

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034



B.Sc. DEGREE EXAMINATION – CHEMISTRY

FOURTH SEMESTER – APRIL 2018

CH 4504 / CH 4502 – ELECTROCHEMISTRY

Date: 20-04-2018
Time: 09:00-12:00

Dept. No.

Max. : 100 Marks

PART - A

Answer ALL questions:

(10x2=20 Marks)

1. What is meant by standard electrode potential?
2. Explain the term electrochemical series.
3. Mention the two uses of Salt bridge
4. What are fuel cells?
5. Calculate the ionic strength of 0.25 M K_2SO_4 solution.
6. State Kohlraush's law.
7. Define the term activity and activity coefficient.
8. Write Debye Huckel-onsager equation and explain the terms involved in it.
9. Define the term hydrogen over voltage.
10. Write the Ilkovic equation and explain the terms involved.

PART - B

Answer any EIGHT questions:

(8x5=40 Marks)

11. Explain metal- insoluble salt electrode with a diagram and write down its electrode reaction.
12. Mention any three significance of electrochemical series.
13. What are the different types of electrodes and write the electrode reaction for any two types of electrodes?
14. Derive an expression for the EMF of a concentration cell with transference.
15. How would you determine the pH of a given solution using glass electrode.
16. Explain the principle in potentiometric titration of a solution of strong acid against standard solution of a strong base.

17. Discuss the Arrhenius theory of electrolytic dissociation and mention any two of its limitations.
18. A potential of 12 volts was applied to two electrodes placed 20 cm apart, a dilute solution of ammonium chloride was placed between the electrodes when NH_4^+ ion was found to cover a distance of 1.6 cm in one hour. What is the mobility of NH_4^+ ion.
19. Mention the advantages of conductometric titrations
20. Explain the effect of temperature on conductance
21. Discuss in detail the Debye Huckel theory of activity coefficient.
22. Explain in detail
 - i) decomposition potential
 - ii) concentration polarization

PART - C

Answer any FOUR questions:

(4x10=40 Marks)

23. Explain the construction and working of tester saturated standard cell with a neat diagram
24. a. Explain the measurement of EMF using potentiometer. **(5)**
 b. Derive Nernst equation. **(5)**
25. The EMF of the cell $\text{Cd}, \text{CdCl}_2.5\text{H}_2\text{O}(\text{sat}) // \text{AgCl}(\text{s}), \text{Ag}$ with the following cell reaction

$$\text{Cd}(\text{s}) + 2 \text{AgCl}(\text{s}) \rightarrow \text{CdCl}_2.5 / 2 \text{H}_2\text{O} \text{ sat} + 2 \text{Ag}(\text{s})$$
 is 0.6753 V at 25°C and 0.6915 V at 0°C . Calculate the free energy change ΔG , enthalpy change ΔH , and entropy change ΔS of the cell reaction at 25°C .
26. Define the transport number of an ion and explain its determination using moving boundary method.
27. a. What is the principle of conductometric titration? Discuss the titration curves obtained in weak acid Vs strong base. **(5)**
 b. Explain how separation of metals is carried out by electrolytic separation. **(5)**
28. Write notes on
 - i) asymmetric effect
 - ii) electrophoretic effect
