INDIAN SCHOOL MUSCAT
SENIOR SECTION
DEPARTMENT OF CHEMISTRY
CLASS XII
COORDINATION COMPOUNDS

Multiple Choice Questions:

1 Oxidation state of titanium in $[Ti(H_2O)_4Cl_2]^+$ is
   a) -3 b)+3 c) +2 d)+1

2 How many ions are produced by complex $[Cr(NH_3)_3Cl_3]$ in solution?
   a) 6 b) 3 c) 0 d)1

3 Vitamin B_{12} is a coordination compound of
   a) Pt b) Co c) V d) Ni

4 Ligand which can ligate through two different atoms
   a) cyanide b) ethane-1,2-diamine c) oxalate d) EDTA

Fill in the blanks:

1 _____complexes have only one kind of donor groups.
2 _____ is used in the treatment of lead poisoning.
3 Ligands arranged in the increasing order of field strength_____.
4 _____ is an example of double salt.
5 The magnetic moment of $[MnBr_4]^{2-}$ is_____

Assertion[A] & Reasoning[R]-

(A) Both assertion and reason are correct statements, and the reason is the correct explanation of the assertion
(B) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion
(C) Assertion is correct, but reason is wrong statement
(D) Assertion is wrong, but reason is correct statement
(E) Both assertion and reason are wrong statements

1 [A]: For a d^4 configuration in an octahedral field t_{2g} is filled before e_g
   [R]: in an octahedral field the t_{2g} orbitals have lower energy than e_g.

2 [A]: $[Co(NH_3)_5Cl]Cl_2$ gives 2 moles of AgCl when treated with silver nitrate solution.
   [R]: Primary valences are non- ionisable in nature.

Answer the following:

1. What are ambident ligands? Explain giving example.

2. Write the IUPAC name of the ionization isomer of $[Pt(NH_3)_3Br]Cl$

3. Write the formula of $CrCl_3.5H_2O$ that furnishes 2 moles of Chloride ions per mole of salt.

4. i) Write down the IUPAC name of the following complex :
   $[Pt(NH_3)(H_2O)Cl_2]$

   ii) Write the formula for the following complex:
   Tris(ethane-1,2-diamine)chromium(III) chloride

5. Write IUPAC names of the following:
   a) $[Co(NH_3)_5Cl]Cl_2$

b) $[Cr(NH_3)_6]^{3+}$

6. a) What type of isomerism is shown by $[Co(NH_3)_5ONO]Cl_2$?
   b) On the basis of crystal field theory, write the electronic configuration for d^4 ion if $\Delta o < P$.
   c) Write the hybridization and shape of $[Fe(CN)_6]^{3-}$.
   (Atomic number of Fe = 26)

7. Give the formula of the compound:
   a) Nitrito – N-pentaamminecobalt(III)nitrate
   b) Potassium hexacyanidocobaltate(III)
   c) Hexaammineplatinum(IV)chloride

8. Account for the following
   a) $[Fe(CN)_6]^{3-}$ is weakly paramagnetic while $[Fe(CN)_6]^{4-}$ is diamagnetic.
   b) $[Ni(CO)_4]$ is tetrahedral while $[Ni(CN)_4]^{2-}$ is square planar.
   c) $[Ti(H_2O)_6]^{3+}$ is coloured while $[Sc(H_2O)_6]^{3+}$ is colourless

9. a) For the complex $[Fe(CO)_5]$, write the hybridization, magnetic character and spin of the complex. (At. Number : Fe = 26)
   b) Define crystal field splitting energy.

10. Describe the state of hybridization, the shape and magnetic behavior of the following complexes:
   a) $[Cr(H_2O)_2(C_2O_4)_2]^-$
   b) $[Co(NH_3)_2(en)_2]^{3+}$
   (At no's: Cr = 24 , Co = 27)

11. a) What is a ligand? Give an example of a bidentate ligand.
   a) 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. (At no: of Ni = 28)
   b) Discuss the nature of bonding in metal carbonyls.

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