

TEST PAPER NO. 09

TOPIC : COORDINATION CHEMISTRY

M.M. 50

TIME: 3 HRS.

Name of Student _____ Roll No. _____

Q.NO. 1-10 carries 1 mark, 11-20 2 marks, 21-25 carries 3 marks, 26 carries 5 marks.

1. Write the formulae of compound: Tetraamineaquachloridocobalt(III) chloride
2. Write the IUPAC name of $K_3[Cr(C_2O_4)_3]$
3. Why geometrical isomerism is not possible for tetrahedral complexes having two different types of unidentate ligands coordinated with the central metal atom?
4. Indicate the type of isomerism exhibited by $[Co(en)_3]Cl_3$
5. The spin only moment of $[MnBr_4]^{-2}$ is 5.9 BM. Predict the geometry of the complex ion?
6. Calculate the overall complex dissociation equilibrium constant for the $[Cu(NH_3)_4]^{2+}$ ion, given β_4 for this complex is 2.1×10^{13}
7. Draw the structures of optical isomers of: $[Cr(C_2O_4)_3]^{-3}$?
8. A solution of $[Ni(H_2O)_6]^{2+}$ is green but a solution of $[Ni(CN)_4]^{-2}$ is colourless?
9. What is meant by chelate effect give one example?
10. How many ions are produced from complex $[Co(NH_3)_6]Cl_2$ in a solution?
11. List various types of isomerism possible for coordination compounds, giving an example of each type?
12. Discuss the nature of bonding in metal carbonyls?
13. What is spectrochemical series? Explain the difference b/w a weak and strong field ligand with example?
14. Draw figure to show the splitting of d orbitals in an octahedral crystal field?
15. What is meant by the stability of a coordination compound in solution? State the factors which govern the stability of complexes?
16. Explain the bonding in the coordination compounds in terms of Werner's postulate?
17. What is meant by unidentate, didentate and ambidentate ligands? 2 ex of each.
18. Give the application of coordination compound in field of biological science?
19. Give the application of coordination compound :
 - a. Extraction or Metallurgy
 - b. Photography
20. Explain the :
 - a. $[Cr(NH_3)_6]^{3+}$ is paramagnetic while $[Ni(CN)_4]^{-2}$ is diamagnetic.
 - b. $[Fe(CN)_6]^{-4}$ and $[Fe(H_2O)_6]^{+3}$ are different colours in dilute solution.
21. Write short notes on:
 - a. Coordination number
 - b. Ligand
 - c. Homoleptic and heteroleptic
22. Explain Crystal field theory in reference to : octahedral and tetrahedral complex.
23. Explain $[Ni(CN)_4]^{-2}$: under following heads:
 - a. Nomenclature
 - b. Hybridization
 - c. Magnetic moment

- 24 Write the formulae and name of complex formed during qualitative test:
- Ring test of Nitrate
 - Prussian Blue colour in test of Ferric
 - EDTA Ligand
- 25 Give the oxidation state, d orbital occupation and coordination number of the central metal ion in the following complex:
- $K_3[Co(C_2O_4)_3]$
 - $(NH_4)_2[CoF_4]$
 - $cis-[Cr(en)_2Cl_2]Cl$
- 26
- Explain on the basis of valence bond theory that $[Ni(CN)_4]^{-2}$ ion with square planar structure is diamagnetic and the $[Ni(Cl)_4]^{-2}$ ion with tetrahedral geometry is paramagnetic.
 - $[Ni(Cl)_4]^{-2}$ is paramagnetic while $[Ni(CO)_4]$ is diamagnetic though both are tetrahedral.
 - $[Fe(H_2O)_6]^{3+}$ is strongly paramagnetic whereas $[Fe(CN)_6]^{3-}$ is weakly paramagnetic.
 - $[Co(NH_3)_6]^{3+}$ is an inner orbital complex whereas $[Ni(NH_3)_6]^{2+}$ is an outer orbital complex.
 - Hexaquo manganese (II) ion contains five unpaired electrons, while the hexacyanoion contains only one unpaired electron.