

UNIT 5 COORDINATION CHEMISTRY

BOOK –BACK QUESTIONS:

1. Write the IUPAC names for the following complexes. (B/B-1) **** PTA-3 QY-2019
 i) $[\text{Co}(\text{ONO})(\text{NH}_3)_5]^{2+}$ ii) $\text{Na}_2 [\text{Ni}(\text{EDTA})]$
 iii) $[\text{Co}(\text{en})_3]^{2+} (\text{SO}_4)_3$ iv) $[\text{Pt}(\text{NH}_3)_2 \text{Cl} \cdot \text{NO}_2]$ v) $[\text{Ag}(\text{CN})_2]^-$
2. Based on VB theory explain why $[\text{Cr}(\text{NH}_3)_6]^{3+}$ is paramagnetic, while $[\text{Ni}(\text{CN})_4]^{2-}$ is diamagnetic. B/B-4 **** Aug-2021
3. $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ is coloured while $[\text{Sc}(\text{H}_2\text{O})_6]^{3+}$ is colourless. Explain. (B/B-10) MAR 2020
4. Give the one test to differentiate compounds $[\text{Co}(\text{NH}_3)_5 \text{Cl}]\text{SO}_4$ and $[\text{Co}(\text{NH}_3)_5 \text{SO}_4] \text{Cl}$ (B/B-9)
5. What is linkage isomerism. Explain with an example. (B/B-11) ****
6. Give the difference between double salts and coordination compounds? (B/B-13)
7. Write the postulates of Werner's theory? **** B/B-14 SEP 2020 MAY 2022
8. What are hydrate isomers? Explain with an example. **** (B/B-17) Mar-2020
9. What is crystal field stabilization energy OR CFSE? (B/B-19) PTA-1 ****
10. Discuss briefly the nature of bonding in metal carbonyls. B/B 21 PTA-2 ****
11. What are the limitations of VB theory? B/B24 QY & HY 2019, Aug -2021 ***

BOOK-INSIDE QUESTIONS:

1. What are Ionisation isomers? GMQ-2019 **** IN.P.NO:142
2. What are inert and Labile complexes?
3. What are the stability constant? Mention its significance.
4. In a tetrahedral crystal field, draw the figure to show splitting of d-orbitals.
5. Write any two medicinal uses of coordination compounds?
6. Arrange the following ligands in the ascending order on the basis of crystal field splitting power H_2O , CO , Br^- , CN^-
7. Calculate the magnetic moment and magnetic property of $[\text{CoF}_6]^{3-}$
8. Write the IUPAC Name of the following: a) $[\text{Ag}(\text{NH}_3)_2]^+$ b) $[\text{Co}(\text{NH}_3)_5 \text{Cl}]^{2+}$
9. In the complex $[\text{Co}(\text{C}_2\text{O}_4)_3]^{3-}$, mention the i) Hybridisation ii) Nature of ligand iii) Geometry
10. $[\text{Fe}(\text{CN})_6]^{4-}$ and $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$ are of different colours in dilute solutions why?
11. Explain $[\text{Fe}(\text{CN})_6]^{3-}$ is paramagnetic, using Crystals Field theory.
12. Explain the main assumption of VBT of Coordination compounds.
13. Write the use of metal complexes in biological systems.
14. Write the salient features of Crystal Field Theory.
15. What will be the correct order for the wave lengths of absorption in the visible region and explain for the followings $[\text{Ni}(\text{NO}_2)_6]^{4-}$ $[\text{Ni}(\text{NH}_3)_6]^{2+}$ $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$
16. a) For the complex $[\text{Fe}(\text{en})_2 \text{Cl}_2] \text{Cl}$, identify. see pta q/a
 1) Oxidation number of Fe 2) Hybridisation and shape 3) Magnetic behavior
 4) Number of geometric isomers. 5) Whether there may be optical isomers also?
 6) IUPAC name
17. Write the postulates of Crystal field theory. (In. P.NO:153) ****
18. What is stability constant? Mention its significance. (In.P.NO-163)
19. The mean pairing energy and octahedral field splitting energy of $[\text{Mn}(\text{CN})_6]^{3-}$ are 28,000

cm⁻¹ and 38,500cm⁻¹ respectively. Whether this complex is stable in low spin or high spin ? (In. P.NO:160) ****

20. For [Fe(H₂O)₆]²⁺ ion the magnitude of octahedral field splitting energy is 14,000 cm⁻¹ and the mean pairing energy is 30,000cm⁻¹ .Then calculate CFSE for low spin complex of the above complex. (In. P.NO:157)

OTHER BOOK BACK QUESTIONS;

1. Write the formula for the following coordination compounds.

- a) Potassiumhexacyanidoferrate(II) b) Pentacarbonyliron(0)
c) Pentaamminenitrito-k-NNCobalt(III)ion d) Hexaamminecobalt(III)sulphate
e) Sodiumtetrafluorodihydroxidochromate(III)

2. Arrange the following in order of increasing molar conductivity i) Mg[Cr(NH₃)(Cl)₅]
ii)[Cr(NH₃)₅Cl]₃ [CoF₆]₂ iii)[Cr(NH₃)₃Cl]₃

3. Give an example of coordination compound used in medicine and two examples of biologically important coordination compounds.

4. Draw all possible geometrical isomers of the complex [Co(en)₂Cl₂] and identify the optically active isomer.

5. Give an example for complex of the type [Ma₂b₂c₂] where a, b, c are monodentate ligands and give the possible isomers.

6. In an octahedral crystal field, draw the figure to show splitting of d orbitals.

7. Classify the following ligands based on the number of donor atoms.

- a) NH₃ b) en c) ox²⁻ d) pyridine

8. Why tetrahedral complexes do not exhibit geometrical isomerism.

9. Explain optical isomerism in coordination compounds with an example.

10. What is crystal field splitting energy?

11. What is the coordination entity formed when excess of liquid ammonia is added to an aqueous solution of copper sulphate?

12. A solution of [Ni(H₂O)₆]²⁺ is green, whereas a solution of [Ni(CN)₄]²⁻ is colorless – Explain.

13. Write the oxidation state, coordination number, nature of ligand, magnetic property and electronic configuration in octahedral crystal field for the complex K₄[Mn(CN)₆]