

THE GURUKUL INSTITUTE

PLOT 5C, 2ND FLOOR, GANAPATI COMPLEX, SEC-13, OPP. JAIPURIA
SCHOOL, VASUNDHRA, GHAZIABAD (U.P)
COORDINATION COMPOUNDS-9

- Write IUPAC naming of the complex:
 - $\text{Na}_3[\text{Cr}(\text{OH})_2\text{F}_4]$
 - $[\text{Cr}(\text{H}_2\text{O})_5\text{Cl}]\text{Cl}_2$
 - $[\text{Co}(\text{NH}_3)_5\text{SCN}]\text{Cl}_2$
 - $[\text{Co}(\text{en})_2(\text{ONO})\text{Cl}]\text{Cl}$
- Name the ionization isomer of $[\text{Cr}(\text{H}_2\text{O})_5(\text{NCS})]^{2+}$.
- Write the IUPAC name for any of the isomers with the molecular formula $[\text{Pt}(\text{NH}_3)_4\text{Cl}_2]^+$.
- Write the formula of copper hexacyanoferrate (II).
- Write an anion whose shape can be explained by the scheme of sp^3d^2 hybridization.
- Write the chemical formula for pentaammine chloroplatinum(IV) chloride.
- How many isomers are there for the complex isomer of $[\text{Co}(\text{NH}_3)_5][\text{Cr}(\text{CN})_6]$ and for octahedral complex $[\text{CoCl}_2(\text{en})(\text{NH}_3)]^{+}$?
- What is the oxidation state of Co in the complex $[\text{Co}(\text{NH}_3)_2(\text{NO}_2)\text{Cl}][\text{Au}(\text{CN})_2]^{-}$?
- What is the shape of $[\text{Ni}(\text{CN})_4]^{2-}$?
- How is the magnitude of Δ_o affected by (i) nature of the ligand and (ii) oxidation state of metal ion?
- Using the valence bond approach, deduce the shape and magnetic character of $[\text{Fe}(\text{CN})_6]^{3-}$ ion.
- Using the valence bond theory, predict the shape and magnetic behavior of $[\text{Cr}(\text{NH}_3)\text{Cl}]^{2+}$ ion. [At. No. of Cr = 24]
- Among $[\text{Ag}(\text{NH}_3)_4]\text{Cl}$, $[\text{Ni}(\text{CN})_4]^{2-}$ and $[\text{CuCl}_4]^{2-}$ which
 - Has square planar geometry?
 - Remains colorless in aqueous solutions and why? [At. No. of Ag = 47, Ni = 28, Cu = 29]
- Write the state of hybridization and the oxidation state of the central atom in each of the following species:
 - $\text{cis}-[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^+$
 - $[\text{PtCl}_3(\text{C}_2\text{H}_4)]^-$. [At No. of Pt = 78]
- Predict the shape and magnetic character of each of the following:
 - $[\text{Cr}(\text{NH}_3)_6]^{3+}$
 - $[\text{Cr}(\text{CO})_6]$[Given At.No. of Cr = 24]
- Write the IUPAC names of the following :
 - $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$
 - $[\text{Cr}(\text{NH}_3)_6]^{2+}$
- Deduce the shape and magnetic behavior of the complex ion $[\text{Co}(\text{NH}_3)_5\text{NO}_2]^{2+}$.
- Using the valence bond theory, predict the shape and magnetic behavior of $[\text{Cr}(\text{NH}_3)_5\text{Cl}]^{2+}$ ion. [At. No. of Cr = 24]
- Explain the following:
 - $[\text{Co}(\text{NH}_3)_6]^{3+}$ is diamagnetic, whereas $[\text{CoF}_6]^{3-}$ is paramagnetic.
 - $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ is more paramagnetic than $[\text{Fe}(\text{CN})_6]^{3-}$.
[At. No. of Fe = 26, Co = 27]
- A coordination compound has the formula $\text{CoCl}_3.4\text{NH}_3$. It does not liberate ammonia but precipitates chloride ion as AgCl. Give the IUPAC name of the complex and write its structural formula.
- Using valence bond theory predict the geometry and magnetic behavior of $[\text{Cr}(\text{NH}_3)_6]^{3+}$ ion.
 - Write the IUPAC name of $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$.
- What are ambidentate ligands? Give an example.

- b. Draw the structure of cis isomer of $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^+$.
23. Draw the structure of the following:
- Cis- dichlorotetracyanochromate(III)
 - Pentaamminenitrito-N-cobalt(III)
 - Hexamethyldialuminium
24. Draw a sketch to show the splitting of d-orbitals in an octahedral crystal field. State for a d^6 ion how the actual configuration of the split d-orbitals in an octahedral crystal field is decided by the relative values of Δ_o and P.
25. Write the IUPAC name of $[\text{Co}(\text{en})_2\text{Cl}_2]\text{Cl}$ and draw the structures of all the isomers with this formula of complex.
26. a. A coordination compound has the formula $\text{CoCl}_3 \cdot 4\text{NH}_3$. It does not liberate ammonia but forms a precipitate with AgNO_3 . Write the structure and IUPAC name of complex compound.
b. Name a ligand which is bidentate and give an example of the complex formed by this ligand.
27. Answer the following:
- Differentiate between a bidentate ligand and a monodentate ligand.
 - Write the IUPAC name of $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]\text{Cl}_2$.
28. a. Name the geometrical isomers of $[\text{Co}(\text{en})_2\text{Cl}_2]^+$. (en = ethylenediamine)
b. Explain the observation:
Tetrahedral Ni(II) complexes are paramagnetic but square planar Ni(II) complexes are diamagnetic.
29. a. Name two factors that favor a metal ion's forming complex.
b. Give an example of industrial application of formation of coordination complex.