

Chemistry
Assignment No: 3
 (Electrochemistry)

Q1. Express the relation between the conductivity and the molar conductivity of a solution.

Q2. Define "electrophoresis" briefly.

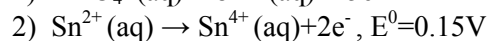
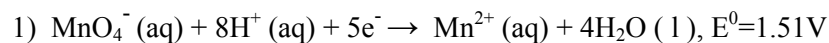
Q3. Explain why fluorine does not come out when chlorine is passed through a solution of sodium fluoride.

Q4. State Nernst equation for cell potential and calculate e.m.f. of the cell at 25°C:
 $\text{Mg(s)} \mid \text{Mg}^{2+} (1.0 \times 10^{-3}) \parallel \text{Cu}^{2+} (1.0 \times 10^{-4} \text{M}) \mid \text{Cu(s)}$
 $(E^0 \text{Mg}^{2+}/\text{Mg} = -2.37\text{V}, E^0 \text{Cu}^{2+}/\text{Cu} = +0.34\text{V})$

Q5. Why does the conductivity of the solution decreases with dilution?

Q6. What type of cell is a lead storage battery? Write anode and cathode reactions of such a battery.

Q7. Two half cell reactions of an electrochemical cells are:



Construct the redox equation from the two half cell reactions and predict if this reaction favours formation of reactants or products.

Q8. Give an example of a fuel cell. Write the anode and cathode reactions for it.

Q9. How does molar conductivity vary with concentration for :

- 1) weak electrolyte
- 2) strong electrolyte.

Give reasons for these variations.

Q10. $\text{Mg(s)} + 2\text{Ag}^+(0.0001\text{M}) \rightarrow \text{Mg}^{2+}(0.10\text{M}) + 2\text{Ag(s)}$
 $E^0 \text{Mg}^{2+}/\text{Mg} = -2.36, E^0 \text{Ag}^+/\text{Ag} = 0.81\text{V}$

For the above cell; Calculate /Write

- a) E^0 Value for electrode 2 Ag^+/Ag
- b) Standard Cell Potential E^0 Cell
- c) Symbolic representation of the above cell
- d) Cell potential
- e) Will the above cell reaction be spontaneous?

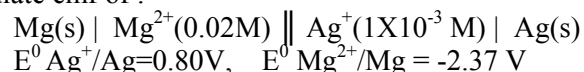
Q11. Write the reactions occurring during electrolysis of:

- 1) Sulphuric acid at the anode
- 2) aq. AgNO_3 solution using Ag electrodes.

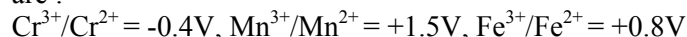
Q12. At 291K, molar conductivity at infinite dilution of NH_4Cl , NaOH and NaCl are 129.8, 217.4, 108.9 $\text{ohm}^{-1}\text{cm}^2$ respectively. If molar conductivity of centinormal solution of NH_4OH is 9.33 $\text{ohm}^{-1}\text{cm}^2$. What is the degree of dissociation of NH_4OH solution?

Q13. The standard reduction potential values of 3 metallic cations X, Y, Z, are 0.52, -3.03, -1.18V respectively. What will be the order of reducing power of the corresponding metals.

Q14. Calculate emf of :



Q15. The E^0 Values in respect of electrodes of Cr (Z=24), Mn (Z=25) and Fe (Z=26) are :



On the basis of the above information compare the feasibilities of further oxidation of their +2 states.

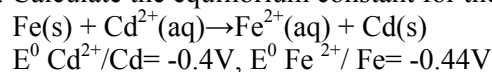
Q16. Explain Kohlrausch's law of independent migration of ions. Mention one application of Kohlrausch's law.

Q17. Suggest a way to determine the Λ^0 of H_2O .

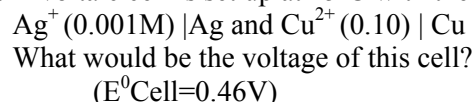
Q18. How much charge is required for the following reduction of:

- 1) 1 mol Al^{3+} to Al
- 2) 1 mol MnO_4^- to Mn^{2+}

Q19. Calculate the equilibrium constant for the reaction:

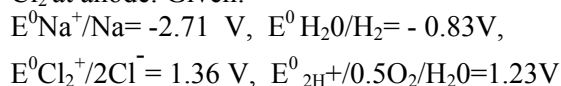


Q20. A voltaic cell is set up at 25°C with the following half cells:



Q21. State the relationship amongst cell constant of a cell, resistance of the solution in the cell, conductivity of the solution.

Q22. Explain why electrolysis of an aqueous solution of NaCl gives H_2 at cathode and Cl_2 at anode. Given:-



Q23. Give reason: Rusting of iron is quicker in saline water than in ordinary water.

Q24. The measured resistance of a conductance cell containing $7.5 \times 10^{-3} \text{ M}$ solution of KCl at 25°C was 1005 ohms. Calculate:-

- a) Specific Conductance.
- b) Molar Conductance of the solution.
(Cell Constant = 1.25cm^{-1})

Q25. Calculate standard free energy change for the reaction occurring in the cell.

