TOPIC : CO-ORDINATION CHEMISTRY AND ORGANOMETALLICS

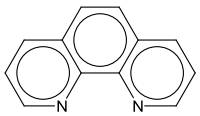
1. Which among the following represent chelating ligand ?
   (a) SCN^- (b) CN^-
   (c) 2, 2-Dipyridyl (d) OH^-

2. How many ions per mole should be produced in the solution when potash alum is dissolved in large excess of water ?
   (a) 4 mols (b) 8 mols
   (c) 6 mols (d) 10 mols

3. In the test for nitrate in, the brown ring formed has a formula $[Fe(H_2O_6NO]SO_4$. The oxidation number of iron in this complex is
   (a) + 1 (b) + 2
   (c) + 3 (d) 0

4. In the complex compound, $[Co(NH_3)_6]$ $[CdCl_x]$ the oxidation number of cobalt is + 3. The values of x is
   (a) 3 (b) 4
   (c) 2 (d) 5

5. The co-ordination number cobalt in $[Co(en)_2Br_2]Cl_2$ is
   (a) 2 (b) 4
   (c) 6 (d) 8

6. The ligand shown here is 
   (a) Tridendate (b) 1, 10-phenanthroline
   (c) 1, 10 phenanthrine (d) 2, 2-dipyridyl

7. The complexes $[Pt(NH_3)_4]$ $[PtCl_6]$ and $[Pt(NH_3)_4Cl_2]$ $[Pt\ Cl_4]$ are
   (a) linkage isomere
   (b) optical isomere
   (c) co-ordination isomers
   (d) ionization isomers

8. Which of the following complexes is inner orbital complex ?
   (a) $Ni(CO)_4$ (b) $[Fe(CN)_6]^{4-}$
   (c) $[CoF_6]^{3-}$ (d) $[Ni(NH_3)_6]^{2+}$

9. In octahedral field of ligands, the d-subshell splits up into 2 set of orbitals which a designated as
   (a) d_1 and d_2 (b) t_g and e_{2g}
   (c) e_g and t_{2g} (d) f_g and f_{2g}

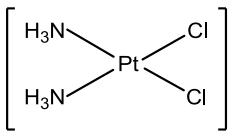
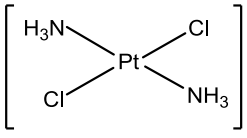
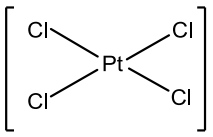
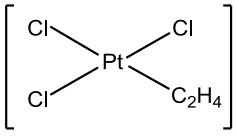
10. Which of the following is π-acid ligand ?
    (a) ONO^- (b) C_2H_4
    (c) NO_2^- (d) CN^-

11. What is true about DMG ?
    (a) It is a tetradentate ligand
    (b) It is an ambidentate ligand
    (c) It is a flexidentate ligand
    (d) It is called dimethyl glyoximato

12. Which of the following complexes entity is poly-nuclear ?
    (a) $[Co(NH_3)_6]$ $[Co(Cl)_6]$
    (b) $[\overset{II}{Pt}(NH_3)_4]$ $[CuCl_4]$
    (c) $[(NH_3)_5\ Cr - O - O - Cr(NH_3)_5]$
    (d) $[Co(en)_2Cl_2]_2\ SO_4$

13. Which of the following complexes entity can show optical activity ?
    (a) trans – $[Co(NH_3)_4Cl_2]^+$
    (b) $[Cr(H_2O)_6]^{3+}$
    (c) cis-$[Co(NH_3)_2(en)_2]^{3+}$
    (d) trans-$[Co(NH_3)_2\ (en)_2]^{3+}$

14. The number of geometrical isomers for $[Pt(NH_3)_2Cl_2]$ is
    (a) 2 (b) 1
    (c) 3 (d) 4

15. Which species among the following is considered to be an anticancer species ?
    (a) 
    (b) 
    (c) 
    (d) 

16. Which of the following is π-acid ligand ?

(a) EDTA (b) Ethylene diamine

(c) Ethylene (d) Oxalate ion

17. What is wrong abut the compound ?

$K[Pt(\eta^2 - C_2H_4)Cl_3]$

(a) It is called Zeise's salt

(b) It is π bonded complex

(c) Oxidation number of Pt is + 4

(d) Four ligands surround the platinum atom

18. Which of the following matchings is incorrect ?

(a) Primary valencies – co-ordination number

(b) Secondary valencies – oxidation number

(c) Secondary valencies – oxidation number

(d) Primary valencies – hold ionisable species

19. The crystal field splitting energy for octahedral complex (Δ_0) and tetrahedral complex (Δ_t) are related as

(a) $\Delta_t = \frac{4}{9}\ \Delta_o$ (b) $\Delta_t = 0.5\ \Delta_o$

(c) $\Delta_t = 0.33\ \Delta_o$ (d) $\Delta_t = \frac{9}{4}\ \Delta_o$

20. Which of the following is referred to as Berlin green?

(a) $\overset{III}{Fe}\ [Fe(CN)_6]$ (b) $[Pt(NH_3)_4]\ [PtCl_4]$

(c) CrO_2Cl_2 (d) $K_3\ [Co(NO_2)_6]$

21. What is not true about $Na_3\ [Co(NO_2)_6]$?

(a) It is called sodium cobaltinitrite

(b) Its IUPAC name is sodium hexanitrocobaltate (III)

(c) Its aqueous solution is slightly basic in nature

(d) Its IUPAC name is sodium hexanitritocobaltate (III)

22. The compounds $[\overset{III}{Pt}(NH_3)_4]\ [Pt\ Cl_6]$ and $[Pt^{IV}(NH_3)_4]\ Cl_2]\ [Pt\ Cl_4]$ are

(a) Linkage isomers

(b) Co-ordination isomers

(c) Ionisation isomers

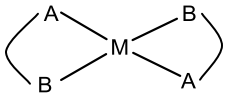
(d) Optical isomers

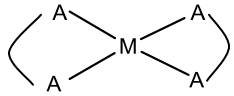
23. The complex $[Pt(NH_3)\ (Py)\ (NH_2OH)\ (NO_2)]$ can form n geometrical isomers. The value of n is

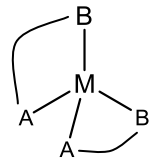
(a) 1 (b) 2

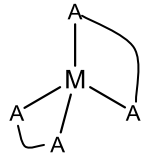
(c) 4 (d) 3

24. If (AA) and (AB) are symmetrical and unsymmetrical bidentate ligands then which of the following arrangement is capable of exhibiting optical isomerism ?

(a) 

(b) 

(c) 

(d) 

25. Which of the following is not a π bonded complex ?

(a) Zeise's salt

(b) Ferrocene

(c) Dibenzene chromium

(d) Tetraethyl lead

26. Which of the following is organo-metallic compound?

(a) $Ti(C_2H_4)_4$ (b) $Ti(OC_2H_5)_4$

(c) $Ti(OCOCH_3)_4$ (d) $Ti(OC_6H_5)_4$

27. Which of the following compound is not coloured ?

(a) $Na_2\ [CuCl_4]$ (b) $Na_2\ [CdCl_4]$

(c) $K_4\ [Fe(CN)_6]$ (d) $K_3\ [Fe(CN)_6]$

28. The IUPAC name of the compound

$[Pt(NH_3)_3Br(NO_2)Cl]\ Cl$ is

(a) Triamminebromochloronitroplatinum (IV) chloride

(b) Triamminenitrochlorobromoplatinum (III) chloride

(c) Triamminebromonitrochloroplatinum (IV) chloride

(d) Triamminebromodichloronitroplatinum (IV)

29. In which of the following complexes the oxidation number of the central metal atom is zero ?

(a) $[Pt(NH_3)_2Cl_2]$ (b) $[Cr(CO)_6]$

(c) $[Cr(NH_3)_3Cl_3]$ (d) $[Cr(en)_2Cl_2]$

30. The co-ordination number of iron in $[Fe(CN)_6]^{3-}$ is

(a) 6 (b) 3

(c) 0 (d) 3

31. $CuSO_4$ dissolves in ammonia due to the formation of

(a) $Cu(OH)_2$ (b) CuO

(c) $[Cu(NH_3)_4]SO_4$ (d) $[Cu(NH_3)_4(OH_2]$

32. What is the co-ordination number of Ni and nickel-DMG complex ?

(a) 2 (b) 3

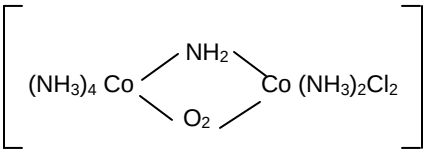
(c) 6 (d) 4

33. Which of the following complex will give white precipitate with barium chloride solution ?

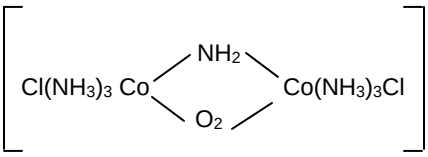
(a) $[Cr(NH_3)_5Cl]\ SO_4$ (b) $[Cr(NH_3)SO_4]Cl$

(c) $[Co(NH_3)_6]Br_3$ (d) None of these

34. The compounds



Cl_2 and



Cl_2 represent

(a) Ligand isomerism

(b) Co-ordination position isomerism

(c) Position isomerism

(d) Ionisation isomerism

35. Which of the following complexes involves d^2sp^3 hybridisation ?

(a) $[FeF_6]^{3-}$ (b) $[Fe(CN)_6]^{3-}$

(c) $[Cr(NH_3)_6]^{3+}$ (d) $[Co(NH_3)_6]^{3+}$

36. Which of the following has highest magnetic moment ?

(a) $[FeF_6]^{3-}$ (b) $[Co\ (NH_3)]^{3+}$

(c) $[Fe(CN)_6]^{4-}$ (d) $[Mn(CN)_6]^{4-}$

37. In any ferric salt, on adding potassium ferrocyanide a Prussian blue is obtained which is

(a) $K_3\ [Fe(CNO)_6]$ (b) $\overset{III}{K}\overset{}{Fe}[\overset{II}{Fe}(CN)_6]$

(c) $FeSO_4.\ Fe(CN)_6$ (d) $Fe_4\ [Fe(CN)_6]_3$

38. The aqueous solution containing one mole of $CoCl_3.5NH_3$ consumed 2 moles of silver nitrate for precipitation of free chloride ions. The formula of the compound should be

(a) $[Co(NH_3)_5\ Cl]\ Cl_2$ (b) $[Co(NH_3)_5Cl_2]\ Cl$

(c) $[Co(NH_3)_4Cl_3].\ NH_3$ (d) $[Co(NH_3)_5\ Cl_3]$

39. Which of the following system in octahedral complex has unpaired maximum electrons ?

(a) d^7 (high spin) (b) d^9 (high spin)

(c) d^6 (low spin) (d) d^4 (low spin)

40. Which of the following will not show geometrical isomerism ?

(a) $[Co(OX)_3]^{3-}$ (b) $[Co(en)_2\ Cl_2]\ Cl$

(c) $[Cr(NH_3)_4cl_2]\ Cl$ (d) Both (b) and (c)

41. Which of the following complexes is/are square planar in shape ?

$[Ni(CN)_4]^{2-}$ $[MeCl_4]^{2-}$ $[ZnCl_4]^{2-}$ $[Ni(NH_3)_4]^{2+}$

(I) (II) (III) (IV)

(a) I, II (b) II, III

(c) Only IV (d) I and IV

42. What is false about $[Ag(NH_3)_2]\ Cl$?

(a) It is a cationic complex

(b) Hybrid state of silver is sp^2

(c) It is diamagnetic in nature

(d) Its name is diammine silver (I) chloride

43. Which is paramagnetic ?

(a) $[Ni(H_2O)_6]^{2+}$ (b) $[Fe(CN)_6]^{4-}$

(c) $[Ni(CO)_4]$ (d) $[Ni(CN)_4]^{2-}$

44. Which of the following is paramagnetic ?

(a) $Co[(NH_3)_6]^{3+}$ (b) $[Ni(CO)_4]$

(c) $[Ni(NH_3)_4]^{2+}$ (d) $[Ni(CN)_4]^{2-}$

45. The complex pentacarbonyliron (0) is diamagnetic. The hybrid state of iron is

(a) sp^3 (b) sp^3d

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

46. The IUPAC name of the complex $[(CO)_3Fe(CO)_3Fe(CO)_3]$ is

(a) Nonacarbonyldiron (0)

(b) Tricarbonyliron (0)-μ-tricarbonyl iron (0)

(c) Hexacarbonyliron (0)-μ-tricarbonyl iron (0)

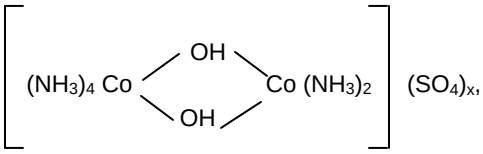
(d) Hexacarbonyl-μ-tricarbonyldiiron (0)

47. In $Fe(C_5H_5)_2$, the number of unpaired electrosn and the hybrid state of iron are respectively

(a) 5, sp^3d^2 (b) 0, d^2sp^3

(c) 2, dsp^2 (d) 4, sp^3d^2

48. What is the value of x in the complex ?



if oxidation state of cobalt in the complex is same as that of iron in K_3 $[Fe(CN)_6]$

(a) 1 (b) 2

(c) 3 (d) 0

49. In the complex $MCl_3.5H_2O$, the co-ordination number of the metal M is six and there is no molecule of hydration. Then the volume of 0.1 M $AgNO_3$ solution needed to precipitate the free chloride ions in 200 ml of 0.01 M solution of the complex is

(a) 80 ml (b) 40 ml

(c) 20 ml (d) 120 ml

50. In sodium nitroprusside, the oxidation number, co-ordination number and EAN of iron are respectively

(a) + 3, 6, 36 (b) + 3, 6, 35

(c) + 3, 3, 36 (d) 6, + 3, 35

ANSWERS KEY

1	C	**11**	D	**21**	B	**31**	C	**41**	D
2	B	**12**	C	**22**	A	**32**	D	**42**	B
3	B	**13**	C	**23**	D	**33**	A	**43**	A
4	D	**14**	A	**24**	C	**34**	B	**44**	C
5	C	**15**	A	**25**	D	**35**	B	**45**	D
6	B	**16**	C	**26**	A	**36**	A	**46**	D
7	C	**17**	C	**27**	B	**37**	B	**47**	B
8	B	**18**	C	**28**	A	**38**	A	**48**	B
9	C	**19**	A	**29**	D	**39**	A	**49**	B
10	B	**20**	A	**30**	A	**40**	A	**50**	B