

B.Sc. DEGREE EXAMINATION, APRIL 2023
BRANCH IV - CHEMISTRY
SIXTH SEMESTER

COURSE : MAJOR-CORE
PAPER : INORGANIC CHEMISTRY - II
TIME : 3 HOURS

MAX. MARKS :100

SECTION – A

ANSWER ALL THE QUESTIONS.

(30x1=30)

I. CHOOSE THE CORRECT ANSWER:

- The name of the iron protein is
(a) ferredoxins (b) cytochrome (c) haemoglobin (d) carboxy peptidase.
- Polydentate ligand that does form a chelate is
(a) gly (b) acac (c) trien (d) hydrazine.
- The example of a complex salt is
(a) NaCl (b) CaCl₂ (c) MgSO₄ (d) [Cu(NH₃)₄]SO₄.
- Coordination number of Cu in the complex is [Cu(NH₃)₄]SO₄ is
(a) 3 (b) 2 (c) 5 (d) 4
- The cation which is coloured in aqueous solution is
(a) Cu⁺ (b) Ti⁴⁺ (c) Zn²⁺ (d) Ni²⁺.
- The CFSE for a high spin octahedral complex of a d₆ ion is
(a) -0.6Δ_o (b) 1.2 Δ_o (c) 1.8 Δ_o (d) -0.4Δ_o.
- Group separation uses
(a) volumetric estimation (b) gravimetric estimation
(c) qualitative analysis (d) Quantitative analysis.
- Zinc containing enzymes is
(a) carboxy peptidase (b) ferredoxin (c) ferritin (d) cytochrome.
- EDTA is
(a) bidentate ligand (b) monodentate ligand
(c) pentadentate ligand (d) -hexadentate ligand.
- The example of sandwich complex is
(a) benzene (b) ferrocene (c) NaCl. (d) [Cu(NH₃)₄]SO₄.

II. FILL IN THE BLANKS:

- Unidentate ligand uses ----- atom at a time to form bond with metal in complexes.
- are donors in a coordinate bond.
- are acceptors in a coordinate bond.
- is the ore of Thorium.

15. ----- technique used to separate lanthanide ions.
16. EAN is -----.
17. 18 electron rule reveals ----- of a complex.
18. ----- is an example of metalloenzyme.
19. ----- is the ore of Uranium.
20. ----- obtained by the complex due to chelation is called chelate effect.

III. MATCH THE FOLLOWING:

21. $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$. (i) Low spin
22. $[\text{Mn}(\text{CN})_6]^{4-}$. (ii) High spin
23. Fe_3O_4 . (iii) Vitamin B12
24. Catalase (iv) Fe(III) heme groups
25. Cyanocobalamin (v) Spinel

IV. ANSWER IN A LINE OR TWO:

26. What is ambidentate ligand?
27. What is hydrate isomerism?
28. Give an example of isomeric ligands.
29. Define the term "Hapticity."
30. What are cytochromes?

SECTION – B

ANSWER ANY FIVE QUESTIONS:

(5x6 = 30)

31. Describe the crystal field splitting in square planar complexes.
32. a) Explain the optical isomerism in four coordinate complexes.
b) Compare the magnetic behaviour of $[\text{NiCl}_4]^{2-}$ (tetrahedral) and $[\text{Ni}(\text{CN})_4]^{2-}$ (square planar).
(3+3)
33. State Jahn-Teller's theorem and explain the tetragonal distortion in octahedral complexes .
34. How will you isolate lanthanides using Ion-exchange chromatography,
35. Draw the structure and give any one application of i) EDTA ii) DMG iii) Cupferron
36. Compare the oxidation states and oxides and Vanadium group metals.
37. Discuss the structure and preparation of Zeise's salt.

SECTION – C

ANSWER ANY TWO QUESTIONS:

(2x20 = 40)

38. a) Discuss the structure, bonding and properties of ferrocene.
b) Compare the crystal field splitting in octahedral and tetrahedral complexes . Why is Δ_o greater than Δ_t ?
(10+10)
39. a) Explain the electronic configuration , oxidation states and colour of actinides.
b) Describe the preparation , properties and structure of $\text{Ni}(\text{CO})_4$.
c) What are chelating ligands ? Explain chelate effect.
(6+10+4)
40. a) Discuss in detail about the factors affecting the magnitude of Δ_o of complexes.
b) What is lanthanide contraction? Explain the causes and consequences of lanthanide contraction.
(10+10)