

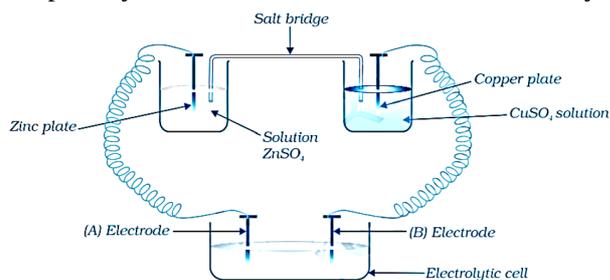
ELECTROCHEMISTRY-2

Class 12 - Chemistry

Time Allowed: 1 hour and 30 minutes

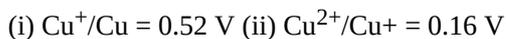
Maximum Marks: 45

1. Consider the following diagram in which an electrochemical cell is coupled to an electrolytic cell. What will be the polarity of electrodes 'A' and 'B' in the electrolytic cell? [1]



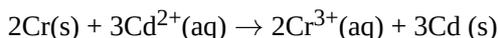
2. Aqueous copper sulphate solution and aqueous silver nitrate solution are electrolyzed by 1 ampere current for 10 minutes in separate electrolytic cells. Will the mass of copper and silver deposited on the cathode be the same or different? Explain your answer. [1]
3. Can you store AgCl solution in Zinc pot? [1]
4. How many coulombs are required for the oxidation of 1 mol of H₂O to O₂? [1]
5. State Kohlrausch's law of independent migration of ions. [1]
6. What is the reference electrode in determining the standard electrode potential? [1]
7. Aluminium metal cannot be produced by the electrolysis of aqueous solution of aluminium salt. Why? [1]
8. What do you understand by corrosion? [1]
9. When acidulated water (dil.H₂SO₄ solution) is electrolysed, will the pH of the solution be affected? Justify your answer. [1]
10. Define the term - standard electrode potential? [1]
11. In the button cell widely used in watches and other devices the following reaction takes place: [3]
- $$\text{Zn}(s) + \text{Ag}_2\text{O}(s) + \text{H}_2\text{O}(l) \rightarrow \text{Zn}^{2+}(aq) + 2\text{Ag}(s) + 2\text{OH}^-(aq)$$
- Determine $\Delta_r G^{\ominus}$ and E^{\ominus} for the reaction
- Given $\text{Zn} \rightarrow \text{Zn}^{2+} + 2e^-$, $E^{\ominus} = 0.76\text{V}$
- Given $\text{Ag} \rightarrow \text{Ag}^+ + 2e^-$, $E^{\ominus} = 0.344\text{V}$
12. A solution of Ni(NO₃)₂ is electrolysed between platinum electrodes using a current of 5 amperes for 20 minutes. [3]
- What mass of Ni is deposited at the cathode?
13. Calculate the emf of the cell [3]
- $$\text{Mg}(s) | \text{Mg}^{+2}(0.1\text{M}) || \text{Cu}^{+2}(1 \times 10^{-3}\text{M}) | \text{Cu}(s)$$
- Given, $E^{\ominus}_{\text{Cu}^{2+}/\text{Cu}} = +0.34\text{V}$, $E^{\ominus}_{\text{Mg}^{2+}/\text{Mg}} = -2.37\text{V}$
14. i. Define weak and strong electrolytes. [3]

ii. The E^θ values corresponding to the following two reduction electrode processes are :



Formulate the galvanic cell for their combination. Calculate the cell potential and ΔG° for the cell reaction.

15. Calculate the standard cell potential of a galvanic cell in which the following reaction takes place. [3]



Calculate ΔG° and equilibrium constant,

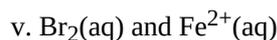
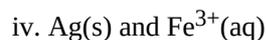
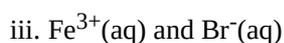
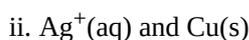
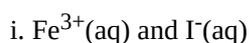
K, of the above reaction at 25°C .

[Given, $E^\circ_{\text{Cr}^{3+}/\text{Cr}} = -0.74 \text{ V}$, $E^\circ_{\text{Cd}^{2+}/\text{Cd}} = -0.40 \text{ V}$, $1F = 96500 \text{ C mol}^{-1}$]

16. Explain with an example, how weak and strong electrolytes can be distinguished? [5]

17. Explain with an example how weak and strong electrolytes can be distinguished. [5]

18. Using the standard electrode potentials given in table 3.1, predict if the reaction between the following is feasible or not: [5]



Note: Standard Electrode Potentials of $\text{Fe}^{3+}(+0.77 \text{ V})$, $\text{I}^-(-0.54 \text{ V})$, $\text{Ag}^+(+0.80 \text{ V})$, $\text{Cu}(-0.34 \text{ V})$, $\text{Br}^-(-1.09 \text{ V})$, $\text{Br}_2(+1.09 \text{ V})$, $\text{Ag}(-0.80 \text{ V})$, $\text{Fe}^{2+}(-0.77 \text{ V})$

19. Conductivity of 0.00241 M acetic acid is $7.896 \times 10^{-5} \text{ S cm}^{-1}$. Calculate its molar conductivity. If Λ_m° for acetic acid is $390.5 \text{ S cm}^2 \text{ mol}^{-1}$, what is its dissociation constant? [5]