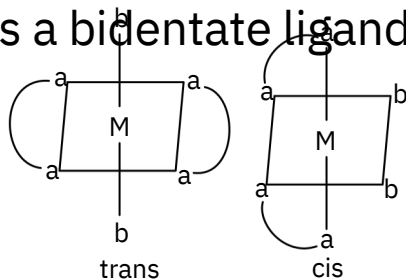


COORDINATION COMPOUNDS

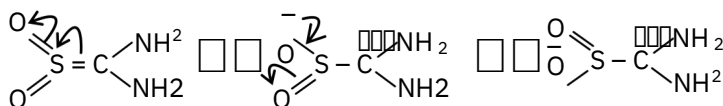
1. Which of the following statements is correct regarding the chirality (optical isomerism) of the cis and trans isomers of the type $M(aa)_2b_2$ (M stands for a metal, a and b are achiral ligands and aa is a bidentate ligand) ?



- (A) The trans form is achiral and optically inactive while the cis form is chiral and exists in two enantiomeric forms
- (B) Both the cis and trans forms are achiral and optically inactive
- (C) The trans form is chiral and exists in two enantiomeric forms while the cis form is achiral and optically inactive.
- (D) Both the cis and trans forms are chiral, and each exists in two enantiomeric forms.
1. [A]
Cis is optically active and trans is optically inactive.
2. In compound $O_2SC(NH_2)_2$, the geometry around the S, N, and number of resonating structure are respectively -
- (A) trigonal planar, trigonal pyramidal and three
- (B) tetrahedral, pyramidal and two

- (C) trigonal planar, tetrahedral and three
 (D) linear, pyramidal and three

2. [A]



3. If excess of AgNO_3 solution is added to 100 ml of a 0.024 M solution of dichlorobis(ethylene diamine)cobalt(III) chloride, how many moles of AgCl will be precipitated?
 (A) 0.0012 (B) 0.0016 (C) 0.0024 (D) 0.0048

3. (C)

The formula of the complex is $[\text{CoCl}_2(\text{en})_2]\text{Cl}$.



$$\text{Moles of complex} = \text{Moles of AgCl} = 100 \times 10^{-3} \times 0.024 = 0.0024$$

4. Which of the following complex's aqueous solution has maximum conductance?

- (A) $\text{PtCl}_4 \cdot 6\text{NH}_3$ (B) $\text{PtCl}_4 \cdot 5\text{NH}_3$
 (C) $\text{PtCl}_4 \cdot 4\text{NH}_3$ (D) equal

4. (A)

Platinum has coordination number equal to six. The structures of the complexes are



which indicates that the number of ions given on ionization

(assuming 100% ionization) would be 5, 4 and 3 respectively. Thus, $[\text{Pt}(\text{NH}_3)_4]\text{Cl}_4$ would have maximum conductance.

5. The coordination number and oxidation number of X in the compound $[\text{X}(\text{SO}_4)(\text{NH}_3)_5]$ will be

- (A) 10 and 3 (B) 1 and 6
(C) 6 and 2 (D) 6 and 4

5. (C)

$[\text{X}(\text{SO}_4)(\text{NH}_3)_5]$ contains X in +2 oxidation state and coordination number is 6.

6. The hybridization of central metal ion and shape of Wilkinson's catalyst is

- (A) dsp^2 , square planar (B) sp^3 , tetrahedral
(C) sp^3d , trigonal bipyramidal (D) d^2sp^3 , octahedral

6. (A)

In Wilkinson's catalyst (a homogeneous catalyst), $(\text{Ph}_3\text{P})_3\text{RhCl}$, Rh is dsp^2 hybridized giving square planar shape to the compound.

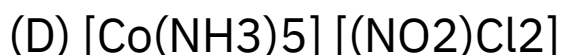
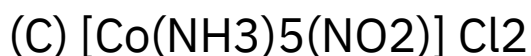
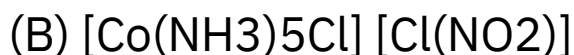
7. The complex ion which has no 'd' electrons in the central metal atom is (atomic number Cr = 24, Mn = 25, Fe = 26, Co = 27)

- (A) $[\text{MnO}]_4^-$ (B) $[\text{Co}(\text{NH}_3)_6]^{3+}$
(C) $[\text{Fe}(\text{CN})_6]^{3-}$ (D) $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$

7. (A)

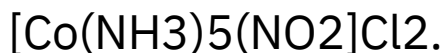
Oxidation number of Mn in $[\text{MnO}]_4$ is +7 which is achieved by losing all $3d^5$ and $4s^2$ electrons.

8. A complex compound of cobalt has molecular formula containing five NH_3 molecules, one nitro group and two chlorine atoms for one Co atom. One mole of this compound produces three mole ions in aqueous solution. On reacting with excess of AgNO_3 solution, two moles of AgCl get precipitated. The ionic formula of the compound is



8. (C)

As the compound gives 2 moles of AgCl on reacting with excess of AgNO_3 , so there must be 2 Cl present in the ionization sphere. So, the formula would be



9. The total number of possible isomers of the complex compound $[\text{Cu}^{\text{II}}(\text{NH}_3)_4] [\text{Pt}^{\text{II}}\text{Cl}_4]$ is

(A) 3

(B) 6

(C) 5

(D) 4

9. (D)

$[\text{Cu}^{\text{II}}(\text{NH}_3)_4] [\text{Pt}^{\text{II}}\text{Cl}_4]$ shows

$[\text{Cu}(\text{NH}_3)_3\text{Cl}]$ $[\text{PtCl}_3(\text{NH}_3)]$,
 $[\text{Pt}(\text{NH}_3)_3\text{Cl}]$ $[\text{Cu}(\text{NH}_3)\text{Cl}_3]$, $[\text{Pt}(\text{NH}_3)_4]$
 $[\text{CuCl}_4]$ and $[\text{Cu}(\text{NH}_3)_4]$ $[\text{PtCl}_4]$

10. Which of the following complex will give white precipitate with BaCl_2 (aq)?

- (A) $[\text{Cr}(\text{NH}_3)_5\text{SO}_4]\text{Cl}$ (B) $[\text{Co}(\text{NH}_2)_4\text{SO}_4]\text{NO}_2$
 (C) $[\text{Cr}(\text{NH}_3)_5\text{Cl}]\text{SO}_4$ (D) Both (A) and (C)

10. (C)

BaCl_2 gives white precipitate of BaSO_4 with SO_4^{2-} , so the complex must have SO_4^{2-} in the ionization sphere.

11. $\text{K}_3[\text{Al}(\text{C}_2\text{O}_4)_3]$ is called

- (A) Potassium aluminooxalate
 (B) Potassium trioxalatoaluminate(III)
 (C) Potassium aluminium(III) oxalate
 (D) Potassium trioxalato aluminate(VI)

11. (B)

IUPAC name of $\text{K}_3[\text{Al}(\text{C}_2\text{O}_4)_3]$ is potassium trioxalatoaluminate(III).

12. Which of the following complex will show geometrical as well as optical isomerism?

en = ethylenediamine

- (A) $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$ (B) $[\text{Pt}(\text{NH}_3)\text{Cl}_4]$
 (C) $[\text{Pt}(\text{en})]_4^{3+}$ (D) $[\text{Pt}(\text{en})_2\text{Cl}_2]$

12. (D)

[Pt(en)₂Cl₂] shows cis-trans isomerism and cis form also shows optical activity.

13. Which of the following is not an organo-metallic compound?

(A) C₄H₉ Li

(B) (C₂H₅)₄ Pb

(C) [(C₅H₅)₂Fe]

(D) C₂H₅-O-Na

13. (D)

Compounds in which the carbon or organic groups are directly bonded to metal atoms are known as organometallic compounds. D is sodium ethoxide and alkoxide.

14. Co-ordination number of Co in [Co(NH₃)₆]²⁺ is-

(A) 4

(B) 5

(C) 6

(D) 8

14. (C)

Co-ordination number is equal to total number of ligands in a complex.

15. The structure of iron pentacarbonyl is-

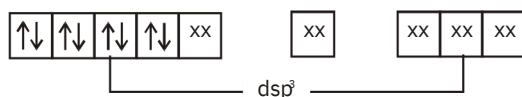
(A) Square planar

(B) Trigonal bipyramid

(C) Triangular

(D) None of these

15. (B)



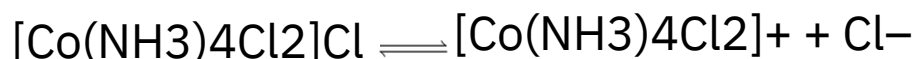
xx electron pair donated by CO.

16. A cobaltamine has the formula $\text{Co}(\text{NH}_3)_6\text{Cl}_3$, with AgNO_3 solution, one third of the chloride is precipitated. The complex shows cis-trans isomerism. It can have the structure –

- (A) $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$ (B) $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$
 (C) $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]\text{Cl}$ (D) $[\text{Co}(\text{NH}_3)_5.\text{H}_2\text{O}]\text{Cl}_3$

16. (C)

This compound has only one ionisable Cl^- out of given three.

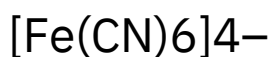


It also exhibits cis-trans isotherm.

17. The oxidation number of Fe in $[\text{Fe}(\text{CN})_6]^{4-}$, Co in $[\text{Co}(\text{NH}_3)_3(\text{NO}_2)_3]$ and Ni in $[\text{Ni}(\text{CO})_4]$ are respectively

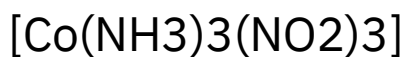
- (A) +2, +3, 0 (B) +3, 0, +3
 (C) +2, +3, +4 (D) 0, +3, +4

17. (A)



$$x + \{-6\} = -4$$

$$x = +2$$



$$x + (3 \times 0) + (-3) = 0$$

$$x - 3 = 0 \quad x = +3$$



$$x + (4 \times 0) = 0$$

$$x = 0$$

18. Which of the following sets is/are example(s) of co-ordination isomerism in complex?
- (A) $[\text{Co}(\text{NH}_3)_6]$ $[\text{Cr}(\text{CN})_6]$ and $[\text{Co}(\text{CN})_6]$ $[\text{Cr}(\text{NH}_3)_6]$
(B) $[\text{Cr}(\text{H}_2\text{O})_5\text{Cl}]\text{Cl}\cdot 2\text{H}_2\text{O}$ and $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2]\text{Cl}\cdot 2\text{H}_2\text{O}$
(C) $[\text{Co}(\text{NH}_3)_5\text{Br}] \text{SO}_3$ and $[\text{Cr}(\text{NH}_3)_5\text{SO}_4]\text{Br}$
(D) $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$ and $[\text{Pt}(\text{NH}_3)_4]$ $[\text{PtCl}_4]$

18. (A)

When both positive and negative ions are complex, co-ordination isomerism may occur due to the interchange of ligands within the co-ordination sphere itself e.g.

$[\text{Co}(\text{NH}_3)_6]$ $[\text{Cr}(\text{CN})_6]$ and $[\text{Co}(\text{CN})_6]$ $[\text{Cr}(\text{NH}_3)_6]$ are two co-ordination isomers, where ammonia and cyanide ligands have been changed within the co-ordination sphere.

Choices (B), (C) and (D) are examples of hydrate isomers, ionisation isomers and polymerisation isomers, respectively.

19. Which of the following has least conductivity in aqueous solution-

- (A) $\text{Co}(\text{NH}_3)_4\text{Cl}_3$ (B) $\text{Co}(\text{NH}_3)_3\text{Cl}_3$
(C) $\text{Co}(\text{NH}_3)_5\text{Cl}_3$ (D) $\text{Co}(\text{NH}_3)_6\text{Cl}_3$

19. (B)

Werner's theory.

[Co(NH₃)₃Cl₃] is non electrolyte.

20. In nitroprusside ion, the iron and NO exist as Fe(II) and NO⁺ rather than Fe(III) and NO. These forms can be differentiated by –

- (A) estimating the concentration of iron
- (B) measuring the concentration of CN[–]
- (C) measuring the solid state magnetic moment
- (D) thermally decomposing the compound

20. (C)

Fe (II) contains 4 unpaired electrons,

So $\sqrt{4(4+2)} \text{ BM} = 4.9 \text{ BM}$

Fe (III) contains 5 unpaired electrons,

So $\sqrt{5(5+2)} \text{ BM} = 5.9 \text{ BM}$

21. When the configuration is d⁷ in a transition metal, the paramagnetic susceptibility will be equal to-

- (A) 3.87 B.M.
- (B) 2.68 B.M.
- (C) 5.92 B.M.
- (D) 6.92 B.M.

21. (A)

The magnetic moment values in Bohr magneton for 1 lone electron is 1.73, for 2 is 2.83, for 3 is 3.87 for 4 is 4.90, for 5 is 5.92, for 6 is 6.92 and so on d⁷ configuration has three lone electrons, hence, $m = 3.87 \text{ BM}$.

22. The EAN of nickel in Ni(CO)₄ is-

- (A) 36 (B) 38 (C) 28 (D) 54

22. (A)

Effective atomic no. (EAN)

= at. no. of central atom - oxidation state + 2 × (no. of ligands) = 28 - 0 + 2 × 4 = 36.

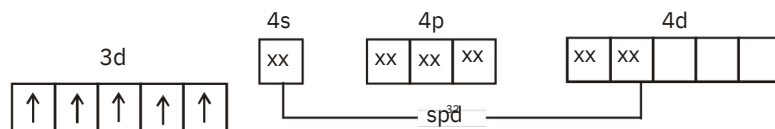
23. Hexafluoroferrate (III) ion is an outer orbital complex. The number of unpaired electrons present in it is.

- (A) 1 (B) 5 (C) 4 (D)

Unpredictable

23. (B)

Electronic configuration of [FeF₆]³⁻ is :



24. The crystal field splitting energy for Cr³⁺ ion in an octahedral field increases for the ligands I⁻, H₂O, NH₃, CN⁻ and the order is such that

- (A) I⁻ < H₂O < NH₃ < CN⁻ (B) CN⁻ < I⁻ < H₂O < NH₃
 (C) CN⁻ < NH₃ < H₂O < I⁻ (D) NH₃ < H₂O < I⁻ < CN⁻

24. (A)

Weak field ligands produce small degree of splitting of 'd' orbitals and strong field ligands cause large splitting. I⁻ is the weakest ligand, CN⁻ is the strongest.

25. An aqueous solution of $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ ion has a mild violet colour of low intensity. Which of the following statements is incorrect?
- (A) The ion absorbs visible light in the region of $\sim 5000 \text{ \AA}$.
 - (B) The colour results from an electronic transition of one electron from the t_{2g} to an e_g orbital.
 - (C) The low colour-intensity is because of a low probability of transition.
 - (D) The transition is the result of metal-ligand back bonding.

25. (D)

$\text{Ti}(\text{H}_2\text{O})_6^{3+}$ has one unpaired electron in its d-subshell which gives rise to d-d transition to impart colour.

26. The EAN of platinum in potassium hexachloroplatinate (IV) is:

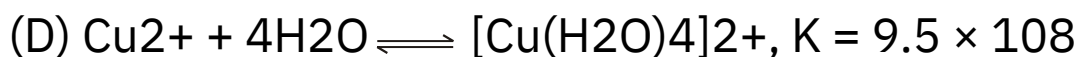
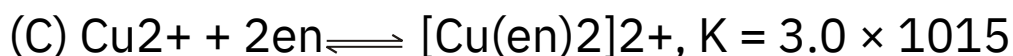
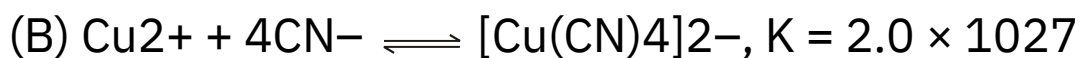
(A) 46 (B) 86 (C) 36 (D) 84

26. (B)

$\text{EAN} = \text{atomic no. of the metal} - \text{no. of electron lost in ion formation} + \text{no. of electrons gained from the donor atoms of the ligand} = 78 - 4 + 2 \times 6 = 86.$

27. From the stability constants (hypothetical values), given below, predict which one is the strongest ligand?

(A) $\text{Cu}^{2+} + 4\text{NH}_3 \rightleftharpoons [\text{Cu}(\text{NH}_3)_4]^{2+}$, $K = 4.5 \times 10^{11}$



27. (B)

Greater the value of stability constant, stronger is the ligand.

28. Mohr's salt is a:

(A) Simple salt

(B) Complex salt

(C) Complex ion

(D) Double salt

28. (D)

The union of two or more molecules of simple salts, when combining through electrostatic forces of attraction, combine with each other without losing their chemical identity, generally combining by simple physical methods, the resulting products are known as double salts; e.g., carnallite ($\text{KCl} \cdot \text{MgCl}_2 \cdot 6\text{H}_2\text{O}$), chromealum ($\text{Cr}_2(\text{SO}_4)_3 \cdot \text{K}_2\text{SO}_4 \cdot 12\text{H}_2\text{O}$), Mohr's salt ($\text{FeSO}_4 \cdot (\text{NH}_4)_2 \cdot 6\text{H}_2\text{O}$), etc.

29. In lithium tetrahydroaluminate, the ligand is:

(A) Al^+

(B) H

(C) H^-

(D) None

29. (C)

$\text{LiH} + \text{AlH}_3 \rightleftharpoons \text{Li}[\text{AlH}_4]$; H^- of LiH acts as ligand.

30. Which has a complex anion?

(A) Na_3AlF_6 (B) K_2SiF_6 (C) K_2PtCl_6 (D) All

30. (C)

Na_3AlF_6 and K_2SiF_6 actually represent double salt since presence of F^- is detected as $3\text{NaF} \cdot \text{AlF}_3$ and $2\text{KF} \cdot \text{SiF}_4$. True complex is K_2PtCl_6 .

31. A co-ordination complex compound of cobalt has 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 silver nitrate solution, two molecules of AgCl get precipitated. The ionic formula of this compound would be –

(A) $[\text{Co}(\text{NH}_3)_4\text{NO}_2\text{Cl}] [(\text{NH}_3)\text{Cl}]$

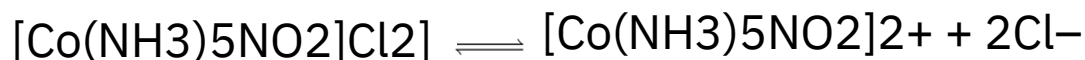
(B) $[\text{Co}(\text{NH}_3)_5\text{Cl}] [\text{Cl}(\text{NO}_2)]$

(C) $[\text{Co}(\text{NH}_3)_5\text{NO}_2]\text{Cl}_2$

(D) $[\text{Co}(\text{NH}_3)_5] [(\text{NO}_2)_2\text{Cl}_2]$

31. (C)

Because only (C) gives two moles of AgCl with AgNO_3 and yields three ions (including two ionisable Cl^- ions) in aqueous solution.



32. The charge on cobalt in $[\text{Co}(\text{CN})_6]^{3-}$ is-

- (A) -6 (B) $+3$ (C) -3 (D) $+6$

32. (B)

The algebraic sum of oxidation no. of all atoms in a complex ion is equal to charge on that ion,

i.e., $a + 6 \times (-1) = -3$

□ $a = +3$.

33. Which of the following is not a simple salt?

- (A) FeSO_4 (B) $\text{KCl} \cdot \text{MgCl}_2 \cdot 6\text{H}_2\text{O}$ (C)
(D) NH_4Br

33. (B)

A simple salt is a compound which has been prepared by the combination of two simple ions like Na^+ and Cl^- ions to form NaCl . Similarly KBr , K_2S , MgCl_2 , CaC_2 etc., simple ionic salts. Another set of simple salts can be Zn_3P_2 , V_2O_5 etc., which are bonded covalently. Salts like FeSO_4 , $\text{Al}_2(\text{CO}_3)_3$, NH_4Br etc., are ionic, but formed by the combination of a simple ion and a compound ion such as SO_4^{2-} , CO_3^{2-} , NH_4^+ etc.

34. When FeCl_3 reacts with $\text{K}_3[\text{Fe}(\text{CN})_6]$ no blue colour is observed. $\text{K}_3[\text{Fe}(\text{CN})_6]$ is used as indicator in estimation of Fe^{2+} by $\text{Cr}_2\text{O}_7^{2-}$ ion in acidic medium. End point will be when:

- (A) Solution of iron salt does not give blue colour with indicator.
- (B) Solution of iron salt gives blue colour with indicator
- (C) No colour before and after with indicator
- (D) Always blue colour before and after

34. (A)

At the end point, there is no Fe^{2+} , all iron in Fe^{3+} hence no blue colour with $\text{K}_3[\text{Fe}(\text{CN})_6]$ hence (A).

35. The oxidation number of cobalt in $\text{K}[\text{Co}(\text{CO})_4]$ is-

- (A) +1
- (B) +3
- (C) -1
- (D) -3

35. (C)

The correct answer is (c)



$$\text{So } x + 1 = 0 \quad \text{or} \quad x = -1$$

36. Point out the wrong statement: In an octahedral geometry,

- (A) a central metal ion with d^8 configuration has two unpaired electrons.
- (B) an ion with d^6 configuration is diamagnetic in a strong field.
- (C) an ion with d^5 configuration has one unpaired electron both in weak and strong fields.

(D) in d^4 , d^5 , d^6 and d^7 configurations, weak and strong field complexes have different numbers of unpaired electrons.

36. (C)

A d^5 -ion has 5 unpaired electrons in a weak field.

37. The compound $[\text{Co}(\text{NO}_2)(\text{NH}_3)_5]\text{Cl}_2$ and $[\text{Co}(\text{ONO})(\text{NH}_3)_5]\text{Cl}_2$ are examples of –

- (A) Geometrical isomers (B) Linkage isomers
(C) Ligand isomers (D) Ionisation isomers

37. (B)

The ligand NO_2 has two types of linkage with central atom. In NO_2 , N donates electron pair, while in $\text{O} - \text{NO}$ the O atom donates the electron pair.

38. Each of the compounds $\text{Pt}(\text{NH}_3)_6\text{Cl}_4$, $\text{Cr}(\text{NH}_3)_6\text{Cl}_3$, $\text{Co}(\text{NH}_3)_4\text{Cl}_3$ and $\text{K}_2\text{Pt}.\text{Cl}_6$ were dissolved in water to make its 0.001 M solution. The correct order of their increasing conductivity in solution is

- (A) $\text{K}_2\text{Pt}.\text{Cl}_6 < \text{Co}(\text{NH}_3)_4.\text{Cl}_3 < \text{Cr}(\text{NH}_3)_6\text{Cl}_3 < \text{Pt}(\text{NH}_3)_6\text{Cl}_4$
(B) $\text{Cr}(\text{NH}_3)_6\text{Cl}_3 < \text{Co}(\text{NH}_3)_4\text{Cl}_3 < \text{K}_2\text{Pt}.\text{Cl}_6 < \text{Pt}(\text{NH}_3)_6\text{Cl}_4$

(C) $\text{Co}(\text{NH}_3)_4\text{Cl}_3 < \text{K}_2\text{Pt}.\text{Cl}_6 < \text{Cr}(\text{NH}_3)_6\text{Cl}_3 < \text{Pt}(\text{NH}_3)_6\text{Cl}_4$

(D) $\text{Pt}(\text{NH}_3)_6\text{Cl}_4 < \text{Co}(\text{NH}_3)_4\text{Cl}_3 < \text{Cr}(\text{NH}_3)_6\text{Cl}_3 < \text{K}_2\text{Pt}.\text{Cl}_6$

38. (C)

In aqueous solution (0.001 M), the complexes will dissociate to give the ions:

$\text{Pt}(\text{NH}_3)_6\text{Cl}_4 \rightleftharpoons [\text{Pt}(\text{NH}_3)_6]^{4+} + 4\text{Cl}^-$; 5 ions.

$\text{Cr}(\text{NH}_3)_6\text{Cl}_3 \rightleftharpoons [\text{Cr}(\text{NH}_3)_6]^{3+} + 3\text{Cl}^-$; 4 ions.

$\text{Co}(\text{NH}_3)_4\text{Cl}_3 \rightleftharpoons [\text{Co}(\text{NH}_3)_4\text{Cl}_2]^+ + \text{Cl}^-$; 2 ions.

$\text{K}_2\text{PtCl}_6 \rightleftharpoons [\text{PtCl}_6]^{2-} + 2\text{K}^+$; 3 ions.

39. Consider the following complexes:

(I) K_2PtCl_6 (II) $\text{PtCl}_4.2\text{NH}_3$ (III) $\text{PtCl}_4.3\text{NH}_3$ (IV) $\text{PtCl}_4.5\text{NH}_3$

Their electrical conductances in aq. solutions are-

(A) 256, 0, 97, 404 (B) 404, 0, 97, 256 (C) 256, 97, 0, 404 (D) 404, 97, 256, 0

39. (A)

C.N. of Pt is 6 hence

I is K_2PtCl_6 - Three ions

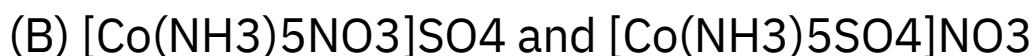
II $[\text{Pt}(\text{NH}_3)_2\text{Cl}_4]$ - One molecule

III $[\text{Pt}(\text{NH}_3)_3\text{Cl}_3] \text{Cl}$ - Two ions

IV $[\text{Pt}(\text{NH}_3)_5\text{Cl}]\text{Cl}_3$ - Four ions

Conductivity \square no. of ions.

40. Which of the following pairs exhibits linkage isomerism –



40. (C)

$[\text{Cr}(\text{H}_2\text{O})_5\text{SCN}]^{2+}$ and $[\text{Cr}(\text{H}_2\text{O})_5\text{NCS}]^{2+}$ exhibits linkage isomerism.

41. Hexafluoro ferrate (III) ion is an outer orbital complex. The number of unpaired electrons present in it is –

(A) 1

(B) 3

(C) 4

(D) 5

41. (D)

Hexafluoroferrate (III) is $[\text{FeF}_6]^{3-}$. The O.N. of Fe in it is $x + (-6) = -3$ or $x - 6 = -3$ or $x = +3$.

Thus in it Fe is present as Fe^{3+} , which contains 5 unpaired electrons.

42. The hybridisation of Mn in hexacyano-manganate (II) is sp^3d^2 . The number of unpaired electrons in it is –

(A) 1

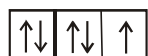
(B) 2

(C) 5

(D) 3

42. (A)

The configuration of Mn is $[\text{Ar}]d^5$. Thus it is expected to have 5 unpaired electrons. But the strong ligand CN^- causes the pairing of electrons as



Thus there is only one unpaired electron left.

43. Which of the following is most likely structure of $\text{CrO}_3 \cdot 6\text{H}_2\text{O}$ if $1/3$ of total chlorine of the compound is precipitated by adding AgNO_3 to its aqueous solution –
- (A) $\text{CrCl}_3 \cdot 6\text{H}_2\text{O}$
 (B) $[\text{Cr}(\text{H}_2\text{O})_3\text{Cl}_3] \cdot (\text{H}_2\text{O})_3$
 (C) $[\text{CrCl}_2(\text{H}_2\text{O})_4]\text{Cl} \cdot 2\text{H}_2\text{O}$
 (D) $[\text{CrCl}(\text{H}_2\text{O})_5]\text{Cl}_2 \cdot \text{H}_2\text{O}$

43. (C)

$[\text{CrCl}_2(\text{H}_2\text{O})_4]\text{Cl} \cdot 2\text{H}_2\text{O}$ has only one ionisable Cl out of three Cl atoms present in the compound. Two Cl atoms which are non-ionisable are present in co-ordination sphere.

44. The oxidation state of Ag in Tollen's reagent is:

- (A) 0 (B) +1 (C) +2 (D) +1.5

44. (B)

Ag in Tollens reagent exists as Ag_2O

$$2 \times a + 1 \times (-2) = 0$$

$$\square a = +1.$$

45. Consider transition metal ions which have d1 to d10 electrons. Which of these can form high spin and low spin complexes in octahedral geometry.

(A) d3, d5, d6, d9

(B) d4, d5, d6, d7

(C) d2, d5, d7, d9

(D) d4, d6, d7, d10

45. (B)

Metal ions with d4, d5, d6 and d7 configuration can form high spin and low spin complexes. For transition metal ions with configuration d1, d2, d3, d8, d9 or d10 all the octahedral complexes of a given metal ion have approximately the same magnetic moment and there is no high spin versus low spin complexes.