

CHEMISTRY OF COORDINATION COMPOUNDS

CHAPTER-9

TEST-A

SOLVED

Time: 1 hr.

Max. Marks: 30

SECTION-A

Tick the correct option:

- Each of the following complex is paramagnetic and inner orbital except. [1]
 (i) $[\text{Co}(\text{NH}_3)_6]^{3+}$ (ii) $[\text{Cr}(\text{CN})_6]^{3-}$ (iii) $[\text{Fe}(\text{CN})_6]^{3-}$ (iv) $[\text{Fe}(\text{en})_3]^{3-}$
- Which of the following ligand is NOT a monodentate ligand? [1]
 (i) NC^- (ii) CH_3COO^- (iii) $\text{C}_2\text{O}_4^{2-}$ (iv) both (ii) and (iii)
- The chemical formula of iron (II) hexacyanidoferrate (III) is [1]
 (i) $\text{Fe}_2[\text{Fe}(\text{CN})_6]$ (ii) $\text{Fe}_2[\text{Fe}(\text{CN})_6]_3$ (iii) $\text{Fe}_4[\text{Fe}(\text{CN})_6]_3$ (iv) $\text{Fe}_2[\text{Fe}(\text{CN})_6]_2$

Assertion-Reason type Questions:

- If assertion and reason both are correct and reason is the correct explanation of assertion.
 - If assertion and reason both are correct and reason is not the correct explanation of assertion.
 - If assertion is correct and reason is wrong.
 - If assertion is wrong and reason is correct.
- Assertion: $[\text{CrCl}_6]^{3-}$ and $[\text{Cr}(\text{en})_3]^{3+}$ have difference in their paramagnetism. [1]
 Reason: Ethane-1, 2-diamine is a strong field ligand whereas chloride ion is a weak field ligand.
 - Assertion: $\text{Ni}(\text{CO})_4$ and $[\text{Co}(\text{CO})_4]^-$ both are tetrahedral and diamagnetic complexes. [1]
 Reason: CO participates in back bonding with the metal in both the complex.

One word /One Sentence type Questions.

- Write IUPAC name of the ionisation isomer of $[\text{Cr}(\text{NH}_3)_5\text{Br}]\text{SO}_4$. [1]
- What is spectrochemical series? [1]

SECTION-B

- What are ambident ligands? Give one example. [2]
 - Give one example of hexadentate ligand.

9. Draw all possible stereoisomers of Diamminebis (ethane-1, 2-diamine) cobalt (III). [2]
10. (i) Write the chemical formula of sodium tetracyanidozincate (II). [2]
(ii) Give four points to distinguish between primary and secondary valencies in coordination compounds.
11. For each of the following complex ion, calculate the magnetic moment and predict the geometry: [3]
(i) $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$ (ii) $[\text{Ni}(\text{CN})_4]^{2-}$ (iii) $[\text{Cr}(\text{CN})_6]^{3-}$
(At. no. : Cr = 24, Ni = 28)
12. Give reason: [3]
(i) $[\text{Co}(\text{en})_3]^{3+}$ has more stability than $[\text{Co}(\text{NH}_3)_6]^{3+}$
(ii) $[\text{Sc}(\text{H}_2\text{O})_6]^{3+}$ is repelled by the magnetic field.
(iii) $[\text{Pt}(\text{NH}_3)_6]\text{Cl}_4$ is more electrical conducting than $[\text{Pt}(\text{NH}_3)_4]\text{Cl}_2$.
13. Explain the following: [3]
(i) $[\text{NiCl}_4]^{2-}$ and $\text{Ni}(\text{CO})_4$ both are tetrahedral in shape but $[\text{NiCl}_4]^{2-}$ is paramagnetic while $\text{Ni}(\text{CO})_4$ is diamagnetic.
(ii) $[\text{Co}(\text{NH}_3)_6]^{3+}$ is an inner orbital complex while $[\text{Ni}(\text{NH}_3)_6]^{2+}$ is an outer orbital complex.
14. (a) Show the crystal field splitting diagram for a complex with d^6 configuration in the presence of an octahedral weak field ligands. [3]
(b) What are the factors on which the crystal field splitting energy depends?
15. (a) For a given complex $[\text{Fe}(\text{Cl})_2(\text{en})_2]^+$ (Atomic number of Fe = 26). [1×5]
(i) write IUPAC name
(ii) State the hybrid orbitals used by iron.
(iii) Predict the geometry of the complex ion.
(iv) Predict whether the complex is attracted or repelled by the magnetic field.
(v) Draw the geometrical isomers.
(vi) Predict any optical isomerism possible? Yes or No
(b) Draw the facial and meridional isomer of $[\text{Co}(\text{NH}_3)_3\text{Cl}_3]$ [3+2]
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