

Topic :- Electro Chemistry

- 1 (a)
In the process of electro decomposition for purification of metal, impure metal acts as anode.
- 2 (b)
Specific conductivity (κ)
$$= \frac{1}{R} \times \text{cell constant}$$

Cell constant = $\kappa \times R$
$$= 0.0129 \times 100 = 1.29$$
- 3 (b)
According to Nernst equation.
$$E_{\text{cell}} = E_{\text{cell}}^{\circ} + \frac{0.0591}{2} \log \frac{[\text{Cu}^{2+}]}{[\text{Zn}^{2+}]}$$

$$E_{\text{cell}} = E_{\text{cell}}^{\circ} - \frac{0.0591}{2} \log \frac{[\text{Zn}^{2+}]}{[\text{Cu}^{2+}]}$$

Or $y = c + (-m)x$
Thus, the slope is negative.
- 4 (a)
In MnO_4^- the oxidation number of Mn is +7.
$$\begin{array}{ccc} +7 & & +2 \\ \text{Mn} & + & 5e^- \rightarrow \text{Mn} \end{array}$$

In the reaction, 5 electrons are involved hence 5 Faraday will be needed for the reduction of 1 mole of MnO_4^- .
Therefore, for 0.5 mole of MnO_4^- , number of Faradays required = 2.5 F
- 5 (a)
Anode is electrode at which oxidation occurs.
- 6 (b)
 MnO_2 in Lechlanche cell.
- 7 (d)
As Cr has maximum oxidation potential value, therefore its oxidation should be easiest
- 8 (d)

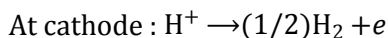
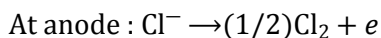
More is reduction potential, more is the power to get itself reduced or greater is oxidising power.

9 **(d)**

$$F = N \times e$$

10 **(c)**

NaCl gives Na^+ and Cl^- ions;



11 **(b)**

Electrons flow from Zn to Cu in outside circuit and current from Cu to Zn.

12 **(d)**

$$E_{\text{cell}}^{\circ} = E_{\text{cathode}}^{\circ} - E_{\text{anode}}^{\circ}$$



$$E_{\text{cell}}(\text{Au}^{3+} / \text{Au}) = 0.150 \text{ V}$$

$$E_{\text{cell}}(\text{Ni}^{2+} / \text{Ni}) = - 0.25 \text{ V}$$

$$E_{\text{cell}}^{\circ} = E_{\text{cathode}}^{\circ} - E_{\text{anode}}^{\circ}$$

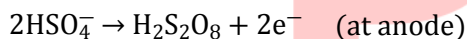
$$= 0.150 - (- 0.25)$$

$$= 0.15 + 0.25$$

$$= + 0.4 \text{ V}$$

13 **(b)**

50 % H_2SO_4 aqueous solution can be electrolysed by using Pt electrodes as



14 **(d)**

It is fact.

15 **(d)**

For the given cell,

$$E_{\text{cell}} = E_{\text{cell}}^{\circ} - \frac{0.0591}{2} \log \frac{[\text{Zn}^{2+}]}{[\text{Cu}^{2+}]}$$

$$1. \quad E_1 = E_{\text{cell}}^{\circ} - \frac{0.0591}{2} \log \frac{1}{0.1}$$

$$= E_{\text{cell}}^{\circ} - \frac{0.0591}{2}$$

$$2. \quad E_2 = E_{\text{cell}}^{\circ} - \frac{0.0591}{2} \log \frac{1}{1}$$

$$= E_{\text{cell}}^{\circ} - \frac{0.0591}{2} \times 0$$

$$= E_{\text{cell}}^{\circ}$$

$$3. \quad E_2 = E_{\text{cell}}^{\circ} - \frac{0.0591}{2} \log \frac{0.1}{1}$$

$$= E_{\text{cell}}^{\circ} + \frac{0.0591}{2}$$

$$\therefore E_3 > E_2 > E_1$$

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(a)

Transport number of an ion

$$= \frac{\text{current carried by that ion}}{\text{total current carried by both the ions}}$$

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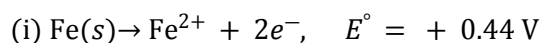
(c)

Reduction is always carried out at cathode.

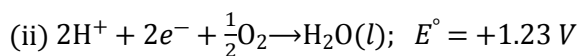
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(a)

Reactions

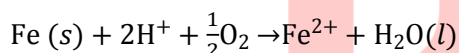


$$\text{and } \Delta G_1^{\circ} = -nE^{\circ}F = -2 \times 0.44 \times F$$



$$\text{and } \Delta G_2^{\circ} = -2 \times (+1.23) \times F$$

Net reaction,



$$\Delta G_3^{\circ} = \Delta G_1^{\circ} + \Delta G_2^{\circ}$$

$$= -2 \times (+0.44)F + (-2 \times 1.23 \times F)$$

$$= -0.88F - 2.46F = -3.34F$$

$$= -3.34 \times 96500 \text{ J}$$

$$= -322.31 \text{ kJ} = -322 \text{ kJ}$$

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(b)

2 faraday will deposit 2 eq. or 1 mole of Cu.

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(a)

Cl_2 is placed above F_2 in electrochemical series, halogen placed below replaces the other from its solution.

| ANSWER-KEY | | | | | | | | | | |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Q. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| A. | A | B | B | A | A | B | D | D | D | C |
| | | | | | | | | | | |
| Q. | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| A. | B | D | B | D | D | A | C | A | B | A |
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