Co-Ordination Chemistry and organometallics Assignment

1. The proper name for $K_2[PtCl]_6$ is

(a) Potassium platinum hexachloride
(b) Potassium hexachloro platinum IV
(c) Potassium hexachloro platinate IV
(d) Potassium hexachloro platinum

2. Pick the correct name of $[Co(NH_3)_5Cl]Cl_2$

(a) Chloropentammine cobalt (III)
(b) Pentammine cobalt (III) chloride
(c) Chloropentammine cobalt (III) chloride
(d) Chloropentammine cobalt (II) chloride

3. The I.U.P.A.C. name of $K_3[Ir(C_2O_4)_3]$ is

(a) Potassium tri oxalato iridium (III)
(b) Potassium tri oxalato iridate (III)
(c) Potassium tris (oxalato) iridium (III)
(d) Potassium tris (oxalato) iridate (III)

4. IUPAC name of $[Co(ONO)(NH_3)_5Cl_2]$ is

(a) Pentaammine nitro cobalt (III) chloride
(b) Pentaammine nitrito cobalt (III) chloride
(c) Pentaammine nitroso cobalt (III) chloride
(d) Pentaammine oxo-nitro cobalt (III) chloride

5. The complex chlorocompound diaquatriammine cobalt (III) chloride is represented as

(a) $[Co(NH_3)_3(H_2O)_3]Cl_2$
(b) $[Co(NH_2)_3(H_2O)_2]Cl_2$
(c) $[CoCl(NH_3)_3(H_2O)_2]Cl_3$
(d) $[CoCl(NH_3)_3(H_2O)_2]Cl_2$

6. According to IUPAC nomenclature sodium nitroprussied is named is

(a) Sodium pentacyanonitrosyl ferrate (III)
(b) Sodium nitroferricyanide
(c) Sodium nitroferrocyanide
(d) Sodium pentacyanonitrosyl ferrate (II)

7. The correct name of $[Pt(NH_3)_4Cl_2][PtCl_4]$ is

(a) Tetra ammine dichloro platinum (iv) tetra chloro platinate (ii)
(b) Dichloro tetra ammine platinium (iv) tetrachloro platinate (ii)
(c) Tetrachloro platinum (ii) tetra ammine platinate (iv)
(d) Tetra chloro platinum (ii) dichloro tetra ammine platinate (iv)

8. Which of the following compounds exhibits linkage isomerism

(a) $[Co(en)_3]Cl_3$
(b) $[Co(NH_3)_6][Cr(CN)_6]$
(c) $[Co(en)_2NO_2Cl]Br$
(d) $[Co(NH_3)_5Cl]Br_2$

9. The complexes $[Co(NH_3)_6][Cr(C_2O_4)_3]$ and $[Cr(NH_3)_6][Co(C_2O_4)_3]$

(a) Linkage isomerism
(b) Geometrical isomerism
(c) Coordination isomerism
(d) Ionisation isomerism

10. Which one of the following will not show geometrical isomerism

(a) $[Cr(NH_3)_4Cl_2]Cl$
(b) $[Co(en)_2Cl_2]Cl$
(c) $[Co(NH_3)_5NO_2]Cl_2$
(d) $[Pt(NH_3)_2Cl_2]$

11. The type of isomerism present in nitropentamine chromium (III) chloride is

(a) Optical
(b) Linkage
(c) Ionization
(d) Polymerisation

12. Coordination isomerism is caused by the interchange of ligands between the

(a) *Cis* and *Trans* structure
(b) Complex cation and complex anion
(c) Inner sphere and outer sphere
(d) Low oxidation and higher oxidation states

13. Which one of the following octahedral complexes will not show geometric isomerism (*A* and *B* are monodentate ligands)

(a) $[MA_5B]$
(b) $[MA_2B_4]$
(c) $[MA_3B_3]$
(d) $[MA_4B_2]$

14. The possible number of optical isomers in $[Co(en)_2Cl_2]^+$ are

(a) 2
(b) 3
(c) 4
(d) 6

15. What is true for $[Fe(CN)_6]^{3-}$ and $[FeF_6]^{3-}$

(a) Both are paramagnetic
(b) Only $[Fe(CN)_6]^{3-}$ is paramagnetic
(c) Only $[FeF_6]^{3-}$ is paramagnetic (d) Both are diamagnetic

16. What type of hybridization is involved in $[Fe(CN)_6]^{3-}$

(a) d^2sp^3
(b) dsp^2
(c) sp^3d^2
(d) dsp^3

17. Which one is an example of octahedral complex

(a) FeF_6^{3-}
(b) $Zn(NH_3)_4^{2+}$
(c) $Ni(CN)_4^{2-}$
(d) $Cu(NH_3)_4^{2+}$

18. What is the shape of $Fe(CO)_5$

(a) Linear (b) Tetrahedral (c) Square planar (d) Trigonal bipyramidal

19. In the complex $[SbF_5]^{2-}, sp^3d$ hydridisation is present. Geometry of the complex is

(a) Square phyramidal (b) Square bipyramidal (c) Tetrahedral (d) Square

20. Which one has the highest paramagnetism

(a) $Ni(CO)_4$ (b) $[Ni(NH_3)_4]Cl_2$ (c) $[Ni(NH_3)_6]Cl_2$ (d) $[Cu(NH_3)_4]Cl_2$

21. The colour of $CoCl_3.5NH_3.H_2O$ is

(a) Orange yellow (b) Orange (c) Green (d) Violet
(e) Pink

22. $[Ti(H_2O)_6]^{+3}$ is paramagnetic in nature due to

(a) One unpaired e^- (b) Two unpaired e^- (c) Three unpaired e^- (d) No unpaired e^-

23. The most stable complex among the following is

(a) $K_3[Al(C_2O_4)_3]$ (b) $[Pt(en)_2]Cl_2$ (c) $Ag(NH_3)_2Cl$ (d) $K_2(Ni(EDTA)]$

24. The most stable ion is

(a) $[Fe(OH)_3]^{3-}$ (b) $[Fe(Cl)_6]^{3-}$ (c) $[Fe(CN)_6]^{3-}$ (d) $[Fe(H_2O)_6]^{3+}$

25. 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 the complex is

(a) $[Co(NH_3)_5Cl]Cl_2$ (b) $[Co(NH_3)_3Cl_3].2NH_3$
(c) $[Co(NH_3)_4Cl_2]Cl.NH_3$ (d) $[Co(NH_3)_4Cl]Cl_2.NH_3$

26. The number of unpaired electrons in the complex ion $[CoF_6]^{3-}$ is (Atomic no. $Co = 27$)

(a) Zero (b) 2 (c) 3 (d) 4

27. Pick out the complex compound in which the central metal atom obeys EAN rule strictly

(a) $K_4[Fe(CN)_6]$ (b) $K_3[Fe(CN)_6]$ (c) $[Cr(H_2O)_6]Cl_3$ (d) $[Cu(NH_3)_4]SO_4$

28. Magnetic moment of $[Cu(NH_3)_4]^{2+}$ ion is

(a) 1.414 (b) 1.73 (c) 2.23 (d) 2.38

29. In $[NiCl_4]^{2-}$, the number of unpaired electron is

(a) 4.5 (b) 2 (c) 3 (d) 4

30. The correct order of hybridisations of central atom in $NH_3, [PtCl_4]^{2-}, PCl_5$ and BCl_3 is

(a) dsp^2, dsp^3, sp^2 and sp^3 (b) sp^3, sp^3, sp^3d and sp^2
(c) dsp^2, sp^2, sp^3 and dsp^3 (d) dsp^2, sp^3, sp^2 and dsp^3

31. The effective atomic number of cobalt in the complex $[Co(NH_3)_6]^{3+}$ is

(a) 36 (b) 33 (c) 24 (d) 30

32. Which of the following is formed when *n*-butyl lithium reacts with tin (II) chloride

(a) $LiBr$ (b) Et_4Pb (c) $(C_4H_9)_4Sn$ (d) $(C_2H_5)_4Pb$

33. Finely divided iron combines with *CO* to give

(a) $Fe(CO)_5$ (b) $Fe_2(CO)_9$ (c) $Fe_2(CO)_{12}$ (d) $Fe(CO)_6$

34. Complex salt can be made by the combination of $[Co^{III}(NH_3)_5Cl]^X$ with

(a) PO_4^{3-} (b) Cl^- (c) $2Cl^-$ (d) $2K^+$

35. Ammonia forms the complex ion $[Cu(NH_3)_4]^{2+}$ with copper ions in alkaline solutions but not in acidic solution. What is the reason for it

(a) In acidic solutions hydration protects copper ions

(b) In acidic solutions protons coordinate with ammonia molecules forming NH_4^+ ions and NH_3 molecules are not available

(c) In alkaline solutions insoluble $Cu(OH)_2$ is precipitated which is soluble in excess of any alkali

(d) Copper hydroxide is an amphoteric substance

36. The complex used as an anticancer agent is

(a) *trans* –$[Co(NH_3)_3Cl_3]$ (b) *cis* –$[PtCl_2(NH_3)_2]$

(c) *cis* $-K_2[PtCl_2Br_2]$ (d) Na_2CO_3

37. In the process of extraction of gold,

Roasted gold ore $+ CN^- + H_2O \xrightarrow{O_2} [X] + OH^-$

$[X] + Zn \rightarrow [Y] + Au$

Identify the complexes [*X*] and [*Y*]

(a) $X = [Au(CN)_2]^-, Y = [Zn(CN)_4]^{2-}$ (b) $X = [Au(CN)_4]^{3-}, Y = [Zn(CN)_4]^{2-}$

(c) $X = [Au(CN)_2]^-, Y = Zn(CN)_6]^{4-}$ (d) $X = [Au(CN)_4]^-, Y = [Zn(CN)_4]^{2-}$

38. $(Me)_2SiCl_2$ on hydrolysis will produce

(a) $(Me)_2Si(OH)_2$ (b) $(Me)_2Si = O$

(c) $-[-O-(Me)_2Si-O-]_n-$ (d) $Me_2SiCl(OH)$

39. Mixture $X = 0.02\,mol$ of $[Co(NH_3)_5SO_4]Br$ and 0.02 *mol* of $[Co(NH_3)_5Br]SO_4$ was prepared in 2 *litre* of solution

1 *litre* of mixture *X* + excess $AgNO_3 \rightarrow Y$.

1 *litre* of mixture *X* + excess $BaCl_2 \rightarrow Z$

Number of moles of *Y* and *Z* are

(a) 0.01, 0.01 (b) 0.02, 0.01 (c) 0.01, 0.02 (d) 0.02, 0.02

40. Which of the following organometallic compound is σ and π bonded

(a) $Fe(CH_3)_3$ (b) $[Fe(n^5 - C_5H_5)_2]$ (c) $[Co(CO)_5NH_3]^{2+}$ (d) $K[PtCl_3(n^2 - C_2H_4)]$

41. Among the following, which is not the π-bonded organometallic compound

(a) $(CH_3)_4Sn$ (b) $K[PtCl_3(\eta^2 - C_2H_4)]$ (c) $Fe(\eta^5 - C_5H_5)_2$ (d) $Cr(\eta^6 - C_6H_6)_2$

42. Which of the following organo-silicon compound on hydrolysis will give a three dimensional silicone

(a) R_3SiCl (b) $RSiCl_3$ (c) $SiCl_4$ (d) R_2SiCl_2

43. Which of the following shall form an octahedral complex

(a) d^4 (low spin) (b) d^8 (high spin) (c) d^6 (low spin) (d) None of these

44. The oxidation number of *Pt* in $[Pt(C_2H_4)Cl_3]^-$ is

(a) +1 (b) +2 (c) +3 (d) +4

45. Oxidation state of nitrogen is incorrectly given for

(a) $[Co(NH_3)_5Cl]Cl_2$; 0 (b) NH_2OH ; -1 (c) $(N_2H_5)_2SO_4$; +2 (d) Mg_3N_2 ; -3

46. Which of the following represents a chelating ligand

(a) H_2O (b) OH^- (c) *DMG* (d) Cl^-

47. How many ions are produced in aqueous solution of $[Co(H_2O)_6]Cl_2$

(a) 2 (b) 3 (c) 4 (d) 6

48. The number of ions per mole of a complex $[CoCl_2.5\,NH_3]Cl_2$ in aqueous solution will be

(a) Nine (b) Four (c) Three (d) Two

49. According to Lewis the ligands are

(a) Acidic in nature (b) Basic in nature

(c) Neither acidic nor basic (d) Some are acidic and others are basic

50. Which of the following is wrong statement

(a) $Ni(CO)_4$ has oxidation number + 4 for *Ni* (b) $Ni(CO)_4$ has zero oxidation number for *Ni*

(c) *Ni* is metal (d) *CO* is gas