Saitech Informatics

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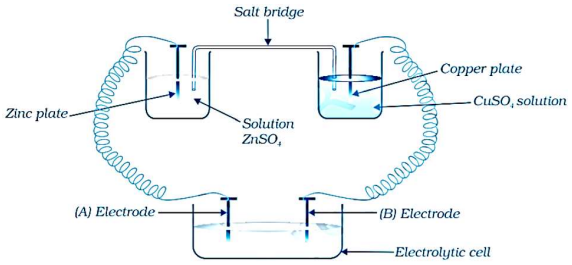
ELECTROCHEMISTRY-2

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 H_2O to O_2? **[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.H_2SO_4 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]**

    $Zn(s) + Ag_2O(s) + H_2O(l) \rightarrow Zn^{2+}(aq) + 2Ag(s) + 2OH^-(aq)$

    Determine $\Delta_r G^{(-)}$ and $E^{(-)}$ for the reaction

    Given $Zn \rightarrow Zn^{2+} + 2e^-$, E^0 = 0.76V

    Given $Ag \rightarrow Ag^+ + 2e^-$, E^0 = 0.344V
12. A solution of $Ni(NO_3)_2$ 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]**

    $Mg(s)|Mg^{+2}(0.1M)||Cu^{+2}(1 \times 10^{-3}M|Cu(s))$

    $Given, E^{\ominus}_{Cu^{2+}/Cu} = +0.34V, E^{\ominus}_{Mg^{+2}/Mg} = -2.37V)$
14. i. Define weak and strong electrolytes. **[3]**

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

(i) Cu^{+}/Cu = 0.52 V (ii) $Cu^{2+}/Cu+$ = 0.16 V

Formulate the galvanic cell for their combination. Calculate the cell potential and ΔG^{o} for the cell reaction.

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

$2Cr(s) + 3Cd^{2+}(aq) \rightarrow 2Cr^{3+}(aq) + 3Cd(s)$

Calculate ΔG^{o} and equilibrium constant,

K, of the above reaction at 25°C.

[Given, $E^{0}_{Cr^{3+}/Cr}$ = -0.74 V, $E^{\circ}_{Cd^{2+}/Cd}$ = -0.40 V, 1F = 96500 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]**

i. $Fe^{3+}(aq)$ and $I^{-}(aq)$

ii. $Ag^{+}(aq)$ and Cu(s)

iii. $Fe^{3+}(aq)$ and $Br^{-}(aq)$

iv. Ag(s) and $Fe^{3+}(aq)$

v. $Br_2(aq)$ and $Fe^{2+}(aq)$

Note: Standard Electrode Potentials of Fe^{3+}(+0.77 V), I^{-}(-0.54 V), Ag^{+}(+0.80 V), Cu(-0.34 V), Br^{-}(-1.09 V), Br_2(+1.09 V), Ag(-0.80 V), Fe^{2+}(-0.77 V)

19. Conductivity of 0.00241 M acetic acid is 7.896×10^{-5} S cm^{-1}. Calculate its molar conductivity. If Λ^{o}_{m} for acetic acid is 390.5 S cm^{2} mol^{-1}, what is its dissociation constant? **[5]**