Perfect solution to all problems

Tips, Tricks, General Knowledge, Current Affairs, Latest Sample, Previous Year, Practice Papers with solutions.

CBSE 12th Chemistry
Chapter- 9 (Coordination Compounds)
Unsolved Important Questions

CBSE 12th Chemistry
Chapter- 9 (Coordination Compounds)
Unsolved Important Questions

SECTION A

(Each question in this section carry 1 mark)

Q.1. What is the coordination number of each type of ions in a rock-salt type crystal structure?

Q.2. Give an example of linkage isomerism?

Q.3. Which of the following is more stable complex and why?

$[Co(NH_3)_6]^{3+}$ and $[Co(en)_3]^{3+}$

SECTION B

(Each question in this section carry 2 marks)

Q.4. For the complex $[Fe(en)_2cl_2]Cl$, (en=ethylene diamine), identify

(i) The oxidation number of iron,

(ii) The hybrid orbits and the shape of the complex,

(iii) The magnetic behavior of the complex.

(iv) The number of geometrical isomers,

(v) Whether there is an optical isomer also, and

(vi) name of the complex. (At. No. of Fe = 26)

Q.5. Name the following coordination compounds according to IUPAC system of nomenclature:

(i) $[Co(NH_3)_4(H_2O)Cl]Cl_2$

(ii) $[CrCl_2(en)_2Cl, (en = ethane - 1,2 - diamine)$

Q.6. Write the IUPAC name of the complex $[Cr(NH_3)_4Cl_2]^+$. What type of isomerism does it exhibit?

Q.7. **(i) Write down the IUPAC name of the following complex:**
$[Cr(NH_3)_2Cl_2(en)]Cl$ **(en = ethylenediamine)]**

(ii) Write the formula for the following complex:
Pentaamminenitrito-o-Cobalt(III).

Q.8. **When a co-ordination compound $CrCl_3.6H_2O$ is mixed with $AgNo_3$, 2 moles of AgCl are precipitated per mole of the compound. Write.**

(i) Structural formula of the complex.

(ii) IUPAC name of the complex.

Q.9. **(i) Write down the IUPAC name of the following complex:**
$[Co(NH_3)_5Cl]^{2+}$
(ii) Write the formula for the following complex: Potassium tetrachloridonickelate(II).

Q.10. **Using IUPAC norms write the formulae for the following:**
(a) Sodium dicyanidoaurate (I)
(b) Tetraamminechloridonitrito-N-plantinum(IV) sulphate

SECTION C

(Each question in this section carry 3 marks)

Q.11. **(a) What is a ligand? Give an example of a bidentate ligand.**
(b) Explain as to how the two complexes of nickel, $[Ni(CN)_4]^{2-}$ and $Ni(CO)_4$ have different structures but do not differ in their magnetic behavior. (Ni = 28)

Q.12. **Give the formula of each of the following coordination entities:**

(i) CO^3 ion is bound to one cl^-, one NH_3 molecules and two bidentate enthylene diamine (en) molecules.

(ii) Ni^{2+} ion is bound to two water molecules and two oxalate ions. Write the name and magnetic behavior of each of the above coordination entities.
(At. Nos. Co=27, Ni =28)

Q.13. **Write the IUPAC names of the following coordination compounds:**
(i) $[Cr(NH_3)_3Cl_3]$

(ii) $K_3[Fe(CN)_6]$

(iii) $[CoBr_2(em)_2]^+$, **(en = ethylenediamine)**

Q.14. **(i) Draw the geometrical isomers of complex $[Pt(NH_3)_2Cl_2]$.**
(ii). On the basis of crystal field theory, write the electronic configuration for d^4 ion if $\Delta_o <$ P.

(iii). Write the hybridization and magnetic behavior of the complex $[Ni(CO)_4]$. (At. no. of Ni = 28).

Q.15. **(i) What type of isomerism is shown by the complex $[Co(NH_3)_6]$ $[Cr(CN)_6]$?**
(ii) Why a solution of $[Ni(H_2O)_6]^{2+}$ is green while a solution of $[Ni(CN)_4]^{2-}$ is colourless? (At. no. of Ni = 28).
(iii) Write the IUPAC name of the following complex: $[Co(NH_3)_5\ (CO_3)]Cl$.

Q.16. **(a) What is the basis of formation of the spectrohemical series?**

(b) Draw the structures of geometrical isomers of the following coordination complexes:

$[CO(NH_3)_3\ Cl_3]$ and $[CoCl_2(en)_2]^+$

(en = ethylenediamine and atomic number of Co is 27).

Q.17. **Giving a suitable example for each, explain the following:**

(i) Crystal field splitting

(ii) Linkage isomerism

(iii) Ambidentate ligand

Q.18. **Compare the following complexes with respect to structural shapes of units magnetic behavior and hybrid orbitals involved in units:**

$[Co(NH_3)_6]^{3+}, [Cr(NH_3)_6]^{3+}, Ni(CO)_4$

$At.Nos: Co = 27, Cr = 24, Ni = 28$

Q.19. **Explain the following terms giving a suitable example in each case:**
(i) Ambident ligand
(ii) Denticity of a ligand
(iii) Crystal field splitting in an octahedral field.

Q.20. Name the following coordination entities and draw the structures of their stereoisomers:
(i) $[\mathbf{co(en)_2Cl_2}]^{+}(\mathbf{en = ethan - 1,2 - diamine})$
(ii) $[\mathbf{Cr(C_2O_4)_3}]^{3-}$
(iii) $[\mathbf{Co(NH_3)_3Cl_3}]$
(Atomic numbers Cr=24, Co=27)

Q.21. For the complex $[NiCl_4]^{2-}$**, write .**
(i) the IUPAC name.
(ii) the hybridization type.
(iii) the shape of the complex. (Atomic no. of Ni = 28)

Q.22. What is meant by crystal field splitting energy? On the basis of crystal field theory, write the electronic configuration of d^4 **terms of** t_{2g} **and** e_g **in an octahedral field when**
(i) $\Delta_0 > P$
(ii) $\Delta_0 > P$

Q.23. (i) Write the IUPAC name of the complex $[Cr(NH_3)_4Cl_2]Cl$**.**

(ii) What type of isomerism is exhibited by the complex $[Co(en)_3]^{3+}$**?**

(iii) Why is $[Nicl_4]^{2-}$**paramagnetic** $[Ni(CO)_4]$ **is a diamagnetic?**
$(At.Nos.: Cr = 24, Co = 27, Ni = 28)$

Q.24. (i) What type of isomerism is shown by the complex$[Cr(H_2O)_6]Cl_3$?

(ii) On the basis of crystal field theory, write the electronic configuration for d^4 **ion if** $\Delta_o P$.

(iii) Write the hybridization and shape of $[CoF_6]^{3-}$**. (Atomic no. of Co = 27)**

Q.25. (a) For the complex $[Fe(H_2O)_6]^{3+}$**, write the hybridization, magnetic character and spin of the complex. (At. Number: Fe = 26)**
(b) Draw one of the geometrical isomers of the complex $[Pt\ (en)_2Cl_2]^{2+}$ **which is optically inactive.**

Q.26. (a) What type of isomerism is shown by the complex $[Co(NH_3)_5(SCN)]^{2+}$**?**
(b) Why is $[NiCl_4]^{2-}$ **paramagnetic while** $[Ni(CN)_4]^{2-}$ **is diamagnetic ?**
(Atomic number of Ni = 28).
(c) Whey are low spin tetrahedral complexes rarely observed?

SECTION D

(Each question in this section carry 5 marks)

Q.27. (a) What is meant by undictated, bidentate and ambidentate ligands? Give two examples for each.

(b) Calculate the overall complex dissociation equilibrium constant for the $Cu(NH_3)_4^{2+}$ ion, given that β_4 for this complex is 2.1×10^{13}.