



Date: 16-06-2022

Dept. No.

Max. : 100 Marks

Time: 09:00 AM - 12:00 NOON

PART – A

Answer ALL Questions.

(10 x 2 = 20 Marks)

- Mention any two disadvantages of using standard hydrogen electrode as a reference electrode.
- Express the Weston Cell in the IUPAC Cell notation form and write the cell reaction.
- Calculate the EMF of the following cell at 298 K:
$$\text{Zn} | \text{Zn}^{2+}(0.1\text{M}) || \text{Ag}^{+}(0.001\text{M}) | \text{Ag}$$
$$E^{\circ}_{\text{Zn}^{2+} | \text{Zn}} = -0.76 \text{ V} ; E^{\circ}_{\text{Ag}^{+} | \text{Ag}} = +0.80 \text{ V}$$
- What are the advantages of using Quinhydrone electrode in the measurement of pH of an aqueous solution?
- Define transport number and mention the factors affecting transport number.
- Sketch the conductometric titration plots of weak acid vs strong base and NaCl vs AgNO₃ titrations.
- Write the expression relating the mean ionic activity of the Na₃PO₄ with its ionic activities.
- Calculate the ionic strength of an electrolyte solution prepared by mixing equal volumes of 0.1M CuSO₄ and 0.05M Na₂SO₄ solutions.
- Define half-wave potential.
- What is diffusion current?

PART – B

Answer any EIGHT Questions.

(8 x 5 = 40 Marks)

- Explain the principle involved in the measurement of cell potential using potentiometer.
- Write a brief account on electrochemical series and its applications.
- Deduce the relationships between EMF of an electrochemical cell with ΔG , ΔH and ΔS of the cell reaction.
- What are concentration cells? How are they classified? Give an example for each type.
- Discuss the principle involved in the determination of solubility product of a sparingly soluble salt from EMF measurements.
- State and explain Kohlrausch law of independent migration.
- Predict the conductometric titration plot of mixture of acids containing HCl and CH₃COOH vs standard NaOH and explain the shape of the graph.

18. Define molar conductance. Explain its variation with concentration of electrolyte solution.
19. Write a brief account on: i) Electrophoretic effect ii) Asymmetric effect
20. Discuss the salient features of Debye-Huckel theory of strong electrolyte.
21. Mention the advantages and disadvantages of dropping mercury electrode.
22. Explain the following:
 - (i) concentration polarization (ii) decomposition potential

PART – C

Answer any FOUR Questions.

(4 x 10 = 40 Marks)

23. (a) Given the following half cells:



Write the cell notations, cell reactions and calculate the standard cell potentials of cells that have the following properties: (a) a cell in which copper dissolves (b) the cell with the largest standard cell potential.

(b) The potential of a hydrogen electrode ($P_{\text{H}_2} = 1 \text{ atm}$, $T = 298 \text{ K}$) measured against a saturated calomel electrode ($E_{\text{SCE}} = 0.242 \text{ V}$) is -0.150 V . Calculate the pH of the solution.

24. Write a brief account on the different types of potentiometric titrations.
25. Compare the methods of determining pH of an aqueous solution using hydrogen electrode and glass electrode.
26. Discuss the principle involved in the determination of transport number of an ion by Hittorf's method.
27. Write a brief account on:
 - (i) Ostwald's dilution law (ii) Arrhenius theory of electrolytic dissociation.
28. Describe the Electrochemical theory of corrosion.

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