B. Sc. Part 2
Assignment

COORDINATON COMPOUNDS

1. Write the IUPAC names of the following compounds
   $[Co(NH_3)_6]Cl_3$, $K_3[Fe(C_2O_4)_3]$, $K[PtCl_3(NH_3)]$, $Na_2[CrOF_4]$, $[CoCl_2(en)_2]SO_4$, $Hg[Co(SCN)_4]$, $[Ni(CO_4)]$, $[PtCl_2(NH_3)_2]$, $[CoCl_2(en)]SO_4$, $[CoCl_2(NH_3)_4]_3[Cr(CN)_6]$, $Li[AlH_4]$, $[Fe(C_5H_5)_2]$, $[Ni(dmg)_2]$, $[Mn_3(CO)_{12}]$, $[(NH_3)_5Cr\text{-}OH\text{-}Cr(NH3)_5]Cl_5$
2. Which types ligands form chelates?
3. How many isomers are there for the complex $[Co(NH_3)_4Cl_2]Cl$?
4. Which isomer of $[CoCl_2(en)_2]^+$ does not show optical isomerism ?
5. A co-ordination compound has the formula $CoCl_3.4NH_3$. It does not liberate ammonia but precipitates chloride ions as silver chloride. Give the IUPAC name of the complex and write its structural formula.
6. Which of the compounds is more stable and why?
7. $[NiCl_4]^{2-}$ is paramagnetic while $[Ni(CO)_4]$ is diamagnetic though both are tetrahedral. Why?
8. $[Co(CN)_6]^{3-}$ and $[CoF_6]3-$ both are octahedral complexes. Then what is the difference between the two?
9. Account for the fact that $[Ni(CO)_4]$ has tetrahedral geometry whereas $[Ni(CN)_4]^{2-}$ has square planar geometry.
10. Why Ligand Field Theory is also called Crystal Field Theory?
11. What is Crystal field splitting?
12. Draw isomers of the complex ion $[Co(en)_2Cl_2]^+$
13. Using th valence bond theory, predict the geometry and magnetic character of
    (i) $[NiCl_4]^{2-}$ (ii) $[Ni(CO)_4]$ (At. No. of Ni = 28)
    Hint. (i) sp3 hybridization-tetrahedral, two unpaired electrons-paramagnetic.
14. How coordination sites are there in ethylene diamine CH_2NH_2 ?
    |
    CH_2NH_2
15. Write the formula of tetrachlorocuprate (II) ion.
16. Name the ionisarion isomer of $[Cr(H_2O)Br]SO_4$
16. Predict the number of different types of isomers for the following complex :
    (i) $[Pt(NH_3)_3Br]NO_2$ (ii) $[Cr(ox)_3]^{3-}$
    (iii) $[Co(en)_2Cl_2]+$ (iv) $[Pt(NH_3)_4][PtCl]_4]$
17. Which of the following exhibit geometrical isomers :
    (a) $[Co(en)_2Cl_2]+$ (b) $[Pt(Nh_3)_3Cl]$
    (c) Tetrahedral $[Co(NH_3)_2BrCl]$ (d) $[Rh(NH_3)_3Cl_3]$
18. Write the formula of the following :
    (i) Linkage isomer of $[CoCl(NO_2)(en)_2]Cl_2$
    (ii) Coordination isomer of $[Co(NH_3)_6][Cr(NO_2)_6]$
    (iii) Ionisation isomer of $[CoCl(NO_2)(en)_2]Cl$
19. Give one example of hexadentate ligand.
20. What is linkage isomerism? Give one example.
21. What is chelate? Give one example.
22. Give the example of an organometallic compound that is used as a homogeneous catalyst.
23. Write the formula of the complex ion chloronitrotetrammine cobalt (III) and identify ligand, coordinate number and coordinate sphere in this complex. How many ions per mole would be given by this complex in solution?

24. How many geometrical isomers of $[Cr(en)2Cl2]^+$ axist? Which of these show optical activity?

25. $Ni(CO)_4$ has tetrahedral geometry while $[Pt(NH_3)_2Cl_2]$is square planar.
26. Account for the non-ionic nature of the complex $CoCl_3.3NH_3$.
27. Write the formula of the following complexes:
    (a) Diamminechloroethylenediaminenitro-platinum(IV) chloride
    (b) Calcium hexacyanoferrate (II)
    (c) Tetracarbonylnickel (0)
    (d) Iron hexacyanoferrate (II)
    (e) Hexaaquonickel (II) perchlorate
    (f) Dichlorobis (ethylenediaamine) cobalt (III) sulphate.
28. What is spectrochemical series? Explain the difference between a week field ligand and a strong field ligand.
29. How many geometrical and optical isomers are possible for the complex ion, $[Co(en)_2Cl_2]^+$?
30. Write the formula of the following complex:
    (i) Pentaamminechlorocobalt (III) ion
    (ii) Lithium tetrahydroaluminate (III)
31. Explain how $[Pt(NH_3)_2Cl_2]$ and $[Pt(NH_3)_6]Cl_4$ differ in their electrolytic conductance?