CHEMISTRY

FOR IIT JEE ASPIRANTS OF CLASS 12 FOR CHEMISTRY

COORDINATION COMPLEXES

W.E.

1. When excess of silver nitrate solution is added to aqueous solution containing 0.1 molar $CoCl_3.xNH_3$. If 43.05 g of silver chloride precipitated, then x value is

Watch Video Solution

2. The secondary valence of Co^{-3} is 6. Calculate the number of moles of AgCl precipitated, when excess of $AgNO_3$ solution is added to 1.5 lit of 0.2 M. $CoCl_3.5NH_3$ solution

Watch Video Solution

3. The number of stereo isomers of the compound is $\left[Co\left(C_2O_4\right)\left(NH_3\right)_2\left(NO_2\right)_2\right]$

Watch Video Solution

4. If $\left[Co\left(NH_3\right)_6\right]^{y+}$ follows EAN rule, the oxidation state of Co is (At. No. of CO = 27 and At. No. of Kr = 36).

Watch Video Solution

5. Which of the following is correct value of x in $Cr(CO)_x$?

Watch Video Solution

6. The spin only magnetic moment of $\left[FeBr_4\right]^-$ is 5.92 BM. Predict the geometry of complex ion.

Watch Video Solution

7. Arrange the following in the increasing order of stabilization energy of following in presence of strong field ligands.

Watch Video Solution

8. Give the stabilization energy of d^7 electrons in presence of strong and weak field ligands.

Watch Video Solution

Watch Video Solution

9. In $\left[Ti\left(H_2O\right)_6\right]^{3+}$ complex Ti^{3+} has only one electron in 3d-orbital. Its spectrum shows a single absorption peak of 5000Å then correcponding energy is

Watch Video Solution

10. $Zn^{+2} + 2NH_3 \Leftrightarrow \left[Zn\left(NH_3\right)_2\right]^{+2}, K_1 = 2 \times 10^{-3}$

$\left[Zn\left(NH_3\right)_2\right]^{+2} + 2NH_3 \Leftrightarrow \left[Zn\left(NH_3\right)_4\right]^{2+}, K_2 = 1.5 \times 10^{-3}$

Find out the instability constant?

Watch Video Solution

C.U.Q

1. The following does not give a precipitate either with $AgNO_3$ or $BaCL_2$

A. $\left[Co\left(NH_3\right)_5Cl\right]SO_4$

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

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

D. $\left[Co\left(NH_3\right)_2Cl_4\right]Cl$

Answer: 2

Watch Video Solution

2. Which of the following has the highest molar conductivity in solution?

A. $\left[Co\left(NH_3\right)_6\right]Cl_3$

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

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

D. $\left[Co\left(NH_3\right)_6Cl_3\right]$

Answer: 1

Watch Video Solution

3. The transition metals have a strong tendency to form complaexes because of

(i) smaller sizes of the metal ions

(ii) variable oxidation states

(iii) high ionic charges of metal ions

(iv) availability of vacant d-orbitals for bond formation.

A. I only

B. ii only

C. I & ii

D. I,ii,iii

Answer: 4

Watch Video Solution

4. The ionizable valency of Ni in $Ni(CO)_4$ is

A. 2

B. 4

C. 0

D. 1

Answer: 3

Watch Video Solution

5. According to Werner's theory transition metals possesses

A. only one type of valency

B. two types of valencies

C. three types of valencies

D. four types of valencies

Answer: 2

Watch Video Solution

6. The primary valency of the metal ion is satisfied by

A. neutral molecules

B. positive ions

C. negative ions

D. all the above

Answer: 3

Watch Video Solution

7. No of ionizable & non-ionizable Cl^- ions in $CoCl_35NH_3$ representively are

A. 3, 0

B. 2, 1

C. 1, 2

D. 0, 3

Answer: 2

Watch Video Solution

8. Central metal ion in complex compound acts as

A. Lewis acid

B. Lewis base

C. Arrhenius acid

D. Arrhenius base

Answer: 1

Watch Video Solution

9. Which one of the following acts as a Lewis base in complexes

A. CO_2

B. BF_3

C. NH_3

D. BCl_3

Answer: 3

Watch Video Solution

10. Potassium ferrocyanide is a

A. Complex salts

B. Normal salts

C. Double salts

D. Basic salts

Answer: 1

Watch Video Solution

11. Example for a coordination compound is

A. $KCl.\ MgCl_2.6H_2O$

B. $K_2SO_4.\ Al_2\left(SO_4\right)_3.24H_2O$

C. $CoCl_3.6NH_3$

D. $FeSO_4.\ \left(NH_4\right)_2SO_4.6H_2O$

Answer: 3

Watch Video Solution

12. in which of the following transition metal complexes does the metal exhibits zero oxidation state.

A. $\left[Co\left(NH_3\right)_6\right]Cl_3$

B. $\left[Fe\left(H_2O\right)_6\right]SO_4$

C. $\left[Ni(CO)_4\right]$

D. $\left[Fe\left(H_2O\right)_6\right]Cl_3$

Answer: 3

Watch Video Solution

13. The number of ions formed form a formula unit of potassium ferricyanide in solution is

A. 2

B. 4

C. 5

D. 6

Answer: 2

Watch Video Solution

14. Metal-Isothiocyananto is indicated by

A. M-SCN

B. M-NCS

C. M-CNS

D. M-CSN

Answer: 2

Watch Video Solution

15. Number of chlorides satisifying secondary valency in $CoCl_3 4NH_3$

A. 2

B. 3

C. 4

D. 1

Answer: 1

Watch Video Solution

16. Which of the following is cationic complex?

A. $K_4\left[Fe(CN)_6\right]$

B. $\left[Ni(CO)_4\right]$

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

D. $\left[Cu\left(NH_3\right)_4\right]SO_4$

Answer: 4

Watch Video Solution

17. The no. of moles of AgCl obtained when excess $AgNO_3$ is added to one mole of $\left[Cr\left(NH_3\right)_4Cl_2\right]Cl$

A. 1

B. 2

C. 3

D. 4

Answer: 1

Watch Video Solution

18. Positive ligand in sodium nitroprusside complex is

A. Na^+

B. NO^+

C. CN^+

D. H_3O^+

Answer: 2

Watch Video Solution

19. The no. of moles of AgCl precipitated when excess of $AgNO_3$ is mixed with one mole of $\left[Cr\left(NH_3\right)_3Cl_3\right]$ is

A. 0

B. 1

C. 2

D. 3

Answer: 1

Watch Video Solution

20. IUPAC name of the complex $CoCl_35NH_3$ is

A. Cobalt trichloride penta amonium

B. Penta amine carbonyl chloride

C. Trichloro penta amino cabalt

D. Pentaaminechlorocobalt (III) chloride

Answer: 4

Watch Video Solution

21. The property of possessing atleast one atom that is attached to four non-identical groups in tetrahedral geomentry is called

A. polarisation

B. chirality

C. enantiomerism

D. meridionity

Answer: 2

Watch Video Solution

22. A racemic mixture has a net rotation

A. to right of chirality

B. to left of original plane

C. to right of original plane

D. zero

Answer: 4

Watch Video Solution

23. Optical isomer have

A. property of chirality

B. almost identical chemist properties

C. almost identical physical properties

D. all the above

Answer: 1

Watch Video Solution

24. The effective atomic number of iron in $\left[Fe(CN)_6\right]^{3-}$ is

A. 34

B. 36

C. 37

D. 35

Answer: 4

Watch Video Solution

25. Which does not obey EAN rule?

A. $Fe(CO)_5$

B. $K_4\left[Fe(CN)_6\right]$

C. $\left[Cu\left(NH_3\right)_4\right]SO_4$

D. $\left[Co\left(NH_3\right)_6\right]Cl_3$

Answer: 3

Watch Video Solution

26. The effective atomic number of central metal ion is wrongly calculated in the following complex?

A. In $\left[Ni(CO)_4\right]$ the EAN of Ni is 36

B. In $K_2\left[Ni(CO)_4\right]$ the EAN of Ni is 36

C. In $K_3\left[Fe(CO)_6\right]$ the EAN of Fe is 35

D. In $\left[Cr\left(NH_3\right)_6\right]Cl_3$ the EAN of Cr is 33

Answer: 1

Watch Video Solution

27. According to effective atomic number rule the central metal acquires:

A. inert gas configuration

B. octet

C. duplet

D. quartet

Answer: 4

Watch Video Solution

28. The shape of the complex species will be square planar if its coordination number is

A. 2

B. 6

C. 5

D. 4

Answer: 4

Watch Video Solution

29. Which of the following is outer orbital complex?

A. $\left[CoF_6\right]^{-3}$

B. $\left[Cu\left(H_2O\right)_6\right]^{+2}$

C. $\left[Co\left(NH_3\right)_6\right]^{+2}$

D. Both 1 and 2

Answer: 1

Watch Video Solution

30. sp^3d^2 hybridisation is present in

A. $\left[CoF_6\right]^{-3}$

B. $\left[Ni(CO)_4\right]$

C. $\left[Co\left(NH_3\right)_6\right]^{+2}$

D. $\left[Ni(CN)_4\right]^{-2}$

Answer: 2

Watch Video Solution

31. The type of hybridisation present in $\left[Cu\left(NH_3\right)_4\right]^{+2}$ ion is

A. sp^3

B. dsp^2

C. sp^3d

D. sp^3d^2

Answer: 3

Watch Video Solution

32. The shape of $\left[CoF_6\right]^{-3}$ is

A. Square planner

B. Trigonal bipyramidal

C. Octahedral

D. Tetrahedral

Answer: 1

Watch Video Solution

33. The hybridisation of metal atom & geometry of complex in $\left[Ag\left(NH_3\right)_2\right]^{-3}$ are

A. sp, linear

B. sp^2, linear

C. sp^2, trigonal planner

D. sp, angular

Answer: 1

Watch Video Solution

34. The magnetic moment of $\left[Ni(Cl)_4\right]^{2-}$ is

A. $2.85BM$

B. $1.83BM$

C. $4.86BM$

D. $5.95BM$

Answer: 1

Watch Video Solution

35. Which of the following system has maximum number of the unpaired electrons in an inner octahedral complex?

A. d^4

B. d^9

C. d^7

D. d^5

Answer: 1

Watch Video Solution

36. In an octahedral crystal field, the correct set of low orbitals are

A. $d_{xy}, d_{xz}, d_{x^2-y^2}$

B. $d_{x^2-y^2}, d_{z^2}$

C. d_{xy}, d_{xz}, d_{yz}

D. $d_{xy}, d_{x^2-y^2}$

Answer: 3

Watch Video Solution

37. For the same metal, the stabiliing energies of tetrahedral and octahedral complex are related as

A. $\Delta_t = \Delta_0$

B. $\Delta_t \times 4 = \Delta_0 \times 6$

C. $\Delta_t \times 9 = \Delta_0 \times 4$

D. $\Delta_t \times 6 = \Delta_0 \times 4$

Answer: 3

Watch Video Solution

38. The orbitals having lower energy in tetrahedral complexs according to CFT are

A. d_{xy}, d_{yz}, d_{z^2}

B. $d_{xy}, d_{yz}, d_{x^2-y^2}$

C. d_{xy}, d_{yz}, d_{zx}

D. $d_{x^2-y^2}, d_{z^2}$

Answer: 4

Watch Video Solution

39. The metal which does not form poly nuclear carbonly is

A. Mn

B. Fe

C. Cr

D. Co

Answer: 3

Watch Video Solution

40. Nessler's reagent is

A. $K_2\left[HgI_4\right]$

B. $K_2\left[HgI_2\right]$

C. $K_2\left[HgCl_4\right]$

D. HgI_2

Answer: 1

Watch Video Solution

41. Among the following metal carbonyls the C - O bond order is lowest in .

A. $\left[V(CO)_6\right]^-$

B. $Fe(CO)_5\Big]$

C. $\left[Cr(CO)_6\right]$

D. $Mn(CO)_6]^+$

Answer: 1

Watch Video Solution

LEVEL-I

1. Which of the following is not a draw back of Werner's theory?

A. does not explain the valency of metal ions in the complex

B. does not give any explanation for the colour of complex compounds

C. does not explain the magnetic behaviour of complex compounds

D. does not correlate electronic configuratio of the metal with the formation of complex

Answer: 1

Watch Video Solution

2. Aqueous solution of $\left[Co\left(H_2O\right)_5SO_4\right]Cl$ gives precipitate with

A. $BaCl_{2(aq)}$

B. $AgNO_{3(aq)}$

C. both 1 and 2

D. neither 1 nor 2

Answer: 2

Watch Video Solution

3. Silver chloride dissolves in excess ammonia due to the formation of a soluble compplex whose formula is

A. $\left[Ag\left(NH_3\right)\right]Cl$

B. $\left[Ag\left(NH_3\right)_2\right]Cl$

C. $\left[Ag\left(NH_3\right)_3\right]Cl$

D. $\left[Ag\left(NH_3\right)_4\right]Cl$

Answer: 2

Watch Video Solution

4. Which is anionic complex?

A. Ferrous ammonium sulphate

B. Carnallite

C. Potassium ferrocyaniode

D. Gypsum

Answer: 3

Watch Video Solution

5. Zn^{+2} dissolves in excess of NaOH due to the formation of

A. Soluble $Zn(OH)_2$

B. Soluble $Na_2\left[Zn(OH)_4\right]$

C. Soluble $Na\left[Zn(OH)_3\right]$

D. ZnO

Answer: 2

Watch Video Solution

6. Example of neutral complex compound in the following is

A. $CoCl_3.6NH_3$

B. $CoCl_3.5NH_3$

C. $CoCl_3.4NH_3$

D. $CoCl_3.3NH_3$

Answer: 4

Watch Video Solution

7. Which of the following releases metal slowly to give uniform coating in electroplating is?

A. metal salts

B. double salts

C. complex salt

D. alums

Answer: 3

Watch Video Solution

8. IUPAC name of the complex $\left[Cu\left(NH_3\right)_4\right]SO_4$ is

A. cuprammonium sulphate

B. copper sulphate tetraammonia

C. tetraamminecopper(II) sulphate

D. copper ammonium(IV) sulphate

Answer: 3

Watch Video Solution

9. Which of the following does not exhibit optical isomerism?

A. $\left[Cr\left(NH_3\right)_3\right]Cl_3$

B. $\left[Cr(en)_3\right]Cl_3$

C. $\left[Cr(en)_2Cl_2\right]Cl$

D. $\left[Cr(en)\left(NH_3\right)_2Cl_2\right]Cl$

Answer: 1

Watch Video Solution

10. Co-ordination compounds $\left[Pt\left(NH_3\right)_3(NCS)\right]$ and $\left[Pt\left(NH_3\right)_2Cl_2\right]Cl$ are example of ..... Isomerism

A. Co-ordination

B. Ionization

C. Linkage

D. Optical

Answer: 3

Watch Video Solution

11. ISOMERISM IN COORDINATION COMPOUNDS

A. Tetrahedral complex

B. Square planar complex

C. Linear Complex

D. Planar triangle complexes

Answer: 2

Watch Video Solution

12. Stable complex based on EAN rule

A. $K_4\left[Fe(CN)_6\right]$

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

C. $\left[Ni(CO)_4\right]$

D. all the above

Answer: 4

Watch Video Solution

13. Deduce the structures of $\left[NiCl_4\right]^{2-}$ and $\left[Ni(CN)_4\right]^{2-}$ considering the hybridisation of the metal ion. Calculate the magnetic moment (spin only) of the species.

A. sp^3

B. dsp^2

C. sp^3d

D. sp^3d^2

Answer: 1

Watch Video Solution

14. Which one of the following has a square planar geometry?

$(Co = 27, Ni = 28, Fe = 26, Pt = 78)$

A. $\left[COCl_4\right]^{-2}$

B. $\left[PtCl^4\right]^{-2}$

C. $\left[NiCl_4\right]^{-2}$

D. $\left[FeCl_4\right]^{-2}$

Answer: 2

Watch Video Solution

15. Which of the following is paramagnetic?

A. $Ni(CO)_4$

B. $Fe(CO)_5$

C. $V(CO)_6$

D. $Cr(CO)_6$

Answer: 3

Watch Video Solution

16. The number of ions formed when cuprammonium sulphate is dissolved in water is

A. 1

B. 2

C. 4

D. zero

Answer: 2

Watch Video Solution

17. Which of the following is correct arrangement of ligands in terms of field strength

A. $Cl^- < F^- < NCS^- < NH_3 < CN^-$

B. $NH_3 < F^- < Cl^- < NCS^- < CN^-$

C. $Cl^- < F^- < NCS^- < CN^- < NH_3$

D. $NH_3 < CN^- < NCS^- < Cl^- < F^-$

Answer: 1

Watch Video Solution

18. In which of the following octahedral complexes of Co (at. no. 27), will the magnitude of Δ_o be the highest?

A. $\left[Co\left(C_2O_4\right)_3\right]^{3-}$

B. $\left[Co\left(H_2O\right)_6\right]^{3+}$

C. $\left[Co\left(NH_3\right)_6\right]^{3+}$

D. $\left[Co(CN)_6\right]^{3-}$

Answer: 4

Watch Video Solution

19. If $\Delta_0 < P$, the correct electronic configuration for d^4 system will be (P = paiting energy)

A. $t_{2g}^4 e_g^0$

B. $t_{2g}^3 e_g^1$

C. $t_{2g}^0 e_g^4$

D. $t_{2g}^2 e_g^2$

Answer: 2

Watch Video Solution

20. Ammonium ions are detected with

A. Nessler's reagent

B. Borsch reagent

C. Tollen's reagent

D. Fehling's solution

Answer: 1

Watch Video Solution

21. $\left[\left(Ph_3P\right)_3RhCl\right]$ is a familiar catalyst used in

A. hydrogenation of oils

B. hydrogenation of alkenes

C. dehydration of alcohols

D. dehydration of aldehydes

Answer: 2

Watch Video Solution

22. Metals those can be extracted commercailly with aqueous solution of sodium cyanide as complexes are

A. Au and Ag

B. Fe and Ag

C. Au and Mg

D. Hg and Fe

Answer: 1

Watch Video Solution

23. If $Ag^{+} + NH_3 \Leftrightarrow \left[Ag\left(NH_3\right)\right]^{+}$, $K_1 = 3.5 \times 10^{-3}$ and $\left[Ag\left(NH_3\right)\right]^{+} + NH_3 \Leftrightarrow \left[Ag\left(NH_3\right)_2\right]^{+}$, $K_2 = 1.74 \times 10^{-3}$. The formation constant of $\left[Ag\left(NH_3\right)_2\right]^{+}$ is :

A. 1.7×10^{-3}

B. 5.92×10^{-6}

C. 1.8×10^{3}

D. 1.7×10^{7}

Answer: 2

Watch Video Solution

LEVEL-II

1. The oxidation number of cobalt in $K\left[Co(CO)_4\right]$ is

A. $+1$

B. $+3$

C. -1

D. -3

Answer: 3

Watch Video Solution

2. EDTA has coordination number

A. Monodentate ligand

B. Bidentate ligand

C. Quadridentate ligand

D. Hexadentate ligand

Answer: 4

Watch Video Solution

3. en' is an example of a

A. Monodentate ligand

B. Bidentate ligand

C. Tridentate ligand

D. Hexadentate ligand

Answer: 2

Watch Video Solution

4. IUPAC name of $K_2\left[PtCl_6\right]$ is

A. Potassiumhexachloroplatinum

B. Potassiumhexachloroplatinum(IV)

C. Potassiumhexachloroplatinum(IV)

D. Dipotassium hexa chloro plantinum

Answer: 3

Watch Video Solution

5. IUPAC name of $\left[Pt\left(NH_3\right)_3(Br)\left(NO_2\right)CI\right]CI$ is

A. Trimminechlorobromonitroplatinum (IV) chloride

B. Trimminebromonitrochloroplatinum (IV) chloride

C. Trimminebromochloronitroplatinum (IV) chloride

D. Trimminenitrobromochloroplatinum (IV) chloride

Answer: 3

Watch Video Solution

6. Tetrammine diaqua copper (II) hydroxide is given by the formula

A. $\left[Cu\left(NH_3\right)_4\right](OH)_2.2H_2O$

B. $\left[Cu\left(NH_3\right)_4(OH)_2\right].2H_2O$

C. $\left[Cu\left(NH_3\right)_4\left(H_2O\right)_2\right](OH)_2$

D. $\left[Cu\left(NH_3\right)_4\left(H_2O\right)(OH)_2\right]$

Answer: 3

Watch Video Solution

7. The compexes $\left[Co\left(NH_3\right)_6\right]\left[Cr\left(C_2O_4\right)_3\right]$ and $\left[Cr\left(NH_3\right)_6\right]\left[Co\left(C_2O_4\right)_3\right]$

A. Geometrical isomerism

B. Linkage isomerism

C. Coordination isomerism

D. Ionization isomerism

Answer: 3

Watch Video Solution

8. `Which of the following complex or the complex ion will show geometrical isomerism?

A. $\left[Pt\left(NH_3\right)_2Cl^2\right]$

B. $\left[Pt\left(NH_3\right)Cl_5\right]^-$

C. $\left[Pt\left(NH_3\right)_5Cl\right]^{3+}$

D. $\left[Co\left(NH_3\right)_6\right]Cl_3$

Answer: 1

Watch Video Solution

9. Which isomerism is exhibited by

$\left[Co\left(NH_3\right)_3\left(H_2O\right)_3\right]Cl_3$?

A. Geometrical isomerism

B. Linkage isomerism

C. Coordination isomerism

D. Ionization isomerism

Answer: 1

Watch Video Solution

10. $\left[Co\left(NH_3\right)_4\left(NO_2\right)_2\right]CI$ exhibits

A. Linkage isomerism, ionization isomerism and geometrical isomerism

B. Ionisation isomerism, geometrical isomerism and optical isomerism

C. Linkage isomerism, geometrical isomerism and optical isomerism

D. Linkage isomerism, ionization isomerism and optical isomerism

Answer: 1

Watch Video Solution

11. Which one of the following is an example of coordination isomerism?

A. $\left[Co\left(NH_3\right)_5Br\right]SO_4$ and $\left[Co\left(NH_3\right)_5SO_4\right]Br$

B. $\left[Co\left(NH_3\right)_5NO_2\right]Cl_2$ and $\left[Co\left(NH_3\right)_5ONO\right]Cl_2$

C. $\left[Cr\left(H_2O\right)_6\right]Cl_3$ and $\left[Cr\left(H_2O\right)_5Cl\right]Cl_2.H_2O$

D. $\left[Cr\left(NH_3\right)_6\right]\left[Co(CN)_6\right]$ and $\left[Co\left(NH_3\right)_6\right]\left[Cr(CN)_6\right]$

Answer: 4

Watch Video Solution

Watch Video Solution

12. $\left[FeF_6\right]^{3+}$ has Fe atom ..... Hybridized with unpaired ..... Electrons.

A. d^2sp^3, 4

B. d^2sp^3,5

C. sp^3d^2,5

D. sp^3d^2, 3

Answer: 3

Watch Video Solution

13. How many EDTA molecules are required to make an octahedral complex with a Ca^{2+} ion?

A. two

B. six

C. three

D. one

Answer: 4

Watch Video Solution

14. The d electron congfiguration of Cr^{2+} , Mn^{2+} , Fe^{2+} and Ni^{2+} are $3d^4$, $3d^5$, $3d^6$ and $3d^8$ respectively. Which one of the folowing aqua complexes will exhibit the minimum paramagnetic behaviour ? $(At.\ No.\ Cr = 24, Mn = 25, Fe = 26, Ni = 28)$

A. $\left[Fe\left(H_2O\right)_6\right]^{+2}$

B. $\left[Mn\left(H_2O\right)_6\right]^{+2}$

C. $\left[Cr\left(H_2O\right)_6\right]^{+2}$

D. $\left[Ni\left(H_2O\right)_6\right]^{+2}$

Answer: 4

Watch Video Solution

15. The expected spin only magnetic mometum for $\left[Fe(CN)_6\right]^{4-}$ and $\left[FeF_6\right]^{3+}$ are

A. 1.73 and 1.73 B.M

B. 1.73 and 5.93 B.M

C. 0.0 and 1.73 B.M

D. 0.0 and 5.92 B.M

Answer: 4

Watch Video Solution

16. The volume (in mL) of $0.1MAgNO_3$ required for complete precipitation of chloride ions present in $30mL$ of $0.01M$ solution of $\left[Cr\left(H_2O\right)_5Cl\right]Cl_2$, as silver chloride is close to:

A. 3

B. 4

C. 5

D. 6

Answer: 4

Watch Video Solution

17. Among the following ions which one has the highest paramagnetism?

A. $\left[Cr\left(H_2O\right)_6\right]^{3+}$

B. $\left[Fe\left(H_2O\right)_6\right]^{2+}$

C. $\left[Cu\left(H_2O\right)_6\right]^{2+}$

D. $\left[Cu\left(H_2O\right)_2\right]^{2+}$

Answer: 2

Watch Video Solution

18. Which of the following complex is an outer orbital complex?

A. $\left[Fe(CN)_6\right]^{4-}$

B. $\left[Mn(CN)_6^{4-}\right.$

C. $\left[Co\left(NH_3\right)_6\right]^{3+}$

D. $\left[Ni\left(NH_3\right)_6\right]^{2+}$

Answer: 4

Watch Video Solution

19. The EAN of cobalt in the complex ion $\left[Co(en)_2Cl_2\right]^+$ is

A. 27

B. 36

C. 33

D. 35

Answer: 2

Watch Video Solution

20. For an octahedral complex, which of the following d electron configuration will give maximum crystal-field stabilisation energy?

A. High spin d^6

B. Low - spin d^4

C. Low spin d^5

D. High - spin d^7

Answer: 3

Watch Video Solution

21. Chromium compound widely used in tanning of leather is

A. Cr_2O_3

B. $Cr_2O_2Cl_2$

C. Cr_2O_3

D. $K_2SO_4Cr_2\left(SO_4\right)_324H_2O$

Answer: 4

Watch Video Solution

22. Oxidation state of central metal atom and geometry for the Wilkinsons catalyst. $\left[Rh\left(Ph_3P\right)_3Cl\right]$ used for hydrogenation of alkenes are .....

A. 1, tetrahedral

B. 2, tetrahedrak

C. 1, square planar

D. 2, square planar

Answer: 3

Watch Video Solution

23. Coordination compounds have great importance in biological systems. In this context which of the following statements is

incorrect:

A. Chlorophylls are green pigments in plants and contain calcium.

B. Haemoglobin is the red pigment of blood and contains iron.

C. Cyanocobalamin is B_{12} and contains cobalt.

D. Carboxypeptidase-A is an enzyme and contains zinc.

Answer: 1

Watch Video Solution

LEVEL-III

1. One mole of complex compound $Co\left(NH_3\right)_5Cl_3$ gives 3 moles of ions on dissolution in water. One mole of same complex reacts with two moles of $AgNO_3$ to yield two moles of $AgCl(s)$. The complex is:

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

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

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

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

Answer: 2

Watch Video Solution

2. The primary and secondary valencies of chromium in the complex ion, dichlotodioxalatochromoium (III), are respectrively

A. 3, 4

B. 4, 3

C. 3, 6

D. 6, 3

Answer: 3

Watch Video Solution

3. In the complex with formula $MCl_3.4H_2O$ the co-ordination number of the metal M is six. And there is a no molecule of hydration in it. The volume of 0.1 M $AgNO_3$ solution needed to precitate the free chloride ions in 200 ml of 0.01 M solution of the complex is

A. 40 ml

B. 20 ml

C. 60 ml

D. 80 ml

Answer: 2

Watch Video Solution

4. The molar ionic conductances of octahedral complexes.

(I) $PtCl_4.5NH_3$ (II) $PtCl_4.4NH_3$

(III) $PtCl_4.3NH_3$ (IV) $PtCl_4.2NH_3$

A. $I < II < III < IV$

B. $IV < III < II < I$

C. $III < IV < II < I$

D. $IV < III < I < II$

Answer: 2

Watch Video Solution

5. The coordination number of a central metal atom in a complex is determined by:

A. the number of ligands around a metal ion bonded by sigma bonds

B. the number of ligarnds around a metal ion bonded by π-bonds

C. the number of ligands around a metal ion bounded by sigma and pi bonds both

D. the number of only anionic ligands bonded to the metal ion.

Answer: 1

Watch Video Solution

6. Among the following which are ambidentate ligands?

(a) NO_2^- (b) NO_3^- (c) $EDTA^+$

(d) $C_2O_4^{2+}$ (e) SCN^- (f) $H_2NCH_2CH_2NH_2$

A. (a) and (b)

B. (c) and (d)

C. (a) and (f)

D. (a) and (e)

Answer: 4

Watch Video Solution

7. The number of donor sites in dimethyl glyoxime, glycinato, diethylene triamine and $EDTA$ are respectively

(a) $2, 2, 3$ and 4

(b) $2, 2, 3$ and 6

(c) $2, 2, 2$ and 6

(d)$2, 3, 3$ and 6 .

A. 2, 2, 3 and 6

B. 2, 2, 3 and 4

C. 2, 2, 2 and 6

D. 2, 3, 3 and 6

Answer: 1

Watch Video Solution

8. The IUPAC name of the coordination compound $K_3\left[Fe(CN)_6\right]$ is:

A. potassium hexacyanoferrate (II)

B. potassium hexacyanoferrate (III)

C. potassium hexacyanoiron (II)

D. tripotassium hexacyanoion (II)

Answer: 2

Watch Video Solution

9. Which one of the following has largest number of isomers?

A. $\left[Ru\left(NH_3\right)_4Cl_2\right]^+$

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

C. $\left[Ir\left(PR_3P\right)_2H(CO)\right]^{2+}$

D. $\left[Co(en)_2Cl_2\right]^+$

Answer: 4

Watch Video Solution

10. Which of the following compounds shows optical isomerism?

A. $\left[Cr\left(C_2O_4\right)_3\right]^{3-}$

B. $\left[Co(CN)_6\right]^{3-}$

C. $\left[Cu\left(NH_3\right)_4\right]^{2+}$

D. $\left[ZnCl_4\right]^{2-}$

Answer: 1

Watch Video Solution

11. In which of the following pairs both the complexes do not show optical isomerism?

A. $cis\text{-}\left[Cr\left(C_2O_4\right)_2Cl_2\right]^{-3}, trans\text{-}\left[Co\left(NH_3\right)_4Cl_2\right]$

B. $\left[Co(en)_3\right]Cl_3, Cia\text{-}\left[Co(en)_2Cl_2\right]Cl$

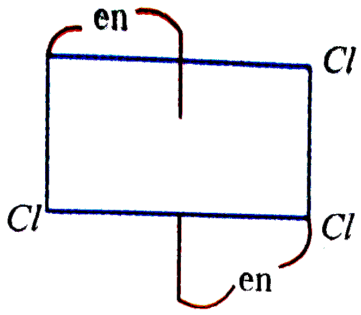
C. $\left[PtCl_2(en)\right], \left[NiCl_2Br_2\right]^{2-}$

D. $\left[Co\left(NO_3\right)_3\left(NH_3\right)_3\right], cis\text{-}\left[Pt(en)_2Cl_2\right]$

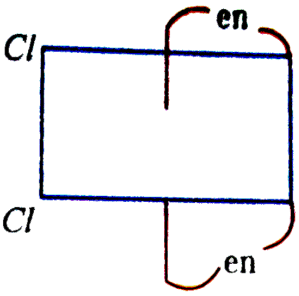
Answer: 3

Watch Video Solution

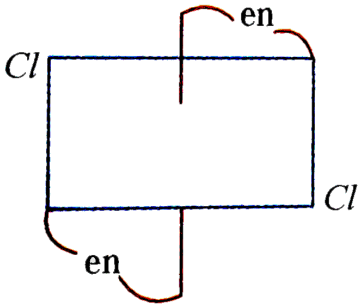
12. Of the following configurations, the optical isomers are



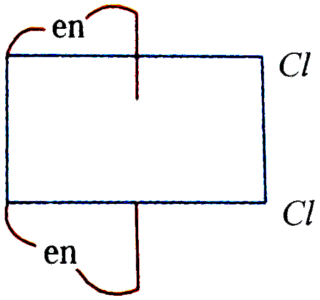
(*I*)



(*II*)



(*III*)



(*IV*)

A. *I&II*

B. *I&III*

C. *II&IV*

D. *II&III*

Answer: 3

Watch Video Solution

13. Which kind of isomerism is shown by $Co\left(NH_3\right)_4Br_2Cl$?

A. Optical and ionisation

B. Geometrical and optical

C. Geometrical and ionisation

D. Only geometrical

Answer: 3

Watch Video Solution

14. Which of the following does not have optical isomer?

A. $\left[Co(en)_3\right]Cl_3$

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

C. $\left[Co(en)_2Cl_2\right]Cl$

D. $\left[Co(en)\left(NH_3\right)_2Cl_2\right]Cl$

Answer: 2

Watch Video Solution

15. The complex $K_3\left[Fe(CN)_6\right]$ should have a spin only magentic of

A. $\sqrt{8}BM$

B. $2\sqrt{5}BM$

C. $\sqrt{3}BM$

D. $\sqrt{6}BM$

Answer: 3

Watch Video Solution

16. Which one of the following complexes? [Atomic numbers, Mn=25, Fe = 26, Co = 27, Ni = 28]

A. $\left[Fe(CN)_6\right]^{4-}$

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

C. $\left[Co\left(NH_3\right)_6\right]^{3+}$

D. $\left[Ni\left(NH_3\right)_6\right]^{2+}$

Answer: 4

Watch Video Solution

17. The correct order of magnetic moments (spin values in B.M.) among is:

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

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

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

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

Answer: 1

Watch Video Solution

18. Which one of the following has lowest value of paramagnetic behaviour?

A. $\left[Fe(CN)_6\right]^{3-}$

B. $\left[Co(CN)_6\right]^{3-}$

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

D. $\left[Mn(CN)_6\right\}^{3-}$

Answer: 3

Watch Video Solution

19. Which of the following statements is not correct?

A. The complexes $\left[NiCl_4\right]^{2-}$ and $\left[Ni(CN)_4\right]^{2-}$ differ in their magnetic properties.

B. The complexes $\left[NiCl_4\right]^{2-}$ and $\left[Ni(CN)_4\right]^{2-}$ differ in the state of hybridisation of nickel

C. The complexes $\left[NiCl_4\right]^{2-}$ and $\left[Ni(CN)_4\right]^{2-}$ differ in geometry

D. The complexes $\left[NiCl_4\right]^{2-}$ and $\left[Ni(CN)_4\right]^{2-}$ differ in primary valancies of nickel.

Answer: 4

Watch Video Solution

20. The compound having a tetrahedral geometry is .

A. $\left[PdCl_4\right]^{2-}$

B. $\left[Ni(CN)_4\right]^{2-}$

C. $\left[Pd(CN)_4\right]^{2-}$

D. $\left[NiCL_4\right]^{2-}$

Answer: 4

Watch Video Solution

21. Geometry, hybridisation and magnetic moment of the ions $\left[Ni(CN)_4\right]^{2-}$, $\left[MnBr_4\right]^{2-}$ and $\left[FeF_6\right]^{3-}$ are .

A. Tetrahedral, square planar, octahedral:

$sp^3, dsp^3, sp^3d^2 : 5.9, 0, 4.9$

B. Tetrahedral, square planar, octahedral:

$dsp^2, sp^3, sp^3d^2 : 0, 5.9, 4.9$

C. Square planar, tetrahedral, octahedral:

$dsp^2, sp^3, d^2sp^3 : 5.9, 4.9, 0$

D. Square planar, tetrahedral, octahedral:

$dsp^3, sp^3, sp^3d^2 : 0, 5.9, 4.9$

Answer: 4

Watch Video Solution

22. $\left[Cr\left(H_2O\right)_6\right]Cl_3$ (at no. of Cr = 24) has a magnetic moment of $3.83B.M.$ The correct distribution of $3d$ electrons the chromium of the complex.

A. $3d_{xy}^1, 3d_{yx}^1, 3d_{zx}^1$

B. $3d_{xy}^1, 3d_{yx}^1, 3d_{z^2}^1$

C. $3d\left(x^2\text{-}y^2\right)^1, 3d_{z^2}^1, 3d_{xz}^1$

D. $3d_{xy}^1, 3d\left(x^2\_y^2\right)^1, 3d_{yz}^1$

Answer: 1

Watch Video Solution

23. In which of the following octahedral complexes of Co (at. no. 27), will the magnitude of Δ_o be the highest?

A. $\left[Co(CN)_6\right]^{3-}$

B. $\left[Co\left(C_2O_4\right)_3\right]^{3-}$

C. $\left[Co\left(H_2O\right)_6\right]^{3+}$

D. $\left[Co\left(NH_3\right)_6\right]^{3+}$

Answer: 1

Watch Video Solution

24. Which of the following is a correct Irving-Williams order? (Tendency of complex formation)

A. $Mn^{2+} < Fe^{2+} < Co^{2+} < Ni^{2+}$

B. $Ni^{2+} < Co^{2+} < Fe^{2+} < Mn^{2+}$

C. $Fe^{2+} < Mn^{2+} < Ni^{2+} < Co^{2+}$

D. $Co^{2+} < Mn^{2+} < Fe^{2+} < Ni^{2+}$

Answer: 1

Watch Video Solution

25. What is spectrochemical series?

A. $Cl^- < F^- < C_2O_4^{2-} < NO_2^- < CN^-$

B. $CN^- < C_2O_4^{2-} < Cl^- < NO_2^- < F^-$

C. $C_2O_4^{2-} < F^- < Cl^- < NO_2^- < CN^-$

D. $F^- < Cl^- NO_2^- < C_2O_4^{2-}$

Answer: 1

Watch Video Solution

26. Which of the following ligands is calles π- acceptors?

CO	CN^-	NO^+
(I)	(II)	(III)

A. I, II, III

B. I, II only

C. I, III only

D. III only

Answer: 1

Watch Video Solution

27. In $Fe(CO)_5$, the Fe - C bond possesses:

A. π-character only

B. σ character only

C. ionic character only

D. both σ & π character

Answer: 4

Watch Video Solution

PREVIOUS AIEEE QUESTIONS

1. Which of the following has an optical isomer?

(en=ethylenediamine) ?

A. $\left[Zn(en)_2\right]^{2+}$

B. $\left[Zn(en)\left(NH_3\right)_2\right]^{2+}$

C. $\left[Co(en)_3\right]^{3+}$

D. $\left[Co\left(H_2O\right)_4 en\right]^{3+}$

Answer: 3

Watch Video Solution

2. Which of the following facts about the complex $\left[Cr\left(NH_3\right)_6\right]Cl_3$ is

wrong?

A. The complexes innvolves d^2sp^3 hybridisation and is octahedral shape

B. The complex is paramagnetic

C. The complex is an outer orbital complex

D. The complex gives white prepipitate which silver nitrate solution

Answer: 3

Watch Video Solution

3. Deduce the structures of $\left[NiCl_4\right]^{2-}$ and $\left[Ni(CN)_4\right]^{2-}$ considering the hybridisation of the metal ion. Calculate the magnetic moment (spin only) of the species.

A. $1.8BM$

B. $5.86BM$

C. $2.82BM$

D. $3.82BM$

Answer: 3

Watch Video Solution

4. Which among the following will be named as dibromidobis (ethylene diamine) chromium (III) bromide?

A. $\left[CrBr_2(en)_2\right]^+$

B. $Cr\left[Br_2(eN)_2^-\right]^-$

C. $\left[CrBr_2(en)\right]^+$

D. $\left[CrBr_2(en)\right]^{+2}$

Answer: 1

Watch Video Solution

5. Which of the following complex species is not expected to exhibit optical isomerism ?

A. $\left[Co(en)_2Cl_2\right]^+$

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

C. $\left[Co(en)\left(NH_3\right)_2Cl_2\right]^+$

D. $\left[Co(en)_3\right]^{3+}$

Answer: 2

Watch Video Solution

LEVEL - IV

1. Which is a low spin complex?

A. $\left[Fe(CN)_6\right]^{3-}$

B. $\left[Co\left(NO_2\right)_6\right]^{3-}$

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

D. All of these

Answer: 4

Watch Video Solution

2. Aqueous solution of Ni^{2+} contains $\left[Ni\left(H_2O\right)_6\right]^{2+}$ and its magnetic moment is 2.83 B.M. When ammonia is added in it, the predicted change in the magnetic moment of solution is:

A. It will remain same

B. It increases from 2.83 B.M.

C. It decreases from 2.83 B.M.

D. It can not be predicted theoretically.

Answer: 1

Watch Video Solution

3. Which of the following complexes is a paramagnetic complex?

A. $K_2\left[Ni(CN)_4\right]$

B. $Ni\left[H_2O\right)_6\Big]\left(NO_3\right)_2$

C. $\left[Co\left(NH_3\right)_6\right]Cl_3$

D. $\left[Pt\left(NH_3\right)_4\right]Cl_2$

Answer: 2

Watch Video Solution

Watch Video Solution

4. Which of the following are paramagnetic?

A. $K_4\left[Ni(CN)_4\right]$

B. $K_3\left[Cr(CN)_6\right]$

C. $K_3\left[Co(CN)_6\right]$

D. $K_2\left[Ni(CN)_4\right]$

Answer: 2

Watch Video Solution

5. Which of the following pairs of d-electron configuration exhibit both low and high spin tetrahedral complex

A. d^1, d^2

B. d^3, d^4

C. d^7, d^8

D. d^9, d^{10}

Answer: 2

Watch Video Solution

6. Assign the hybridisation, shape and magnetic moment of $K_2\left[Cu(CN)_4\right]$

A. sp^3, tetrahedral, 1.73 BM

B. dsp^2 square planar, 1.73 BM

C. sp^3, tetrahedral, 2.8 BM

D. dsp^2, square planar, 2.8 BM

Answer: 2

Watch Video Solution

7. Which of the following is most stable?

A. $\left[Fe\left(H_2O\right)_6\right]^{3+}$

B. $\left[Fe(CN)_6\right]^{3-}$

C. $\left[Fe\left(C_2O_4\right)_3\right]^{3-}$

D. $\left[FeCl_6\right]^{3-}$

Answer: 3

Watch Video Solution

8. Which of the following complex formed by Cu^{2+} ions is most stable?

A. $Cu^{2+} + 4NH_3 \Leftrightarrow \left[Cu\left(NH_3\right)_4\right]^{2+}$, logK = 11.6

B. $Cu^{2+} + 4CN \Leftrightarrow \left[Cu(CN)_4\right]^{2-}$, logK = 27.3

C. $Cu^{2+} + 2en \Leftrightarrow \left[Cu(en)_2\right]^{2+}$, logK = 15.4

D. $Cu^{2+} + 4H_2O \Leftrightarrow \left[Cu\left(H_2O\right)_4\right]^{2+}$, logK = 8.9

Answer: 2

Watch Video Solution

9. The colour of the coordination compounds depends on the crystal field splitting . What will be the correct order of obsorption of wavelength of light in the visible region, for the comolexes, $\left[Co\left(NH_3\right)_6\right]^{3+}$ m and $\left[Co\left(H_2O\right)_6^{3+}\right.$?

A. $\left[Co(CN)_6\right]^{3-} > \left[Co\left(NH_3\right)_6\right]^{3+} > \left[Co\left(H_2O\right)_6\right]^{3+}$

B. $\left[Co\left(NH_3\right)_6\right]^{3+} > \left[Co\left(H_2O\right)_6\right]^{3+} > \left[Co(CN)_6\right]^{3-}$

C. $\left[Co\left(H_2O\right)_6\right]^{3+} > \left[Co\left(NH_3\right)_6\right]^{3+} > \left[Co(CN)_6\right]^{3-}$

D. $\left[Co\left(NH_3\right)_6\right]^{3+} > \left[Co(CN)_6\right]^{3-} > \left[Co\left(H_2O\right)_6\right]^{3+}$

Answer: 3

Watch Video Solution

10. Indicate the complex ion which shows geometrical isomerism.

A. $\left[Cr\left(H_2O\right)_4Cl_2\right]^{+}$

B. $\left[Pt\left(NH_3\right)_3Cl\right]^{+}$

C. $\left[Co\left(NH_3\right)_6\right]^{3+}$

D. $\left[Co(CN)_5(NC)\right]^{3-}$

Answer: 1

Watch Video Solution

11. When 1 mol $CrCl_3.6H_2O$ is treated with excess of $AgNO_3$, 3 mol of $AgCl$ are obtained. The formula of the coplex is

A. $\left[CrCl_3\left(H_2O\right)_3\right].3H_2O$

B. $\left[CrCl_2\left(H_2O\right)_4\right]Cl.2H_2O$

C. $\left[CrCl\left(H_2O\right)_5\right]Cl_2.H_2O$

D. $\left[Cr\left(H_2O\right)_6\right]Cl_3$

Answer: 4

Watch Video Solution

12. When 0.1 mol $CoCl_3\left(NH_3\right)_5$ is treated with excess of $AgNO_3$, 0.2 mole of AgCl are obtained. The conductivity of solution will correspond to

A. $1:3$ electrolyte

B. $1:2$ electrolyte

C. $1:1$ electrolyte

D. $3:1$ electrolyte

Answer: 2

Watch Video Solution

13. The correct IUPAC name of $\left[Ot\left(NH_3\right)_2Cl_2\right]$ is

A. diamminedichloridoplatinum (II)

B. diamminedichloridoplatinum (IV)

C. diamminedichloridoplatinum (O)

D. diamminedichloridoplatinum (IV)

Answer: 1

Watch Video Solution

14. The stabilization of coordination compound due to chelation is called the chelate effect. Which of the following is the most stable complex species?

A. $\left[Fe(CO)_5\right]$

B. $\left[Fe(CN)_6\right]^{3-}$

C. $\left[Fe\left(C_2O_4\right)_3\right]^{3-}$

D. $\left[Fe\left(H_2O\right)_6\right]^{3+}$

Answer: 3

Watch Video Solution

15. The CFSE for octahedral $\left[CoCl_6\right]^{4-}$ is $18,000 cm^{-1}$. The CFSE for tetrahedral $\left[CoCl_4\right]^{2-}$ will be

A. $18,000 cm^{-1}$

B. $16,000 cm^{-1}$

C. $8,000 cm^{-1}$

D. $20,000 cm^{-1}$

Answer: 3

Watch Video Solution

16. Due to the presence of ambidenate ligands coordination compounds show isomerism. Palladium complexes of the type $\left[Pd\left(C_6H_5\right)_2(SCN)_2\right]$ & $\left[Pd\left(C_{6H_5}-(2)(NCS)_2\right]\right.$ are

A. Linkage isomerism

B. coordination isomers

C. ionization isomers

D. geometrical isomers.

Answer: 1

Watch Video Solution

17. The compounds $\left[Co\left(SO_4\right)\left(NH_3\right)_5\right]Br$ and $\left[Co\left(SO_4\right)\left(NH_3\right)_5\right]Cl$

A. Linkage isomerism

B. Ionisation isomerism

C. coordinatio isomerism

D. no isomerism

Answer: 4

Watch Video Solution

Watch Video Solution

18. Which of the following is not chelating agent

(a) Thiosulphate

(b) Oxalato

(c) Glycinato

(d) Ethylene diamine .

A. Thiosulphate

B. Oxalato

C. Glycinato

D. Ethane-1, 2-diamine

Answer: 1

Watch Video Solution

19. Which of the following species is not expected to be a ligand?

A. NO

B. NH_4^+

C. $NH_2CH_2CH_2NH_2$

D. CO

Answer: 1

Watch Video Solution

20. What kind of isomerism exists between $\left[Cr\left(H_2O\right)_6\right]Cl_3$ (violet) and $\left[Cr\left(H_2O\right)_5Cl\right].H_2O$ (greyish-green)?

A. Linkage isomerism

B. Solvate isomerism

C. Ionisation isomerism

D. Coordination isomerism

Answer: 2

Watch Video Solution

21. IUPAC name of $\left[Pt\left(NH_3\right)_2Cl\left(NO_2\right)\right]$ is

A. platinum diaminechloronitrite

B. Chloronitrito-N-ammeniplatinum (II)

C. diammenichloridonitrito-N-plantinum(II)

D. diamminechloronitrito-N-plantinate(II)

Answer: 3

Watch Video Solution

22. On the basis of the following observations made with acqueous solutions. In which of the following complexes the central metal atom exhibits secondary valency is six

complex formula	Moles of AgCl precipitated per mol of the compounds with execess of $AgNO_3$
(i) $PdCl_2 \cdot 4NH_3$	2
(ii) $NiCl_2 \cdot 6H_2O$	2
(iii) $PtCl_4 \cdot 2HCl$	0
(iv) $CoCl_3 \cdot 4NH_3$	1
(v) $PtCl_2 \cdot 2NH_3$	0

A. *I, ii, iv*

B. *ii, iii, iv*

C. *ii, iv, v*

D. *I, iv, v*

Answer: 2

Watch Video Solution

23. Calculate the overall complex dissociation equilibrium constant for the $\left[Cu\left(NH_3\right)_4\right]^{2+}$ ion, given that β_4 for this complex is 2.1×10^{13}

A. 4.7×10^{-14}

B. 2.1×10^{-13}

C. 2.1×10^{13}

D. 4.7×10^{14}

Answer: 1

Watch Video Solution

LEVEL-I (H.W)

1. The complex formed by the combination of calcium ions and ethylene di ammine tetra acetate. $(EDTA)^{-4}$ Number of moles of calcium ions produced by dissolving of one moles of calcium ions produced by dissolving of one mole of that complex in excess of water is

A. one

B. two

C. four

D. five

Answer: 2

Watch Video Solution

2. Which of the following is a double salt?

A. Carnalite

B. Potassium ferrocyanide

C. Potasium ferricyanide

D. Nessler's reagent

Answer: 1

Watch Video Solution

3. Bonds present in $K_4\left[Fe(CN)_6\right]$ are

A. only ionic

B. only covalent

C. ionic and covalent

D. ionic, covalent and coordinate covalent

Answer: 4

Watch Video Solution

4. Copper sulphate solution forms blue coloured complex with excess of ammonia. Its formula is

A. $\left[Cu\left(NH_3\right)_4\right]^{+3}$

B. $\left[Cu\left(NH_3\right)_4\right]^{+2}$

C. $\left[Cu\left(NH_4\right)_3\right]^{+2}$

D. $\left[Cu\left(NH_4\right)_3\right]^{+3}$

Answer: 2

Watch Video Solution

5. Which of the following cannot act as a ligand?

A. BF_3

B. NH_3

C. NO^+

D. CN^-

Answer: 1

Watch Video Solution

6. Alum in aqueous solution gives positive test for

(A) K^+ (B) Al^{3+} (C) SO_4^{2-}

A. A only

B. B only

C. A and B

D. A, B and C

Answer: 4

Watch Video Solution

7. Chelates are used in

A. Analytical chemistry

B. Water softening

C. Removal of Pb^{+2} from the blood

D. All of these

Answer: 4

Watch Video Solution

8. Hexaaquatitanium (III) chloride is

A. $\left[Ti\left(H_2O\right)_6\right]Cl_3$

B. $\left[TiCl_3\right]6H_2O$

C. $\left[Ti\left(H_2O\right)_5Cl\right]Cl_2$

D. $\left[TI\left(H_2O\right)_3Cl_3\right]$

Answer: 1

Watch Video Solution

9. IUPAC name of $Li\left[AIH_4\right]$ is

A. Lithium aluminium hydride

B. Lithium tetrahydrido aluminate (III)

C. Tetrahydride aluminium lithionate

D. Aluminium lithium hydride

Answer: 2

Watch Video Solution

10. Dipole moment will be zero in the complexes

A. $\left[Ni(CN)_4\right]^{2-}$

B. *Cis* - $\left[Pt\left(NH_3\right)_2Cl_2\right]$

C. *Trans* - $\left[Pt\left(NH_3\right)_2Cl_2\right]$

D. Both 1 and 3

Answer: 4

Watch Video Solution

11. The number of geometrical isomers of $\left[Co\left(NH_3\right)_3\left(NO_3\right)_3\right]$ is

A. 0

B. 2

C. 3

D. 4

Answer: 2

Watch Video Solution

12. For the given complex $\left[CoCl_2(en)\left(N_3\right)_2\right]^+$, the number of geometrical iosmers, the number of optical isomers and total number of isomers of all type possible respectively are

A. 2, 2, &4

B. 2, 2&3

C. 2, 0&2

D. 0, 2&2

Answer: 2

Watch Video Solution

13. Which does not obey EAN rule?

A. $K_4\left[Fe(CN)_6\right]$

B. $K_3\left[Fe(CN)_6\right]$

C. $\left[Co\left(NH_3\right)_6\right]Cl_3$

D. $\left[Ni(CO)_4\right]$

Answer: 2

Watch Video Solution

14. The following solutions requires three moles of $AgNO_3$ for the complete precipitation of all the chloride ions present in it

A. One litre of 1M $\left[Co\left(NH_3\right)_6\right]Cl_3$

B. Three litres of 1M $\left[Co\left(NH_3\right)_4Cl_2\right]Cl$

C. One litre of 1.5 M $\left[Co\left(NH_3\right)_5Cl\right]Cl_2$

D. all the above

Answer: 4

Watch Video Solution

15. $AgCl$ dissolved in excess of NH_3, KCN and $Na_2S_2O_3$ solutions the complex produces ions

A. $\left[Ag\left(NH_3\right)_2\right]^+, \left[Ag(CN)_2\right]^- \& \left[Ag\left(S_2O_3\right)_2\right]^{3-}$

B. $\left[Ag\left(NH_3\right)_2\right]^{2+}, \left[Ag(CN)_2\right]^{3-} \& \left[Ag_4\left(S_2O_3\right)_5\right]^{2+}$

C. $\left[Ag\left(NH_3\right)_2\right]^{2+}, \left[Ag(CN)_2\right]^+ \& \left[Ag_2\left(S_2O_3\right)_5\right]^{2-}$

D. $\left[Ag\left(NH_3\right)_4\right]^+, \left[Ag(CN)_4\right]^{3-} \& \left[Ag_2\left(S_2O_3\right)_2\right]^{2-}$

Answer: 1

Watch Video Solution

16. The secondary valency of chromium in $\left[Cr(en)_3\right]Cl_3$ is

A. 6

B. 3

C. 2

D. 4

Answer: 1

Watch Video Solution

17. Stabilisation energy of octahedral complex with d^7 configuration

(A) $-1.8\Delta_0$ with one unpaired electron

(B) $1.8\Delta_0$ with three unpaired electrons

(C) $-0.8\Delta_0$ with one unpaired electron

(D) $0.8\Delta_0$ with three unpaired electrons

A. A and D

B. A and B

C. C and D

D. B and C

Answer: 1

Watch Video Solution

18. If $\Delta_0 > P$, the correct electronic configuration for d^4 system will be (p = pairing energy)

A. $t_{2g}^4 e_g^0$

B. $t_{2g}^3 e_g^1$

C. $t_{2g}^0 e_g^4$

D. $t_{2g}^2 e_g^2$

Answer: 1

Watch Video Solution

19. The ligand that gives dark blue color with curic ion in the laboratory is

A. NH_3

B. I^-

C. CN^-

D. $S_2O_3^{2-}$

Answer: 1

Watch Video Solution

20. The configuration of an elements 'X' is $3d^{10}4s^1$. The wrong statement regarding the element 'X' is

A. it forms complexes

B. it exhibits variable velency

C. it forms paramagnetic ions only

D. it can form coloured salts

Answer: 3

Watch Video Solution

21. In the qualitative analysis of group 3 cations blood red colouration is a test for

A. iron using cyanate as ligand

B. chromium using cyanide as ligand

C. iron using thiocyante as ligand

D. chromium using thiocyanate as ligand

Answer: 3

Watch Video Solution

LEVEL-II (H.W)

1. An ambidentate ligand is one which

A. is linkage to the metal atom at two points

B. has two donor atoms but only one of them has the capacity to form a coordinate bond

C. has two donor atoms but either of the two can form a co-ordinate bond

D. forms chelate rings

Answer: 3

Watch Video Solution

2. Which of the following is not chelating agent

(a) Thiosulphate

(b) Oxalato

(c) Glycinato

(d) Ethylene diamine .

A. Thiosulphato

B. Oxalato

C. Glycinato

D. Ethylene diamine

Answer: 1

Watch Video Solution

3. IUPAC name of $Na_3\left[CoCl\left(NO_2\right)_5\right]$ is

A. Sodium chloropentanitrocobaltate (III)

B. Sodium cobaltnitrate

C. Trisodium chloropentanitro cobalt

D. Pentanitrocobalt (III) trisodium complex

Answer: A

Watch Video Solution

4. The IUPAC name of Wilkinsons catalyst $\left[RhCl\left(PPh_3\right)_3\right]$ is

A. Chlorotris (triphenylphopshine) rhodium (I)

B. Chlorotris (triphenylphosphine) rhodium (IV)

C. Chlorotris (triphenylphosphine) rhodium (0)

D. Chlorotris (triphenylphosphine) rhodium (VI)

Answer: 1

Watch Video Solution

5. IUPAC name $\left[Co\left(NH_3\right)_5\left(NO_2\right)\right]Cl_2$ is

A. Nitrito-N-pentaammine cobalt (III) chloride

B. Nitrito-N-pentaammine cobalt (II) choride

C. pentaammine nitrito-N-cobalt (II) chloride

D. Pentaamine nitroto-N-cobalt (III) chloride

Answer: 4

Watch Video Solution

6. Both geometrical and optical isomerism are shown by

A. $\left[Co(en)_2Cl_2\right]^+$

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

C. $\left[Co\left(NH_3\right)_4Cl_2\right]^+$

D. $\left[Cr(ox)_3\right]^{3-}$

Answer: 1

Watch Video Solution

7. Which of the following is not optically active?

A. $\left[Co(en)_3\right]^{3+}$

B. $\left[Cr(ox)_3\right]^{3-}$

C. *cis* - $\left[CoCl_2(en)_2\right]^{+}$

D. *trans* - $\left[CoCl_2(en)_2\right]^{+}$

Answer: 4

Watch Video Solution

8. Cis-trans isomerism is found in square planar complexes of molecular formula: (a and b are monodentate ligands)

A. Ma_4

B. Ma_3b

C. Ma_2b_2

D. Mab_3

Answer: 3

Watch Video Solution

9. Which of the following isomeric pairs shows ionization isomerism?

A. $\left[Co\left(NH_3\right)_6\right]\left[Cr(CN)_6\right]$ and $\left[Cr\left(NH_3\right)_6\right]\left[Co(CN)_6\right]$

B. $\left[Cr\left(H_2O\right)_6Cl_3\right.$ and $\left[Cr\left(H_2O\right)_5Cl\right]Cl_2.H_2O$

C. $\left[Pt\left(NH_3\right)_2Cl_2\right]$ and $\left[Pt\left(NH_3\right)_4\right]\left[PtCl_4\right]$

D. $\left[Co\left(NH_3\right)_5Br\right]SO_4$ and $\left[Co\left(NH_3\right)_5SO_4\right]Br$

Answer: 4

Watch Video Solution

10. The color of $\left[Ti\left(H_2O_6\right]^{3+}\right.$ is due to

A. Charge transfer transition

B. $d \rightarrow d$ transition

C. Ligand to metal charge transfer tranition

D. Metal to ligand charge transfer transition

Answer: 2

Watch Video Solution

11. Coordination number of Cr is six. A complex with ligands $C_2O_4^{2-}$, en and superoxide will be in the ratio to make complex $\left[Cr\left(C_2O_4\right)_x(en)_y\left(O_2\right)_z\right]^{\Theta}$.

A. $1:1:2$

B. $1:1:1$

C. $1:2:2$

D. $2:1:1$

Answer: 1

Watch Video Solution

12. The geometries of $Ni(CO)_4$ and $Ni\left(PPh_3\right)_2Cl_2$ are .

A. both square planar

B. tetrahedral and square planar

C. both tetrahedral

D. square planar and tetrahedral

Answer: 2

Watch Video Solution

13. What are the magnetic moment (in BM) for Ni(II) ion in square planar and octahedral geometry, respectrively?

A. 0 and 2.83

B. 2.83 and 2.83

C. 0 and 1.73

D. 2.83 and 0

Answer: 1

Watch Video Solution

14. A solution containing 2.675 g of $CoCl_3.6NH_3$ (molar mass $= 267.5 gmol^{-1}$) is passed through a cation exchanger. The chloride ions obtained is solution were treated with excess of $AgNO_3$ to give 4.73 g of $AgCl$ (molar mass = $143.5 gmol^{-1}$). The formula of the complex is (At. mass of Ag = 108 u)

A. $\left[CoCl_3\left(NH_3\right)_3\right]$

B. $\left[CoCl\left(NH_3\right)_5\right]Cl_2$

C. $\left[Co\left(NH_3\right)_6\right]Cl_3$

D. $\left[CoCl_2\left(NH_3\right)_4\right]Cl$

Answer: 3

Watch Video Solution

Watch Video Solution

15. The complex $\left[Pd(en)_2\right]^{2+}$ has....Structure

A. Square planner

B. tetrahedral

C. pyramidal

D. pentagonal

Answer: 1

Watch Video Solution

16. Crystal field stabilization energy for high spin d^4 octahedral complex is

A. $-0.6\Delta_0$

B. $-1.8\Delta_0$

C. $-1.6\Delta_0$

D. $-1.2\Delta_0$

Answer: 1

Watch Video Solution

17. Which of the following is antidote for lead poisoinig ?

A. $CoCl_3$

B. Cis-platin

C. EDTA

D. DMG

Answer: 3

Watch Video Solution

18. EDTA is used for the estimation of

A. Na^+ and K^+ ions

B. Cl^- and Br^- ions

C. Cu^{2+} and Ag^+ ions

D. Ca^{2+} and Mg^{2+} ions

Answer: 4

Watch Video Solution

19. Wilkinson's catalyst is used as a homogeneous hydrogenation catalyst for the conversion of alkenes to alkanes. It is a complex of

A. iron

B. aluminium

C. rhodium

D. cobalt

Answer: 3

Watch Video Solution

20. Ziegler-Natta catalyst is

A. Solution of $SnCl_4$ + trialkylaluminium

B. Solution of $TiCl_4$ + trakylaluminium

C. Solution of $TiCl_4$ + trialkylchromium

D. Solution of $SnCl_4$ + Tollen's reagent

Answer: 2

Watch Video Solution

EXERCISE -1

1. IUPAC name of complex $K_3\left[Al\left(C_2O_4\right)_3\right]$ is

A. Potassium alumino-oxalate

B. Potassium trioxalatoaluminate(III)

C. Potassium aluminium (III) oxalate

D. Potassium trioxalatoaluminate (IV)

Answer: B

Watch Video Solution

2. Trioxalato aluminate (III) and tetrafluoro-borate (III) ions are:

A. $\left[Al\left(C_2O_4\right)_3\right], \left[BF_4\right]^{3-}$

B. $\left[Al\left(C_2O_4\right)_3\right]^{3+}, \left[BF_4\right]^{3+}$

C. $\left[Al\left(C_2O_4\right)_3\right]^{3-}, \left[BF_4\right]^{-}$

D. $\left[Al\left(C_2O_4\right)_3\right]^{2-}, \left[BF_4\right]^{2-}$

Answer: C

Watch Video Solution

3. Which of the ligands can show linkage isomerism:

A. NCS^-

B. NO_2^-

C. CN^-

D. All of these

Answer: D

Watch Video Solution

Watch Video Solution

4. In which of the following complexes the nickel metal is in highest oxidation state :

A. $Ni(CO)_4$

B. $K_2\left[NiF_6\right]$

C. $\left[Ni\left(NH_3\right)_6\right]\left(BF_4\right)_2$

D. $\left[K_2\left[Ni(CN)_4\right]\right.$

Answer: B

Watch Video Solution

5. A complex of platinum, ammonia and chloride produces four ions per molecule in the solution. The structure consistent with the observation is:

A. $\left[Pt\left(NH_3\right)_4\right]Cl_4$

B. $\left[Pt\left(NH_3\right)_2Cl_2\right]$

C. $\left[Pt\left(NH_3\right)_5Cl\right]Cl_3$

D. $\left[Pt\left(NH_3\right)_4Cl_2\right]Cl_2$

Answer: C

Watch Video Solution

6. The oxidation state of Mo in its oxo-complex species $\left[Mo_2O_4\left(C_2H_4\right)_2\left(H_2O\right)_2\right]^{2-}$ is:

A. $+2$

B. $+3$

C. $+4$

D. $+5$

Answer: B

Watch Video Solution

7. In which of the following compounds transition metal is in oxidation state zero

A. $\left[Co\left(NH_3\right)_6\right]Cl_2$

B. $\left[Fe\left(H_2O\right)_6SO_4\right]$

C. $\left[Ni(CO)_4\right]$

D. $\left[Fe\left(H_2O\right)_3\right](OH)_2$

Answer: C

Watch Video Solution

8. Formula of ferrocene is :

A. $\left[Fe(CN)_6\right]^{4-}$

B. $\left[Fe(CN)_6\right]^{3+}$

C. $\left[Fe(CO)_5\right]$

D. $\left[Fe\left(C_5H_5\right)_2\right]$

Answer: D

Watch Video Solution

9. Which of the following is a π complex?

A. Trimethyle aluminium

B. Ferrocene

C. Diethyl zinc

D. Nickel tetra carbonyl

Answer: B

Watch Video Solution

10. Which of the following is most likely structrure of $CrCI_3.6H_2O$ if $1/3$ of total chlorine of the compound is precipitated by adding $AgNO_3$ to its aqueous solution?

A. $CrCl_3.6H_2O$

B. $\left[CrCLl_3\left(H_2O\right)_3\right].\left(H_2O\right)_3$

C. $\left[CrCl_2\left(H_2O\right)_4\right]Cl.2H_2O$

D. $\left[CrCl\left(H_2O\right)_5\right]Cl_2.H_2O$

Answer: C

Watch Video Solution

11. The two compounds $\left[Co\left(SO_4\right)\left(NH_3\right)_5\right]Br$ and $\left[Co\left(SO_4\right)\left(NH_3\right)_5\right]Cl$ represent:

A. Linkage isomerism

B. Ionisation isomerism

C. Co-ordination isomerism

D. no isomerism

Answer: D

Watch Video Solution

12. Diethylene triamine is:

A. Chelating agent

B. Polydentate ligand

C. Tridentate ligand

D. All of these

Answer: D

Watch Video Solution

13. How many moels of AgCI would be obtained, when 100 mL of 0.1 M $CO\left(NH_3\right)_5CI_3$ is treated with excess of $AgNO_3$?

A. 0.01

B. 0.02

C. 0.03

D. none of these

Answer: B

Watch Video Solution

14. 0.001 mol of $Co(NH_3)_5(NO_3)(SO_4)$ was passed through a cation exchanger and the acid coming out of it required 20 ml of 0.1 M NaOH for neutralisation. Hence, the complex is

A. $[CoSO_4(NH_3)_5]NO_3$

B. $[CoNO_3(NH_3)_5]SO_4$

C. $[Co(NH_3)_5]SO_4NO_3$

D. none of these

Answer: B

Watch Video Solution

15. Which of th efollowing is a bivalent and bidentate ligand?

A. Nitrito

B. Oxalato

C. Glycinato

D. Ethylene diamine

Answer: B

Watch Video Solution

16. Which of the following has six donor (coordinating) sites?

A. Triethylene tetramine

B. Ethylenediamine tetracetate ion (EDTA)

C. Nitrilotriacetic (NTA)

D. Diethylene triamine

Answer: B

Watch Video Solution

17. The IUPAC name of the red coloured complex $\left[Fe\left(C_4H_7O_2N_2\right)_2\right]$ obtained from the reaction of Fe^{2+} and dimethyl glyoxime

A. bis (dimethyl glyoxime) ferrate (II)

B. bis (dimethyl glyoximato) iron (II)

C. bis (2, 3-butanediol dioximato) iron (II)

D. bis (2, 3-butanedione dioximato) iron (II)

Answer: B

Watch Video Solution

18. On treatment of 10 ml of 1M solution of the complex $CrCl_3.6H_2O$ with excess of $AgNO_3$, 4.305 g of AgCl was obtained. The complex is

A. $\left[CrCl_3\left(H_2O\right)_3\right].3H_2O$

B. $\left[CrCl_2\left(H_2O\right)_4\right]Cl.2H_2O$

C. $\left[CrCl\left(H_2O\right)_5\right]Cl_2.H_2O$

D. $\left[Cr\left(H_2O\right)_6\right]Cl_3$

Answer: D

Watch Video Solution

19. Which of the following species is not expected to be a ligand

$(a)\overset{\oplus}{N}O$

(b) $NH_4^{\oplus}$

(c) NH_2 - $NH_3^{\oplus}$

(d) (CO) .

A. NO^+

B. NH_4^+

C. NH_2 - NH_3^+

D. CO

Answer: B

Watch Video Solution

20. The number of donor sites in dimethyl glyoxime, glycinato, diethylene triamine and $EDTA$ are respectively

(a) 2, 2, 3 and 4

(b) 2, 2, 3 and 6

(c) 2, 2, 2 and 6

(d)2, 3, 3 and 6 .

A. 2,2,3 and 4

B. 2,2,3 and 6

C. 2,2,2 and 6

D. 2,3,3 and 6

Answer: B

Watch Video Solution

21. The IUPAC name of $Ba\left[BrF_4\right]_2$ is

A. Barium tetrafluorobromate (V)

B. Barium tetraflurorbromate(III)

C. Barium bis (tetrafluorobromate)(III)

D. none of these

Answer: B

Watch Video Solution

22. The formula of the complex hyderidotrimethoxoborate (III) ion is:

A. $\left[BH\left(OCH_3\right)_3\right]^{2-}$

B. $\left[BH_2\left(OCH_3\right)_3\right]^{2-}$

C. $\left[BH\left(OCH_3\right)_3\right]^{-}$

D. $\left[BH\left(OCH_3\right)_3\right]^{+}$

Answer: C

Watch Video Solution

23. The complex ion which has no 'd'-electrons in the central metal atom is

A. $\left[Co\left(NH_3\right)_6\right]^{3+}$

B. $\left[Fe(CN)_6\right]^{3-}$

C. $\left[Cr\left(H_2O\right)_6\right]^{3+}$

D. $\left[MnO_4\right]^-$

Answer: D

Watch Video Solution

24. Oxidation number of Fe in violet coloured complex $Na_4\left[Fe(CN)_5(NOS)\right]$ is :

A. 0

B. 2

C. 3

D. 4

Answer: B

Watch Video Solution

25. Complexes $\left[Co\left(SO_4\right)\left(NH_3\right)_5\right]Br$ and $\left[CoBr\left(NH_3\right)_5\right]SO_4$ can be distinguished by

A. conductance measurement

B. using $BaCl_2$

C. using $AgNO_3$

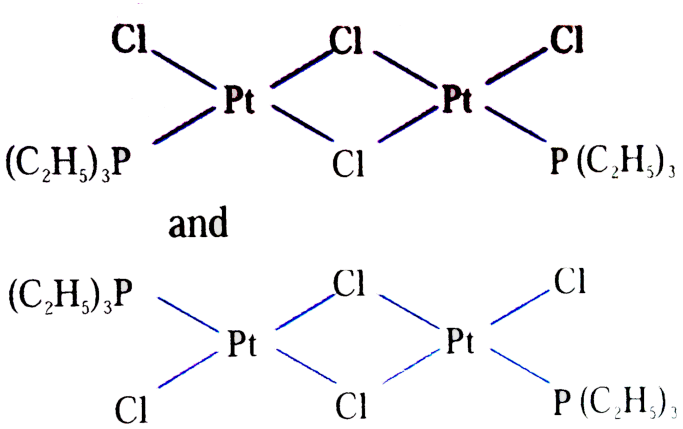
D. all

Answer: D

Watch Video Solution

EXERCISE -2

1. The Complexes given below show:



A. Optical isomerism

B. coordination isomers

C. Geometrical isomerism

D. Bridged isomerism

Answer: C

Watch Video Solution

2. For the complex ion dichloro bis (ethylene diamine) cobalt (III), select the correct statement.

A. It has three isomers, two of them are optically active and one is optically inactive

B. It has three isomers, all of them are optical active

C. It has three isomers, all of them are optically inactive

D. It has one optically active isomer and two geometrical isomers

Answer: A

Watch Video Solution

3. $\left[Pd\left(NH_3\right)_2(SCN)_2\right]$ and $\left[Pd\left(NH_3\right)_2(NCS)_2\right]$ are :

A. Linkage isomers

B. coordination isomers

C. Ionisation isomers

D. geometrical isomers.

Answer: A

Watch Video Solution

4. Which one of the following will be able to show geometrical isomerism if complexes are square planar? .

A. Ma_3b

B. $M(\forall)_2$

C. $Mabcd$

D. Ma_4

Answer: C

Watch Video Solution

5. The total number possible isomers for the complex compound $\left[Cu^{II}\left(NH_3\right)_4\left[Pt^{II}CI_4\right]\right.$ are

A. 3

B. 5

C. 4

D. 6

Answer: C

Watch Video Solution

6. Cis-trans isomerism is found in square planar complexes of molecular formula: (a and b are monodentate ligands)

A. MA_4

B. MA_3B

C. MA_2B_2

D. MAB_3

Answer: C

Watch Video Solution

7. Which complex is likely to show optical activity :

A. Trans-$\left[CoCl_2\left(NH_3\right)_4\right]^+$

B. $\left[Cr\left(H_2O\right)_6\right]^{3+}$

C. *Cis* - $\left[Co\left(NH_3\right)_2(en)_2\right]^{3+}$

D. Trans-$\left[Co\left(NH_3\right)_2(en)_2\right]^{3+}$

Answer: C

Watch Video Solution

8. The number of bridged carbonyl groups in $Mn_2(CO)_{10}$ is :

A. 2

B. 3

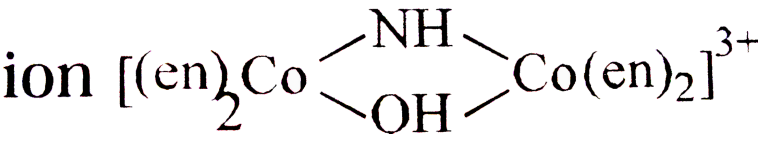
C. 0

D. 1

Answer: C

Watch Video Solution

9. The oxidation number of *Co* in the complex ion

ion 

A. +2

B. +3

C. +4

D. +6

Answer: B

Watch Video Solution

10. Which of the following statements is correct?

A. Geometrical isomerism is not observed in complexes of C.N. 4 having tetrahedral geometry

B. Square planar complexes generally do not show geometrical isomerism

C. The square planar comlex of general formulae Ma_3b or Mab_3 exhibits cis-trans isomerism

D. The plantinum glycinato complex, $\left[Pt(Gly)_2\right]$ does not show geometrical isomerism

Answer: A

Watch Video Solution

11. Geometrical isomerism can be shown by

A. $\left[Ag(CN)\left(NH_3\right)\right]$

B. $Na_2\left[Cd\left(N_2\right)_4\right]$

C. $\left[PtCl_4I_2\right]$

D. $\left[PtCl\left(NH_3\right)_3\right]\left[Au(CN)_4\right]$

Answer: C

Watch Video Solution

12. $\left[Co(en)_3\right]^{3+}$ ion is expected to show

A. two optically active isomers: d, l forms

B. three optically active isomers: d, l and meso forms

C. four optically active isomers: cis, d and l isomers and trans d and l isomers

D. none of these

Answer: A

Watch Video Solution

13. The number of geometrical isomers for octahedral $\left[CoCl_4\left(NH_3\right)_2\right]^-$, square planar $\left[AuBr_2Cl_2\right]^-$ and $\left[PtCl_2(en)\right]$ are

A. 2, 2, 2

B. 2, 2, no isomerism

C. 3, 2, 2

D. 2, 3, no isomerism

Answer: B

Watch Video Solution

14. Which of the following statements is incorrect?

A. Co-ordination compounds and complexes are synonymous terms

B. Complexes must give free metal ions in the solution

C. Complexes may give ions in the solution or may not give ions the solution

D. Generally complex ion does not dissociate into its component parts even in the solution

Answer: B

Watch Video Solution

15. Which one of the following is an example of coordination isomerism?

A. $\left[Co\left(NH_3\right)_5Br\right]SO_4$ and $\left[Co\left(NH_3\right)_5SO_4\right]Br$

B. $\left[Co\left(NH_3\right)_5NO_2\right]Cl_2$ and $\left[Co\left(NH_3\right)_5ONO\right]Cl_2$

C. $\left[Cr\left(H_2O\right)_6\right]Cl_3$ and $\left[Cr\left(H_2O\right)_5Cl\right]Cl_2.H_2O$

D. $\left[Cr\left(NH_3\right)_6\right]\left[Co(CN)_6\right]$ and $\left[Co\left(NH_3\right)_6\right]\left[Cr(CN)_6\right]$

Answer: D

Watch Video Solution

16. The two compounds pentaamminesulphatocobalt (III)bromide and pentaamminesulphatocobalt (III) chloride represent :

A. Linkage isomerism

B. Ionisation isomerism

C. coordinatio isomerism

D. no isomerism

Answer: D

Watch Video Solution

17. Select the correct code about complex $\left[Cr\left(NO_2\right)\left(NH_3\right)_5\right]\left[ZnCl_4\right]$:

(I) IUPAC name of compoun is pentaammminenitrito-N - chromium

(III) tetrachlorozincate (II)

(II) It shows geometrical isomerism

(III) It shows linkage isomerism

(IV) It shows coordination isomerism`

A. III, IV

B. I, III & IV

C. II, III & IV

D. I, II, III & IV

Answer: B

Watch Video Solution

18. Isoomerisms exhibited by $\left[Cr\left(NH_3\right)_2\left(H_2O\right)_2Cl_2\right]^+$ are

A. ionisation, optival

B. hydrate, optical

C. geometrical, optical

D. coordinate, geometrical

Answer: C

Watch Video Solution

19. Of the following complex ions which one can form a chelate with ethylenediamine?

A. *cis* - $\left[Co(en)_2Cl_2\right]^+$

B. trans-$\left[Co\left(NH_3\right)_4Cl_2\right]^+$

C. trans-$\left[Co\left(NH_3\right)_2Cl_4\right]^-$

D. trans-$\left[Co(en)_2Cl_2\right\}^+$

Answer: A

Watch Video Solution

20. $\left[Pt\left(NH_3\right)\left(NO_2\right)Ph\left(NH_2OH\right)\right]^+$, the no. of geometrical isomers including linkage isomerism is

A. 2

B. 6

C. 4

D. 5

Answer: B

Watch Video Solution

21. Which of the following compound shows optical isomerism? (en=ethylenediamine)?

(1) *cis* - $\left[Co\left(NH_3\right)_4Cl_2\right]$

(2) *trans* - $\left[Co(en)_2Cl_2\right]$

(3) *cis* - $\left[Co(en)_2Cl_2\right]$

(4) $\left[Co(en)_3\right]$

Select the correct answer using the codes given below:

Codes:

A. I and II

B. II and III

C. III and IV

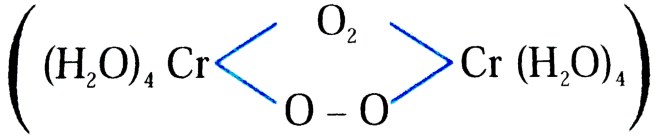
D. I, II and IV

Answer: C

Watch Video Solution

Watch Video Solution

22. Oxidation number of Cr in the following complex is



A. 3

B. 6

C. 4

D. 5

Answer: A

Watch Video Solution

23. $\left[Cr\left(NH_3\right)_5Br\right]Cl$ and $\left[Cr\left(NH_3\right)_5Cl\right]Br$ can be distinguished by/and isomerism shown is:

A. $BaCl_2$, ionisation

B. $AgNO_3$, ionisation

C. $AgNO_3$, coordinate

D. $BaCl_2$,linkage

Answer: B

Watch Video Solution

24. 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 mol of AgCl be precipitated:

A. 0.0012

B. 0.0016

C. 0.0024

D. 0.0048

Answer: C

Watch Video Solution

25. Match the column:

Column I (Co-ordination compound)

(A) $Na_2[Pt(SCN)_2(Ox)_2]$

(B) $[CrCl_2(NH_3)_4]NO_3$

(C) $[Pt(NO_2)(Gly)(NH_3)]$

(D) $K_3[Fe(OH)_2(C_2O_4)_2]$

Column II (Type of isomerism shown)

(P) Ionization isomerism

(Q) Linkage isomerism

(R) Geometrical isomerism

(S) Optical isomerism

Watch Video Solution

26. Which of the following is correct IUPAC name of any compound.

A. Tris (acetyl acetonato) iron (III) chloride

B. Hexachloroplantinum (IV) tetraammine dicyano platinate(IV)

C. Ammine bromochloro methylamine platinum (II)

D. Cis dichloro (ethylenediamine) platinum (II)

Answer: C

Watch Video Solution

27. $\left[Fe^{II}Cl(CN)_4\left(O_2\right)\right]^{4-}$ is named as :

A. chlorotetracyanodioxoferrate (II) ion

B. chlorotetracyanoperoxoferrate(II) ion

C. chlorotetracyanosuperoxoferrate(II) ion

D. none is correct

Answer: C

Watch Video Solution

28. Which of the following complexes has the least molar conductivity in the solution?

A. $CoCl_3.3NH_3$

B. $CoCl_3.4NH_3$

C. $CoCl_3.5NH_3$

D. $CoCl_3.6NH_3$

Answer: A

Watch Video Solution

29. Hybridization and magnetic moment of $\left[Cu\left(NH_3\right)_4\right]^{2+}$ and $\left[Mn(CN)_6^{3-}\right.$ ions respectively are

A. $dsp^2, 1.73BM : d^2sp^3, 2.83BM$

B. $sp^3, zero, sp^3d^2, 4.9BM$

C. $sp^3, 1.73BM, sp^3d^2, 4.9BM$

D. $dsp^2, 1.73BM, d^2sp^3, zero$

Answer: A

Watch Video Solution

30. Lead poisoinig in the body can be removed by:

A. EDTA in the form of calcium dihydrogen salt

B. Cis-platin

C. Zeisse's salt

D. DMG

Answer: A

Watch Video Solution

31. How many geometrical isomers are possible for $\left[Pd^{2+}\left(NH_2\text{-}CH\left(CH_3\right)\text{-}CO_2^-\right)_2\right]^0$

A. 2

B. 3

C. 4

D. 6

Answer: C

Watch Video Solution

32. Which kind of isomerism is exhibited by $[Co(EDTA)]$-

A. Optical & geometrical isomerism

B. Geometrical isomerism

C. Optical isomerism

D. no isomerism

Answer: C

Watch Video Solution

33. Find the correct pair for Column-I and Column-II :

Column-I

(A) $[Ma_2bcde]^{n\pm}$ (B) $[Ma_2b_2c_2]^{n\pm}$

(C) $[Ma_3bcd]^{n\pm}$ (D) $[M(AB)c_2d_2]^{n\pm}$

Column II

(P) 3 optically inactive isomers

(Q) 4 geometrical isomers

(R) 6 stereo(space)isomers

(S) 2 optically active isomers

(where AB → Unsym. bidentate ligand, a,b,c,d & e → monodentate ligands)

View Text Solution

34. Which of the following complexes exhibit optical isomerism?

A. trans-tetramminebis (thiocyanato)chromium(III)ion

B. cis-diamminedicarbonatocobaltate(III) ion

C. trans-diamminedicarbonatocobaltate(III) ion

D. cis-bis(glycinato)platinum(II)

Answer: B

Watch Video Solution

35. Coordination compounds plays many important roles in animals and plants. The are essential in the storage and transport of oxygen as electrons transfer agents as catalysts and in photosynthesis Wide range of application in daily life takes place through formation of complexes Photographic fixing qualitative and quantitative analysis purification of water metallurgical extraction are some specific worth mentioning

The complex $\left[Fe\left(H_2O\right)_5NO\right]^{2+}$ is formed in the brown ring test for nitrates when freshly prepared $FeSO_4$ soultion is added to aqueous solution of $NO_3^{\ominus}$ followed by addition of conc. H_2SO_4 Select correct statement about this complex

(a) Colour change is due to charge transfer

(b) It has iron in $+1$ oxidation state and nitrosyl as $NO^{\oplus}$

(c) It has magnetic moment of $3.87BM$ confirming three unpaired electrons in Fe

(a) All the above are correct statements .

A. Colour change is due to charge transfer

B. It has iron in $+1$ oxidation state and nitrosyl as NO^+

C. It has magnetic moment of 3.87 B.M. confirming three unpaired electrons in Fe

D. All are correct statements

Answer: D

Watch Video Solution

EXERCISE -3

1. Which of the following statements is not true about the complex ion $\left[CrCl_2(en)_2\right]^+$

A. It has two geometrical isomers - cis and strans

B. Both the cis and transi isomers display optical activity

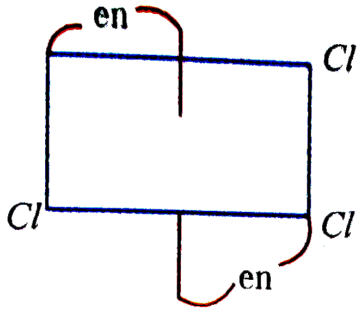
C. only the cis isomers displays optical activity

D. only the cis isomers has non-superimpossible mirror image

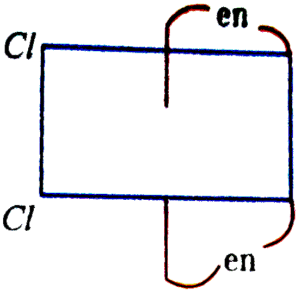
Answer: B

Watch Video Solution

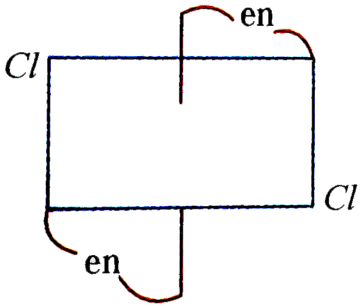
2. Of the following configurations, the optical isomers are



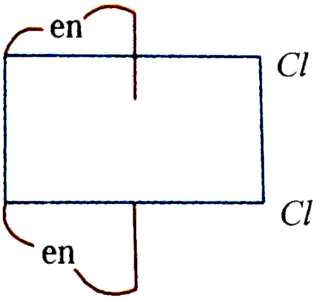
(*I*)



(*II*)



(*III*)



(*IV*)

A. I and II

B. I and III

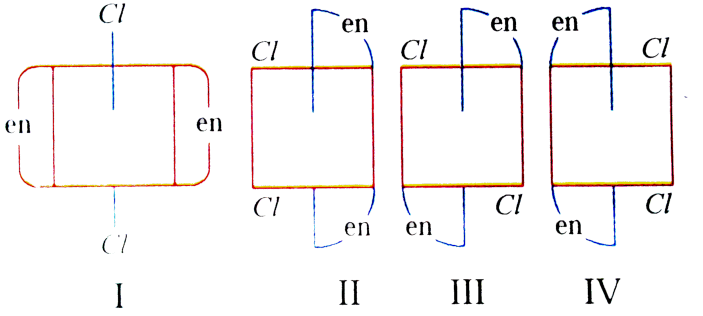
C. II and IV

D. II and III

Answer: C

Watch Video Solution

3. Identify the geometrical isomers of the following:



A. I with III

B. II with IV

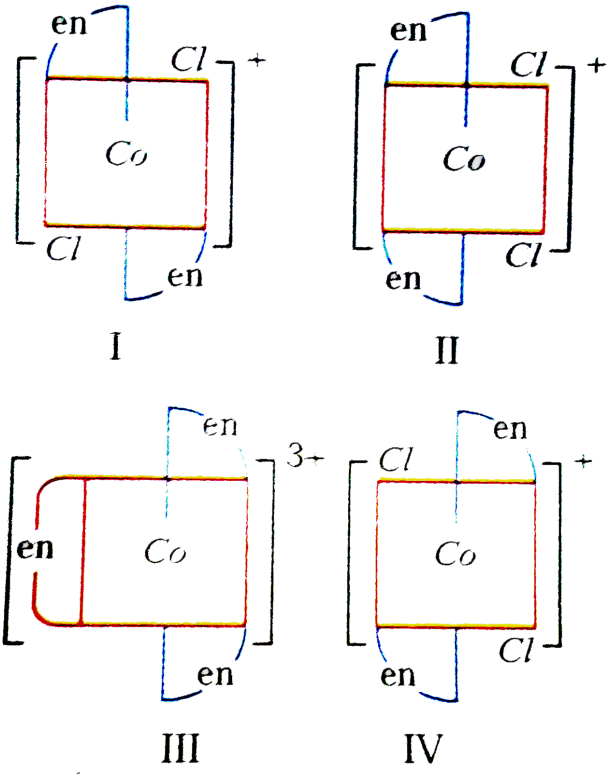
C. I with II and IV

D. none of these

Answer: C

Watch Video Solution

4. Which of the following ions are optically active?



A. I only

B. II only

C. II and III

D. IV only

Answer: C

Watch Video Solution

5. How many isomers are possible for the complex ion $\left[Cr\left(NH_3\right)(OH)_2CI_3\right]^{2-}$?

A. 2

B. 3

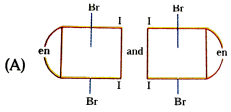
C. 4

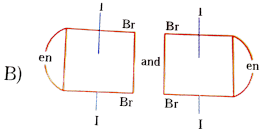
D. 5

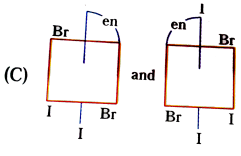
Answer: B

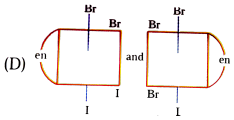
Watch Video Solution

6. The complex ion . $\left[M(en)Br_2I_2\right]^{-1}$, has two optical isomers. Their correct configurations are:

A. 

B. 

C. 

D. 

Answer: D

Watch Video Solution

7. Match the complexes in column I with their properties listed in column II. Indicate your answer by darkening the appropriate bubbles of the 4 × 4 matrix given in the ORS.

Column I

(A) $[Co(NH_3)_4(H_2O)_2]Cl_2$

(B) $[Pt(NH_3)_2Cl_2]$

(C) $[Co(H_2O)_5Cl]Cl$

(D) $[Ni(H_2O)_6]Cl_2$

Column II

(P) Geometrical isomers

(Q) Paramagnetic

(R) Diamagnetic

(S) Metal ion with +2 oxidation state

Watch Video Solution

8. Consider the following complexes:

(I) K_2Ptcl_6 (II) $PtCl_4.2NH_3$

(III) $PtCl_4.3NH_3$ (IV) $PtCl_4.5NH_3$

Their electrical conductances in an aqueous solution are:

A. 256, 0, 97, 404

B. 404, 0, 97, 256

C. 256, 97, 0, 404

D. 404, 97, 256, 0

Answer: A

Watch Video Solution

9. The total possible co-ordination isomers for the following compounds respectively are

(i) $\left[Co(en)_3\right]\left[Cr\left(C_2O_4\right)_3\right]$

(ii) $\left[Cu\left(NH_3\right)_4\right]\left[CuCl_4\right]$

(iii) $\left[Ni(en)_3\right]\left[Co\left(NO_2\right)_6\right]$

A. 4, 4, 4

B. 2, 2, 2

C. 2, 2, 4

D. 4, 2, 4

Answer: D

Watch Video Solution

10. Geometrical isomerism in coordination compounds is exhibited by

A. Square planar and tetrahedral complexes

B. Square planar and octahedral complexes

C. Tetrahedral and octahedral complexes

D. Square planar, tetrahedral and octahedral complexes

Answer: B

Watch Video Solution

11. Which of the following is not optically active?

A. $\left[Co(en)_3\right]^{3+}$

B. $\left[Cr(ox)_3\right]^{3-}$

C. *cis* - $\left[CoCl_2(en)_2\right]^{+}$

D. trans-$\left[CoCl_2(en)_2\right]^{+}$

Answer: D

Watch Video Solution

12. Coordination compounds plays many important roles in animals and plants. The are essential in the storage and transport of oxygen

as electrons transfer agents as catalysts and in photosynthesis Wide range of application in daily life takes place through formation of complexes Photographic fixing qualitative and quantitative analysis purification of water metallurgical extraction are some specific worth mentioning

Arrange of the following in order of decreasing number of unpaired electrons

(I) $\left[Fe\left(H_2O\right)\right)_6]^{2+}$

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

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

(IV) $\left[fe\left(H_2O\right)_6\right]^{3+}$

(a) IV,I,II,III

(b) I, II, III, IV

(c) III, II, IIV

(d) II,III,I,IV` .

Watch Video Solution

13. Which of the following statements is/are false

A. In $\left[PtCl_2\left(NH_3\right)_4\right]^{2+}$ complex ion, the cis-form is optically active, while trans-form is optically inactive

B. In $\left[Fe\left(C_2O_4\right)_3\right]^{3-}$, geometrical isomerism does not exist, while optical isomerism exists

C. $[Mabcd]^{n\pm}$ square planar complexes exhibit both optical as well as geometrical isomerism

D. In $[Mabcd]^{n\pm}$ tetrahedral comlexes, optical isomerism cannot be observed

Answer: A,C,D

Watch Video Solution

14. The number of unpaired electrons expected for the complex ion $\left[Cr\left(NH_3\right)_6\right]^{2+}$ is :

A. 2

B. 3

C. 4

D. 5

Answer: A

Watch Video Solution

15. Select the correct code regarding total number of space isomers for the following compounds:

(I) $\left[Ma_3b_2c\right]^{n\pm}$

(II) $\left[M(AB)_3\right]^{n\pm}$

(III) $\left[Ma_2b_2c_2\right]^{n\pm}$

Watch Video Solution

EXERCISE -4

1. In $\left[Cr\left(C_2O_4\right)_3\right]^{3-}$, the isorerism shown is

A. Ligand

B. Optical

C. Geometrical

D. Ionization

Answer: B

Watch Video Solution

2. A similarity between optical and geometrical isomerism is that

A. Each gives equal number of iosmers for a given compound

B. If in a compound one is present then so is the other

C. Both are included in stereoisomerism

D. They have similarity

Answer: C

Watch Video Solution

3. A square planar complex is formed by hybridization of which atomic orbitals?

A. s,P_x, P_y, d_{yz}

B. s,p_x, p_y, d_x^2 - y^2

C. s,p_x, p - (y), d_z^2

D. s,p_x, p_y, d_{xy}

Answer: B

Watch Video Solution

4. The type of isomerism present in intro pentaamine-chromium(III) chloride is:

A. Optical

B. Linkage

C. Inization

D. Polymerization

Answer: B, C

Watch Video Solution

5. In the complex $\left[Fe\left(H_2O\right)_6\right]^{3+}$ $\left[Fe(CN)_6\right]^{3-}$ $\left[Fe\left(C_2O_4\right)_3\right]^{3-}$ and $\left[FeCl_6\right]^{3-}$, that complex that has highest stability is

A. $\left[Fe\left(H_2O\right)_6\right]^3$

B. $\left[Fe(CN)_6\right]^{3-}$

C. $\left[Fe\left(C_2O_4\right)_4\right]^{3-}$

D. $\left[FeCl_6\right]^{3-}$

Answer: C

Watch Video Solution

6. One mole of complex compound $Co\left(NH_3\right)_5Cl_3$ gives 3 moles of ions on dissolution in water. One mole of same complex reacts with two moles of $AgNO_3$ to yield two moles of $AgCl(s)$. The complex is:

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

B. $\left[Co\left(NH_3\right)_4Cl\right]Cl.\,NH_3$

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

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

Answer: C

Watch Video Solution

7. Ammonia forms the complex $\left[Cu\left(NH_3\right)_4\right]^{2+}$ with copper ions in alkaline solution but not in acid solution. The reasons for it is:

A. In alkaline solution $Cu(OH)_2$ is precipitated which is soluble in excess is alkali

B. Copper hydroxide is amphoteric

C. In acidic solution hydration protects Cu^{2+} ions

D. In acidic solution protons coordinates with ammonia molecule formaing NH_4^+ ions and NH_4 molecules are not available

Answer: D

Watch Video Solution

8. Which one of the following statement is correct ?

A. Ferric ions give abule colour with ammonium thiocyanate in acidic medium

B. On boiling a solution having $\left[Co\left(H_2O\right)_6\right]^{2+}$ and air is bubbled to get $CoCO_3$ quanititaively

C. A dilute solution of mageanese salt give a pint colour

D. Form a mixed precipitate of AgCl and Agl ammonia solution dissolves only AgCl

Answer: D

Watch Video Solution

9. Which has regular tetrahedral geometary ?

A. $\left[Ni(CH)_4\right]^{2+}$

B. $\left[Pt(NH\text{ - }(3))_4\right]^{2+}$

C. $\left[AuCl_4^{-1}\right]$

D. $\left[Cu\left(NH_3\right)_4\right]^{2+}$

Answer: C

Watch Video Solution

10. The coordination number of a central metal atom in a complex is determined by:

A. The numbe of only anionic ligand bonded to metal ion

B. The number of ligands aroumnd a metal ion bounded by pi bonds

C. The number of ligands around a metal a ion bonded by sigma and pi bonds

D. The number o ligands around a metal ion bonded by sigma bonds

Answer: D

Watch Video Solution

11. Which of the following complex is an outer orbital complex?

A. $\left[Ni\left(NH_3\right)\right]^{2+}$

B. *[Math Processing Error]*

C. $\left[Co\left(NH_3\right)_6\right]^{3+}$

D. $\left[Fe(CN)_6\right]^{4-}$

Answer: A

Watch Video Solution

12. Co-ordination compounds have great importance in biological systems. In this context, which statements is incorrect?

A. Carboxypeptidase - A is an enzyme and contains zinc

B. Haemoglobin is the red pigment of blood and contains iron.

C. Cyanocobalamin is B_{12} and contains cobalt.

D. Cis platin is used as analgesic.

Answer: D

Watch Video Solution

13. Which one of the following has largest number of isomers?

A. $\left[Co(en)_2Cl_2\right]^+$

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

C. $\left[Ir\left(PR_3P\right)_2H(CO)\right]^{2+}$

D. $\left[Ru\left(NH_3\right)_4Cl_2\right]^+$

Answer: A

Watch Video Solution

14. The correct order of magnetic moments (spin values in B.M.) among is:

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

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

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

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

Answer: D

Watch Video Solution

15. In $Fe(CO)_5$, the Fe - C bond possesses:

A. π-character only

B. Both σ and π characters

C. Ionic characters

D. σ-character only

Answer: B

Watch Video Solution

16. Which of the following will show optical isomerism? .

A. $\left[Cu\left(NH_3\right)_4\right]^{2+}$

B. $\left[ZnCl_4\right]^{2-}$

C. $\left[Cr\left(C_2O_4\right)_3\right]^{3-}$

D. $\left[Co(CN)_6\right]^{3-}$

Answer: C

Watch Video Solution

17. The value of 'spin only' magnetic moment for one of the following configuration is $2.84B.M.$ The correct one is:

A. d^4 (in strong field ligand)

B. d^4 (in weak as well as strong field ligand)

C. d^3 (in weak as well as strong field ligand)

D. d^5 (in strong field ligand)

Answer: A

Watch Video Solution

18. Nickel $(Z = 28)$ combines with a uninegative monodentate ligand X^- to form a paramagnetic complex $\left[NiX_4\right]^{2-}$. The number of unpaired electron(s) in the nickel and geometry of this complex ion are, respectively:

A. One, tetrahedral

B. Two, tetrahedral

C. One, square planar

D. Two, square planar

Answer: B

Watch Video Solution

19. IUPAC name $\left[Co\left(NH_3\right)_5\left(NO_2\right)\right]Cl_2$ is

A. Nitrito-N-pentaammine cobalt (III) chloride

B. Nitrito-N-pentaammine cobalt (II) chloride

C. pentaamminenitrito-N-cobalt (II) chloride

D. pentaamminenitrito-N-cobalt (III) chloride

Answer: D

Watch Video Solution

Additional questions page-155

1. Type of isomerism

Type of
isomerism
A) Ionisation
B) Linkage
C) Coordination
D) Hydrate
Pair of examples

(a) $\left[Cr(H_2O)_6\right]Cl_3$ and

$$\left[Cr(H_2O)_5\,Cl\right]Cl_2.H_2O$$

(b) $\left[Cr(NH_3)_6\right]\left[Co(CN)_6\right]$
& $\left[Co(NH_3)_6\right]\left[Cr(CN)_6\right]$

(c) $\left[Co(NH_3)_5(NO_2)\right]Cl_2$
& $\left[Co(NH_3)_5(ONO)\right]Cl_2$

(d)

$\left[Co(SO_4)(NH_3)_5\right]Br$ & $\left[Co(Br)(NH_3)_5\right]SO_4$

The correct match is

A B

A. A B C D
a b c d

B. b a d c

C. $d \quad c \quad b \quad a$

D. $d \quad b \quad c \quad a$

Answer: 3

Watch Video Solution

2. Match the following columns

COLUMN-I (Complex)	COLUMN-II (Geometry)
A) $[Ni(CN)_4]^{2-}$	p) Tetrahedral
B) $[ZnCl_4]^{2-}$	q) Tetragonal
C) $[Co(en)_3]^{3+}$	r) Sqaure planar
D) $[CuCl_4]^{3-}$	s) square pyramid
	t) Octahedral

A. $\begin{matrix} A & B & C & D \\ r & p & t & p \end{matrix}$

B. $r \quad p \quad t \quad (q, t)$

C. $p \quad q \quad r \quad s$

D. $p \quad t \quad q \quad s$

Answer: 1

Watch Video Solution

3. Match the following columns

COLUMN-I (Equivalent conductance)	COLUMN-II (formula)
A) 229	p) $[Pt(NH_3)_5Cl]Cl_3$
B) 97	q) $[Pt(NH_3)_3Cl_3]Cl$
C) 404	r) $[Pt(NH_3)_4Cl_2]Cl_2$
D) 523	s) $[Pt(NH_3)_6]Cl_4$

A. $\begin{matrix} A & B & C & D \\ s & p & q & r \end{matrix}$

B. $r \quad q \quad s \quad p$

C. $r \quad q \quad s \quad p$

D. $s \quad p \quad r \quad q$

Answer: 3

Watch Video Solution

4. Match the following columns

COLUMN-I (Complex)	COLUMN-II (μ effective)
A) $K_3[MnF_6]$	p) 1.70
B) $K_3[VF_6]$	q) 2.8
C) $K_2[Mn(CN)_6]$	r) 3.8
D) $K_3[TiF_6]$	s) 4.9

A. $\begin{matrix} A & B & C & D \\ s & q & r & p \end{matrix}$

B. $q \quad s \quad r \quad p$

C. $s \quad q \quad p \quad r$

D. $p \quad q \quad r \quad s$

Answer: 1

Watch Video Solution

5. Match the following columns

Set -I	Set -II
A) Co-ordination number 3	1) Pentagonal bipyramidal
B) Co-ordination number 2	2) Trigonal bipyramidal
C) Co-ordination number 5	3) Linear
D) Co-ordination number 7	4) Trigonal planar

The correct matching is

A. $\begin{matrix} A & B & C & D \\ 4 & 3 & 2 & 1 \end{matrix}$

B. 1 2 3 4

C. 4 3 1 2

D. 3 1 2 4

Answer: 1

Watch Video Solution

6. Match the following columns

COLUMN-I (Complex Ions)	COLUMN-II (No. of unpaired electrons)
A) $[CrF_6]^{4-}$	p) One
B) $[MnF_6]^{4-}$	q) Two
C) $[Cr(CN)_6]^{4-}$	r) Three
D) $[Mn(CN)_6]^{4-}$	s) Four
	t) Five

A. $\begin{matrix} A & B & C & D \\ s & t & q & p \end{matrix}$

B. $q \quad r \quad s \quad t$

C. $t \quad q \quad s \quad p$

D. $p \quad q \quad r \quad s$

Answer: 1

Watch Video Solution

7. Match the following columns

COLUMN-I (Complex)	COLUMN-II (O.N. of Co)
A) $[Co(NCS)(NH_3)_5](SO_3)$	p) -1
B) $Na[Co(CO)_4]$	q) 0
C) $Na_4[Co(S_2O_3)_3]$	r) +1
D) $Co_2(CO)_8$	s) +2
	t) +3

A.

A	B	C	D
t	p	s	q

B. $t \quad p \quad s \quad q$

C. $q \quad t \quad s \quad p$

D. $q \quad r \quad s \quad t$

Answer: 1

Watch Video Solution

8. Match the list I and II and pick the correct matching from the codes given below

List - I (complex)	List - II (Structure and magneticmoment)
a) $\left[Ag(CN)_2\right]^-$	1) square planar and 1.73 BM
b) $\left[Cu(CN)_4\right]^{3-}$	2) Linear and zero
c) $\left[Cu(CN)_6\right]^{4-}$	3) Octahedral and zero
d) $\left[Cu(NH_3)_4\right]^{2+}$	4) tetrahedral and zero
e) $\left[Fe(CN)_6\right]^{4-}$	5) octrahedral and 1.73 BM

A. a-2, b-4, c-5, d-1, e-3

B. a-5, b-4, c-1, d-3, e-2

C. a-1, b-3, c-4, d-2, e-5

D. a-4, b-5, c-2, d-1, e-3

Answer: 1

Watch Video Solution

9. Two statements 'A' and 'R' are given below Select your answers to these items using the codes given below:

Assertio (A) : Among the cobalt (III) complexes $\left[Co\left(NH_3\right)_6\right]^{3+}$ is a diamagnetic but $\left[CoF_6\right]^{3-}$ is paramagnetic.

Reason (R) : Hybridisation of $\left[Co\left(NH_3\right)_6\right]^{3+}$ is sp^3d^2 where as hybridisation of Co in $\left[CoF_6\right]^{3-}$ is d^2sp^3.

A. Both A and R are correct and R is the correct explanation of A

B. Both A and R are correct and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: 3

Watch Video Solution

10. Two statements 'A' and 'R' are given below Select your answers to these items using the codes given below:

Assertion(A) : The complex ion *cis* - $\left[Co(en)_2Cl_2\right]^+$ is optically active

Reason (R) : It is an octahedral complex

A. Both A and R are correct and R is the correct explanation of A

B. Both A and R are correct and R is not a correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: 2

Watch Video Solution

EXERCISE-5

1. A complex cation is formed by Pt (in some oxidation state) with ligands (in proper number so that coordination number of Pt vecomes six). Which of the following can be its correct IUPAC name?

A. Diammineethylenediaminedithiocyanato-S-iplatinum (II)

B. Diammineethylenediaminedithiocyaanato-S- platinate (IV) ion.

C. Diammineethylendiaminedithiocyanato-S-platinate (IV) ion.

D. Dimminebis (enthlenediamine) dithiocyanato-S-platinum (IV) ion.

Watch Video Solution

2. The correct order of their paramagnetic moment (spin only) is

$P: \left[FeF_6\right]^{3-}, Q: \left[CoF_6\right]^{3-}$

$R: \left[V\left(H_2O\right)_6\right]^{3+}, S: \left[Ti\left(H_2O\right)_6\right]^{3+}$

A. $P > Q > R > S$

B. $P < Q < R < S$

C. $P = Q = R = S$

D. $P > R > Q > S$

Watch Video Solution

3. Which of the following statement is incorrect ?

A. $Ti\left(NO_3\right)_4$ is a colourless compound.

B. $\left[Cu\left(NCCH_3\right)_4\right]^+BF_4^-$ is a colourless comopound.

C. $\left[Cr\left(NH_3\right)_6\right]^{3+}3Cl^-$id a coloured compound.

D. $K_3\left[VH_6\right]$ is a colourless compound.

Watch Video Solution

4. What will be the 'spin only' magnetic moment of the complex formed when Fe $(SCN)_3$ reacts with solution containing excess F- ?

A. 2.83 B.M.

B. 3.87 B.M.

C. 5.92 B.M.

D. 1.73 B.M.

Watch Video Solution

5. The compound having a tetrahedral geometry is .

A. $\left[Pd(CN)_4\right]^{2-}$

B. $\left[Ni(CN)_4\right]^{2-}$

C. $\left[PbCl_4\right]^{2-}$

D. $\left[NiCl_4\right]^{2-}$

Watch Video Solution

6. It is an experimental fact that $Cs_2\left[CuCl_4\right]$ is orange coloured but $\left(NH_4\right)_2\left[CiCl_4\right]$ is yellow. It id further known that total paramagnetic moment of an unpaired electron is due to spin as well as due to nature of orbitlal, 'd' orbital contributing more than 's' or 'p' Thus the total paramagnetic moment of organe compound is found to be more than that of yellow compound. Then which of the following is correct.

A. Anion of organe compound is tetrahedral and that of yellow is square planar.

B. Anion or orange compound is squance and that of yellow is tetrahedral.

C. Both the anions are terrahedral

D. Both the anion are square planar.

Watch Video Solution

7. The hybridization of the d-block element sodium nitropruside is

A. sp^3

B. dsp^2

C. d^2sp^3

D. sp^3d^2

Watch Video Solution

8. Which of the following statements is correct?

A. Potassium ferrocyanide is diamagnetic where as potassium ferricyanide is paramagnetic.

B. Crystal field splititing in ferrocyanide ion is greater than that of ferricyanide ion.

C. The geometry of $Ni(CO)_4$ and $\left[NiCl_2\left(PPh_3\right)_2\right]$ are tetrachedral.

D. (A) & (D)

Watch Video Solution

9. Amongst $\left[Co(ox)_3\right]^{3-}$, $\left[CoF_6\right]^{3-}$ and $\left[Co\left(NH_3\right)_6\right]^{3+}$:

A. $\left[Co(ox)_3\right]^{3-}$ and $\left[CoF_6\right]^{3-}$ are paramagnetic and $\left[Co\left(NH_3\right)_6\right]^{+3}$ is diamagnetic.

B. $\left[Co(ox)_3\right]^{3-}$ and $\left[Co\left(NH_3\right)_6\right]^{+3}$ are paramagnetic and $\left[CoF_6\right]^{3-}$ is paramagnetic.

C. $\left[Co(ox)_3\right]^{3-}$ and $\left[Co\left(NH_3\right)_6\right]^{3+}$ are diamagnetic and $\left[CoF_6\right]^{3-}$ is paramagnetic.

D. $\left[Co\left(NH_3\right)_6\right]^{3+}$ and $\left[CoF_6\right]^{3-}$ are paramagnetic and $\left[Co(ox)_3\right]^{3-}$ is diamagnetic.

Watch Video Solution

10. All the following complexes show decrease in their weights when placed in a magnetic balance then the group of complexes having tetrahedral geometry is :

$Ni(CO)_4$

$K\left[AgF_4\right]$

$Na_2\left[Zn(CN)_4\right]$

$K_2\left[PtCl_4\right]$

$\left[RhCl\left(PPh_3\right)_3\right]$

A. (ii), (iii),(v)

B. (i), (II), (iii)

C. (i), (III), (iv)

D. None of these

Watch Video Solution

11. The geometry of $\left[NiCl_4\right]^{2-}$ and $\left[Ni\left(PPh_3\right)_2Cl_2\right]$ are :

A. tetrahedral and square planar redpectively.

B. both tetrahedral.

C. both square planar.

D. square planer and tetrahedral respactively.

Watch Video Solution

12. $\left[Co(en)_2\left(H_2O\right)_2\right]^{3+} + en \rightarrow$ complex (X) is :

A. it is a low spin complex

B. it is diamagnetic

C. it show geometrical isomerism

D. (A) & (B)

Watch Video Solution

13. Which one of the following complexes exhibit chirality?

A. $\left[Cr(ox)_3\right]^3$

B. *cis* - $\left[PtCl_2(en)\right]$

C. *cis* - $\left[RhCl_2\left(NH_3\right)_2\right]^-$

D. *mer* - $\left[Co\left(NO_2\right)_3(\text{trien})\right]$

Watch Video Solution

14. On treatment of $\left[Pt\left(NH_3\right)_4\right]^{2+}$ with Cl compound I is formed When $\left[PtCl_4\right]^{2-}$ reacted with aq. NH_3 the complex II is formed. Point out the correct statement.

A. I cis. II trans, both tetrahedral

B. I cis, II trans, both square planar

C. I trans, II cis, both tetrahedral

D. I trans, II cis, both square planar

Watch Video Solution

15. For the empirical formula, $Pt\left(NH_3\right)_2Cl_2$ the number of possiblecoordination isomers would be : (oxidation number of platinum should be +2 in all isomeric forma)

A. 1

B. 2

C. 3

D. 4

Watch Video Solution

16. The total number of isomer shown by $\left[Co\left(NH_3\right)_4\left(NO_2\right)_2\right]\left(NO_3\right)$ complex is :

A. 10

B. 6

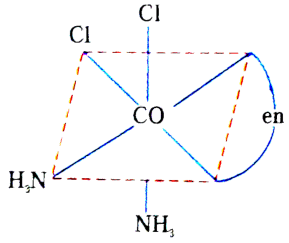
C. 4

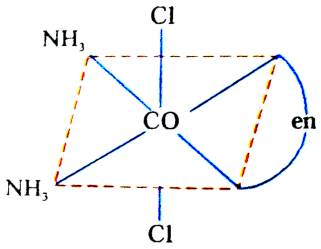
D. 12

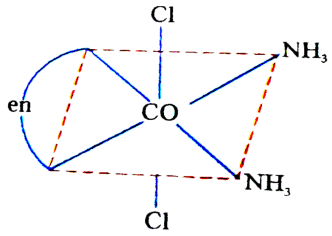
Watch Video Solution

EXERCISE-6

1. Three arrangements are shown for the complex $\left[Co(en)\left(NH_3\right)_2Cl_2\right]^+$ pick up the wrong statement.

(I) 

(II) 

(III) 

A. I and II are geometrical isomers

B. II and III are optical isomers

C. I and III are optical isomers

D. II and III are geometrical isomers

Answer: B,C,D

Watch Video Solution

2. Which of the following isomerism is/are shown by the complex $\left[CoCl_2\left(H_2O\right)_2\left(NH_3\right)_2\right]$ Br ?

A. Ionization

B. Linkage

C. Geometrical

D. optical

Answer: A,C,D

Watch Video Solution

3. Co-ordination number of Cr in $CrCl_3.5H_2O$ is six. The volume of 0.1 N $AgNO_3$ needed to ppt. the chorine in outer sphere in 200 ml of 0.01 M solution of he possible complex es is/are:

A. 140 ml

B. 40 ml

C. 80 ml

D. 20 ml

Answer: B,D

Watch Video Solution

4. Which of the following statement(s) is (are) correct with reference to the ferrous and ferric ions ?

A. Fe^{3+} gives brown colour solution with potassium ferricyanide.

B. gives blue precipitate with potassium ferricyanide.

C. Fe^{3+} gives red colour solution with potassium sulphocyanide.

D. Fe^{2+} gives brown colour solution with potassium sulphocyanide.

Answer: A,B,C

Watch Video Solution

5. The complex $\left[Cr\left(H_2O\right)_4Br_2\right]$ gives the test for :

A. Br^-

B. Cl^-

C. Cr^{3+}

D. H_2O

Answer: B

Watch Video Solution

6. Which of the following ligands can show linkage isomerism?

A. NO_2^-

B. SCN^-

C. CNO^-

D. CO_3^{2-}

Answer: A,B,C

Watch Video Solution

EXERCISE-7

1. Which one of the following has the correct order of Δ_o ?

A. $\left[Co(CN)_6\right]^{3-} > \left[Co\left(H_2O\right)_6\right]^{3+}$

B. $\left[Co\left(H_2O\right)_6\right]^{2+} < \left[Co\left(H_2O\right)_6\right]^{3+}$

C. $\left[Co\left(H_2O\right)_6\right]^{3+} > \left[Rh\left(H_2O\right)_6\right]^{3+}$

D. $\left[Co\left(NH_3\right)_6\right]^{3+} < \left[CoF_6\right]^{3-}$

Watch Video Solution

2. Wilkinson's catalyst react with H_2 to from an octahedral complex in which Rh (Z= 45) has the following electronic configuration in the ligand field $t_{2g}^{2.2.2}, e_g^{0.0}$. Then which of the following is (are) correct about this new complex ?

A. It is diamagnetic

B. Its IUPAC name is chlorodihydridotris (triphenylphosphine) rohidium (III)

C. Hybridisation of Rh (I) is d^2sp^3

D. It is a paramagnetic complex

Watch Video Solution

3. In the cystal field of the complex $\left[Fe(Cl)(CN)_4\left(O_2\right)\right]^{4-}$ the electronic configuration of metalis found to be t_{2g}^6, e_g^o then which of the following is/are true about this complex ion :

A. It is a paramagnetic complex

B. O-O bond length will be more than found in O_2 molecule

C. Its IUPAC name will be chloridotetacyanidosuperoxidoferrate (II) ion.

D. It will show geometrical as will as optical isomerism

Watch Video Solution

4. Select the correct statement (s) for the coordination compound $K_2\left[Cr\left(NO^+\right)\left(NH_3\right)(CN)_4\right]$.

A. Its IUPAC name is potassium amminetetracyanidonitrosoniumchromate (I).

B. Its' spin only' magnetic moment is 8 B.M.

C. Its hybridisation is d^2sp^3

D. It shows geometrical isomerism

Watch Video Solution

5. Which of the following complex (s) is/are correctly matched with their geometry ?

A. $\left[CoCl_4\right]^{2-}$ -tetrahedral

B. $\left[Co(PY)_4\right]^{2+}$ -square planar.

C. $\left[Cu(CN)_4\right]^{3-}$ -tetrahedral

D. $\left[Fe(CO)_4\right]^{2-}$ -square planar.

Watch Video Solution

EXERCISE-8

1. Match the complexes listed in column-I with characteristic (s)/type of hybridisation olisted in column-II.

Column-I

(A) $[Co(OX)_3]^{3-}$

(B) $[Co(F)_6]^{3-}$

(C) $[Fe(H_2O)_5(NO)]^{2+}$

(D) $[Co(NH_3)_6]^{3+}$

(E) $[Mn(CN)_6]^{3-}$

Column-II

(p) Chelation

(q) 2.8 BM 'spin only' magnetic moment

(r) d^2sp^3 and paramagnetic

(s) sp^3d^2 and paramagnetic

(t) +1 oxidation state of central metal

(u) d^2sp^3 and diamagnetic

Watch Video Solution

2. Match the complexes listed in column-I with characteristic(s) listed in column-II.

Column-I

(A) $[Ni(CO)_4]$ (B) $[Fe(CO)_2(NO)_2]$

(C) $[Ni(PF_3)_4]$ (D) $[Ni(PPh_3)_2Br_2]$

Column –II

(p) Terahedral

(q) π back bonding

(r) Diamagnetic

(s) One of the ligand is three electeron donor.

Watch Video Solution

3. Match the complexes listed in column-I with characteristic (s)/type hybridisation listed in column-II.

Column –I

(A) $[Co(H_2O)_6]^{3+}$ (B) $[CoF_6]^{3-}$

(C) $[Co(NO_2)_6]^{3-}$ (D) $[CoF_3(H_2O)_3]$

Column –II

(p) d^2sp^3 (q) sp^3d^2

(r) Diamagnetic (s) Paramagnetic

Watch Video Solution

4. Match the complexes listed in column-I with characteristic (s)/type of bridisation listed in column -II

Column – I

(A) $[Co(en)_3]^{3+}$ (B) $[Co(OX)_3]^{3-}$

(C) $[Co(H_2O)_6]^{2+}$ (D) $[Co(NO_2)_6]^{4-}$

Column – II

(p) sp^3d^2 hybridisaion (q) Diamagnetic

(r) d^2sp^3 hybridisation (s) Paramagnetic

(t) Chelating reagent

Watch Video Solution

5. Match the complexes listed in colmn-I with type hybridisation listed in column-II.

Column - I

(A) $[Au F_4]$ (B) $[Cu(CN)_4]^{3-}$

(C) $[Co(NH_3)_6]^{2+}$ (D) $[Fe(H_2O)_5 NO]^{2+}$

Column - II

(p) dsp^2 hybridisation (q) sp^3 hybridisation

(r) sp^3d^2 hybridisation (s) d^2sp^3 hybridisation

Watch Video Solution

6. Select the correct option (s) for the coordination compounds and their respectively isomeric forms.

Column-I

(A) $[Co(en)_2NH_3Cl]SO_4$

(B) $[Co(NH_3)_4(NO_2)_2](NO_3)$

(C) $[Co(en)(pn)(NO_2)_2]Cl$ (D) $[Co(gly)_3]$

Column-II

(p) Optical isomer (q) Geometrical isomer

(r) Ionization isomer (s) Linkage isomer

Watch Video Solution

EXERCISE-9

1. STATEMENT -1 A solution of $\left[Ni\left(H_2O\right)_6\right]^{2+}$ is geen but a solution of $\left[Ni(CN)_4\right]^{2-}$ is colourless.

STATEMENT-2 : : Energy difference between d level $(i.e.\Delta)$for H_2O complex (paramagnetic) is in the visible region and that for the cyano complex (diamagnetic)is in the UV region.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explation for statement-1

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Watch Video Solution

2. STATEMENT-1 The value of Δ_o for M^{3+} complexes are always much higher than value for M^{2+} complexes

STATEMENT-2 : The crystal field stabilization energy of $\left[Co\left(NH_3\right)_6\right]^{3+} < \left[Rh\left(NH_3\right)_6\right]^{3+}$

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explation for statement-1

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Watch Video Solution

3. STATEMENT-1: All the complexes of Pt (+ □ □) and Au (+ □ □ □) with strong field as well as with weak field ligands are square planar.

STATEMENT-2 : The crystal filed spliting energy is larger for secong

and third row transition elements, and for more highly charged species. This large value of crystal field splitting enerfy energetically favours the pairing of electron for square planar geometry.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explation for statement-1

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Watch Video Solution

4. STATEMENT-1 : diamminedichloroplatinum (□ □) is more soluble in water than trans-diammine dichloroplatinum (□ □)

STATEMENT-2 : Diamminedichloroplatinum (□ □) is square planar and diamagnetic.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explation for statement-1

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Watch Video Solution

5. STATEMENT-1 : $\left[Co\left(NH_3\right)_4Cl_2\right]^+$ can exist in cis-and trans-forms but neither can display optical activity.

STATEMENT-2: Each of these possesses at least one plane of symmetry.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explation for statement-1

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Watch Video Solution

6. STATEMENT-1: In complex $\left[Cr\left(NH_3\right)_4 BrCl\right]$Cl, the'spin only' magnetic moment is close to 1.73 B.M.

STATEMENT-2: All known monoculear complexeas of chromim (III)

irrespective of the strength of the ligand field, must hae three unpaired electrons.

Consider the following statement and arrange in the order of trur/flase as given in the codes.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explation for statement-1

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Watch Video Solution

7. S-1 : $\left[Cr\left(NH_3\right)_6\right]^{3+}$ is a inner orbital complex with

S-2: The complex formed by joining the CN ligands to Fe^{3+} ion has theoretical value fo 'spin only' magnetic moment equal to 1.73 B.M.

S-3: $Na_2S + Na_2\left[Fe(CN)_5NO\right] \rightarrow Na_4\left[Fe(CN)_5NOS\right]$, In reactan and product the oxidation states of iron are same

A. F T F

B. T T F

C. T T T

D. F F F

Watch Video Solution

8. s-1: $\left[MnCl_6\right]^3$, $\left[FeF_6\right]^{3-}$ and $\left[CoF_6\right]^{-3}$ are paramagnetic having four, five and four unpaired electrons respectively.

S-2: Valence bond theory gives a quantitative interpreation of the thermodynamic stabilities of coordination compounds.

S-3: The crystal field splitting Δ_o depends upon the field produced by the ligand and charge onn the metal ion.

A. T T T

B. T F T

C. F T F

D. T F F

Watch Video Solution

9. S-1: The $\left[Co(ox)_3\right]^{3-}$ complex is diamagnetic andgains stability through chelation.

S-2: The $\left[Co\left(NO_2\right)_6\right]^4$ is inner orbital complex involving d^2sp^3

hybridisation and is paramagnetic.

S-3: The complex $\left[PtCl_4\right]^{2-}$ is square planar and is diamagnetic.

A. T T T

B. F F T

C. T F T

D. T T F

Watch Video Solution

10. Consider the following satements :

S_1: Generally square planare complexes show geometrical isomerism but do not exhibit optical isomerism because thy do not possess plane of symmetry .

$S_2: \Delta_t = \frac{4}{9}\Delta_0$

S_3: In octahedral complexes each electron entering teh t_{2g} orbitals

stabilizes the complex ion by 0.4 Δ_0 and each electron entering teh e_g orbital destabilizes the complex by an amount of 0.6 Δ_0

Select the correct statement from the codes given below.

A. F T T

B. F F T

C. T F T

D. T T F

Watch Video Solution

11. The ionisation isomer of $\left[Cr\left(H_2O\right)_4Cl\left(NO_2\right)\right]Cl$

A. F T T

B. F F T

C. T F T

D. T T T

Watch Video Solution

12. Consider the following statements and arrange in the order of the true/false as given in the codes.

S_1:Both $\left[Co(ox)_3\right]^{3-}$ and $\left[CoF_6\right]^{3-}$ are paramagnetic.

S_2:$CoCl_3 3NH_3$ complex is non-conducting.

S_3:The number of possible isomers for the complex $\left[Pt\left(NO_2\right)(py)(OH)\left(NH_3\right)\right]$ is six.

S_4:The oxidation state of iron in brown ring complex $\left[Fe\left(H_2O\right)_5 NO^+\right] SO_4$ is + || Where NO is NO^+

A. FTTF

B. TTTT

C. FTTF

D. TTT

Watch Video Solution

13. What is the coordination number of Co in $\left[Co\left(NH_3\right)_4\left(H_2O\right)Br\right]\left(NO_3\right)_2$?

A. FTTF

B. TTTT

C. FTTF

D. TTTF

Watch Video Solution

Comprehension-1

1. Double salts are addition compounds which lose their identity in aqueous solution whereas complexes which are also addition compounds do not lose their identity in aqueous solution. The coordination compounds show isomerism and find applications in photography, qualitative analysis, metallurgy, water purification and in the treatment of various diseases .

Which of the following statment is incorrect ?

A. Alum is a double salt.

B. BDTA salt of calcium is used in the treatment of lead poisoning.

C. Effective atomic number of the metals in complexes $\left[Ni(CO)_4\right]$ and $\left[Fe(CN)_6\right]^{4-}$ is same.

D. Chloridotris (triphenyl phosphine) rhodiuym (I) is effective heterogeneous catalyst for hydrogenation of alkenes.

Watch Video Solution

2. Double salts are addition compounds which lose their identity in aqueous solution whereas complexes which are also addition compounds do not lose their identity in aqueous solution. The coordination compounds show isomerism and find applications in photography, qualitative analysis, metallurgy, water purification and in the treatment of various diseases .

Which of the following statement is true for the complex $\left[Co\left(NH_3\right)_4Br_2\right]NO_2$?

A. It shows ionisation , linkage and geometrical isomerism.

B. It does not show optical isomerism because its cis and trans forms each have at least one plane of symmetry.

C. Its ionisation isomers cannot be differenatiated symmetry

D. (A) and (B) both.

Watch Video Solution

3. Double salts are addition compounds which lose their identity in aqueous solution whereas complexes which are also addition compounds do not lose their identity in aqueous solution. The coordination compounds show isomerism and find applications in photography, qualitative analysis, metallurgy, water purification and in the treatment of various diseases .

Choose the correct option if the complex $\left[PtCl_2(en)_2\right]^{2+}$.

A. Platinum is in +2 oxidation state

B. Racemic mixture is obtained on mixing mirror images of its trans form in 1:1 molar ratio.

C. It has two five membered chelating rings

D. (B) and (C) both

Watch Video Solution

Comprehension-2

1. In coordination chemistry there are a veriety of methods applied to find out the structure of complexes. One method involves treating the complex with known reagents and from the nature of reaction, the formula0 of the complex can be predicted. An isomers of the complex $Co(en)_2\left(H_2O\right)Cl_2Br$, on reaction with concentrated H_2SO_4 (dehydrating agent) it suffers loss in weight and on reaction with $AgNO_3$ solution it gives a white precipitate which is soluble in $NH_3(aq)$.

The correct formula of the complex is :

A. $\left[CoCIBr(en)_2\right]H_2O$

B. $\left[CoCl(en)_2\left(H_2O\right)\right]BrCl$

C. $\left[CoBr(en)_2\left(H_2O\right)\right]Cl_2$

D. $\left[CoBrCl(en)_2\right]Cl.\,H_2O$

Watch Video Solution

2. In coordination chemistry there are a variety of methods applied to find out the structures of complexes. One method involves treating the complex with known reagents and from the nature of reaction , the formula of the complex can be predicated. An isomer of the complex $Co(en)_2\left(H_2O\right)Cl_2Br$, on reaction with concentrated H_2SO_4 (dehydrating agent) it suffers loss in weight and on reaction with $AgNO_3$ solution it gives a white precipitate which is soluble in $NH_3(aq)$.

If all the ligands in the coordination sphere of the above complex be replaced by SCN^- , then the paramagnetic moment of the $\left[Co(SCN)_4\right]^{2-}$ (due to spin only) will be:

A. 2.8 BM

B. 5.9 BM

C. 4.9 BM

D. 1.73 BM

Watch Video Solution

3. In coordination chemistry there are a variety of methods applied to find out the structure of complexes.One method involves treating the complex with known reagents and from the nature of reaction, the formula of the complex can be predicted.An isomer of the complex $Co(en)_2\left(H_2O\right)Cl_2Br$,on reaction with concentrated H_2SO_4

(dehydrating agent) it suffers loss in weight and on reaction with $AgNO_3$ solution it gives a white precipitate which is soluble in NH_3 (aq).

If one mole of original complex is treated with excess $Pb\left(NO_3\right)_2$ solution, then the number of moles of white precipitate (of $PbCl_2$) formed will be :

A. 0.5

B. 1.0

C. 0.0

D. 3.0

Watch Video Solution

Comprehension-3

1. $Co^{2+}(aq) + SCN^{-}(aq) \rightarrow \text{complex}(X)$.

$$Ni^{2+}(aq) + \text{Dimethylglyoxime} \xrightarrow{NH_4OH} \text{Complex}(Y).$$

The coordination number of cobalt and nickel in complexes X and Y are four.

The IUPAC names of the complexes (X) and (Y) are respectively.

A. tetrathicyanato-S -Cobalt (II) and bis (dimethylglyoximate) nickel (II).

B. tetrathicyanato-S -Cobaltate (II) and bis (dimethylglyoximato) nickel (II).

C. tetrathicyanato-S -Cobaltate (II) and bis (dimethylglyoximato) nickelate (II).

D. tetrathicyanato-S -Cobaltate (II) and bis (dimethylglyoximato) nickel (II).

Watch Video Solution

2. $Co^{2+}(aq) + SCN^{-}(aq) \rightarrow \text{complex}(X).$

$$Ni^{2+}(aq) + \text{Dimethylglyoxime} \xrightarrow{NH_4OH} \text{Complex}(Y).$$

The coordination number of cobalt and nickel in complexes X and Y are four.

The geometry of complexes (X) and (Y) are respectively :

A. tetrahedral and sqaure planar.

B. both tetrahedral.

C. square planer and tetrahedral

D. both square planer.

Watch Video Solution

3. $Co^{2+}(aq) + SCN^{-}(aq) \rightarrow \text{complex}(X).$

$$Ni^{2+}(aq) + \text{Dimethylglyoxime} \xrightarrow{NH_4OH} \text{Complex}(Y).$$

The coordination number of cobalt and nickel in complexes X and Y are four.

Select the correct statement for the complexes (X) and (Y).

A. (X) is paramagnetic with two unpaired electrons

B. (Y) is diamagnetic and shows intermolecular H-bonding.

C. (X) is paramagnetic with three unpaired electrons and(Y) is diamagnetic

D. (X) and (Y) both are diamagnetic .

Watch Video Solution

Comprehension-4

1. Square planar complexes are formed by d^8 ions with strong field ligands The crystal field splitting Δ_0 is larger for the second and theird row transition elements and for more highly charged species All the complexes having $4d^8$ and $5d^8$ configurations are mostly square planar including those with weak field ligands such as halide ions square planar complexes can show geometrical isomerism but they do not show optical isomerism due to the presence of plane of symmetry

Among the following complexes which has a square planar geometry?

(a) $\left[RhCI(CO)\left(PPh_3\right)_2\right]$

(b) $K_3\left[Cu(CN)_4\right]$

(c) $\left[Ni(CO)_4\right]$

(d) $K_2\left[Zn(CN)_4\right]$.

A. $Ni(+\square\square)$ and Rh $(+\square)$ with strong field ligands

B. $Rh(+\square)$ and Ag $(+\square\square)$ with strong field ligand.

C. $Pd(+\square\square)$,Pt $(\square\square)$ and Au $(+\square\square\square)$ with strong and weak field ligands

D. None

Watch Video Solution

2. Square planar complexes are formed by d^8 ions with strong field ligands The crystal field splitting Δ_0 is larger for the second and theird row transition elements and for more highly charged species All the complexes having $4d^8$ and $5d^8$ configurations are mostly square planar including those with weak field ligands such as halide ions square planar complexes can show geometrical isomerism but they do not show optical isomerism due to the presence of plane of symmetry

Among the following complexes which has a square planar geometry?

(a) $\left[RhCI(CO)\left(PPh_3\right)_2\right]$

(b) $K_3\left[Cu(CN)_4\right]$

(c) $\left[Ni(CO)_4\right]$

(d) $K_2\left[Zn(CN)_4\right]$.

A. $\left[RhCI(CO)\left(PPH_3\right)_2\right]$

B. $K_3\left[CU(CN)_4\right]$

C. $K_2\left[Zn(CN)_4\right]$

D. $\left[Ni(CO)_4\right]$

Watch Video Solution

Comprehension-5

1. In metal carbonyls. There is synergic bonding interaction between metal and carbon monoxide . This leads to increase in strength of metal ligand bond and decrease in bond ordeer of CO in carbony1 complex as compared to band order in order in carbon monoxide. The increases in bond length in CO as compared to carbon monoxide .is due to :

A. the donation of lone pair of electrons from a filled d-orbital of the metal atom

B. the donation of pair of electrons from a filled d-orbital of metal into the vacant antibonding π^{*} orbital of carbon monoxide.

C. (A) and (B)

D. None

Watch Video Solution

2. In metal carbonyls, there is synergic bonding interaction between metal and carbon monoxide. This leads to increase in strength of metal ligands bond and decrease in bond order of CO in carbonyl complex as compared to bond order in carbon monoxide.

Simple carbonyls are invariably spin-paired complexes except for vanadium metal.

Which one of the following metal carbonyls are inner orbital complexes with diamagnetic property ?

$(P)Ni(CO)_4$ $(Q)Fe(CO)_5$

$(R)V(CO)_6$ $(S)Cr(CO)_6$

Select the correct answer from the codes given below :

A. I and II only

B. II, III and IV

C. II and IV

D. I,II and IV

Watch Video Solution

LEVEL - V

1. The hybridization of the metal in $\left[CoF_6\right]^{3-}$ is

A. sp^3d^2

B. d^2sp^3

C. dsp^3

D. sp^3d

Answer: a

Watch Video Solution

2. The hybridization of Cr in $\left[Cr(en)_3\right]^{3+}$ is

A. d^2sp^3

B. sp^3d

C. sp^3d^2

D. dsp^3

Answer: a

Watch Video Solution

3. The magnetic moment of the complex $\left[Ti\left(H_2O\right)_6\right]^{3+}$ is

A. 3.87 BM

B. 1.73 BM

C. 2.84 BM

D. 5.87 BM

Answer: b

Watch Video Solution

4. Which one of the following coordination numbers can show a square pyramidal geometry?

A. 4

B. 3

C. 7

D. 5

Answer: d

Watch Video Solution

5. If the formation constant of $\left[Cu\left(NH_3\right)_4\right]^{2+}$ is 2×10^3, then its dissociation constant is

A. 5×10^{-4}

B. 2×10^3

C. 5×10^{-2}

D. 0.2×10^3

Answer: a

Watch Video Solution

6. The IUPAC of $\left[Fe\left(H_2O\right)_6\right]Cl_3$ is

A. Hexaaquirion(III) chlorine

B. Hexaquorion(III) trichloride

C. Hexaaquairion(III) chloride

D. Hexa aquairion(III) trichloride

Answer: c

Watch Video Solution

7. IUPAC name of $\left[Co(en)_2Cl_2\right]Cl$ is

A. dichloridobis (ethylene diammine) cobalt (III) Chloride.

B. dichloridobis (ethylenediammine) cobalt (III) Chloride

C. dichlorobis (ethlene diamine) cobalt (III) Chloride.

D. dichloridobis (ethylene diamine) cobalt (III) chloride

Answer: d

Watch Video Solution

8. Which is not true statement?

A. $\left[Ti\left(H_2O\right)_6\right]^{3+}$ is coloured due to d-d transition.

B. $\left[Dy\left(H_2O\right)_6\right]^{3+}$ is coloured due tof-f transition.

C. $\left[Sc\left(H_2O\right)_6\right]^{3+}$ and $\left[Ti\left(H_2O\right)_6\right]^{4+}$ are coloured complexes

D. Cu^{+} is colourless ion.

Answer: c

Watch Video Solution

9. Among the following ions, which one has the highest paramagnetism ?

A. $\left[Cr\left(H_2O\right)_6\right]^{3+}$

B. $\left[Fe\left(H_2O\right)_6\right]^{2+}$

C. $\left[Cu\left(H_2O\right)_6\right]^{2+}$

D. $\left[Zn\left(H_2O\right)_6\right]^{2+}$

Answer: b

Watch Video Solution

10. Which of the following statements is correct?

A. $\left[CoF_6\right]^{3-}$ and $\left[Co\left(NH_3\right)_6\right]^{3+}$ both are paramagnetic complexes

B. $\left[CoF_6\right]^{3-}$ and $\left[Co\left(NH_3\right)_6\right]^{3+}$ both are high spin complex

C. $\left[CoF_6\right]^{3-}$ is octahedral while $\left[Co\left(NH_3\right)_6\right]^{3+}$ has a pentagonal pyramid shape

D. $\left[CoF_6\right]^{3-}$ is outer orbital complex while $\left[Co\left(NH_3\right)_6\right]^{3+}$ is inner orbital complex

Answer: d

Watch Video Solution

11. What is wrong about the compound $K\left[Pt\left(\eta^2 - C_2H_4\right)Cl_3\right]$?

A. It is called Zeise's salt

B. It is only π-bonded complex

C. Oxidation number of Pt is +2

D. Four ligands surrounds the Platinum atom.

Answer: b

Watch Video Solution

12. Which complex is likely to show optical activity :

A. Trans-$\left[Co\left(NH_3\right)_4Cl_2\right]^+$

B. $\left[Cr\left(H_2O\right)_6\right]^{3+}$

C. *Cis* - $\left[Co\left(NH_3\right)_2(en)_2\right]^{3+}$

D. Trans-$\left[Co\left(NH_3\right)_2(en)_2\right]^{3+}$

Answer: c

Watch Video Solution

13. Which of the following complex ion has a magnetic moment same as $\left[Cr\left(H_2O\right)_6\right]^{3+}$?

A. $\left[Mn\left(H_2O\right)_6\right]^{4+}$

B. $\left[Mn\left(H_2O\right)_6\right]^{3+}$

C. $\left[Fe\left(H_2O\right)_6\right]^{3+}$

D. $\left[Cu\left(NH_3\right)_4\right]^{2+}$

Answer: a

Watch Video Solution

14. In which of the following ions, the colour is not due to d-d transition?

A. CrO_4^{2-}

B. $Cu\left(NH_3\right)_4^{2-}$

C. $Ti\left(H_2O\right)_6^{3+}$

D. CoF_6^{3-}

Answer: a

Watch Video Solution

15. Gold and platnum dissolves in aquaregia to produce respectively

A. $H\left[AuCl_4\right]$ and $H\left[PtCl_3\right]$

B. $H\left[AuCl_4\right]$ and $H_2\left[PtCl_6\right]$

C. $H_2\left[AuCl_6\right]$ and $H\left[PtCl_4\right]$

D. $H_2\left[AuCl_6\right]$ and $H\left[PtCl_6\right]$

Answer: b

Watch Video Solution

Multiple Answer Questions

1. Which of the following statements is/are true?

A. In metal carbonyl complexes d increases compared to that in CO molecule

B. The pair of compounds $\left[Cr\left(H_2O\right)_6\right]Cl_3$ and $\left[CrCl_3\left(H_2O\right)_3\right].3H_2O$ shows hydration isomerism

C. d_{z^2} orbital of central metal atom/ion is used in dsp^2 hybridisation

D. Facial and meridional isomers associated with $\left[Ma_3b_3\right]^{n\pm}$ type complex compound, both are optically inactive

Answer: a,d

Watch Video Solution

2. A d-block element forms octahedral complex but its spin magnetic moment remains same either in strong field or in weak field ligand. Which of the following is/are correct ?

A. d-block element always forms colourless compound

B. Number of electrons in t_{2g} orbitals are higher than in e_g orbitals

C. It can have either d^3or d^8 configuration

D. It can have either d^7 or d^8 configuration

Answer: b,c

Watch Video Solution

3. The complexes that have a magnetic moment of 1.73 BM is

A. $\left[Ti\left(H_2O\right)_6\right]^{3+}$

B. $\left[V\left(H_2O\right)_6\right]^{4+}$

C. $\left[Mn\left(H_2O\right)_6\right]^{2+}$

D. $\left[Mn\left(H_2O\right)_6\right]^{3+}$

Answer: a,b

Watch Video Solution

4. The square planar complexes are

A. $\left[Pt\left(NH_3\right)_2Cl_2\right]$

B. $\left[Ni(CN)_4\right]^{2-}$

C. $\left[NiCl_4\right]^{2-}$

D. $\left[PtCl_4\right]^{2-}$

Answer: a,b,d

Watch Video Solution

5. The tetrahedral complexes are

A. $Ni(CO)_4$

B. $\left[FeCl_4\right]^{-1}$

C. $\left[MnCl_4\right]^{2-}$

D. $\left[CoCl_4\right]^{2-}$

Answer: a,b,c,d

Watch Video Solution

6. The diamagnetic complexes are

A. $\left[Cr(CO)_6\right]$

B. $\left[Co\left(NH_3\right)_6\right]^{3+}$

C. $\left[Fe(CN)_6\right]^{4-}$

D. $\left[Ni\left(NH_3\right)_6\right]^{2+}$

Answer: a,b,c

Watch Video Solution

7. The strong field ligands or moderate ligand are

A. NH_3

B. en

C. CO

D. CN^-

Answer: a,b,c,d

Watch Video Solution

8. $d \rightarrow d$ transition is possible in

A. $\left[Cu\left(NH_3\right)_4\right]^{2+}$

B. $KMnO_4$

C. $K_2Cr_2O_7$

D. $\left[Co\left(NH_3\right)_6\right]^{3+}$

Answer: a,d

Watch Video Solution

9. Which of the following can act as bridging ligands?

A. OH^-

B. H_2O

C. CO

D. Cl^-

Answer: a,c,d

View Text Solution

10. Which of the following ligands can show linkage isomerism?

A. en

B. NO_2^-

C. CN^-

D. SCN^-

Answer: b,c,d

Watch Video Solution

11. Which of the following can show geometrical isomers (M=metal,a,b,c-monodentate ligands?

A. Ma_3b

B. Ma_4b_2

C. Ma_2bc (squareplanar)

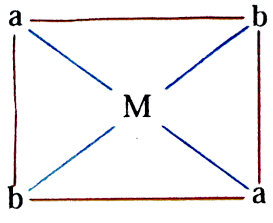
D. $Ma_2b_2c_2$

Answer: b,c,d

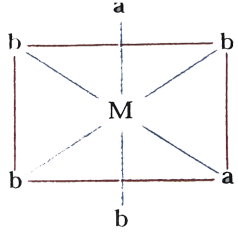
Watch Video Solution

12. Which of the following are cis isomers ?

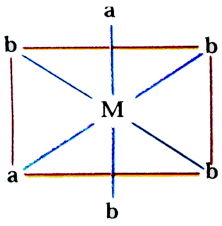
A.



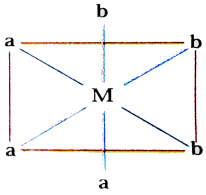
B.



C.



D.



Answer: b,c,d

Watch Video Solution

13. The following complexs are given?

trans-$\left[Co\left(NH_3\right)_4 1_2\right]^{\oplus}$

cis - $\left[Co\left(NH_3\right)_2(en)_2\right]^{3+}$

trans-$\left[Co\left(NH_3\right)_2(en)_2\right]^{3+}$

$\left[NiI_4\right]^{2-}$

$\left[TiF_6\right]^{2-}$

$\left[CoF_6\right]^{3-}$

Choose the correct code .

A. (1),(2) are optically active,

B. (2) is optically active, (1), (3) are optically inactive

C. (4),(6) are colourless (5) is coloured

D. (4) is coloured and (5) is colourless

Answer: b,d

Watch Video Solution

14. Among the following which is most stable?

(1) $[Fe(CN)_6]^{3-}$ and $[FeF_6]^{3-}$
(X) (Y)

(2) $[Fe(CN)_6]^{3-}$ and $[Fe(CN)_6]^{4-}$
(S) (T)

(3) $[Cr(CN)_6]^{-3}$ and $[Cr(CN)_6]^{-4}$
(P) (Q)

Choose the correct code

A. 1 - *X*, 2 - *T*, 3 - *Q*

B. 1 - *X*, 2 - *S*, 3 - *Q*

C. 1 - *X*, 2 - *S*, 3*P*

D. 1 - *Y*, 2 - *T*. 3 - *Q*

Answer: c

View Text Solution

15. Which of the following is/are correct?

A. Ligands with filled π orbitals are called π donors

B. π donor ligand forms sigma bond with metal t_{2g} orbital

C. Ligand to metal charge transfer favoured when the central metal has a high oxidation state

D. Delocalization of π electrons from the ligand to the metal rduces the value of $\triangle_0$

Answer: a,d

Watch Video Solution

16. The magnitude of crystal field stabilization energy depends on

A. The nature of of ligands

B. The charge on the metals atom

C. The charge on the ligand

D. Position of metal in periodic table

Answer: a,b,d

Watch Video Solution

17. Complex ions $\left[NiCl_4\right]^{2-}$,$\left[Ni\left(CN_4\right]^{2-}\right.$

Similar in theior given properties:

A. Oxidation state

B. Co-Ordination number

C. Mangnetic moment

D. Color

Answer: a,b

Watch Video Solution

18. Select correct statement(s) regarding given complexes:

A. $\left[Fe(CO)_5\right]$ the orbitals used for hybridix=zation in Fe atom are s, Px, Py, Pz, d_{z^2}

B. $\left[Pt\left(NH_3\right)_2Cl\right]$ the orbital used for hydrization on pt atom are s,Px,Py,$d_{x^2\text{-}y^2}$ and it is low spin complex

C. $\left[Cr\left(H_2O\right)_6\right]^{3+}$ the orbitals used for hybridiztion in cr atom are s P_xP_y, P_z, D_{z^2}, $D_{x^2\text{-}y^2}$ and it si high spain complex

D. $Ni\left(CO_4$the orbitals used for hybrization in Ni atom s P_X, P_y, P_z and it low spin complex

Answer: a,b,c,d

Watch Video Solution

19. Complex compound $\left[Co(SCN)_2\left(NH_3\right)_4\right]Cl$ exhibits:

A. ionzation isomerism

B. Geometrical isomerism

C. optical isomerism

D. Linkage isomerism

Answer: a,b,d

Watch Video Solution

20. Which of the following compound has/have effective atomic number equal to the atomic number of a noble gas ?

A. $K\left[Co(CO)_4\right]$

B. $K_2\left[Fe(CO)_4\right]$

C. $\left[Co\left(NH_3\right)_6\right]Cl_2$

D. $\left[CoCl_3\left(H_2O\right)_3\right]$

Answer: a,b,d

Watch Video Solution

21. $K_2\left[Ni(CN)_4\right] \xrightarrow{\text{K in liq.}} NH_3X'$

Regarding this reaction correct statement is/are:

A. $'X'$ $isK_4\left[Ni(CN)_4\right]$

B. the oxidation state of Ni changed +2 to zero

C. The stucture of 'X'is tertrahedral

D. $\left[Ni(CN)_4\right]^{2-}$ is a square planar complex

Answer: a,b,c,d

Watch Video Solution

22. Which one of the following statement(s) is/are false?

A. Weak ligands like F^- and OH^- usually form low apin complexes

B. strong liqand like CN^- and NO_2^- generally form high spin complexes

C. $\left[FeF_6\right]^{3-}$ is high spin complex

D. $\left[Ni(CO)_4\right]$ is a high spin complex

Answer: a,b,d

Watch Video Solution

23. Which of the following is correct about Tetraamminedithiocyanato-s cobalt(III) tris(oxalato)cobaltate(III)?

A. Formula of the complex is

$$\left[Co(SCN)_2(NH)_3\right]\left[Co(OX)_3\right]$$

B. It is a chelating complex and show linkage isomerism

C. It shown optical isomerism

D. It shows geometal isomerism

Answer: b,c,d

Watch Video Solution

24. Select the correct statement

A. Chelatiojn effect is maximum for five and Six memberd rings

B. Greater the charge on the central metal cation greater ,the value of $\Delta(CFSE)$

C. In complex ion $\Delta_{Oct} < P$(Pairing energy) and it is a low spin complex

D. $\left[CoCl_2\left(NH_3\right)_2(en)\right]^{\oplus}$ complex ion will have four different isomers

Answer: a,b

Watch Video Solution

25. Which of the following obey18e^-rule?

A. $Cr(CO)_6$

B. $Ni(CO)_4$

C. $Cr\left(C_6H_6\right)_2$

D. $Fe\left(C_5H_5\right)_2$

Answer: a,b,c,d

Watch Video Solution

26. Which of the following obey EAN rule?

A. $\left[Co\left(NH_3\right)_6\right]^{3+}$

B. $Cr(CO)_6$

C. $\left[V(CO)_6\right]^-$

D. $[Zn(EDTA)]^{-2}$

Answer: a,b,c,d

Watch Video Solution

27. Which of the following are four coordinated cpomplexes?

A. $Be(acac)_2$

B. $[Zn(EDTA)]^{2-}$

C. $[Pt(dien)Cl]^{+}$ (dien=diethyklene triamine)

D. $[Pt(\text{Trien})]^{+2}$ (triehtylene tetramine)

Answer: a,c,d

Watch Video Solution

28. In Ni^{2+} octahedral complex ,which of the following ligands do not pair up the electrous ?

A. NH_3

B. H_2O

C. en

D. Dien

Answer: a,b,c,d

Watch Video Solution

29. Explain the following :

(i) Low spin octahedral complexes of nickel are not known.

(ii) The π - complexes are known for transition elememts only.

(iii) CO is a stroger ligand than NH_3 for many metals.

A. Ferrocene

B. Zeises salt

C. Dibenzenechromimum exhibits optical activity ?

D. Grignard Reagent

Answer: a,b,c

Watch Video Solution

30. which of the following exhibits optical activity?

A. *Cis* - $\left[Co(en)_2Cl_2\right]^+$

B. *Trans* - $\left[Co(en)_2Cl_2\right]^+$

C. $K_3\left[Al\left(C_2O_4\right)_3\right]$

D. $\left[Co\left(NH_3\right)_4Cl_2\right]^+$

Answer: a,c

Watch Video Solution

31. The optically active complex are

A. $\left[As\left(CH_3\right)(Cl)(Br)(I)\right]^+$

B. $\left[Pt\left(NH_3\right)(Py)(Cl)(Br)\right]$

C. $\left[Pt(gly)_2\right]$

D. $\left[Cr(en)_3\right]Cl_3$

Answer: a,d

Watch Video Solution

32. Which is (are) correct statement (s) ?

A. $\left[Ag\left(NH_3\_(2)\right]^+\right.$ is linear with sp hybridsed AG^+ ions

B. $NiCl_4^{2-}$, CrO_4^{2-} and MnO_4^- have tetrahedral geometry

C. $\left[Cu\left(NH_3\right)_4\right]^{2+}$, $\left[pt\left(NH_3\right)_4\right]^{2+}$ and $\left[Ni(CN)_4\right]^{2-}$ have dsp^2 hybridisatioj of the metal ion

D. $Fe(CO)_5$ has trigonal bipyramidal struure with $D_{Z^2}Sp^3$ hydridesed ion

Answer: a,b,c,d

Watch Video Solution

33. which of the following is /are correct relations(s)?

A. $\Delta_0 = \frac{4}{9}\Delta_t$

B. $\Delta_t = \frac{4}{9}\Delta_0$

C. $\Delta_s = 1.3\Delta_0$

D. $\Delta_t = \frac{3}{7}\Delta_0$

Answer: b,c

Watch Video Solution

34. Which of the following is /are correct aboout wikinson's catalst?

A. It is used as homogeneous catalst for selecticve hydrrogenatuion of organic mole cule at room temparture and pressure

B. It is tetrahedral complex

C. It does not have unpaired el,ectrons

D. Its formula is $TiCl_4 + Al\left(C_2H_5\right)_3$

Answer: a,c

Watch Video Solution

Comprehension Questions

1. A metal complex having composition $\left[Cr\left(NH_3\right)_4Br_2I\right]$ was isolated in two forms (X) and (Y). Form (X) reacts with $AgNO_3$ to give a pale yellow precipitate which is partially soluble in excess of NH_4OH whereas (Y) gives a greenish yellow precipitate which is insoluble in NH_4OH.

what is formula of X and Y?

A. The formula of (X) and (Y) are $\left[Cr\left(NH_3\right)_4BrI\right]Br$ and $\left[Cr\left(NH_3\right)_3Br_2I\right]NH_3$ respectively

B. The formula of (X) and (Y) are $\left[Cr\left(NH_3\right)_4BrI\right]Br$ & $\left[Cr\left(NH_3\right)_4Br_2\right]I$ repectively

C. The formula of (X) and (Y) are both $\left[Cr\left(NH_3\right)_4I\right]Br_2$

D. The formula of (X) and (Y) are $\left[Cr\left(NH_3\right)_2IBr_2\right]\left(NH_3\right)_2$

Answer: b

Watch Video Solution

2. A metal complex having composition $\left[Cr\left(NH_3\right)_4Br_2I\right]$ was isolated in two forms (X) and (Y). Form (X) reacts with $AgNO_3$ to give a pale yellow precipitate which is partially soluble in excess of NH_4OH whereas (Y) gives a greenish yellow precipitate which is

insoluble in NH_4OH.

what is formula of X and Y?

A. linkage isomerism

B. Coordination isomerism

C. Ionization isomerism

D. None of these

Answer: c

Watch Video Solution

3. A metal complex having composition $\left[Cr\left(NH_3\right)_4Br_2I\right]$ was isolated in two forms (X) and (Y). Form (X) reacts with $AgNO_3$ to give a pale yellow precipitate which is partially soluble in excess of NH_4OH whereas (Y) gives a greenish yellow precipitate which is

insoluble in NH_4OH.

Which of the following statement is true?

A. (X)-cis form optically inactive (Y)-cis form optically active

B. (X)-cis form optically inactive (Y)- trans form optically active

C. The cis and trans forms of both X and Y are optically active

D. The cis and trans form of both X and Y are optically inactive.

Answer: d

Watch Video Solution

Matrix Matching Questions

1. Match the following

Column - I (molar conductance)	Column - II
a) 229	p) $\left[Pt(NH_3)_5Cl\right]Cl_3$
b) 0	q) $\left[Pt(NH_3)_2Cl_4\right]$
c) 404	r) $\left[Pt(NH_3)_4Cl_2\right]Cl_2$
d) 523	s) $\left[Pt(NH_3)_6\right]Cl_4$
	t) $\left[Co(NH_3)_3Cl_3\right]$

Watch Video Solution

2. Match the following

Column - I	Column - II
a) $K_2[NiCl_4]$	p) sp^3 hybridized
b) $[Ni(CO)_4]$	q) para magnetic
c) $[Cr(NH_3)_6]^{3+}$	r) outer orbital complex
d) $[FeF_6]^{3-}$	s) digmagnetic

View Text Solution

3. Match the following

Column - I	Column - II
a) $[Fe(CN)_6]^{4-}$	p) Paramagnetic, sp^3d^2
b) $[Fe(H_2O)_6]^{2+}$	q) Diamagnetic, d^2sp^3
c) $[CrCl_2(NH_3)_4]NO_3$	r) Diamagnetic sp^3d^2
d) $[Zn(H_2O)_6]^{2+}$	s) Ionization isomerism

Watch Video Solution

4. Match the following

Column - I	Column - II
a) $\left[Ni(NH_3)_6\right]^{2+}$	p) Diagmagnetic
b) $\left[Ni(CO)_4\right]$	q) $sp^3\ d^2$
c) $\left[Cr(H_2O)_6\right]^{3+}$	r) d^2sp^3
d) $\left[Ni(CN)_4\right]^{2-}$	s) Inner orbital complex

View Text Solution

5. Match the following

Column - I	Column - II
a) $\left[Co(NH_3)_4(H_2O)_2\right]Cl_2$	p) Geometrical isomers
b) $\left[Pt(NH_3)_2Cl_2\right]$	q) Diamagnetic
c) $\left[Cr(H_2O)_5Cl\right]Cl$	r) Paramagnetic
d) $\left[Cr(H_2O)_6\right]Cl_3$	s) optical isomers

View Text Solution

6. Match the following

List-I	List-II
(A) $[CoF_6]^{3-}$	(p) High spin complex
(B) $\left[Fe(H_2O)_6\right]^{3+}$	(q) Low spin complex
(C) $\left[Co(en)_3\right]^{3+}$	(r) Outer orbital complex
(D) $\left[Cr(CO)_6\right]$	(s) Inner orbital complex
	(t) Paramagnetic

Watch Video Solution

7. Match the following

List-I	List-II
(A) $\left[Pt(NH_3)_2Cl_2\right]$	(p) Dipole Moment
(B) $K_3\left[Cr(OX)_3\right]$	(q) Polarimeter
(C) $\left[Co(NH_3)_4Cl_2\right]Cl$	(r) Precipitation with $AgNO_3$
(D) $\left[Co(en)_2Cl_2\right]Cl$	(s) Cation exchange Resin (t) Anion exchange Resin

View Text Solution

8. Match the following

List-I	List-II
(A) Wilkinson catalyst	(p) +1 O.S.
(B) deoxy haemoglobin	(q) +2 O.S.
(C) Brown Ring complex	(r) Coordination number 4
(D) Vaskas complex	(s) Coordination number 6
	(t) Neutral complex

Watch Video Solution

9. Match the following

Column-I	Column-II
A) $[Co(NH_3)_4Cl_2]$	p) Optical isomerism
B) $[Co(en)_3]Cl_2$	q) Ionization isomerism
C) $[Co(en)_2(NO_2)Cl]SCN$	r) Coordination isomerism
D) $[Co(NH_3)_6][Cr(CN)_6]$	s) Geometrical isomerism

Watch Video Solution

10. Match the following

Column - I Pair of complex	Column - II Property is different among the given pair
A) $[Ni(CO)_4]$ & $K_2[Ni(CN)_4]$	p) Magnetic moment
B) $[Cu(NH_3)_4]SO_4$ & $K_3[Cu(CN)_4]$	q) Oxidation no of central metal
C) $K_2[NiCl_4]$ & $K_2[Ni(CN)_4]$	r) Geometry
D) $K_2[NiCl_4]$ & $K_2[PtCl_4]$	s) EAN of central atom

View Text Solution

11. Match the following

Column - I	Column - II
A) $MnCl_4^{2-}$	p) Square planar
B) $NiCl_4^{2-}$	q) Tetrahedral
C) $Cs_2(CuCl_4)$	r) Diamagnetic
D) $Ni(CN)_4^{2-}$	s) Paramagnetic

Watch Video Solution

12. Match the following

Column - I

Column - I

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

c) $[Co(NH_3)_6]^{3+}$ d) $[CoF_6]^{3-}$

Column - II

p) Paramagnetic q) Diamagnetic

r) Inner orbital complex s) Outer orbital complex

t) octahedral

Watch Video Solution

13. Match the following : Complex

Complex

(A) $\left[Pt(gly)_2\right]$

(B) $\left[Co(gly)_3\right]$

(C) $\left[Pt(en)_2\right]^{2+}$

(D) $\left[Co(en)_3\right]^{3+}$

View Text Solution

14. Match the following:

List-I	List-II
(A) $Be(acac)_2$	(p) Octahedral
(B) $\left[Zn(EDTA)\right]^{-2}$	(q) Square planar
(C) $K_3\left[Al(C_2O_4)_3\right]$	(r) Tetrahedral
(D) $Ni(DMG)_2$	(s) Diamagnetic
	(t) Exhibits optical activity

View Text Solution

15. Match the following:

List-I

A) deoxyhaemoglobin (B) Wilkinson catalyst

(C) Sodium nitroprusside (D) Reineck salt

List-II

(p) Oxidation state of the metal is +2

(q) Oxidation state of the metal is +1

(r) Oxidation state of the metal is +3

(s) Coordination number : 4

(t) Coordination number : 6

A. deosyhaemoglobin

B. Wilkinson catalyst

C. Sodium nitroprusside

D. Reineck salt

Answer: A-p,t B-q,s C-p,t D-r,t

Watch Video Solution

16. Match the following

Complex	I
(1) $\left[Co(NH_3)_6\right]^{3+}$	(A) 5.87 BM
(2) $\left[Fe(CN)_6\right]^{3-}$	(B) diamagnetic
(3) $\left[Mn(H_2O)_6\right]^{2+}$	(C) 1.73 BM

II	III
1) (P) sp^3d^2	(U) Outer orbital complex
2) (Q) d^2sp^3	(V) Inner orbital complex
3) (R) dsp^3	(W) Having only σ donation from the ligand

A. 1: B,Q,V,W 2:C,Q,V 3:A,P,U,W

B. 1: A,Q,V,W 2:B,P,V,W 3:B,Q,U,W

C. 1: B,Q,V,W 2:A,P,U,W 3:C,R,V

D. 1: A,P,U 2:C,R,U,W 3:A,Q,V

Answer: A

Watch Video Solution

17. Match the following

Complex	I
(1) $[Pt(CN)_4]^{2-}$	(A) 2.83 BM
(2) $[NiCl_4]^{2-}$	(B) 5.87 BM
3) $[MnBr_4]^{2-}$	(C) 3.87 BM
4) $[CoCl_4]^{-2}$	(D) Diamagnetic

II	III
1) (P) sp^3	(U) d^8 (Low spin)
2) Q) dsp^2	(V) d^5
3) (R) Tetrahedral	(W) d^7
(4) (S) Square planar	(X) d^8 (high spin)

A. 1: A,P,R,W 2:D,Q,S,U 3:D,Q,S,W 4: A,Q,S,X

B. 1: C,Q,S,W 2:B,P,R,W 3:A,P,R,V 4:B,Q,S,W

C. 1: B,P,R,V 2:C,Q,S,V 3:C,Q,S,X 4:D,P,R,V

D. 1: D,Q,S,U 2:A,P,R,X 3:B,P,R,V 4:C,P,R,W

Answer: D

View Text Solution

18. Match the following

List-I	List-II
(A) $\left[Co(en)_2 Cl_2\right]Cl$	(p) Geometrical Isomerism
(B) $\left[Co(en)_3\right]Cl_3$	(q) Optical isomerism
(C) $\left[Cr(NH_3)_4 Cl_2\right]Cl$	(r) Paramagnetic
(D) $K_3\left[Cr(C_2O_4)_3\right]$	(s) Diamagnetic
	(t) Cationic complex

A. 1: A,P,R,W 2:D,Q,S,U 3:D,Q,S,W 4: A,Q,S,X

B. 1: C,Q,S,W 2:B,P,R,W 3:A,P,R,W 4: B,Q,S,W

C. 1: B,P,R,V 2:C,Q,S,V 3:C,Q,S,X 4: D,P,R,V

D. 1: D,Q,S,U 2:A,P,R,X 3:B,P,R,V 4: C,P,R,W

Answer: A-p,q,s,t B- q,s,t C-p,r,t D-q,r

View Text Solution

19. Match the following

Column - I	Column - II
A) $\left[Cr(gly)_3\right]$	p) Low spin complex
B) $\left[Co(Br)_2(Cl)_2(SCN)_2\right]^{3-}$, $\mu = 4.84$ B.M	q) High spin complex
C) $\left[Co(NH_3)_6\right]^{3+}$	r) Optical isomerism
D) $Na\left[Pt(Br)(Cl)(NO_2)(NH_3)\right]$	s) Geometrical isomerism
	t) Linkage isomerism

View Text Solution

Statement Type

1. Statement-1: $Co(CO)_4$ is not stable but $\left[Co(CO)_4\right]^-$ is stable.

Statement-2: $\left[Co(CO)_4\right]^-$ obeys EAN rule

A. Statement-1 is True, Statement-2 is True,

Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True,

Statement-2 is NOTa correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: a

Watch Video Solution

2. Statement-1: $\left[W(CO)_6\right]$ obeys EAN rule as it attains xe configuration.

Statement-2: It is stable because it attains Rn configuration

A. Statement-1 is True, Statement-2 is True,

Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True,

Statement-2 is NOTa correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: d

Watch Video Solution

3. The questions given below consist of Assertion (A) and Reason (R) . Use the following key to select the correct answer.

Assertion : The complex $\left[Ni(en)_3\right]Cl_2$ has lower stability than $\left[Ni\left(NH_3\right)_6\right]Cl_2$.

Reason : In $\left[Ni(en)_3\right]Cl_2$, the geometry of Ni is triagonal bipyramidal

.

A. Statement-1 is True, Statement-2 is True,

Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True,

Statement-2 is NOTa correct explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: d

Watch Video Solution

4. On the basis of crystal field theory explain why Co(III) Forms paramagnetic octahedral complex with weak field ligands whereas it forms diamagnetic octahedral complex with strong field ligands.

A. Statement-1 is true,Statement-2 is True, Statement-2 is a correct explanation for Statement-1

B. Statement- is True, Statement-2 is True, Statement-2 is not a correct explanantion for Statement-1

C. Statement-1 is True,Statement-2 is False

D. Statement-1 is False, Statement-2 is True.

Answer: C

Watch Video Solution

5. The magnetic moment of $\left[Ni(Cl)_4\right]^{2-}$ is

A. Statement-1 is true,Statement-2 is True, Statement-2 is a correct explanation for Statement-2

B. Statement- is True, Statement-2 is True, Statement-2 is not a correct explanantion for Statement-2

C. Statement-1 is True,Statement-2 is False

D. Statement-1 is False, Statement-2 is True.

Answer: D

Watch Video Solution

6. Fe^{3+} compounds are more stable than Fe^{2+} compounds because

A. Statement-1 is true,Statement-2 is True, Statement-2 is a correct explanation for Statement-3

B. Statement- is True, Statement-2 is True, Statement-2 is not a correct explanantion for Statement-3

C. Statement-1 is True,Statement-2 is False

D. Statement-1 is False, Statement-2 is True.

Answer: A

Watch Video Solution

7. The shape of $\left[Co\left(NH_3\right)_6\right]^{3+}$ is

A. Statement-1 is true,Statement-2 is True, Statement-2 is a correct explanation for Statement-4

B. Statement- is True, Statement-2 is True, Statement-2 is not a correct explanantion for Statement-4

C. Statement-1 is True,Statement-2 is False

D. Statement-1 is False, Statement-2 is True.

Answer: A

Watch Video Solution

Watch Video Solution

8. The percentage of Mg^{2+} ions in a solution can be tested by adding a solution of

A. Statement-1 is true,Statement-2 is True, Statement-2 is a correct explanation for Statement-5

B. Statement- is True, Statement-2 is True, Statement-2 is not a correct explanantion for Statement-5

C. Statement-1 is True,Statement-2 is False

D. Statement-1 is False, Statement-2 is True.

Answer: C

Watch Video Solution

9. Square planar complexes are formed by d^8 ions with strong field ligands The crystal field splitting Δ_0 is larger for the second and theird row transition elements and for more highly charged species All the complexes having $4d^8$ and $5d^8$ configurations are mostly square planar including those with weak field ligands such as halide ions square planar complexes can show geometrical isomerism but they do not show optical isomerism due to the presence of plane of symmetry

Which of these is square planar complex?

(a) All are square planar complexes (b) $\left[Ni(CO)_4\right]$ (c) $\left[Pt\left(NH_3\right)_4\right]^{2+}$ (d) $\left[Ni\left(NH_3\right)_6\right]^{2+}$.

A. Statement-1 is true,Statement-2 is True, Statement-2 is a correct explanation for Statement-6

B. Statement- is True, Statement-2 is True, Statement-2 is not a correct explanantion for Statement-6

C. Statement-1 is True,Statement-2 is False

D. Statement-1 is False, Statement-2 is True.

Answer: A

Watch Video Solution

Integer Type Questions

1. The secondary valency in $[Co(EDTA)]^{2-}$ is

Watch Video Solution

2. How many of the following are diamagnetic?

$\left[Ag\left(NH_3\right)_2\right]^+$, $\left[Cd\left(NH_3\right)_4\right]^{2+}$,

$Cr(CO)_6$, $\left[Ni\left(NH_3\right)_6\right]^{2+}$, $\left[Ni(CN)_4\right]^{2-}$

Watch Video Solution

3. The number of geometrical isomers and optical isomers of $\left[Pt\left(NH_3\right)(Br)(Cl)(Py)\right]$ are respectively.

Watch Video Solution

4. The number of oxygen atoms involved in bonding in the coordination sphere of $[Mg(EDTA)]^{2-}$ is

Watch Video Solution

5. The number of unpaired spins in the $\left[Cr(en)_3\right]^{2+}$ ion is

Watch Video Solution

6. How many geometrical isomers arepossible for $\left[Pt\left(NO_2\right)\left(NH_2OH\right)(Py)\right]^+$?

Watch Video Solution

7. How many steroisomers are possible for

$\left[Pt(Br)(Cl)\left(NH_3\right)_2\right]$?

Watch Video Solution

8. Dimethyl glyoxime forms a square planar conplex with Ni^{+2}.The number of unpaired electrons are

Watch Video Solution

9. How many number of d-electrons are present in $\left[Co\left(NH_3\right)_5CO_3\right]ClO_4$?

Watch Video Solution

10. The number of oxygen atoms coordinated to Cr in Cr $(acac)_3$ is ?

Watch Video Solution

11. Al $(acac)_X$ the 'X' is

Note : acac is univalent bidentate ligand

Watch Video Solution

12. In Zn $(\text{oxine})_2$ (oxine : 8- quinolinol), the coordination number and the oxidation state of Zn are x and Y respectively, then (x+y) is

View Text Solution

13. $\left[Fe^{3+}(biphy)_X\right]$, (bipy = 2,2' bipyridine)'X' value is

View Text Solution

14. Choose the incorrect regarding stability

(a) $\left[Fe(\text{phen})_3\right]^{+2} > \left[Fe(\text{phen})_3\right]^{+3}$

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

(c) $Fe(\text{dipy})_3^{+3} > Fe(\text{dipy})_3^{+2}$

Watch Video Solution

15. The number of t_{2g} electrons in $\left[Fe\left(H_2O\right)_6\right]^{3+}$ is

Watch Video Solution

16. Which of the following compound statement is correct for $[Co(EDTA)]^-$ complex compound?

Watch Video Solution

17. How many of the following are sp^3 hybridized?

$\left[ZnCl_4\right]^{2-}, Ni(DMG)_2, \left[Ni(CN)_4\right]^{2-}, \left[Ni(CO)_4\right]$

$\left[NiCl_4\right]^{2-}, \left[PtCl_4\right]^{2-}, \left[Pd\left(NH_3\right)_4\right]^{2+}, \left[FeCl_4\right]^{-1}$

View Text Solution

18. How many of the following have d^2sp^3 hybridization?

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

$\left[Cr\left(NH_3\right)_6\right]^{3+}, \left[Co(en)_3\right]^{3+}, [Co(EDTA)]^{2-}$

$\left[CoF_6\right]^{3-}, \left[Co\left(H_2O\right)_6\right]^{2+}$

View Text Solution

19. The hybridization of the d-block element sodium nitropruside is

Watch Video Solution

20. The number of unpaired electrons in the brown ring complex is

Watch Video Solution

21. the number of five membered chelate rings in $[Zn(EDTA)]^{2-}$ is

Watch Video Solution

22. DMG is x-valen and y-dentate ligand. Taking x and y as numbers, find (x+y)

Watch Video Solution

23. How many geometrical isomers and stereoisomers are possible for $\left[Pt\left(NO_2\right)\left(NH_3\right)\left(NH_2OH\right)(Py)\right]^+$ and $\left[Pt(Br)(Cl)(I)\left(NO_2\right)\left(NH_3\right)(Py)\right]$ respectively?

Watch Video Solution

24. How many molecules of benzene $\left(C_6H_6\right)$ are there in $1L$ of benzene ? Specific gravity of benzene is 0.88.

Watch Video Solution

25. The oxidation number of the d-block metal in Zeises salt is

Watch Video Solution

26. The oxidation stat of the metal in Reinecks salt is +x, x is

Watch Video Solution

27. The coordination number of the metal in the Wilkinson catalyst is $+x$,x is

Watch Video Solution

28. The oxidation number of the metal in the Wilkinson catalyst is $+x$,x is

Watch Video Solution

29. The complexes $\left[Co\left(NH_3\right)_6\right]\left[Cr(CN)_6\right]$ and $\left[Cr\left(NH_3\right)_6\right]\left[Co(CN)_6\right]$ are the examples of which type of isomerism ?

Watch Video Solution

30. In the complex $\left[Pt\left(NH_3\right)_3Cl\right]\left[CuCl_3\left(NH_3\right]\right.$ the charges over $\left[Pt\left(NH_3\right)_3Cl\right]^{+x}$ and $\left[CuCl_3\left(NH_3\right]^{-y}\right.$ then (x+y) is

View Text Solution

31. The possible number of stereoismers for the formula $\left[Ma_2b_2cd\right]^{\pm n}$.

Watch Video Solution

32. The number of nitrogen atoms coordunated in $[Zn(EDTA)]^{-2}$ is

Watch Video Solution

33. The number of five membered rings in $[Pt(\text{trien})]^{2+}$ (trien=triethyleneetetra amine) is

Watch Video Solution

34. The oxidation number of metal atom is zero in

Watch Video Solution

35. The oxidation state amnd coordination number of the metal in Wilkinson catalyst are +x and y respectively. (x+y) is

Watch Video Solution

36. The formula of sodium nitroprusside is

Watch Video Solution

37. Intermolecular hydrogen bonding strongest in :

Watch Video Solution

38. Which of the following isomerism, exhibited by $\left[CrCl_2(OH)_2\left(NH_3\right)_2\right]^-$?

Watch Video Solution

39. The total possible co-ordination isomers for the following compounds respectively are

(i) $\left[Co(en)_3\right]\left[Cr\left(C_2O_4\right)_3\right]$

(ii) $\left[Cu\left(NH_3\right)_4\right]\left[CuCl_4\right]$

(iii) $\left[Ni(en)_3\right]\left[Co\left(NO_2\right)_6\right]$

Watch Video Solution

40. A metal complex of coordination number six having three different types of ligands a, b and c of composition $Ma_2b_2c_2$ can exist in several geometrical isomeric forms, the total number of such isomers is:

Watch Video Solution

41. The crystel field stabalisation energy of $\left[Mn\left(H_2O\right)_6\right]^{2+}$ is

Watch Video Solution

42. If $\Delta_0 < P$ then electronic arrangement of metal atom/ion in an octahederal complex with d^4 configuration is $t_{2g}^x e_g^y$. What is the value of x

Watch Video Solution

43. The no. of complexes showing and mer isomerism

(A) $\left[Co\left(NH_3\right)_3 Cl_3\right]$ (B) $\left[Co(en)_3\right]^{+3}$

$\left[Co(gly)_3\right]$

(D) $\left[Co\left(NH_3\right)_2\left(H_2O\right)_2 Cl_2\right]$

(E) $\left[Fe(dipy)_3\right]^{+2}$ (F) $\left[Fe(o\text{ - }phen)_3\right]^{+2}$

View Text Solution

44. The no. of comlexes showing hepticity 5

A. ferrocene

B. zeise's salt

C. ruthenocene

D. chromocene

Answer: 2

Watch Video Solution

45. The no. of chelating ligands are

A. Sulphato

B. EDTA

C. nitrato

D. thiosulphato

Answer: 1

Watch Video Solution

46. In complex $\left[Cr\left(NH_3\right)_6\left[Co\left(C_2O_4\right)_3\right]\right.$ the total No. of ions formed are

Watch Video Solution

47. In the complex $\left[Fe(CO)_2(NO)_2\right]$ the oxidation state of Fe is -x,'x' is

Watch Video Solution

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

Watch Video Solution

49. The no.of statements is/ are correct ?

View Text Solution

50. Consider the following complex:

$\left[Co\left(NH_3\right)_5CO_3\right]ClO_4$

the coordination number is X and oxidation number is Y, number of d-electrons is Z, and number of unpaired d-electrons of the metal is A are respectively. (X+Y)-(Z+A).

Watch Video Solution

51. The CFSE for $\left[CoCl_4\right]^{4-}$ is $18000cm^{-1}$ the value of y ios

View Text Solution

52. Amongest $\left[Co(OX)_3\right]^{3-}$, $\left[CoF_6\right]^{3-}$, $\left[Co\left(NH_3\right)_6\right]^{3+}$ and $\left[Co\left(NH_3\right)_6\right]^{2+}$ the no. of coloured complexes

Watch Video Solution

53. The theoritical spin-only magnetic moment of cobalt in $Hg\left[Co(SCN)_4\right]$ is 3.87 B.M.

View Text Solution

54. From Ma_3b_3, when one b is replaced by c, the total no. of geometrical isomer possible are

View Text Solution

FILL IN THE BLANKS

1. The number of unpaired electrons in $\left[Cr\left(NH_3\right)_6\right]^{2+}$ is _____ .

Watch Video Solution

2. The hybridization of $\left[Cr\left(H_2O\right)_6\right]^{2+}$ is _____ .

Watch Video Solution

3. The total number of geometric isomers for Mabcdef are _____ .

Watch Video Solution

4. $\left[Pt\left(NH_3\right)_5Cl\right]^+$ does not exhibit _____ and _____ stereio isomersim .

Watch Video Solution

5. The EAN of $Mo(CO)_6$ is _____

Watch Video Solution

6. The coordination number of Pt in cisplatin is _____ .

Watch Video Solution

SINGLE ANSWER QUESTIONS

1. In Ziesses salt C=C bond length is :

$$\text{Note}: \left\{ \begin{array}{l} C\text{ - }C\text{bond length in enthance is } 1.54\text{Å} \\ C = C\text{bond length in enthance is } 1.34\text{Å} \\ C \equiv C\text{bond length in enthance is } 1.20\text{Å} \end{array} \right\}$$

A. $1.37A^{\circ}$

B. $1.19A^{\circ}$

C. $1.87A^{\circ}$

D. $1.34A^{\circ}$

Answer: a

Watch Video Solution

2. Which one of the following can get oxidized easily ?

A. $\left[Co\left(NH_3\right)_6\right]^{3+}$

B. $\left[Co\left(NH_3\right)_6\right]^{2+}$

C. $Fe(Co)_5$

D. $Cr(CO)_6$

Answer: b

Watch Video Solution

3. The magentic momentsn(BM) of the complexes $\left[Ni\left(H_2O\right)_6\right]^{2+}$ and $\left[Ni\left(NH_3\right)_6\right]^{2+}$ are resectively

A. 1.73, 2.84

B. 0, 2.84

C. 2.84, 0

D. 2.84, 2.84

Answer: d

Watch Video Solution

4. The number of electron in t_{2g} orbitals in $K_4\left[Fe(CN)_6\right]$ is

A. 2

B. 3

C. 6

D. 5

Answer: c

Watch Video Solution

5. The crystel field stabalisation energy of $\left[Mn\left(H_2O\right)_6\right]^{2+}$ is

A. -1.2 $\triangle_\theta$

B. -1.9 $\triangle_\theta$

C. 0

D. -2.4 $\triangle_\theta$

Answer: c

Watch Video Solution

6. The theoretical percentage wight loss when $\left[Cr\left(H_2O\right)_4Cl_2\right]Cl.2H_2O$ conc. H_2SO_4 in a closed desicator is

A. 13.5

B. 6.75

C. 18.0

D. 36.0

Answer: a

Watch Video Solution

7. 0.2435 g of a complex gave 0.2870 g of AgCl when treated with a excess $AgNO_3$ solution. The complex is

A. $\left[Cr\left(NH_3\right)_4Cl_2\right]Cl$

B. $\left[Cr\left(NH_3\right)_5Cl_2\right]Cl_2$

C. $\left[Cr\left(NH_3\right)_3Cl_3\right]$

D. $\left[Cr\left(NH_3\right)_6Cl_2\right]Cl_3$

Answer: b

View Text Solution

8. $\left[Fe(CN)_5(CO)\right]^{3-}$ IUPAC name is

A. pentacyanocarbonylferrate (II)

B. carbonylpentacyanidoferrate (II)

C. pentacyanocarbonyliron (III)

D. carbonylpentacyanoiron (III)

Answer: b

Watch Video Solution

9. The IUPAC name of oerrocene is

A. bis (μ^5- cyclopentadienyl) iron (O))

B. bis(μ^{10}-cyclopentadienyl)iron(O))

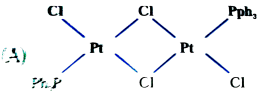
C. bis(μ^5-cyclopentadienyl)iron(II))

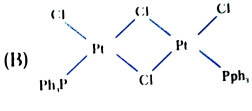
D. bis(μ^{10}-cyclopentadienyl)iron(II))

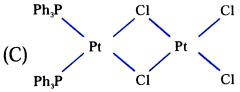
Answer: c

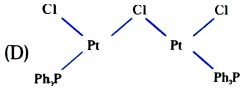
Watch Video Solution

10. Cis di-μ -chloro bis [chloro(triphenyl phosphine) platinum(II)] is

A. 

B. 

C. 

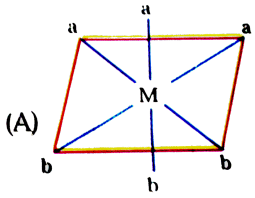
D. 

Answer: b

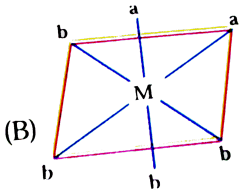
Watch Video Solution

11. Which one of the following represents a Cis isomer ?

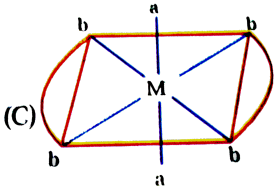
A.



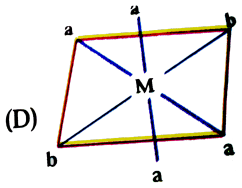
B.



C.



D.



Answer: b

Watch Video Solution

12. The total number of geometric isomers for Mabcdef are _____ .

A. $4C_2$

B. $5C_1$

C. $3C_2$

D. $6C_2$

Answer: d

Watch Video Solution

13. The complex formed by Pt^{2+} with diethylenetriamine (dien) and chlorido ligand is given by

A. $[Pt(dien)]^{2+}$

B. $\left[Pt(dien)Cl_2\right]^{2+}$

C. $[Pt(dien)Cl)]^{1+}$

D. $[Pt(dien)Cl]^{2+}$

Answer: c

Watch Video Solution

14. Which one of the following given an acid whenpassed through cation exchange resin(RSO_3H) ?

A. $K_4\left[Fe(CN)_6\right]$

B. $K_3\left[Al\left(C_2O_4\right)_3\right]$

C. $\left[CO\left(NH_3\right)_6\right]Cl_3$

D. $\left[Cr(CO)_6\right]$

Answer: c

View Text Solution

15. Which one of the following give a base when passed through anion exchange resin $\left[R_4N^+\right]OH^-$?

A. $K_4\left[Fe(CN)_6\right]$

B. $\left[Co(en)_3\right]Cl_3$

C. $\left[CO\left(NH_3\right)_6\right]Cl_3$

D. $\left[Fe\left(H_2O\right)_6\right]SO_4$

Answer: a

View Text Solution

16. Which one of th efollowing does not form a chelate with oxalate ion by reacting in aqueous solution ?

A. cis-$\left[Co\left(NH_3\right)_4Br_2\right]^{+1}$

B. cis-$\left[Co\left(NH_3\right)_4Cl_2\right]^{+1}$

C. cis-$\left[Co(en)_2Cl_2\right]^{+1}$

D. trans-$\left[Co(en)_2Cl_2\right]^{+1}$

Answer: d

View Text Solution

17. The neutral and positive charged species that can coordinate to a metal atom is

A. Cl^-

B. NH_3

C. Co

D. NO

Answer: d

Watch Video Solution

18. Which of the following pair of compounds is expected to exhibit same colour in aqueous solution?

A. $FeCl_2, CuCl_2$

B. $VOCl_2, CuCl_2$

C. $VoCl_2, FeCl_2$

D. $FeCl_2, MnCl_2$

Answer: b

Watch Video Solution

19. The oxidation state of Mo in its oxo-complex species $\left[Mo_2O_4\left(C_2H_4\right)_2\left(H_2O\right)_2\right]^{2-}$ is:

A. 2

B. 3

C. 4

D. 5

Answer: b

Watch Video Solution

20. The donor sites of $(EDTA)^{4-}$ are ?

A. o atoms only

B. N atoms only

C. Two N atoms and four O atoms

D. Three N atoms and three O atoms

Answer: c

Watch Video Solution

21. In nitroprusside ion the iron and NO exist as Fe (II) and NO^+ rather than the Fe(III) and NO. these forms can be differentiated by

A. Estimating the concentration of iron

B. Measuring the cancentration of CN-

C. Measuring the solid state magnetic moment

D. Thermally decomposing the compound

Answer: c

Watch Video Solution

22. In the Iso-electronic series of metal carbonyls, the C-O bond strength is expected to increase in the order:-

A. $\left[Mn(CO)_6\right]^+ < \left[Cr(CO)_6\right] < \left[V(CO)_6\right]^-$

B. $\left[V(CO)_6\right]^- < \left[Cr(CO)_6\right] < \left[Me(CO)_6\right]^+$

C. $\left[V(CO)_6\right]^- < \left[Mn(CO)_6\right]^+ < \left[Cr(CO)_6\right]$

D. $\left[Cr(CO)_6\right] < \left[Mn(CO)_6\right]^+ < \left[V(CO)_6\right]^-$

Answer: b

Watch Video Solution

23. The magnetic moment of complex given below are in the order:

(I) $\left[Ni(CO)_4\right]$

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

(III) $\left[Cr\left(NH_3\right)_6\right]^{3+}$

(IV) $\left[CoF_6\right]^{3-}$

A. I gtII gtIII gtIV

B. I ltII ltIII ltIV

C. IV gt II gtI gtIII

D. IV lt II ltI ltIII

Answer: b

Watch Video Solution

24. Three arrangements are shown for the complexes $\left[CoBr_2\left(NH_3\right)_2(en)\right]^{\oplus}$. Which one is wrong statement?

A. I and II are geometrical isomer

B. II and III are optical isomer

C. I and III are optical isomers

D. II and III are geometrical isomers

Answer: b

Watch Video Solution

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

A. $\left(CH_3\right)_4Sn$

B. $Cr\left(n^6 - C_6H_6\right)_2$

C. $Fe\left(n^5 - C_5H_5\right)_2$

D. $K\left[PtCl_3\left(n^2 - C_2H_4\right)\right]$

Answer: a

Watch Video Solution

26. Complex compounds(s) which is optical active and does ot dpeend upon the orientation of the ligands around metal cation:

(i) $\left[CoCl_3\left(NH_3\right)_3\right]$

(ii) $\left[Co(en)_3\right]Cl_3$

(iii) $\left[Co\left(C_2O_4\right)_2\left(NH_3\right)_2\right]^-$

(iv) $\left[CrCl_2\left(NH_3\right)_2(en)\right]^+$

A. II,IIIand Iv

B. I,Iiand Iv

C. II and Iv

D. Only II

Answer: d

Watch Video Solution

27. The total possible co-ordination isomers for the following compounds respectively are

(i) $\left[Co(en)_3\right]\left[Cr\left(C_2O_4\right)_3\right]$

(ii) $\left[Cu\left(NH_3\right)_4\right]\left[CuCl_4\right]$

(iii) $\left[Ni(en)_3\right]\left[Co\left(NO_2\right)_6\right]$

A. 4,4,4

B. 2,2,2

C. 2,2,4

D. 4,2,4

Answer: d

Watch Video Solution

28. Which of the following can show geometrical isomerism?

A. $\left[Pt\left(NH_2\text{-}CH\,|\,CH_3\text{-}CH\,|\,CH_3\text{-}NH_2\right)_2\right]^{2+}$

B. $\left[Co(en)_2\left(NH_3\right)Cl\right]^{2+}$

C. Both a and B

D. None if these

Answer: c

Watch Video Solution

29. The complex which does not obey EAN rule is

A. $\left[Fe(CO)_5\right]^0$

B. $\left[Cr(CO)_3(NO)_2\right]^0$

C. $\left[Fe(CO)_3(NO)_2\right]^0$

D. $\left[Fe(CO)_2(NO)_2\right]^0$

Answer: c

Watch Video Solution

Compreshession type question

1. $(I)K_3\left[Co(CN)_6\right] + \left[Cr\left(NH_3\right)_6\right]Cl_3 \xrightarrow{\text{acetone}} x + 3KCl \downarrow$

$K_3\left[Cr(CN)_6\right] + \left[Co\left(NH_3\right)_6\right]Cl \xrightarrow{\text{Acetone}} y + 3KCl \downarrow$

the solution was filted x and y are obtained after evoporation of the

solvent from the filtrate.

`X and y are

A. Linkage isomers

B. Geometrical isomerism

C. Coordinaate Isomers

D. Positinal IsoMers.

Answer: c

Watch Video Solution

2. $(I)K_3\left[Co(CN)_6\right] + \left[Cr\left(NH_3\right)_6\right]Cl_3 \xrightarrow{\text{acetone}} x + 3KCl \downarrow$

$K_3\left[Cr(CN)_6\right] + \left[Co\left(NH_3\right)_6\right]Cl \xrightarrow{\text{Acetone}} y + 3KCl \downarrow$

the solution was filted x and y are obtained after evoporation of the solvent from the filtrate.

when x is sent through cation exxhange resin the complex coming out in solution is

A. $\left[Co\left(NH_3\right)_6\right]^{3+}$

B. $\left[Cr\left(NH_3\right)_6\right]^{3+}$

C. $\left[Cr\left(NH_3\right)_6\right]^{3-}$

D. $\left[Cr\left(CN_3\right)_6\right]^{3-}$

Answer: c

View Text Solution

3. $(I)K_3\left[Co(CN)_6\right] + \left[Cr\left(NH_3\right)_6\right]Cl_3 \xrightarrow{\text{acetone}} x + 3KCl \downarrow$

$K_3\left[Cr(CN)_6\right] + \left[Co\left(NH_3\right)_6\right]Cl \xrightarrow{\text{Acetone}} y + 3KCl \downarrow$

the solution was filted x and y are obtained after evoporation of the solvent from the filtrate.

when y is sent through anion exchange resn , then the complex eluted is

A. $\left[Co\left(NH_3\right)_6\right]^{3+}$

B. $\left[Cr\left(NH_3\right)_6\right]^{3+}$

C. $\left[Cr\left(NH_3\right)_6\right]^{3-}$

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

Answer: a

View Text Solution

4. Let $x_1 < x_2 < x_3 < x_4 < x_5$ and $y_1 < y_2 < y_3 < y_4 < y_5$ are in AP such that $\sum_{I=1}^{5} x_i = \sum_{I=1}^{5} y_i = 25$ and $\sum_{III=1}^{5} x_i = \sum_{III=1}^{5} y_i = 0$ then $\left|y_5 - x_5\right|$

A. β_n and $\log \beta_n$

B. K_n and log β_{n-1}

C. β_{n-1} and log β_{n-1}

D. K_{n-1} and log K_{n-1}

Answer: a

Watch Video Solution

5. Consider the following complex equilibrium

$$M + L \Leftrightarrow ML,\ K_1 = \frac{[ML]}{[M][L]}$$

$$ML + L \Leftrightarrow ML_2,\ K_2 = \frac{[ML_2]}{[ML][L]}$$

$$ML_2 + L \Leftrightarrow ML_3,\ K_3 = \frac{[ML_3]}{[ML_2][L]}$$

$$ML_{n-1} + L \Leftrightarrow ML_n,\ K_n = \frac{[ML_n]}{[ML_{n-1}][L]}$$

K_1, K_2, K_3 are step wise stability constant

$$M + L \Leftrightarrow ML \qquad \beta_1 = \frac{[ML]}{[M][L]}$$

$$M + 2L \Leftrightarrow ML_2 \qquad \beta_2 = \frac{[ML_2]}{[M][L]^2}$$

$$M + 3L \Leftrightarrow ML_3 \qquad \beta_3 = \frac{[ML_3]}{[M][L]^3}$$

$$M + nL \Leftrightarrow ML_n \qquad \beta_n = \frac{[MLn]}{[M][L]^n}$$

$\beta_P, \beta_2, \beta_3, \beta_n$ are called over all formation constants.

Choose the

correct order

A. $K_3 > K_2 > K_1$

B. $K_3 = K_2 = K_1$

C. $K_1 > K_2 > K_3$

D. $K_1 = K_2 \neq K_3$

Answer: c

Watch Video Solution

6. (1) $\left[Cd\left(H_2O\right)_4\right]^{2+} + 4NH_3 \Leftrightarrow \left[Cd\left(NH_3\right)_4\right]^{2+} + 4H_2O, \log\beta_1$

(2) $\left[Cd\left(H_2O\right)_4\right]^{2+} + 2en \Leftrightarrow \left[Cd(en)_2\right]^{2+} + 4H_2O \log\beta_2$

$\log\beta_2 > \log\beta_1$, is due to

A. Enthalpy change

B. Entropy change

C. Ring strain in the chelate

D. Large change in Δ_0

Answer: b

Watch Video Solution

7. Bonding in metal carbonyls is represented by the end structures.

$$\underset{I}{M\text{-}C\equiv O} \quad \leftrightarrow \quad \underset{II}{M=C=O}$$

The contribution of I and II to the real structure depends upon the extent of π - back bonding. Both σ donation and π - back bonding are synergitc. The filled orbitals CO overlap with vacant metal d orbitals which is called σ donation. The filled metal d orbitals overlap with π antibondig moleculat orbital of CO. which is called π - back bonding .

Which one of the following has the highest C-O bond length?

A. $\left[Cr(CO)_6\right]$

B. $\left[Ti(CO)_6\right]^{2-}$

C. $\left[Mn(CO)_5\right]^{+}$

D. $\left[Fe(CO)_5\right]$

Answer: b

Watch Video Solution

8. Bonding in metal carbonyls is represented by the end structures.

$$\underset{I}{M-C\equiv O} \quad \leftrightarrow \quad \underset{II}{M=C=O}$$

The contribution of I and II to the real structure depends upon the extent of π - back bonding. Both σ donation and π - back bonding are synergitc. The filled orbitals CO overlap with vacant metal d orbitals which is called σ donation. The filled metal d orbitals overlap with π antibondig moleculat orbital of CO. which is called π - back bonding .

Which one of the following has the highest C-O bond length?

A. $Ti\left(C_2H_5\right)_4$

B. $Ni(CO)_4$

C. $Cr(CO)_6$

D. $\left[Fe(CN)_6\right]^{4-}$

Answer: a

Watch Video Solution

9. Bonding in metal carbonyls is represented by the end structures.

$$\underset{I}{M-C\equiv O} \leftrightarrow \underset{II}{M=C=O}$$

The contribution of I and II to the real structure depends upon the extent of π - back bonding. Both σ donation and π - back bonding are synergitc. The filled orbitals CO overlap with vacant metal d orbitals which is called σ donation. The filled metal d orbitals overlap with π antibondig moleculat orbital of CO. which is called π - back

bonding .

Which one of the following has the highest C-O bond length?

A. $\left[Ti(CO)_6\right]^{2-}$

B. $\left[V(CO)_6\right]^{-}$

C. $\left[Mn(CO)_5\right]^{+}$

D. $Cr(CO)_6$

Answer: c

Watch Video Solution

10. According to crystal field theory d-orbitals split up in octahedral field into two sets.$d_{xy}d_{yx}d_{zx}$ have lower energy and $d_{x^2-y^2}$ and d_{z^2} have higher energy. The difference in energy of these two sets of d-orbitals is called crystal field splitting energy denoted by Δ_0.

In tetrahedral field $d_{x^2-y^2}$ and d_{z^2} have lower energy whereas $d_{xy}d_{yz}d_{zx}$ have higher energy. The difference in energy is denoted Δ_t. Δ_0 can be determined by measuring λ_{max} for absorption and converting into energy units. Δ_0 depends upon nature of metal ions as well as nature of ligands. The magnitude of Δ_0 also decides low energy levels are filled.

which one of the following has the highest magnetic moment

A. $d_{xy}^2 d_{yz}^2 d_{zx}^1$

B. $d_{xy}^1 d_{yz}^1 d_{zx}^1 d_{x^2-y^2} d_{z^2}^1$

C. $d_{xy}^2 d_{yz}^1 d_{zx}^1 d_{x^2-y^2}^1$

D. $d_{xy}^2 d_{yz}^1 d_{zx}^1 d_{x^2-y^2}^2$

Answer: a

Watch Video Solution

11. According to crystal field theory d-orbitals split up in octahedral field into two sets.$d_{xy}d_{yx}d_{zx}$ have lower energy and $d_{x^2\text{-}y^2}$ and d_{z^2} have higher energy. The difference in energy of these two sets of d-orbitals is called crystal field splitting energy denoted by Δ_0.

In tetrahedral field $d_{x^2\text{-}y^2}$ and d_{z^2} have lower energy whereas $d_{xy}d_{yz}d_{zx}$ have higher energy. The difference in energy is denoted Δ_t. Δ_0 can be determined by measuring λ_{max} for absorption and converting into energy units. Δ_0 depends upon nature of metal ions as well as nature of ligands. The magnitude of Δ_0 also decides low energy levels are filled.

Given the following data about absorption maximum of several complex ions, the correct order of Δ_0 for these ions is

Complexes λ_{max}

$\left[Cr\left(H_2O\right)_6\right]^{3+}$ 694nm

$\left[Cr\left(NH_3\right)_6\right]^{3+}$ 465nm

$\left[CrC1_6\right]^{3-}$ 758nm

A. $\Delta_0\left[Cr\left(NH_3\right)_6\right]^{3+} > \Delta_0\left[Cr\left(H_2O\right)_6\right]^{3+} > \Delta_0\left[CrC1_6\right]^{3-}$

B. $\Delta_0\left[Cr\left(NH_3\right)_6\right]^{3+} = \Delta_0\left[Cr\left(H_2O\right)_6\right]^{3+} > \Delta_0\left[CrC1_6\right]^{3-}$

C. $\Delta_0\left[Cr\left(NH_3\right)_6\right]^{3+} < \Delta_0\left[Cr\left(H_2O\right)_6\right]^{3+} < \Delta_0\left[CrC1_6\right]^{3-}$

D. $\Delta_0\left[Cr\left(N_2O\right)_6\right]^{3+} > \Delta_0\left[CrC1_6\right]^{3-} > \Delta_0\left[Cr\left(NH_3\right)_6\right]^{3+}$

Answer: a

Watch Video Solution

12. According to crystal field theory d-orbitals split up in octahedral field into two sets.$d_{xy}d_{yx}d_{zx}$ have lower energy and $d_{x^2\text{-}y^2}$ and d_{z^2} have higher energy. The difference in energy of these two sets of d-orbitals is called crystal field splitting energy denoted by Δ_0.

In tetrahedral field $d_{x^2\text{-}y^2}$ and d_{z^2} have lower energy whereas $d_{xy}d_{yz}d_{zx}$ have higher energy. The difference in energy is denoted Δ_t.

Δ_0 can be determined by measuring λ_{max} for absorption and converting into energy units. Δ_0 depends upon nature of metal ions as well as nature of ligands. The magnitude of Δ_0 also decides low energy levels are filled.

which one of the following has the highest magnetic moment

A. $\left[CoF_6\right]^{3-}$

B. $\left[Ni\left(H_2O\right)_6\right]^{2+}$

C. $\left[Fe(CN)_6\right]^{3-}$

D. $\left[Cu\left(NH_3\right)_4\right]^{2+}$

Answer: a

Watch Video Solution