SmartKalike

CBSE Class 12 · Chemistry

Coordination Compounds

10 most probable questions for Boards 2027

Q1. 0.5 marks · Very short answer

Write the IUPAC name of $K[Zn(OH)_4]$.

Answer

The IUPAC name is potassium tetrahydroxidozincate(III). The complex is anionic, so zinc takes the suffix “-ate”; its oxidation state is +3.

Q2. 1 mark · Very short answer

According to Werner’s theory, which type of valence is normally ionisable and satisfied by negative ions?

Answer

Primary valences are normally ionisable and are satisfied by negative ions, unlike non-ionisable secondary valences.

Q3. 2 marks · Short answer

What are coordination polyhedra? Name three common geometries of transition-metal coordination compounds.

Answer

Coordination polyhedra are the characteristic spatial arrangements of groups bound to a metal through secondary linkages. Common transition-metal geometries are octahedral, tetrahedral and square planar. These arrangements correspond to different coordination numbers.

Q4. 3 marks · Medium answer

State the order in which a coordination compound is named, including how the ligands are ordered. Explain how anionic ligands and ligand counts are represented in the name, including when bis, tris or tetrakis is used.

Answer

1. The cation is named first, followed by the coordination entity. Within the entity, ligand names precede the central atom or ion and are listed alphabetically.
2. Anionic ligand names end in –o, while neutral and cationic ligand names generally remain unchanged, except for special names such as aqua and ammine.
3. Prefixes mono, di and tri show ligand counts; bis, tris or tetrakis are used when a ligand name contains a numerical prefix, with that ligand name in parentheses.

Q5. 5 marks · Long answer

(a) Classify isomerism in coordination compounds into its two broad types, and distinguish them. (2)
(b) Describe the geometrical arrangements that give rise to cis/trans and fac/mer isomerism, and state why geometrical isomerism is not possible in tetrahedral complexes with unidentate ligands. (2)
(c) Define optical isomers. (1)

Answer

1. Bonds and spatial arrangement — Structural isomers have different bonds; stereoisomers have the same chemical formula and chemical bonds but different spatial arrangements.
2. Cis/trans arrangement — Cis isomers have identical ligands adjacent to one another, while trans isomers have them opposite one another in square-planar or octahedral complexes.
3. Fac/mer arrangement — In octahedral complexes with three identical ligands, fac isomers have the ligands on one face; mer isomers have them along a meridian plane.
4. Tetrahedral geometry — Unidentate ligands have the same relative positions to one another in tetrahedral complexes; therefore, these complexes do not show geometrical isomerism.
5. Optical isomers — Optical isomers are mirror images that cannot be superimposed on one another; they are called enantiomers.

Q6. 1 mark · Multiple choice

According to Werner's theory, a metal's secondary valence is: (A) variable and ionisable (B) fixed for a metal and equal to its coordination number (C) always satisfied only by negative ions (D) independent of its coordination number

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/chemistry/coordination-compounds

Q7. 2 marks · Short answer

Define a ligand. How is the coordination number of a metal ion determined when a complex contains multidentate ligands?

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Q8. 3 marks · Medium answer

Explain why tetrahedral complexes are rarely low spin. Also state the types of metal–carbonyl bonding interactions involved in bonding between a metal and CO.

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Q9. 5 marks · Long answer

(a) Compare the crystal-field splitting in tetrahedral and octahedral complexes, including the relationship between Δt and Δo. (2)
(b) Why are tetrahedral complexes rarely low spin? (1)
(c) Explain how the colour of a coordination complex is related to the colour of light it absorbs. (2)

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/chemistry/coordination-compounds

Q10. 1 mark · Very short answer

What is a coordination entity?

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