

# Chapter 23

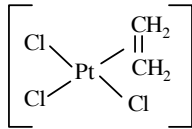
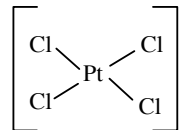
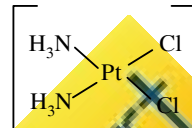
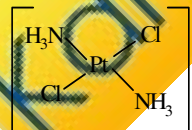
# Coordination Compounds

- An example of a sigma bonded organometallic compound is  
(a) Grignard's reagent (b) ferrocene  
(c) cobaltocene (d) ruthenocene.  
(NEET 2017)
- The correct order of the stoichiometries of AgCl formed when AgNO<sub>3</sub> in excess is treated with the complexes : CoCl<sub>3</sub>·6NH<sub>3</sub>, CoCl<sub>3</sub>·5NH<sub>3</sub>, CoCl<sub>3</sub>·4NH<sub>3</sub> respectively is  
(a) 3AgCl, 1AgCl, 2AgCl  
(b) 3AgCl, 2AgCl, 1AgCl  
(c) 2AgCl, 3AgCl, 2AgCl  
(d) 1AgCl, 3AgCl, 2AgCl (NEET 2017)
- Correct increasing order for the wavelengths of absorption in the visible region for the complexes of Co<sup>3+</sup> is  
(a) [Co(H<sub>2</sub>O)<sub>6</sub>]<sup>3+</sup>, [Co(en)<sub>3</sub>]<sup>3+</sup>, [Co(NH<sub>3</sub>)<sub>6</sub>]<sup>3+</sup>  
(b) [Co(H<sub>2</sub>O)<sub>6</sub>]<sup>3+</sup>, [Co(NH<sub>3</sub>)<sub>6</sub>]<sup>3+</sup>, [Co(en)<sub>3</sub>]<sup>3+</sup>  
(c) [Co(NH<sub>3</sub>)<sub>6</sub>]<sup>3+</sup>, [Co(en)<sub>3</sub>]<sup>3+</sup>, [Co(H<sub>2</sub>O)<sub>6</sub>]<sup>3+</sup>  
(d) [Co(en)<sub>3</sub>]<sup>3+</sup>, [Co(NH<sub>3</sub>)<sub>6</sub>]<sup>3+</sup>, [Co(H<sub>2</sub>O)<sub>6</sub>]<sup>3+</sup>  
(NEET 2017)
- Pick out the correct statement with respect to [Mn(CN)<sub>6</sub>]<sup>3-</sup>  
(a) It is sp<sup>3</sup>d<sup>2</sup> hybridised and tetrahedral.  
(b) It is d<sup>2</sup>sp<sup>3</sup> hybridised and octahedral.  
(c) It is dsp<sup>2</sup> hybridised and square planar.  
(d) It is sp<sup>3</sup>d<sup>2</sup> hybridised and octahedral.  
(NEET 2017)
- The correct increasing order of *trans*-effect of the following species is  
(a) NH<sub>3</sub> > CN<sup>-</sup> > Br<sup>-</sup> > C<sub>6</sub>H<sub>5</sub><sup>-</sup>  
(b) CN<sup>-</sup> > C<sub>6</sub>H<sub>5</sub><sup>-</sup> > Br<sup>-</sup> > NH<sub>3</sub>  
(c) Br<sup>-</sup> > CN<sup>-</sup> > NH<sub>3</sub> > C<sub>6</sub>H<sub>5</sub><sup>-</sup>  
(d) CN<sup>-</sup> > Br<sup>-</sup> > C<sub>6</sub>H<sub>5</sub><sup>-</sup> > NH<sub>3</sub>  
(NEET-II 2016)
- Jahn-Teller effect is not observed in high spin complexes of  
(a) d<sup>7</sup> (b) d<sup>8</sup> (c) d<sup>4</sup> (d) d<sup>9</sup>  
(NEET-II 2016)
- Which of the following has longest C—O bond length? (Free C—O bond length in CO is 1.128 Å.)  
(a) [Fe(CO)<sub>4</sub>]<sup>2-</sup> (b) [Mn(CO)<sub>6</sub>]<sup>+</sup>  
(c) Ni(CO)<sub>4</sub> (d) [Co(CO)<sub>4</sub>]<sup>-</sup>  
(NEET-I 2016)
- The hybridization involved in complex [Ni(CN)<sub>4</sub>]<sup>2-</sup> is (At. No. Ni = 28)  
(a) sp<sup>3</sup> (b) d<sup>2</sup>sp<sup>2</sup> (c) d<sup>2</sup>sp<sup>3</sup>  
(d) dsp<sup>2</sup> (2015)
- The name of complex ion, [Fe(CN)<sub>6</sub>]<sup>3-</sup> is  
(a) hexacyanoferrate (III) ion  
(b) tricyanoferrate (III) ion  
(c) hexacyanidoferrate (III) ion  
(d) hexacyanoiron (III) ion. (2015)
- The sum of coordination number and oxidation number of the metal *M* in the complex [M(en)<sub>2</sub>(C<sub>2</sub>O<sub>4</sub>)]Cl (where *en* is ethylenediamine) is  
(a) 6 (b) 7 (c) 8 (d) 9  
(2015)
- Number of possible isomers for the complex [Co(en)<sub>2</sub>Cl<sub>2</sub>]+Cl will be (*en* = ethylenediamine)  
(a) 1 (b) 3 (c) 4 (d) 2  
(2015)
- Cobalt (III) chloride forms several octahedral complexes with ammonia. Which of the following will not give test for chloride ions with silver nitrate at 25°C?  
(a) CoCl<sub>3</sub>·5NH<sub>3</sub> (b) CoCl<sub>3</sub>·6NH<sub>3</sub>  
(c) CoCl<sub>3</sub>·3NH<sub>3</sub> (d) CoCl<sub>3</sub>·4NH<sub>3</sub>  
(2015, Cancelled)
- Which of these statements about [Co(CN)<sub>6</sub>]<sup>3-</sup> is true?  
(a) [Co(CN)<sub>6</sub>]<sup>3-</sup> has four unpaired electrons and will be in a high-spin configuration.  
(b) [Co(CN)<sub>6</sub>]<sup>3-</sup> has no unpaired electrons and will be in a high-spin configuration.

- (c)  $[\text{Co}(\text{CN})_6]^{3-}$  has no unpaired electrons and will be in a low-spin configuration.  
 (d)  $[\text{Co}(\text{CN})_6]^{3-}$  has four unpaired electrons and will be in a low-spin configuration.  
 (2015, Cancelled)
14. Among the following complexes the one which shows zero crystal field stabilization energy (CFSE) is  
 (a)  $[\text{Mn}(\text{H}_2\text{O})_6]^{3+}$  (b)  $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$   
 (c)  $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$  (d)  $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$   
 (2014)
15. Which of the following complexes is used to be as an anticancer agent?  
 (a) *mer*- $[\text{Co}(\text{NH}_3)_3\text{Cl}_3]$  (b) *cis*- $[\text{PtCl}_2(\text{NH}_3)_2]$   
 (c) *cis*- $[\text{K}_2[\text{PtCl}_2\text{Br}_2]]$  (d)  $\text{Na}_2\text{CoCl}_4$   
 (2014)
16. A magnetic moment at 1.73 BM will be shown by one among of the following  
 (a)  $\text{TiCl}_4$  (b)  $[\text{CoCl}_6]^{4-}$   
 (c)  $[\text{Cu}(\text{NH}_3)_4]^{2+}$  (d)  $[\text{Ni}(\text{CN})_4]^{2-}$   
 (NEET 2013)
17. An excess of  $\text{AgNO}_3$  is added to 100 mL of a 0.01 M solution of dichlorotetraaqua-chromium (III) chloride. The number of moles of  $\text{AgCl}$  precipitated would be  
 (a) 0.003 (b) 0.01 (c) 0.001 (d) 0.002  
 (NEET 2013)
18. Crystal field splitting energy for high spin  $d^4$  octahedral complex is  
 (a)  $-1.2 \Delta_o$  (b)  $-0.6 \Delta_o$   
 (c)  $-0.8 \Delta_o$  (d)  $-1.6 \Delta_o$   
 (Karnataka NEET 2013)
19. In a particular isomer of  $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^{0}$ , the  $\text{Cl}-\text{Co}-\text{Cl}$  angle is  $90^\circ$ , the isomer is known as  
 (a) optical isomer (b) *cis*-isomer  
 (c) position isomer (d) linkage isomer.  
 (Karnataka NEET 2013)
20. The anion of acetylacetonate (acac) forms  $\text{Co}(\text{acac})_3$  chelate with  $\text{Co}^{3+}$ . The rings of the chelate are  
 (a) five membered (b) four membered  
 (c) six membered (d) three membered.  
 (Karnataka NEET 2013)
21. The correct IUPAC name for  $[\text{CrF}_2(\text{en})_2] \text{Cl}$  is  
 (a) chloro difluorido ethylene diaminechromium (III) chloride  
 (b) difluoridobis (ethylene diamine) chromium (III) chloride  
 (c) difluorobis-(ethylene diamine) chromium (III) chloride  
 (d) chloro difluoridobis (ethylene diamine) chromium (III) (Karnataka NEET 2013)
22. Which among the following is a paramagnetic complex?  
 (a)  $[\text{Co}(\text{NH}_3)_6]^{3+}$  (b)  $[\text{Pt}(\text{en})\text{Cl}_2]$   
 (c)  $[\text{CoBr}_4]^{2-}$  (d)  $\text{Mo}(\text{CO})_6$   
 (At. No. Mo = 42, Pt = 78)  
 (Karnataka NEET 2013)
23. Which is diamagnetic?  
 (a)  $[\text{Co}(\text{F})_6]^{3+}$  (b)  $[\text{Ni}(\text{CN})_4]^{2-}$   
 (c)  $[\text{NiCl}_4]^{2-}$  (d)  $[\text{Fe}(\text{CN})_6]^{3-}$   
 (Karnataka NEET 2013)
24. Which one of the following is an outer orbital complex and exhibits paramagnetic behaviour?  
 (a)  $[\text{Ni}(\text{NH}_3)_6]^{2+}$  (b)  $[\text{Zn}(\text{NH}_3)_6]^{2+}$   
 (c)  $[\text{Cr}(\text{NH}_3)_6]^{3+}$  (d)  $[\text{Co}(\text{NH}_3)_6]^{3+}$   
 (2012)
25. Red precipitate is obtained when ethanol solution of dimethylglyoxime is added to ammoniacal  $\text{Ni}(\text{II})$ . Which of the following statements is not true?  
 (a) Red complex has a square planar geometry.  
 (b) Complex has symmetrical H-bonding.  
 (c) Red complex has a tetrahedral geometry.  
 (d) Dimethylglyoxime functions as bidentate ligand.
- $$\left[ \begin{array}{c} \text{dimethylglyoxime} = \begin{array}{c} \text{H}_3\text{C}-\text{C}=\text{N}-\text{OH} \\ | \\ \text{H}_3\text{C}-\text{C}=\text{N}-\text{OH} \end{array} \end{array} \right]$$
- (Mains 2012)
26. Low spin complex of  $d^6$ -cation in an octahedral field will have the following energy  
 (a)  $\frac{-12}{5}\Delta_o + P$  (b)  $\frac{-12}{5}\Delta_o + 3P$   
 (c)  $\frac{-2}{5}\Delta_o + 2P$  (d)  $\frac{-2}{5}\Delta_o + P$   
 ( $\Delta_o$  = crystal field splitting energy in an octahedral field,  $P$  = Electron pairing energy)  
 (2012)

Coordination Compounds

27. Of the following complex ions, which is diamagnetic in nature?  
 (a)  $[\text{NiCl}_4]^{2-}$   
 (b)  $[\text{Ni}(\text{CN})_4]^{2-}$   
 (c)  $[\text{CuCl}_4]^{2-}$   
 (d)  $[\text{CoF}_6]^{3-}$  (2011)
28. The complexes  $[\text{Co}(\text{NH}_3)_6][\text{Cr}(\text{CN})_6]$  and  $[\text{Cr}(\text{NH}_3)_6][\text{Co}(\text{CN})_6]$  are the examples of which type of isomerism?  
 (a) Linkage isomerism  
 (b) Ionization isomerism  
 (c) Coordination isomerism  
 (d) Geometrical isomerism (2011)
29. The complex,  $[\text{Pt}(\text{Py})(\text{NH}_3)\text{BrCl}]$  will have how many geometrical isomers?  
 (a) 3 (b) 4 (c) 0 (d) 2 (2011)
30. The  $d$ -electron configurations of  $\text{Cr}^{2+}$ ,  $\text{Mn}^{2+}$ ,  $\text{Fe}^{2+}$  and  $\text{Co}^{2+}$  are  $d^4$ ,  $d^5$ ,  $d^6$  and  $d^7$  respectively. Which one of the following will exhibit minimum paramagnetic behaviour?  
 (a)  $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$  (b)  $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$   
 (c)  $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$  (d)  $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$   
 (At. nos. Cr = 24, Mn = 25, Fe = 26, Co = 27) (2011)
31. Which of the following carbonyls will have the strongest C – O bond?  
 (a)  $\text{Mn}(\text{CO})_6^+$  (b)  $\text{Cr}(\text{CO})_6$   
 (c)  $\text{V}(\text{CO})_6^-$  (d)  $\text{Fe}(\text{CO})_5$  (2011)
32. Which of the following complex compounds will exhibit highest paramagnetic behaviour?  
 (a)  $[\text{Ti}(\text{NH}_3)_6]^{3+}$  (b)  $[\text{Cr}(\text{NH}_3)_6]^{3+}$   
 (c)  $[\text{Co}(\text{NH}_3)_6]^{3+}$  (d)  $[\text{Zn}(\text{NH}_3)_6]^{2+}$   
 (At. No. Ti = 22, Cr = 24, Co = 27, Zn = 30) (2011)
33. Which of the following complex ions is not expected to absorb visible light?  
 (a)  $[\text{Ni}(\text{CN})_4]^{2-}$  (b)  $[\text{Cr}(\text{NH}_3)_6]^{3+}$   
 (c)  $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$  (d)  $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$  (2010)
34. Crystal field stabilization energy for high spin  $d^4$  octahedral complex is  
 (a)  $-1.8 \Delta_o$  (b)  $-1.6 \Delta_o + P$   
 (c)  $-1.2 \Delta_o$  (d)  $-0.6 \Delta_o$  (2010)
35. The existence of two different coloured complexes with the composition of  $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^+$  is due to  
 (a) linkage isomerism  
 (b) geometrical isomerism  
 (c) coordination isomerism  
 (d) ionization isomerism. (2010)
36. Which one of the following complexes is not expected to exhibit isomerism?  
 (a)  $[\text{Ni}(\text{NH}_3)_4(\text{H}_2\text{O})_2]^{2+}$  (b)  $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$   
 (c)  $[\text{Ni}(\text{NH}_3)_2\text{Cl}_2]$  (d)  $[\text{Ni}(\text{en})_3]^{2+}$  (2010)
37. Out of  $\text{TiF}_6^{2-}$ ,  $\text{CoF}_6^{3-}$ ,  $\text{Cu}_2\text{Cl}_2$  and  $\text{NiCl}_4^{2-}$  ( $Z$  of Ti = 22, Co = 27, Cu = 29, Ni = 28) the colourless species are  
 (a)  $\text{Cu}_2\text{Cl}_2$  and  $\text{NiCl}_4^{2-}$   
 (b)  $\text{TiF}_6^{2-}$  and  $\text{Cu}_2\text{Cl}_2$   
 (c)  $\text{CoF}_6^{3-}$  and  $\text{NiCl}_4^{2-}$   
 (d)  $\text{TiF}_6^{2-}$  and  $\text{CoF}_6^{3-}$ . (2009)
38. Which of the following does not show optical isomerism?  
 (a)  $[\text{Co}(\text{NH}_3)_3\text{Cl}_3]^0$   
 (b)  $[\text{Co}(\text{en})\text{Cl}_2(\text{NH}_3)_2]^+$   
 (c)  $[\text{Co}(\text{en})_3]^{3+}$   
 (d)  $[\text{Co}(\text{en})_2\text{Cl}_2]^+$   
 (en = ethylenediamine) (2009)
39. Which of the following complex ions is expected to absorb visible light?  
 (a)  $[\text{Ti}(\text{en})_2(\text{NH}_3)_2]^{4+}$  (b)  $[\text{Cr}(\text{NH}_3)_6]^{3+}$   
 (c)  $[\text{Zn}(\text{NH}_3)_6]^{2+}$   
 (d)  $[\text{Sc}(\text{H}_2\text{O})_3(\text{NH}_3)_3]^{3+}$   
 [At. nos. Zn = 30, Sc = 21, Ti = 22, Cr = 24] (2009)
40. Which of the following complexes exhibits the highest paramagnetic behaviour?  
 (a)  $[\text{Co}(\text{ox})_2(\text{OH})_2]^-$   
 (b)  $[\text{Ti}(\text{NH}_3)_6]^{3+}$   
 (c)  $[\text{V}(\text{gly})_2(\text{OH})_2(\text{NH}_3)_2]^+$   
 (d)  $[\text{Fe}(\text{en})(\text{bpy})(\text{NH}_3)_2]^{2+}$   
 where gly = glycine, en = ethylenediamine and bpy = bipyridyl moieties. (At. nos. Ti = 22, V = 23, Fe = 26, Co = 27) (2008)
41. In which of the following coordination entities will be maximum?  
 (a)  $[\text{Co}(\text{CN})_6]^{3-}$  (b)  $[\text{Co}(\text{C}_2\text{O}_4)_3]^{3-}$   
 (c)  $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$  (d)  $[\text{Co}(\text{NH}_3)_6]^{3+}$   
 (At. No. Co = 27) (2008)

42. Which of the following will give a pair of enantiomorphs?  
 (a)  $[\text{Cr}(\text{NH}_3)_6][\text{Co}(\text{CN})_6]$   
 (b)  $[\text{Co}(\text{en})_2\text{Cl}_2]\text{Cl}$   
 (c)  $[\text{Pt}(\text{NH}_3)_4][\text{PtCl}_6]$   
 (d)  $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]\text{NO}_2$  (2007)  
 ( $\text{en} = \text{NH}_2\text{CH}_2\text{CH}_2\text{NH}_2$ )
43. The  $d$  electron configurations of  $\text{Cr}^{2+}$ ,  $\text{Mn}^{2+}$ ,  $\text{Fe}^{2+}$  and  $\text{Ni}^{2+}$  are  $3d^4$ ,  $3d^5$ ,  $3d^6$  and  $3d^8$  respectively. Which one of the following aqua complexes will exhibit the minimum paramagnetic behaviour?  
 (a)  $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$  (b)  $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$   
 (c)  $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$  (d)  $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$ .  
 (At. No. Cr = 24, Mn = 25, Fe = 26, Ni = 28) (2007)
44.  $[\text{Cr}(\text{H}_2\text{O})_6]\text{Cl}_3$  (At. no. of Cr = 24) has a magnetic moment of 3.83 B.M. The correct distribution of  $3d$  electrons in the chromium of the complex is  
 (a)  $3d_x^1, 3d_y^1, 3d_z^1$   
 (b)  $3d_{(x^2-y^2)}^1, 3d_z^1, 3d_x^1$   
 (c)  $3d_x^1, 3d_{(x^2-y^2)}^1, 3d_y^1$   
 (d)  $3d_x^1, 3d_y^1, 3d_z^1$  (2006)
45.  $[\text{Co}(\text{NH}_3)_4(\text{NO}_2)_2]\text{Cl}$  exhibits  
 (a) linkage isomerism, geometrical isomerism and optical isomerism  
 (b) linkage isomerism, ionization isomerism and optical isomerism  
 (c) linkage isomerism, ionization isomerism and geometrical isomerism  
 (d) ionization isomerism, geometrical isomerism and optical isomerism. (2006)
46. Which one of the following is an inner orbital complex as well as diamagnetic in behaviour?  
 (a)  $[\text{Zn}(\text{NH}_3)_6]^{2+}$  (b)  $[\text{Cr}(\text{NH}_3)_6]^{3+}$   
 (c)  $[\text{Co}(\text{NH}_3)_6]^{3+}$  (d)  $[\text{Ni}(\text{NH}_3)_6]^{2+}$   
 (Atomic number : Zn = 30, Cr = 24, Co = 27, Ni = 28) (2005)
47. Which one of the following is expected to exhibit optical isomerism?  
 ( $\text{en} = \text{ethylenediamine}$ )  
 (a)  $\text{cis}-[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$   
 (b)  $\text{trans}-[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$   
 (c)  $\text{cis}-[\text{Co}(\text{en})_2\text{Cl}_2]^+$   
 (d)  $\text{trans}-[\text{Co}(\text{en})_2\text{Cl}_2]^+$  (2005)
48. Which of the following is considered to be an anticancer species?  
 (a)   
 (b)   
 (c)   
 (d)  (2004)
49. Which of the following coordination compounds would exhibit optical isomerism?  
 (a) Pentaamminenitrocobalt(III) iodide  
 (b) Diamminedichloroplatinum(II)  
 (c)  $\text{trans}$ -Dicyanobis(ethylenediamine)chromium (III) chloride  
 (d) tris-(Ethylenediamine)cobalt(III) bromide. (2004)
50. Among  $[\text{Ni}(\text{CO})_4]$ ,  $[\text{Ni}(\text{CN})_4]^{2-}$ ,  $[\text{NiCl}_4]^{2-}$  species, the hybridisation states at the Ni atom are, respectively  
 (a)  $sp^3, dsp^2, dsp^2$  (b)  $sp^3, dsp^2, sp^3$   
 (c)  $sp^3, sp^3, dsp^2$  (d)  $dsp^2, sp^3, sp^3$ .  
 [Atomic number of Ni = 28] (2004)
51.  $\text{CN}^-$  is a strong field ligand. This is due to the fact that  
 (a) it carries negative charge  
 (b) it is a pseudohalide  
 (c) it can accept electrons from metal species  
 (d) it forms high spin complexes with metal species. (2004)
52. Considering  $\text{H}_2\text{O}$  as a weak field ligand, the number of unpaired electrons in  $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$  will be (atomic number of Mn = 25)  
 (a) three (b) five  
 (c) two (d) four. (2004)

Coordination Compounds

53. Which of the following does not have a metal - carbon bond?  
 (a)  $\text{Al}(\text{OC}_2\text{H}_5)_3$  (b)  $\text{C}_2\text{H}_5\text{MgBr}$   
 (c)  $\text{K}[\text{Pt}(\text{C}_2\text{H}_4)\text{Cl}_3]$  (d)  $\text{Ni}(\text{CO})_4$  (2004)
54. In an octahedral structure, the pair of  $d$  orbitals involved in  $d^2sp^3$  hybridisation is  
 (a)  $d_{x^2-y^2}$ ,  $d_{z^2}$  (b)  $d_{xz}$ ,  $d_{x^2-y^2}$   
 (c)  $d_{z^2}$ ,  $d_{xz}$  (d)  $d_{xy}$ ,  $d_{yz}$ . (2004)
55. The number of unpaired electrons in the complex ion  $[\text{CoF}_6]^{3-}$  is  
 (a) 2 (b) 3 (c) 4 (d) zero  
 (Atomic no. : Co = 27) (2003)
56. Among the following which is not the p-bonded organometallic compound?  
 (a)  $\text{K}[\text{PtCl}_3(\eta^2-\text{C}_2\text{H}_4)]$   
 (b)  $\text{Fe}(\eta^5-\text{C}_5\text{H}_5)_2$   
 (c)  $\text{Cr}(\eta^6-\text{C}_6\text{H}_6)_2$  (d)  $(\text{CH}_3)_4\text{Sn}$  (2003)
57. Atomic number of Cr and Fe are respectively 24 and 26, which of the following is paramagnetic with the spin of electron?  
 (a)  $[\text{Cr}(\text{CO})_6]$  (b)  $[\text{Fe}(\text{CO})_5]$   
 (c)  $[\text{Fe}(\text{CN})_6]^{4-}$  (d)  $[\text{Cr}(\text{NH}_3)_6]^{3+}$  (2002)
58. The hypothetical complex chloro diaquatrimmine cobalt(III) chloride can be represented as  
 (a)  $[\text{CoCl}(\text{NH}_3)_3(\text{H}_2\text{O})_2]\text{Cl}_2$   
 (b)  $[\text{Co}(\text{NH}_3)_3(\text{H}_2\text{O})\text{Cl}_3]$   
 (c)  $[\text{Co}(\text{NH}_2)_3(\text{H}_2\text{O})_2\text{Cl}]$   
 (d)  $[\text{Co}(\text{NH}_3)_3(\text{H}_2\text{O})_3]\text{Cl}_3$  (2002)
59. In the silver plating of copper,  $\text{K}[\text{Ag}(\text{CN})_2]$  is used instead of  $\text{AgNO}_3$ . The reason is  
 (a) a thin layer of Ag is formed on Cu  
 (b) more voltage is required  
 (c)  $\text{Ag}^+$  ions are completely removed from solution  
 (d) less availability of  $\text{Ag}^+$  ions, as Cu can not displace Ag from  $[\text{Ag}(\text{CN})_2]^-$  ion. (2002)
60.  $\text{CuSO}_4$  when reacts with KCN forms CuCN, which is insoluble in water. It is soluble in excess of KCN, due to formation of the following complex  
 (a)  $\text{K}_2[\text{Cu}(\text{CN})_4]$  (b)  $\text{K}_3[\text{Cu}(\text{CN})_4]$   
 (c)  $\text{CuCN}_2$  (d)  $\text{Cu}[\text{KCu}(\text{CN})_4]$ . (2002)
61. Which of the following will give maximum number of isomers?  
 (a)  $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]$  (b)  $[\text{Ni}(\text{en})(\text{NH}_3)_4]^{2+}$   
 (c)  $[\text{Ni}(\text{C}_2\text{O}_4)(\text{en})_2]^{2-}$   
 (d)  $[\text{Cr}(\text{SCN})_2(\text{NH}_3)_4]^+$  (2001)
62. Coordination number of Ni in  $[\text{Ni}(\text{C}_2\text{O}_4)_3]^{4-}$  is  
 (a) 3 (b) 6 (c) 4 (d) 2 (2001)
63. Which of the following organometallic compounds is  $\sigma$  and  $\pi$  bonded?  
 (a)  $[\text{Fe}(\eta^5-\text{C}_5\text{H}_5)_2]$   
 (b)  $\text{K}[\text{PtCl}_3(\eta^2-\text{C}_2\text{H}_4)]$   
 (c)  $[\text{Co}(\text{CO})_5\text{NH}_3]^{2+}$   
 (d)  $\text{Fe}(\text{CH}_3)_3$  (2001)
64. Which statement is incorrect?  
 (a)  $\text{Ni}(\text{CO})_4$  - tetrahedral, paramagnetic  
 (b)  $\text{Ni}(\text{CN})_4^{2-}$  - square planar, diamagnetic  
 (c)  $\text{Ni}(\text{CO})_4$  - tetrahedral, diamagnetic  
 (d)  $[\text{Ni}(\text{Cl})_4]^{2-}$  tetrahedral, paramagnetic. (2001)
65. Which of the following will exhibit maximum ionic conductivity?  
 (a)  $\text{K}_4[\text{Fe}(\text{CN})_6]$  (b)  $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$   
 (c)  $[\text{Cu}(\text{NH}_3)_4]\text{Cl}_2$  (d)  $[\text{Ni}(\text{CO})_4]$  (2001)
66. Shape of  $\text{Fe}(\text{CO})_5$  is  
 (a) octahedral (b) square planar  
 (c) trigonal bipyramidal  
 (d) square pyramidal. (2000)
67. Which complex compound will give four isomers?  
 (a)  $[\text{Fe}(\text{en})_3]\text{Cl}_3$  (b)  $[\text{Co}(\text{en})_2\text{Cl}_2]\text{Cl}$   
 (c)  $[\text{Fe}(\text{PPh}_3)_3\text{NH}_3\text{ClBr}]\text{Cl}$   
 (d)  $[\text{Co}(\text{PPh}_3)_3\text{Cl}]\text{Cl}_3$  (2000)
68. The total number of possible isomers for the complex compound  $[\text{Cu}^{\text{II}}(\text{NH}_3)_4][\text{Pt}^{\text{II}}\text{Cl}_4]$  are  
 (a) 5 (b) 6 (c) 3 (d) 4 (1998)
69. A coordination complex compound of cobalt has the molecular formula containing five ammonia molecules, one nitro group and two chlorine atoms for one cobalt atom. One mole of this compound produces three mole ions in an aqueous solution. On reacting this solution with excess of  $\text{AgNO}_3$  solution, we get two moles of  $\text{AgCl}$  precipitate. The ionic formula for this complex would be  
 (a)  $[\text{Co}(\text{NH}_3)_5(\text{NO}_2)]\text{Cl}_2$   
 (b)  $[\text{Co}(\text{NH}_3)_5\text{Cl}][\text{Cl}(\text{NO}_2)]$   
 (c)  $[\text{Co}(\text{NH}_3)_4(\text{NO}_2)\text{Cl}](\text{NH}_3)\text{Cl}$   
 (d)  $(\text{Co}(\text{NH}_3)_5)[(\text{NO}_2)_2\text{Cl}_2]$  (1998)



70. IUPAC name of  $[\text{Pt}(\text{NH}_3)_3(\text{Br})(\text{NO}_2)\text{Cl}]\text{Cl}$  is  
 (a) Triamminebromochloronitroplatinum(IV) chloride  
 (b) Triamminebromonitrochloroplatinum(IV) chloride  
 (c) Triamminechlorobromonitroplatinum(IV) chloride  
 (d) Triamminenitrochlorobromoplatinum(IV) chloride (1998)
71. The formula of dichlorobis(urea)copper(II) is  
 (a)  $[\text{Cu} \{ \text{O} = \text{C}(\text{NH}_2)_2 \} \text{Cl}]\text{Cl}$   
 (b)  $[\text{CuCl}_2] \{ \text{O} = \text{C}(\text{NH}_2)_2 \}$   
 (c)  $[\text{Cu} \{ \text{O} = \text{C}(\text{NH}_2)_2 \} \text{Cl}_2]$   
 (d)  $[\text{CuCl}_2 \{ \text{O} = \text{C}(\text{NH}_2)_2 \}_2]$ . (1997)
72. The number of geometrical isomers of the complex  $[\text{Co}(\text{NO}_2)_3(\text{NH}_3)_3]$  is  
 (a) 4 (b) 0 (c) 2 (d) 3 (1997)
73. The structure and hybridisation of  $\text{Si}(\text{CH}_3)_4$  is  
 (a) octahedral,  $sp^3d$  (b) tetrahedral,  $sp^3$  (c) bent,  $sp$  (d) trigonal,  $sp^2$ . (1996)
74. The coordination number and oxidation state of Cr in  $\text{K}_3\text{Cr}(\text{C}_2\text{O}_4)_3$  are respectively  
 (a) 3 and +3 (b) 3 and 0  
 (c) 6 and +3 (d) 4 and +2 (1995)
75. The number of geometrical isomers for  $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$  is  
 (a) 3 (b) 4 (c) 1 (d) 2 (1995)
76. In metal carbonyl having general formula  $M(\text{CO})_x$  where  $M = \text{metal}$ ,  $x = 4$  and the metal is bonded to  
 (a) carbon and oxygen (b)  $\text{C} \equiv \text{O}$   
 (c) oxygen (d) carbon. (1995)
77. Which of the following ligands is expected to be bidentate?  
 (a)  $\text{CH}_3\text{NH}_2$  (b)  $\text{CH}_3\text{C} \equiv \text{N}$   
 (c) Br (d)  $\text{C}_2\text{O}_4^{2-}$  (1994)

---

**Answer Key**


---

1. (a) 2. (b) 3. (d) 4. (b) 5. (b) 6. (b) 7. (a) 8. (d) 9. (c) 10. (d)  
 11. (b) 12. (c) 13. (c) 14. (b) 15. (b) 16. (c) 17. (c) 18. (b) 19. (b) 20. (c)  
 21. (b) 22. (c) 23. (b) 24. (a) 25. (c) 26. (b) 27. (b) 28. (c) 29. (a) 30. (c)  
 31. (a) 32. (b) 33. (a) 34. (d) 35. (d) 36. (c) 37. (b) 38. (a) 39. (b) 40. (d)  
 41. (a) 42. (b) 43. (b) 44. (d) 45. (c) 46. (c) 47. (c) 48. (c) 49. (d) 50. (b)  
 51. (b) 52. (b) 53. (a) 54. (a) 55. (c) 56. (d) 57. (d) 58. (a) 59. (d) 60. (b)  
 61. (d) 62. (b) 63. (c) 64. (a) 65. (a) 66. (c) 67. (b) 68. (d) 69. (a) 70. (a)  
 71. (b) 72. (c) 73. (b) 74. (c) 75. (d) 76. (d) 77. (d)
-