Co-Ordination Compounds

PREVIOUS COMPETATIVE QUESTIONS

1. [Co $(NH_3)_5SO_4$] Br and [Co $(NH_3)_5$ Br] SO_4 are a pair of____ isomers

(E 2008)

1) Ionisation 2) Ligand 3) Coordination 4) Hydrate

2. In the coordination compound, $K_4\left[Ni(CN)_4\right]$ the oxidation state of nickel is

(2003-E)

1) +2 2) -1 3) 0 4) +1

3. One mole of the complex compound $Co(NH_3)_5Cl_3$ gives 3 moles of ions on dissolution in water. One mole of the same complex reacts with two moles of $AgNO_3$ solution to yield two moles of $AgCl(s)$. The structure of complex is

(2003-E)

1) $\left[Co(NH_3)_4Cl\right]Cl_2.NH_3$

2) $\left[Co(NH_3)_5Cl\right]Cl_2$

3) $\left[Co(NH_3)_3Cl_3\right]2.NH_3$

4) $\left[Co(NH_3)_4Cl_2\right]Cl.NH_3$

4. Ammonia forms the complex ion with copper ions in alkaline solutions but not in acidic solutions. What is the reason for it? (2003-E)

1) Copper hydroxide is an amphoteric substance

2) In acidic solutions hydration protects copper ions.

3) In acidic solutions protons coordinate with ammonia molecule forming ions and molecule are not available.

4) In alkaline solutions insoluble is precipitated which is soluble in excess of any

alkali.

5. The coordination number of a central metal atom in a complex is determined by **(2004-E)**

1) The number of ligands around a metal ion bonded by sigma bonds.

2) The number of ligands around a metal ion bonded by –bonds.

3) The number of ligands around a metal ion bounded by sigma and pi bonds both.

4) The number of only anionic ligands bonded to the metal ion.

6. Which one of the following complexes is an outer orbital complex? **(2004-E)**

1) $\left[Fe(CN)_6\right]^{4-}$ 2) $\left[Mn(CN)_6\right]^{4-}$

3) $\left[Co(NH_3)_6\right]^{3+}$ 4) $\left[Ni(NH_3)_6\right]^{2+}$

7. Which one of the following has largest number of isomers? **(2004-E)**

1) $\left[Ru(NH_3)_4Cl_2\right]^{+}$

2) $\left[Co(NH_3)_5Cl\right]^{2+}$

3) $\left[Ir(Ph_3)_2H(CO)\right]^{2+}$

4) $\left[Co(en)_2Cl_2\right]^{+}$

(R=alkyl group, en=ethylenediamine)

8. The correct order of magnetic moments (spin only values in Bohr's magneton) among is **(2004-E)**

1) $\left[MnCl_4\right]^{2-} > \left[CoCl_4\right]^{2-} > \left[Fe(CN)_6\right]^{4-}$

2) $\left[MnCl_4\right]^{2-} > \left[Fe(CN)_6\right]^{4-} > \left[CoCl_4\right]^{2-}$

3) $\left[Fe(CN)_6\right]^{4-} > \left[MnCl_4\right]^{2-} > \left[CoCl_4\right]^{2-}$

4) $\left[Fe(CN)_6\right]^{4-} > \left[CoCl_4\right]^{2-} > \left[MnCl_4\right]^{2-}$

(Atomic numbers: Mn = 25, Fe = 26, Co = 27)

9. Which of the following compounds shows optical isomerism? (2005-E)

1) $\left[Cr\left(C_2O_4\right)_3\right]^{3-}$ 2) $\left[Co\left(CN\right)_6\right]^{3-}$

3) $\left[Cu\left(NH_3\right)_4\right]^{2+}$ 4) $\left[ZnCl_4\right]^{2-}$

10. Which one of the following cyano complexes would exhibit the lowest value of paramagnetic behaviour? (2005-E)

1) $\left[Fe\left(CN\right)_6\right]^{3-}$ 2) $\left[Co\left(CN\right)_6\right]^{3-}$

3) $\left[Cr\left(CN\right)_6\right]^{3-}$ 4) $\left[Mn\left(CN\right)_6\right]^{3-}$

11. Nickel (Z = 28) combines with a uni negative monodentate ligand to form a paramagnetic complex. The number of unpaired electron(s) in the nickel and geometry of this complex ion are, respectively (2006-E)

1) Two, square planar 2) One, tetrahedral

3) Two, tetrahedral 4) One, square planar

12. In $Fe\left(CO\right)_5$, the Fe-C bond possesses (2006-E)

1) σ -Character only 2) π -character only

3) σ Both and π characters 4) Ionic character

13. Which one of the following has a square planar geometry? (2007-E)

1) $\left[CoCl_4\right]^{2-}$ 2) $\left[FeCl_4\right]^{2-}$

3) $\left[NiCl_4\right]^{2-}$ 4) $\left[PtCl_4\right]^{2-}$

14. In which of the following octahedral complexes of cobalt (atomic number 27) will the magnitude of Δ_o be the highest? (2008-E)

1) $\left[Co\left(NH_3\right)_6\right]^{3+}$ 2) $\left[Co\left(CN\right)_6\right]^{3-}$

3) $\left[Co\left(C_2O_4\right)_3\right]^{3-}$ 4) $\left[Co\left(H_2O\right)_6\right]^{3+}$

15. The coordination number and the oxidation state of the element E in the complex, where en is ethylenediamine, are respectively (2008-A)

1) 6 and 3 2) 6 and 2

3) 4 and 2 4) 4 and 3

16. Which of the following has an optical isomer (A-2009)

1) $[Co\ (en)\ (NH_3)_2]^{2+}$ 2) $[Co\ (en)\ (H_2O)_4]^{3+}$

3) $[Co\ (en)_2\ (NH_3)_2]^{3+}$ 4) $[Co(Cl)\ (NH_3)_5]^{+}$

17. Which of the following pairs represents linkage isomers? (A-2009)

1) $[Pd\ (P\ Ph_3)_2\ (NCS)_2]$ and $[Pd(P\ Ph_3)_2\ (SCN)_2]$

2) $[Co\ (NH_3)_5\ NO_3]\ SO_4$ and $[Co\ (NH_3)_5\ SO_4]\ NO_3$

3) $[PtCl_2(NH_3)_4]\ Br_2$ and $[PtBr_2(NH_3)_4]\ Cl_2$

4) $[Cu\ (NH_3)_4]\ [PtCl_4]$ and $[Pt\ (NH_3)_4]\ [CuCl_4]$

18. The d-electron configuration of $Cr^{2+}, Mn^{2+}, Fe^{2+}$ and Co^{2+} are d^4, d^5, d^6 and d^7 respectively. Which one of the following will exhibit minimum paramagnetic behavior? [CBSE AIPMT-2011]

1) $[Cr(H_2O)_6]^{2+}$ 2) $[Mn(H_2O)_6]^{2+}$ 3) $[Fe(H_2O)_6]^{2+}$ 4) $[Co(H_2O)_6]^{2+}$

19. The complex $[Pt(Py)(NH_3)BrCl]$ will have many geometrical isomers? [CBSE AIPMT-2011]

1) 2 2) 3 3) 4 4) 0

20. Number of isomeric forms (Constitutional and stereoisomer's) for $[Rh(en)_2(NO_2)(SCN)]^{+}$ [DUMET2011]

1) 3 2) 6 3) 9 4) 12

21. Crystal field stabilization energy for high spin d^4 octahedral complex is ? [CBSE AIPMT-2010]

1) $-0.6\Delta_0$ 2) $-1.8\Delta_0$ 3) $-1.6\Delta_0 + p$ 4) $-1.2\Delta_0$

Key

1) 1	2) 3	3) 2	4) 3	5) 1
6) 4	7) 4	8) 1	9) 1	10) 2
11) 3	12) 3	13) 4	14) 2	15) 1
16) 3	17)2	18)4	19)2	20) 4
21) 1				