

B. Sc. DEGREE END SEMESTER EXAMINATION - MARCH 2019**SEMESTER – 6: CHEMISTRY (CORE COURSE)****COURSE: 15U6RCHE12: PHYSICAL CHEMISTRY IV***(Common for Regular - 2016 Admission / Supplementary-Improvement 2015 admission)*

Time: Three Hours

Max. Marks: 60

SECTION A(Answer **all** questions. Each question carries 1 mark)

1. Conjugate acid of H₂O is
2. Calculate the pH of 10⁻⁴ M HCl at 298K.
3. What will be the neutral pH if the ionic product is 10⁻¹² at 320 K?
4. Which electromagnetic radiation is used in NMR spectroscopy?
5. Specific conductance = Cell constant x
6. What is the weight of copper deposited by 1F of electricity?
7. How ionic mobility and molar ionic conductance at infinite dilution related?
8. Represent the cell that utilizes the reaction $\text{Zn} + 2\text{H}^+_{(\text{aq})} \longrightarrow \text{Zn}^{2+}_{(\text{aq})} + \text{H}_{2(\text{g})}$

(1 x 8 = 8)

SECTION B(Answer **any six** questions. Each question carries 2marks)

9. What are buffer solutions? Give an example for acidic buffer.
10. Why H₂S addition fails to precipitate Zn²⁺ ions as ZnS from the aqueous acidic solution?
11. How molar conductance varies with dilution for strong and weak electrolytes.
12. What is meant by electro chemical equivalent and chemical equivalent?
13. The dissociation constants of ammonium hydroxide, acetic acid and water at 25°C are 3.83 x 10⁻⁸, 1.75 x 10⁻⁵ and 1.0 x 10⁻¹⁴. Calculate the percentage hydrolysis of ammonium acetate in a decimolar solution.
14. Write notes on paramagnetism and ferromagnetism.
15. What is liquid junction potential. How it is eliminated in galvanic cell?
16. Write the electrode reaction of calomel electrode.

(2 x 6 = 12)

SECTION C(Answer **any four** questions. Each question carries 5 marks)

17. The solubility product of Mg(OH)₂ at 25° C is 1.4 x 10⁻¹¹ mol³litre⁻³. Calculate the solubility of Mg(OH)₂ in g/litre. [Mg=24, O=16, H=1]
18. Discuss on the theory acid-base indicator and redox indicator.
19. What is chemical shift? Name the reference used to represent chemical shift.

20. Write the expressions for relative permittivity and molar refraction in terms of n_r (refractive index)
21. Derive expression for activity of electrolyte of type M_xA_y in terms of its molality.
22. State Kohlrausch's law and how it is used for calculation of molar ionic conductance at infinite dilution of acetic acid. (5 x 4 = 20)

SECTION D

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

23. a) Derive an expression for hydrolysis constant (K_h) and degree of dissociation (α) for an aqueous solution of CH_3COONa .
b) Discuss on how dipole moment and molecular structure related.
24. a) Explain Debye - Huckel theory of strong electrolytes.
b) Write Debye -Huckel Onsager equation and graphically represent the relation between Λ_m and concentration.
25. Derive expression for the EMF of concentration cell with transference,
 $Pt, H_{2(g)}, HCl_{(a1)} / HCl_{(a2)}, H_{2(g)}, Pt$.
26. a) Give the pectoral representation of cell for the determination of pH of a solution using glass electrode.
b) Explain the P.H. determination using this cell. (10 x 2 =20)
