LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **CHEMISTRY**

FOURTH SEMESTER – **APRIL 2016**

CH 4504/CH 4502 – ELECTROCHEMISTRY

Date: 20-04-2016 Dept. No. Max. : 100 Marks

Time: 09:00-12:00

PART- A

Answer **ALL** questions (10x2 = 20marks)

1. Define standard electrode potential.
2. With the help of electrochemical series, show which substance can be used for oxidizing fluorides to fluorine?
3. Define entropy.
4. How will you find the valency of ions using EMF measurements?
5. State Van't Hoff factor?
6. The resistance of 0.5M solution of an electrolyte in a cell was found to be 45 ohm. Calculate the molar conductance of the solution if the electrodes of the cell are 2.2cm apart and have an area of 3.8 cm^2.
7. Define activity and mean ionic activity of an electrolyte.
8. Give Debye – Huckel- Onsager equation.
9. Define diffusion current.
10. State over voltage.

PART- B

Answer any **EIGHT** questions (8x5 = 40 marks)

11. Describe secondary reference electrode with a neat diagram.
12. State and derive the emf of metal-metal ion electrode.
13. Define electrochemical series? Mention its significance.
14. State and derive the EMF of liquid junction potential.
15. Discuss the determination of p^H using glass electrode.
16. Calculate the equilibrium constant of the disproportionation reaction $2Cu^+ \rightleftharpoons Cu^{2+}(aq) + Cu$. The standard electrode potential of $Cu^+/Cu = +0.52V$ and $Cu^{2+}/Cu = +0.34$ V.
17. State Kohlraush's law. Mention its applications
18. Discuss the factors affecting conductance.
19. State and explain Faraday's laws of electrolysis.
20. Derive an expression for activity coefficient.
21. Explain the separation of metals by electrolytic method.
22. Give a brief account on half wave potential.

PART- C

Answer any **FOUR** questions (4x10 = 40 marks)

23. (i). Discuss the determination of EMF using potentiometer with a neat diagram. (5marks)

    (ii). Calculate the EMF of the following electrochemical cell at 25^0C. (5marks)

    Cu, Cu^{2+} (c= 0.1M)/ H^+ (c = 0.01M), H_2(1atm): Pt

24. (i). Derive Nernst equation. (5 marks)

    (ii). How is it used to find the electrode potential of chlorine electrode? (5 marks)

25. (i). Explain the construction and working of Wes torn saturated standard cell. (5 marks)

    (ii).Describe the determination of solubility of AgCl using EMF measurements. (5 marks)

26. (i). Discuss the determination of transport number using Moving boundary method with a neat diagram.

    (5 marks)

    (ii). Calculate the transport numbers of H^+ ions and Cl^- ions from the following data obtained by the Moving boundary method using cadmium chloride as the indicator electrolyte:

    Concentration of HCl solution = 0.1N

    Mass of silver deposited in the coulometer = 0.1209 g

    Movement of boundary = 7.5 cm

    Cross section of the tube = 1.24 cm^2 (5 marks)

27. Give a brief account on Debye – Huckel theory of activity coefficient.

28. (i). Write notes on any two applications of overvoltage. (5 marks)

    (ii). Derive the relation between molar ionic conductance and ionic mobility at infinite dilution.

    (5 marks)

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