

18U612

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Name:

Reg. No.....

SIXTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2021

(CUCBCSS - UG)

(Regular/Supplementary/Improvement)

CC15U CHE6 B11 - PHYSICAL CHEMISTRY III

(Chemistry - Core Course)

(2015 Admission onwards)

Time: Three Hours

Maximum: 80 Marks

Section A (One word)

Answer *all* questions. Each question carries 1 mark.

1. In a hydrogen oxygen fuel cell, the electrolyte used is solution.
2. The standard EMF of the cell in which the cell reaction $2\text{Ag}^+(\text{aq.}) + \text{H}_2(\text{g}) \rightarrow 2\text{Ag}(\text{s}) + 2\text{H}^+$ occurs is 0.80 V. The standard reduction potential of Ag, Ag^+ is V.
3. In a standard hydrogen electrode, the pH of the acid solution is
4. Among the metals Mg, Zn, Ag and Sn, the metal which will not liberate H_2 when added to dil. HCl is
5. A liquid mixture which boils at constant temperature and distils unchanged in composition is known as
6. An aqueous solution of NH_4Cl has a pH value than 7.
7. Solutions which have the same osmotic pressure at the same temperature are called
8. Transport number for cation t_+ can be best represented as
9. The distance between adjacent (111) planes of a cubic lattice is equal to.....
10. The no of atoms per unit cell of *bcc* is

(10 × 1 = 10 Marks)

Section B (Short Answer)

Answer any *ten* questions. Each question carries 2 marks.

11. What are redox electrodes? Give one example.
12. Write electrode reactions in a calomel electrode.
13. What is potential of an electrode at 298K consisting of a silver rod dipping in a 0.05M AgNO_3 solution? Given $E_{\text{Ag}, \text{Ag}^+}^0 = 0.80\text{V}$
14. What is an ideal solution?
15. Why does ZnO turn yellow on heating?
16. Define Van't Hoff factor.

17. What are conjugate acid-base pairs? Explain with the help of an example.
18. Calculate the pH of 0.04 M HNO₃ solution.
19. Give the Bragg's equation and state the terms involved.
20. What is meant by a void in a close packed structure?
21. The molar conductance at infinite dilution of LiX is found to be $89.2 \times 10^{-4} \text{ S m}^2 \text{ mol}^{-1}$.
What would be the molar conductance of halide ion if the molar ionic conductance of Li⁺ ion is $38.70 \times 10^{-4} \text{ S m}^2 \text{ mol}^{-1}$?
22. Depict the conductance graph for titration of strong acid vs weak base.

(10 × 2 = 20 Marks)

Section C (Paragraph)

Answer any *five* questions. Each question carries 6 marks.

23. Explain with a suitable diagram the working of a hydrogen oxygen fuel cell. Write electrode reactions.
24. Explain how the pH of a solution can be obtained from EMF measurements using a quinhydrone electrode.
25. Distinguish between smectic and nematic liquid crystals.
26. What are buffer solutions? Explain the buffer action of various types of buffers.
27. Derive the Van't Hoff osmotic pressure equation.
28. Define and explain the terms space lattice and unit cell.
29. Explain how identification of the type of cubic lattice is possible from interplanar distance ratio.
30. Briefly explain Debye-Falkenhagen and Debye-Wein effect.

(5 × 6 = 30 Marks)

Section D (Essay)

Answer any *two* questions. Each question carries 10 marks.

31. (a) Derive the Nernst equation for the EMF of a galvanic cell from thermodynamic principles
(b) Calculate the potential of a hydrogen electrode at pH= 3 and H₂(g) pressure of 2 atm at 298K. (7+3 marks)
32. How can the crystal structure of NaCl can be deduced from X-ray diffraction studies?
33. Explain the *Hittorf's* method for determination of transport number.
34. What are semiconductors? Explain intrinsic and extrinsic semiconduction.

(2 × 10 = 20 Marks)
