

**19U617S**

(Pages: 2)

Name: .....

Reg. No: .....

**SIXTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2022**

(CUCBCSS-UG)

**CC15U CHE6 B11 - PHYSICAL CHEMISTRY – III**

(Chemistry – Core Course)

(2016 to 2018 Admissions – Supplementary/Improvement)

Time: Three Hours

Maximum: 80 Marks

**Section A** (One word)

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

1. Define transport number.
2. At 25°C, the molar conductance at infinite dilution of HCl, CH<sub>3</sub>COONa and NaCl are 26.1, 91 and 126.4 Sm<sup>2</sup>mol<sup>-1</sup>. Molar conductance of acetic acid at infinite dilution in Sm<sup>2</sup> mol<sup>-1</sup> is -----
3. Calculate the Miller indices of a plane which cuts the X,Y and Z axis at 1a, 2b and 3c respectively, where a, b and c are unit intercepts.
4. Number of particles per unit cell of simple cubic, bcc and fcc are -----, ----- and -----
5. The pH of a solution of potassium acetate in water is.....
6. A liquid mixture which boils at constant temperature and distills unchanged in composition is called -----
7. Zn(s)|Zn<sup>2+</sup>(aq., c1) || Zn<sup>2+</sup>(aq., c2), Zn(s) forms an example for an electrolyte concentration cell ----- transference.
8. Rust is (a) hydrated ferrous oxide (b) hydrated ferric oxide (c) ferrous hydroxide (d) Ferrous oxide
9. In a hydrogen oxygen fuel cell, the electrolyte used is ..... solution.
10. An aqueous solution of NH<sub>4</sub>Cl has a pH value ..... than 7.

**(10 × 1 = 10 Marks)**

**Section B** (Short answer)

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

11. Explain the variation of molar conductance with dilution for weak electrolytes.
12. Write Debye Huckel Onsager equation and explain the terms.
13. Calculate the Miller indices of a plane which cuts the X,Y and Z axis at 2a, 4b and 3c respectively, where a, b and c are unit intercepts.
14. What is radius ratio? How does coordination number vary with the radius ratio?
15. State Raoult's law.

16. What is an ideal solution?
17. Calculate the pH of  $10^{-5}$  M solution of HCl.
18. What is a Frenkel defect?
19. What is meant by a reference electrode? Give one example.
20. Define the term corrosion of metals.
21. What are reversible electrodes? Give examples.
22. What are the different classes of liquid crystals?

**(10 × 2 = 20 Marks)**

**Section C (Paragraph)**

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

23. Explain Debye – Falkenhagen and Debye-Wein Effect.
24. Explain the differences in powder diffraction patterns of NaCl and KCl.
25. Describe the powder method of X-ray diffraction of solids.
26. Explain the term azeotropic mixture with suitable examples.
27. Explain the term amphoteric substance with suitable examples.
28. Derive the van't Hoff osmotic pressure equation.
29. Discuss the principle involved in the potentiometric titration of an acid against a base.  
How is the end point detected in such titration?
30. Outline an experiment for the accurate measurement of the EMF of a cell.

**(5 × 6 = 30 Marks)**

**Section D (Essay)**

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

31. Discuss the application of conductivity measurements.
32. (a) Derive Bragg's equation (b) When a metal crystallizes in fcc, the edge length of the unit cell is found to be  $4 A^\circ$  and crystallized in bcc, the edge length is  $3 A^\circ$ . Calculate the ratio of the densities of the metal in fcc and bcc forms.
33. Give a note on buffer solutions and buffer action. Derive the Henderson equation.
34. Describe application of EMF measurements for (a) determination of pH using quinhydrone electrode (b) determination of solubility and solubility product of sparingly soluble product.

**(2 × 10 = 20 Marks)**

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