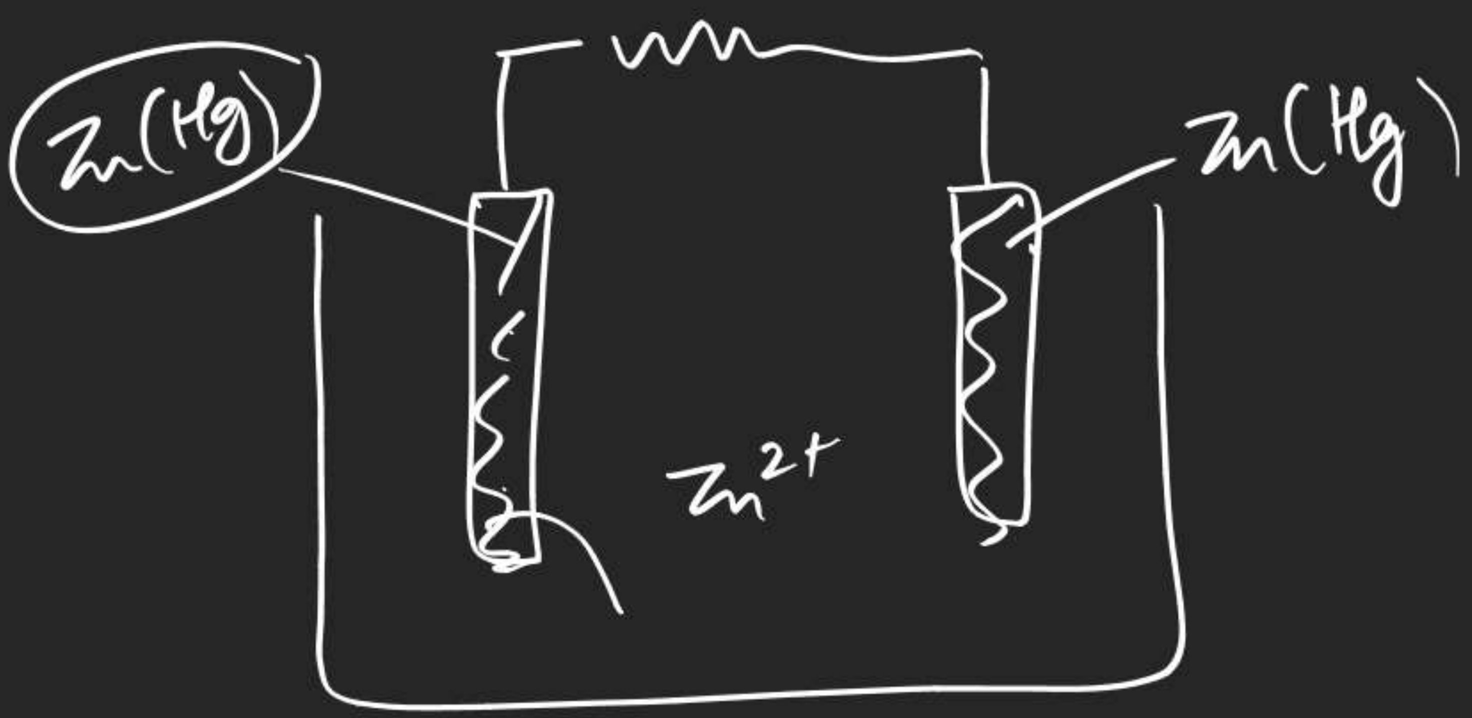


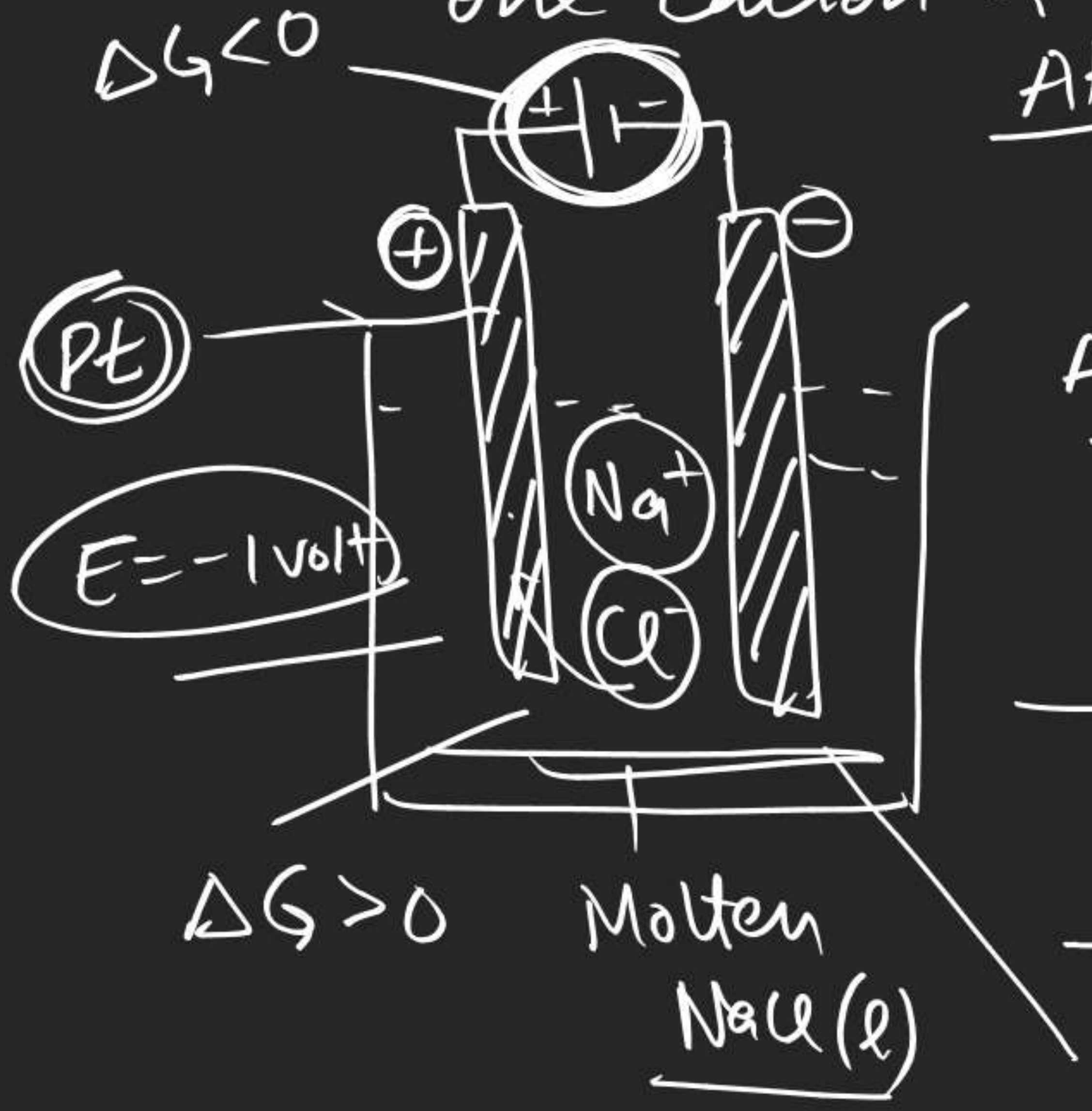


$$Zn(Hg) \mid Zn^{2+} \mid Zn(Hg)$$

$$Ag \mid AgCl \mid HCl \mid H_2 \mid Pt$$

Electrolytic cell

Case - I Cell containing only one cation & one anion



At anode

$$Cl^- \longrightarrow \frac{1}{2}Cl_2 + e^-$$

At cathode

$$Na^+ + e^- \longrightarrow Na(s)$$

$$Na^+ + Cl^- \longrightarrow Na(s) + \frac{1}{2}Cl_2(g)$$

non-spontaneous

$\Delta G > 0$

$E < 0$

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Faraday's 1st law: → Amount of substance produced at anode and cathode is directly proportional to the charge passed.

$W \propto Q$

Amount produced → W; charge → Q

$$\boxed{W = ZQ}$$

Z → electrochemical equivalent

no. of equivalent = no. of moles × n-factor

n-factor of $e^- = 1$

charge on 1 mole e^- = $N_A \times 1.6 \times 10^{-19}$ Coulombs

= 96500 Coulombs

= 1 F

Charge on 1 mole e^- = charge on 1 equivalent e^- = 1 F = 96500 C

= 1 mole charge = 1 equivalent charge

$$\text{equivalent of charge} = \frac{Q}{96500} = \frac{I \times t}{96500}$$

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$Na^+ + e^- \longrightarrow Na(s)$

1 mol   1 mol

1 eq   1 eq

$Ca^{2+} + \boxed{2e^-} \longrightarrow Ca(s)$

1 mol   2 mol

2 eq   2 eq

$Al^{3+} + 3e^- \longrightarrow Al(s)$

1 mol   3 mol

3 eq   3 eq

equivalents of charge passed = equivalents of substance produced at anode = equivalents of substance produced at cathode

Q find the mass of Na(s) & $Cl_2(g)$ produced by 5 Faraday charge.

equivalents of charge $= \frac{5 \times 96500}{96500} = 5$

→ $Na^+ + e^- \longrightarrow Na$

n-factor = no. of e^- involved per molecule

no. of eq of Na = no of moles = 5

Cl_2

→ $2Cl^- \longrightarrow Cl_2 + 2e^-$

$n_f = 1$ $n_f = 2$

5 eq

2.5 moles

2.5 × 71 gm

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S - I 38 - 42

O - I 46 - 51

J - AdV 2, 7, 8, 10, 11, 12