CHEMISTRY

BOOKS - GRB CHEMISTRY (HINGLISH)

COORDINATION COMPOUNDS

STRAIGHT OBJECTIVE TYPE

1. Ethylene diamine is an example of a .... ligand:

A. monodentate

B. bidentate

C. tridentate

D. hexdentate

Answer: B

Watch Video Solution

Watch Video Solution

2. 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

3. Some salts although containing two different metallic elements give test for one of them in solution. Such salts are:

A. complex salt

B. double salt

C. normal salt

D. none of these

Answer: A

Watch Video Solution

4. All ligands are :

A. Lewis acids

B. Lewis bases

C. Netural

D. none of these

Answer: B

Watch Video Solution

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

A. $+2$

B. $+3$

C. $+4$

D. $+5$

Answer: B

Watch Video Solution

6. Co-ordination number of platinum in $\left[Pt(NH_3)_4Cl_2\right]^{2+}$ ion is :

A. 4

B. 2

C. 8

D. 6

Answer: D

Watch Video Solution

7. Which of the following is copper (I) compound ?

A. $\left[Cu\left(H_2O\right)_4\right]^{2+}$

B. $\left[Cu(CN)_4\right]^{3-}$

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

D. All of these

Answer: B

Watch Video Solution

8. In the complex $\left[CoCl_2(en)_2\right]Br$, the co-ordination number and oxidation state of cobalt are :

A. 6 and $+3$

B. 3 and $+3$

C. 4 and $+2$

D. 6 and $+1$

Answer: A

Watch Video Solution

9. What is the charge on the complex $\left[Cr\left(C_2O_4\right)_2\left(H_2O\right)_2\right]$ formed by Cr(III) ?

A. $+3$

B. $+1$

C. $+2$

D. -1

Answer: A

Watch Video Solution

10. In the coordination compound, $K_4\left[Ni(CN)_4\right]$ oxidation state of nickel is

A. -1

B. 0

C. $+1$

D. $+2$

Answer: D

Watch Video Solution

11. The disodium salt of ethylenediamminetetracetic acid can be used to estimate the following ion(s) in the aqueous solution :

A. $Mg^{2+} ion$

B. $Ca^{2+} ion$

C. $Na^{+1} ion$

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

Answer: B

Watch Video Solution

12. Of the following complex ions, one is a Bronsted-Lowery acid. That one is:

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

B. $\left[FeCl_4\right]^-$

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

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

Answer: D

Watch Video Solution

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

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

B. the number of ligands around a metal ion bounded by pi bonds

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

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

Answer: C

Watch Video Solution

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

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

Answer: D

Watch Video Solution

15. The oxidation state of Cr in $\left[Cr\left(NH_3\right)_4Cl_2\right]^+$ is:

A. 0

B. $+1$

C. $+2$

D. $+3$

Answer: D

Watch Video Solution

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

A. six

B. Three

C. One

D. Two

Answer: D

Watch Video Solution

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

A. EDTA in the form of clacium dihydrogen salt

B. cis-platin

C. Zeisse's salt

D. DMG

Answer: C

Watch Video Solution

18. Which of the following are bidentate monoanion ligande?

A. Acetylacetonato

B. Oxalato ion

C. Dimethylglyoximato

D. a) and b) both

Answer: A

Watch Video Solution

19. Diethylenetriamine is :

A. chelating agent

B. tridentate netural molecule

C. tridentatemonoanion

D. (a) and (b) both

Answer: B

Watch Video Solution

20. $Na_2S + Na_2\left[Fe(CN)_5NO\right] \rightarrow Na_4\left[Fe(NH)_5nos\right]$, oxidation number of Fe in reactant (complex) and product (complex) are :

A. 2, 1

B. 2, 2

C. 2, 3

D. 3, 3

Answer: D

Watch Video Solution

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

A. $Ni(CO)_4$

B. K_2NiF_6

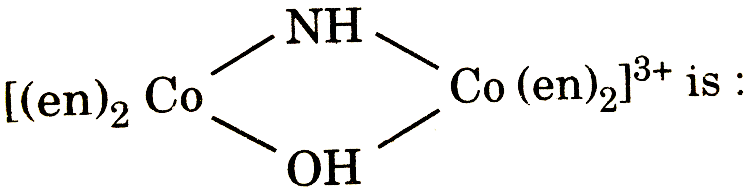
C. $\left[Ni\left(NH_3\right)_6\right]\left(BF_4\right)_2$

D. $K_4\left[Ni(CN)_6\right]$

Answer: B

Watch Video Solution

22. The oxidation number of Co in the complex ion



A. $+2$

B. $+3$

C. $+4$

D. $+6$

Answer: B

Watch Video Solution

23. Which of the following are ambidentate ligands?

A. $CN^-, NOS^-, P\left(C_6H_5\right)_3$

B. $H_2N - NH_2, S_2O_3^{2-}, CNO^-$

C. N_3, CO_3^{2-}, NO_2

D. NO_2, NOS^-, CNO^-

Answer: D

View Text Solution

24. Which of the following is a bidentate ligand?

A. $\overset{..}{N}H_2 - CH_2 - CH_2 - NH_2$

B. $: \bar{N} . . = \overset{+}{N} = \bar{N} . . :$

C. $: \bar{N} . . = \overset{+}{N} = \bar{N} . . :$

D. All of these

Answer: A

Watch Video Solution

25. In dimethylglyoximatoligand (dmg) donor atom is/are:

A. one nitrogen atom

B. one nitrogen and one oxygen atom

C. two nitrogen atoms

D. two oxygen atoms

Answer: C

Watch Video Solution

26. Which of the following is a bidentate ligand?

A. bn

B. dien

C. trien

D. EDTA

Answer: A

Watch Video Solution

27. Which of the following is not a bidentate ligand?

A. (en)

B. (Py)

C. (Ox)

D. (gly)

Answer: B

Watch Video Solution

28. Which of the following complexes is not a chelate?

A. bis(dimethylglyoximato)nickle(II)

B. potassium ethylenediaminetetrathiocyanatochromate(III)

C. tetraamminediazidocobalt(III)nitrate

D. trans-diglycinatoplatinum(II)

Answer: C

Watch Video Solution

29. Which pairs contains both ambidentate and flexidentate?

A. CO_3^{2-}, CN^-

B. CO_3^{2-}, NO_3^-

C. $S_2O_3^{2-}, CO_3^{2-}$

D. CN^-, NO_2^-

Answer: A

Watch Video Solution

30. The cation which is expected to act as ligand is:

A. Pb^{4+}

B. Ca^{2+}

C. K^{+}

D. Tl^{+}

Answer: D

Watch Video Solution

---

31. Which of the following would act as flexidentate ligand?

A. SO_4^{2-}

B. ethylenediamine

C. $NH_2 - NH_2$

D. CH^{-}

Answer: A

Watch Video Solution

32. Which of the following ligands would act as flexidentate ligand and ambidentate ligand?

A. SO_3^{2-}

B. NO_3^-

C. CO_3^{2-}

D. None of these

Answer: A

Watch Video Solution

33. Which of the following would act as Bronsted acid?

A. $NaBH_4$

B. B_2H_6

C. SiH_4

D. $HCo(CO)_4$

Answer: D

Watch Video Solution

34. Give the order of chelating effect of following ligands.

(i) $C_2O_4^{2-}$ (ii) EDTA (iii) dien

A. $R > Q > P$

B. $P > Q > R$

C. $Q > R > P$

D. $P > R > Q$

Answer: C

Watch Video Solution

35. Which of the following lagands can act only π-donor ligand?

A. $C_5H_5^-$

B. $C_3H_5^-$

C. C_6H_6

D. CO

Answer: C

Watch Video Solution

36. Which a"dien" is bonded with a metal it produces:

A. 2 five membered rings

B. 2 six membered rings

C. 1 five membered ring

D. 3 five membered rings

Answer: A

Watch Video Solution

37. Which of the following ligands is ambidentate ligand?

A. $\overset{\Theta}{0}CN$

B. NO_2^{Θ}

C. NOS^{Θ}

D. All of these

Answer: D

View Text Solution

38. Which of the following ion is not present aq. Sloution of potash alum?

A. K^{+}

B. AI^{3+}

C. NH_4^{+}

D. SO_4^{2-}

Answer: C

Watch Video Solution

39. Complex which have minimum number of metal-nitrogen linkage:

A. $\left[\overset{II}{Ni}(EDTA)^{2-}\right]$

B. $\left[\overset{III}{Co}(Gly)_3\right]^0$

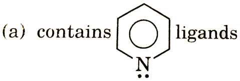
C. $\left[Pt(\text{nitrito-N})_4\right]^{2-}$

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

Answer: A

Watch Video Solution

40. Select incorrect about complex $\left[Fe(en)_2(bipy)\right]SO_4$:

A. 

B. Contains $\begin{array}{l} CH_2 - NH_2 \\ | \\ CH_2 - NH_2 \end{array}$

C. contains total three chelating ligands

D. oxidation number and coordination number of metal are $+2$ and six respectively

Answer: A

Watch Video Solution

41. Which of the following statements is incorrect?

A. Salt of EDTA is used in the treatment of lead poisioning.

B. Co-ordination compound of Pt is effectively inhibit growth of tumors.

C. Haemoglobing is a Co-ordination complex of Co.

D. The excess of copper and iron are removed by the chelating ligands D-penicillamine and desferrioxime-B.

Answer: C

Watch Video Solution

42. Which of the following statements is incorrect?

A. Co-ordination compounds and complexes are synonymous terms.

B. Complexes must give ions in the solution.

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

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

Answer: B

Watch Video Solution

43. Find the correct option in which both ligands form same number of rings with central metal ion:

A. Ox^2, Cl^-

B. en, gly^-

C. Py, Br^-

D. none of these

Answer: B

Watch Video Solution

44. Which will not give test of all the ions present in it?

A. $K_2Fe_2\left(SO_4\right)_4.24H_2O$

B. $\left(NH_4\right)_2Fe\left(SO4\right))_2.6H_2O$

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

D. $Fe_2\left(SO_4\right)_3$

Answer: C

Watch Video Solution

45. Give the oxidation state and co-ordination number of central metal ion in the following comkplexes respectively:

$(P)K_3\left[Co\left(Co_2O_4\right)_3\right]$ $(Q)cis\left[Cr(en)_2Cl_2\right]Cl$

$(R)\left(NH_4\right)_2\left[CoF_4\right]$ $(S)\left[Mn\left(H_2O\right)_6\right]SO_4$

A. $(P)+3, 6(Q)+3, 6(R)+2, 4(S)+2, 6$

B. $(P)+2, 6(Q)+3, 6(R)+2, 4(S)+2, 6$

C. $(P) + 3, 6(Q) + 2, 6(R) + 2, 4(S) + 2, 6$

D. $(P) + 3, 6(Q) + 3, 6(R) + 2, 4(S) + 3, 6$

Answer: A

Watch Video Solution

46. Diethylene triamine is:

A. Chelating ligand

B. Polydentate ligand

C. Tridentate ligand

D. All of these

Answer: D

Watch Video Solution

47. Which amongst the following are ambidentate as well as flexidentate ligand?

A. NO_2^-

B. SCN^-

C. $EDTA^{4-}$

D. None of these

Answer: D

Watch Video Solution

48. Choose the correct statement.

A. Chelating ligands D-penicillamine and desferrioxime B remove toxic proportions of copper and lead (in plant/animal systems)via the formation of co-ordination compounds.

B. EDTA is used in the treatment of lead poisoning.

C. cis-platin is carcinogenic.

D. In black and whitephoto graphy, the debeloped film is fixed by washing with hypo solution which dissolves undisloved AgBr to form a complex ion, $\left[Ag\left(S_2O_3\right]^-\right.$.

Answer: B

Watch Video Solution

49. Choose the only incorrect statement.

A. Articles can be electro palted with silver and gold much more smoothly and evenly form solutions of the complexes, $\left[Ag(CN)_2\right]^-$ and $\left[Au(CN)_2\right]^-$ than form a sloution of simple metal ions.

B. Wilkinson's catalyst, $K\left[\left(Ph_3P\right)_2RhCl_2\right]$, is used for the hydrogenation of alkenes.

C. Anti-pernicious anamia factor is a co-ordination compound of cabalt.

D. Chlorophll pigment, resposible for photosynthesis is a coordination compound of magnesium.

Answer: B

View Text Solution

50. A chelating agent has two or more than two donor atoms to bind to a single metal ion. Which of the following is not a chelating agent?

A. thiosulphato

B. oxalate

C. glycinato

D. ethane-1, 2-diamine

Answer: A

Watch Video Solution

51. 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: B

Watch Video Solution

52. Many proicin-based biomaterlialist such as waste hair and feathers, can absorb heavy metal ions from waste water. It has been observed that metal uptake by these materials increases in alkaline condition. The enhanced uptake in alkaline conditions is due to:

A. generation of many ligand sites in the protein molecules due to removal of H^+

B. availability of a high concentration of OH^- ions as ligands

C. increased cross-linkages in the protein chains by formation of amide bonds

D. increase in solubility of the proteins

Answer: A

View Text Solution

53. A person having osteoporosis is suffering from lead poisoning. Ethylene diamine tetraacetic acid (EDTA) is administered for this condition. The best form of EDTA to be used for such administration is:

A. EDTA

B. tetrasodium salt

C. disodium salt

D. calcium disodium salt

Answer: D

Watch Video Solution

54. Which molecule/ion among the following cannot act as a ligand in complex compounds ?

A. CH_4

B. CN^-

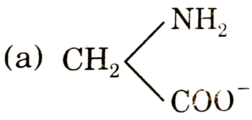
C. CO

D. Br^-

Answer: A

Watch Video Solution

55. Glycinato ligand is :

A. 

(a) $CH_2\langle^{NH_2}_{COO^-}$

B. Bidentate ligand

C. Two donor sites N and O^-

D. All of these

Answer: D

Watch Video Solution

56. One molecule of which of the following ligands form only two rings towards a particular central atom?

A. en

B. bn

C. dien

D. trien

Answer: C

Watch Video Solution

57. The oxidation number of iorn in $\left[Fe(CO)_3\left(\pi - C_4H_4\right]$ is:

A. $+3$

B. $+2$

C. 0

D. -3

Answer: c

Watch Video Solution

58. The co-ordination number and oxidation number of X in the compound $\left[X\left(SO_4\right)\left(NH_3\right)_5\right]$ will be :

A. 10 and $+3$

B. 1 and $+6$

C. 6 and $+4$

D. 6 and $+2$

Answer: D

Watch Video Solution

59. Select isoelectronic and isostructural pair:

A. CO_2, CN_2^{2-}

B. $\left[Cr(CO)_6\right]^0, \left[Fe(CN)_6\right]^{4-}$

C. NO_2^-, O_3

D. All of the above

Answer: D

Watch Video Solution

60. Which of the following ligand does not have any nitrogen donor site?

A. bipy

B. $acac^{1-}$

C. gly^{-1}

D. dien

Answer: B

Watch Video Solution

61. Which of the following ligand can act as chelating agent but does not have chiral centre?

A. nta^{3-}

B. bn

C. pn

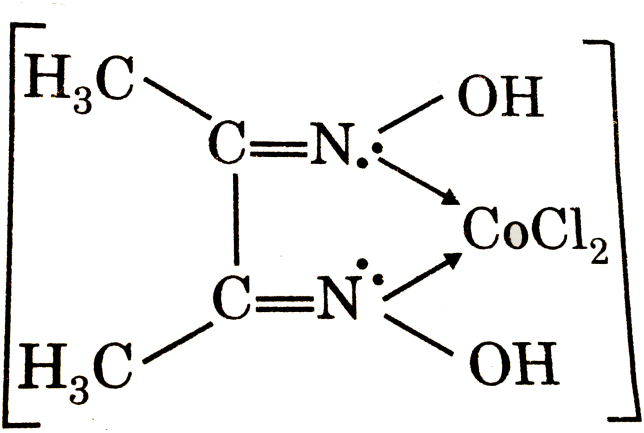
D. None of these

Answer: A

Watch Video Solution

B.Nomenclature of Coordination Compounds

1. The correct IUPAC name of the complex :



A. Dichloridodimethylglyoximecobalt(II)

B. Bis(dimethylglyoxime)dichloridocobalt(II)

C. Dimethylglyoximecobalt(II) chloride

D. Dichlorido (dimethylglyoximato)cobalt(II)

Answer: A

Watch Video Solution

2. 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. Diammineethylenediaminefithiocyanto-S-platinum (II) ion

B. Diammineethylenediaminefithiocyanto-S-platinate (IV) ion

C. Diammineethylenediaminefithiocyanto-S-platinum (IV) ion

D. Diamminebis (ethylenediamine) dithiocyanate-S-platinum (IV) ion

Answer: C

Watch Video Solution

3. Which of the following names is impossible ?

A. Potassium tetrafluoridooxidochromate (VI)

B. Barium tetrafluoridobromate (III)

C. Dichlorobis(urea)copper (II)

D. All are impossible.

Answer: A

Watch Video Solution

4. The formula of the complex tris (ethylenediamine) cobalt (III) sulphate is

A. $\left[Co(en)_2SO_4\right]$

B. $\left[Co(en)_3SO_4\right]$

C. $\left[Co(en)_3\right]_2SO_4$

D. $\left[Co(en)_3\right]_2\left(SO_4\right)_3$

Answer: D

Watch Video Solution

5. The correct IUPAC name of the compound $\left[Co\left(NH_3\right)_4Cl(ONO)\right]Cl$ is :

A. Tetraamminechloridonitrito-N-Cobalt(III) chloride

B. Chloridonitrito-O-tetraamminecobalt(II) chloride

C. Dichloridonitrito-O-tetraamminecobalt(III)

D. Tetraamminechloridonitrito-O-cobalt(III) chloride

Answer: D

Watch Video Solution

6. The hypothetical complex triamminediaquachloridocobalt(III) chloride can be represented as :

A. $\left[CoCl\left(NH_3\right)_3\left(H_2O_2\right)\right]$

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

C. $\left[Co\left(NH_3\right)_3\left(H_2O\right)_2Cl\right]Cl_2$

D. $\left[Co\left(NH_3\right)_3\left(H_2O\right)_3Cl_3\right]$

Answer: C

Watch Video Solution

7. Consider the structure of the complex compound, $\left[Cu_4OCI_6\left(Ph_3P\right)_4\right]$, as given below :

src="https://d10lpgp6xz60nq.cloudfront.net/physics_images/

$\#\#GRB_ORG_CHM_V01_QB_C05_E01_{068} \_ Q01.png\#\#$

Which of the following is the correct IUPAC name of the complex ?

A.

$hexa$ - μ - chl or ide - μ_4 - oxidotetrakis (triphenylphosphine) tetracopper (II

B. μ_4 - oxidohexa - μ_2 - chloridotetra (triphenylphosphine)tetracopper(II)

C.

$hexa$ - μ - chlorido - μ - oxidotetrakis (triphenylphosphine)tetracopper(II)

D. All of these

Answer: A

View Text Solution

8. Structural formula of tetraaquadichloridochromium(III) chloride

A. $\left[Co\left(NH_3\right)_4\left(H_2O\right)Cl\right]Cl_2$

B. $\left[Co\left(NH_3\right)_4\left(H_2O\right)Cl\right]Cl_3$

C. $\left[Co\left(NH_3\right)_4\left(H_2O\right)Cl\right]Cl$

D. $\left[CoCl\left(H_2O\right)\left(NH_3\right)_4\right]Cl_2$

Answer: A

Watch Video Solution

9. The correct IUPAC name of the complex $\left[Pt(gly)_2I_2\right]$ is :

A. bis(glycinato)diiodidoplatinum(IV)

B. diiodidobis(glycinato)platinum(IV)

C. bis(glycinato)diiodidoplatinate(IV)

D. diiodidodiglycinatoplatinum(IV)

Answer: A

Watch Video Solution

10. A complex anion is formed by Osmium (in some oxidation state) with ligands (in proper number so that coordination number of osmium becomes six). Which of the following can be its correct IUPAC name ?

A. pentachloridonitridoosmium(VI)

B. pentachloridonitridoosmate(VI)

C. azidopentachloridoosmate(VI)

D. None of these

Answer: B

Watch Video Solution

11. IUPAC name of $K_3\left[Fe(CN)_6\right]$ is

A. Potassium hexacyanoferrate(II)

B. Potassium hexacyanoferrate(III)

C. Potassium hexacyanoiron(II)

D. Tripotassium hexacyanoiron(II)

Answer: B

Watch Video Solution

12. The IUPAC name for the complex $\left[Co\left(NO_2\right)\left(NH_3\right)_5\right]Cl_2$ is :

A. Nitro-N-pentaamminecobalt(III) chloride

B. Nitro-N-pentaamminecobalt(II) chloride

C. Pentaamminenitritocobalt-N-cobalt(II) chloride

D. Pentaamminenitrito-N-cobalt(III) chloride

Answer: D

Watch Video Solution

13. Complex ion $\left[FeN_3\left(O_2\right)(SCN)_4\right]^{4-}$ is named as : (coordination number of central metal ion in complex is six)

A. Azidosuperoxidotetrathiocyanato-S-ferrate(II)

B. Azidoperoxidotetrathiocyanatoferrate(III)

C. Azidoperoxidotetrathiocyanato-S-ferrate(II)

D. Azidodioxidotetrathiocyanato-S-ferrate(III)

Answer: A

Watch Video Solution

14. 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

15. The IUPAC name of $\left[Ni\left(NH_3\right)_4\right]\left[NiCl_4\right]$ is :

A. Tetrachloronickel(II) tetraamminenickel(II)

B. Tetraamminenickel(II) tetrachloronickel(II)

C. Tetraamminenickel(II) tetrachloronickelate(II)

D. Tetraamminenickel(II) tetrachloronickelate(0)

Answer: C

Watch Video Solution

16. The correct IUPAC name of $\left[Co\left(CH_3NH_2\right)_4(CN)_2\right]Cl$:

A. Dicyanidotetramethylaminecobalt(III) chloride

B. Dicyanidotetrakis(methylamine)cobalt(III) chloride

C. Dicyanidotetrakis(methylammine)cobalt(III) chloride

D. Tetramethylaminedicyanidocobalt(III) chloride

Answer: B

Watch Video Solution

17. Which option is True (T) and False (F) for IUPAC name of $K_3\left[Fe(CN)_6\right]$?

(i) potassium hexacyanido ferrate(III)

(ii) tripotassium hexacyanido ferrate

(iii) potassium haxacyanido ferrate (-3)

tripotassium hexacyanido ferrate (III)

A. TTTF

B. TTFF

C. TFFF

D. TFTF

Answer: A

Watch Video Solution

18. The IUPAC name for the coordination compound $Ba\left[BF_4\right]_2$ is :

A. Barium tetraflouroborate (III)

B. Barium tetraflouroborate (V)

C. Barium bis (tetraflouroborate)(III)

D. None of these

Answer: A

Watch Video Solution

19. The IUPAC name of the complex compound $\left[CoCl_2(en)_2\right]Cl$ is :

A. Dichloridobis(ethane-1, 2-diamine)cobalt(III) chloride

B. Dichloridobis(ethane-1, 2-diammine)cobalt(III) chloride

C. Dichloridobis(ethylenediammine)cobalt(III) chloride

D. Bis(ethylenediamine)dichlorido cobalt(III) chloride

Answer: A

Watch Video Solution

20. The appropriate formula of dichloridobis(ethane-1, 2-diamine)platinum(IV) nitrate is :

A. $\left[PtCl_2(en)_2\right]\left(NO_3\right)_2$

B. $\left[Pt(en)_2Cl_2\right]\left(NO_3\right)_2$

C. $\left[Pt(en)_2Cl_2\right]NO_3$

D. $\left[PtCl_2(en)_2\right]NO_3$

Answer: A

Watch Video Solution

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

A. Chloridotetracyanidodioxidoferrate (II) ion

B. chloridotetracyanidoperoxidoferrate (II) ion

C. chloridotetracyanidosuperoxidoferrate (II) ion

D. None is correct

Answer: C

Watch Video Solution

22. select the cottect IUPAC name of $\left[Co\left(H_2NCH_2CH_2NH_2\right)_3\right]_2\left(SO_4\right)_3$ is

:

A. Tris (ethane-1, 2-diamine) cobalt (III) sulphate

B. Tris (ethane-1, 2-diamine) cobaltate (III) sulphate

C. Tris (ethane-1, 2-diamine) cobaltate (II) sulphate

D. None of the above

Answer: A

Watch Video Solution

23. Write the correct formula of the following complex : [Iron (III)-hexacyanidoferrate(II)-tetradecahydrate]

A. $Fe_4\left[Fe(CN)_6\right]_3$

B. $Fe_3\left[Fe(CN)_6\right]_2$

C. $Fe_3\left[Fe(CN)_6\right]_2.4H_2O$

D. $Fe_4\left[Fe(CN)_6\right]_3.14H_2O$

Answer: D

Watch Video Solution

24. Which of the following IUPAC names are incorrectly matched ?

A. Pentaamminenitrito-N-cobalt (III)

$\rightarrow \left[Co\left(NH_3\right)_5NO_2\right]^{2+}$

B. Potassiumtrioxalato chromate (III) $\rightarrow K_3\left[Cr\left(C_2O_4\right]_3\right.$

C. Diamminedichloridoplatinum(II)

$\rightarrow \left[Pt\left(NH_3\right)_2Cl_2\right]^{2+}$

D. None of these

Answer: C

Watch Video Solution

25. Identify the incorrect combination of IUPAC name of the complex and its formula :

A. Tetraammineaquachloridocabalt(III) chloride

→ $\left[Co\left(NH_3\right)_4\left(H_2O\right]Cl\right]CL_2$

B. Potassium trioxalatoaluminate(III)

→ $K_3\left[\left(Al\left(C_2O_4\right)_3\right]$

C. Dichloridobis (ethane-1, 2-diamine) cobalt(II)

→ $\left[CoCl_2(en)_2\right]^+$

D. Mercury tetrathiocyanatocabaltate(III)

→ $Hg\left[Co(SCN)_4\right]$

Answer: C

Watch Video Solution

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

A. Diamminedichloroplatinum (II)

B. Diamminedichloridoplatinum (IV)

C. Diamminechloridoplatinum (0)

D. Dichloridodiammineplatinum (IV)

Answer: A

Watch Video Solution

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

A. Platinum diaminechloronitrite

B. Chloronitrito-N-ammineplatinum (II)

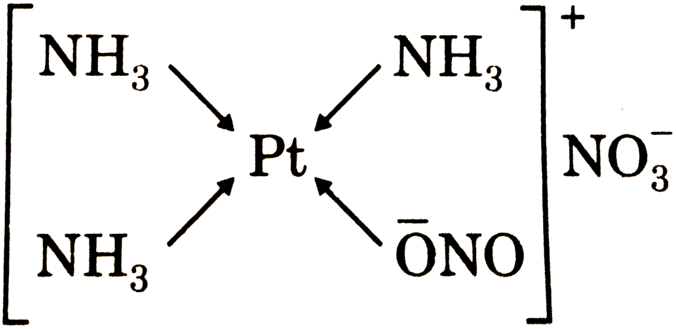
C. Diamminechloridonitrito-N-platinum (II)

D. Diamminechloronitrito-N-platinate (II)

Answer: C

Watch Video Solution

28. Correct IUPAC name of given complex :



A. Triamminenitrito-N-platinum(II) nitrate

B. Triamminenitrito-O-platinum(IV) nitrate

C. Triamminenitrito-O-platinum(II) nitrate

D. Triaminenitrito-O-platinum(II) nitrite

Answer: C

Watch Video Solution

29. 1 mole of which complex produces minimum number of K^{+} ions on dissociation :

A. Potassium tris(oxalato)cobaltate(III)

B. Potassium tetrahydroxidozincate (II)

C. Potassium tetrachloridoplatinate(II)

D. Potassium amminepentachloridoplatinate(IV)

Answer: D

Watch Video Solution

C. Werners Theory, EAN Rule

1. EAN of a metal carbonyl $M(CO)_x$ is 36. If atomic number of metal M is 26, what is the value of x?

A. 4

B. 8

C. 5

D. 6

Answer: C

Watch Video Solution

2. The EAN of platinum in potassium hexachloridoplatinate (IV) is (Atomic number of Pt=78)

A. 90

B. 86

C. 76

D. 88

Answer: B

3. A compound is made by mixing cobalt (III) nitrite and potassium nitrite solutions in the ratio of 1:3. The aqueous solution of the compound showed 4 particles per molecules whereas molar conductivity reveals the presence of six electrical charges. The formula of the compound is :

A. $Co\left(NO_2\right)_3 .2KNO_2$

B. $Co\left(NO_2\right)_3 .3KNO_2$

C. $K_3\left[CO\left(NO_2\right)_6\right]$

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

Answer: C

4. Which of the following will exhibit maximum ionic conductivity ?

A. $K_4[Fe(CN)_6]$

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

C. $\left[Cu\left(NH_3\right)_4\right]Cl_2$

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

Answer: A

Watch Video Solution

5. Which of the following shows maximum molar conductance ?

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

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

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

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

Answer: A

Watch Video Solution

6. A co-ordination complex has the formula $PtCl_4.2KCl$. Electrical conductance measurements indicate the presence of three ion in one formula unit. Treatment with $AgNO_3$ produces no precipitate of $AgCl$. What is the co-ordination number of Pt in this complex ?

A. 5

B. 6

C. 4

D. 3

Answer: B

Watch Video Solution

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

A. Br^-

B. Cl^-

C. Cr^{3+}

D. Br^- and Cl^- both

Answer: B

Watch Video Solution

8. Which of the following complexes produces three moles of silver chloride when its mole is treated with excess of silver nitrate ?

A. $\left[Cr\left(H_2O\right)_3Cl_3\right]$

B. $\left[Cr\left(H_2O\right)_4Cl_2\right]Cl$

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

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

Answer: D

Watch Video Solution

9. The number of chloride ions which would be precipated when one mole of the complex $PtCl_4.4NH_3$ is treated with silver nitrate is : (here coordination number of platinum is 6).

A. four

B. one

C. three

D. two

Answer: D

Watch Video Solution

10. Concentrated H_2SO_4will not dehydrate the following complex :

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

B. $\left[Cr\left(H_2O\right)_4Cl_2\right]Cl.2H_2O$

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

D. All the above complexes will be dehydrated.

Answer: C

Watch Video Solution

11. On adding $AgNO_3$ solution to a solution of $\left[Pt\left(NH_3\right)_3Cl_3\right]Cl$, the percentage of total chloride ion precipitated is

A. 100

B. 75

C. 50

D. 25

Answer: D

Watch Video Solution

12. A coordination compound of cobalt has the molecular, formula containing five ammonia molecules, one nitro group and two chlorine atoms for onew cobalt atom. One mole of this compounds three ions in an aqueous solution. On reacting this solution with excess of $AgNO_3$ solution, we get two moles of AgCI precipitate. The ionic formula for this complex would be

A. $\left[Co\left(NH_3\right)_4\left(NO_2\right)Cl\right]\left[\left(NH_3\right)Cl\right]$

B. $\left[Co\left(NH_3\right)_5Cl\right]\left[ClNO_2\right]$

C. $\left[Co\left(NH_3\right)_5\left(NO_2\right)\right]Cl_2$

D. $\left[Co\left(NH_3\right)_5\right]\left[\left(NO_2\right)_2Cl_2\right]$

Answer: C

Watch Video Solution

13. When any solution passess through a cation exchange resin that is in acidic form, H ion of the resin is replaced by cations of the solution. A solution containing 0.319 g of an isomer with molecular formula $CrCl_3.6H_2O$ is passed through a cation exchange resin in acidic form. The eluted solution requires 19 cm^3 fo 0.125 N NaOH. The isomer is

A. triaquatrichlorochrominum (III) chloride trihydrate

B. hexaaquachromium (III) chloride

C. pentaaquamonochlorochromium (III) chloride monohydrate

D. tetraaquadichlorochromium (III) chloride dihydrate

Answer: C

Watch Video Solution

14. $\left[M(CO)_x(NO)_y\right]$ in this complex if all NO are replaced by CO can be $\left[M(CO)_z\right]$ complex and EAN value for M is 36 value of x, y, z and M is respectively :

A. 3, 2, 5 and Fe

B. 2, 2, 5 and Fe

C. 3, 2, 6 and Fe

D. 2, 3, 5 and Ru

Answer: B

Watch Video Solution

15. 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

16. Which of the following complex acts as reducing agent based on Sidgwick EAN rule?

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

B. $\left[Mn_2(CO)_{10}\right]$

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

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

Answer: C

Watch Video Solution

17. In the compound $CoCl_3.5NH_3$:

A. all the cl show primary valency (PV) only

B. two cl show (PV) and one Cl show secondary valency (SV)

C. two Cl show (PV) and one Cl (PV) as well as (SV)

D. all the Cl show (SV)

Answer: C

Watch Video Solution

18. 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. $P < Q < R < S$

B. $S < R < Q < P$

C. $R < S < Q < P$

D. $S < R < P < Q$

Answer: B

Watch Video Solution

19. Which one is the most likely structure of $CrCl_3.6H_2O$ if $\frac{2}{3}$ of total chlorine of the compound is ppt. by adding $AgNO_3$ to its aqueous solution :

A. $CrCl_3.6H_2O$

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

Answer: C

Watch Video Solution

20. $\left[Ni(CO)_x\right]$ and $\left[Fe(CO)_y\right]$ what will be the value of x and y respectively are :

A. 4 and 4

B. 4 and 5

C. 5 and 4

D. 5 and 5

Answer: B

Watch Video Solution

21. Whch of the following will not follow sidgwick's EAN rule ?

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

B. $\left[Fe(CO)_2(NO)_2\right]$

C. $\left[Mn_2(CO)_{10}\right]$

D. $K_3\left[\overset{III}{Fe}(CN)_5O_2\right]$

Answer: D

Watch Video Solution

22. The molecular formula $Co\left(NH_3\right)_5BrSo_4$ have two isomeric form X and Y which differ in :

A. Hybridisation

B. Magnetic moment

C. Geometry

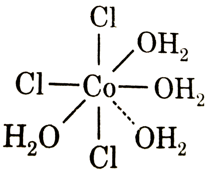
D. Electrical conductivity

Answer: D

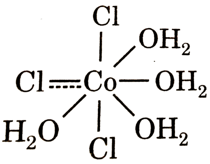
Watch Video Solution

23. $CoCl_3.4H_2O$ is an anyhydrous binary solute hence its Werner's representation is :

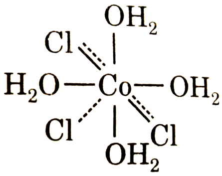
A. (a)



B. (b)



C. (c)



D. none of these

Answer: C

Watch Video Solution

24. 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. $\left[Pt\left(NH_3\right)_2Cl_4\right]$

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

25. How many moels of AgCl 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. 0.001

B. 0.02

C. 0.03

D. None of these

Answer: B

Watch Video Solution

26. One mole of complex compound $Co(NH_3)_5Cl_3$ 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. $\left[Co(NH_3)_4Cl_2\right]Cl.\,NH_3$

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

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

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

Answer: C

Watch Video Solution

27. 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 of these

Answer: D

Watch Video Solution

28. Consider the following satements for Werner's theory :

(P) Ligands are connected to the metal ions by ionic bonds

Secondary valencies have directional properties

Secondary valencies are non-ionisable of these statements :

A. P, Q and R are correct

B. Q and R are correct

C. P and R are correct

D. P and Q are correct

Answer: B

Watch Video Solution

29. Which of the following is correct for both the following coordination compounds ?

$(P)CoCl_3.6NH_3$ and $(Q)PtCl_4.5NH_3$

A. They give white precipitate with $AgNO_3$ solution

B. The have different primary valencies for the central metal ions.

C. Both (a) and (b)

D. None of these

Answer: C

View Text Solution

30. 50 ml of 0.2 M solution of a compound with empirical formula $CoCl_3 . 4NH_3$ on treatment with excess of $AgNO_3(aq)$ yields 1.435 g of AgCl. Ammonia is not removed by treatment with concentrated H_2SO_4. The formula of the compound is

A. $Co\left(NH_3\right)_4Cl_3$

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

C. $\left[Co\left(NH_3\right)_4\right]Cl_3$

D. $\left[CoCl_3\left(NH_3\right)\right]NH_3$

Answer: B

Watch Video Solution

31. Which of the following is non-conducting ?

A. $CoCl_3.6NH_3$

B. $CoCl_3.5NH_3$

C. $CoCl_3.4NH_3$

D. $CoCl_3.3NH_3$

Answer: D

View Text Solution

32. Choose the complex entity which follow(s) EAN rule :

A. $Fe(CO)_5$

B. $\left[Mn(CO)_5\right]^-$

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

D. all of these

Answer: D

Watch Video Solution

33. A solution containing 0.319 g of complex $CrCl_3.6H_2O$ was passed through cation exchanger and the solution given out was neutralised by 28.5 ml of 0.125 m NaOH. The correct formula of the complex will be: [molecular weight of complex =266.5]

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

B. $\left[CrCl\left(H_2O\right)_6\right]Cl_3$

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

D. all are correct

Answer: B

Watch Video Solution

34. Other than the X-ray difference , how could be the following pairs of isomers be distinguished from one another by :

$[Cr(NH_3)_6][Cr(NO_2)_6]$ and $[Cr(NH_3)_4(NO_2)_2][Cr(NH_3)_2(NO_2)_4]$

A. cryoscopic method

B. measurement of molar conductance

C. measuring magnetic moments

D. observing their colours

Answer: B

Watch Video Solution

35. The EAN of metal atoms in $[Fe(CO)_2(NO^+)_2]$ and $Co_2(CO)_8$ respectively are :

A. 34, 35

B. 34, 36

C. 36, 36

D. 36, 35

Answer: C

Watch Video Solution

36. EAN of the elements (*) are equla in :

A. $\left[\overset{*}{Ni}(CO)_4\right], \left[\overset{*}{Fe}(CN)_6\right]^{4-}$

B. $\left[\overset{*}{Ni}(en)_2\right]^{2+}, \left[\overset{*}{Fe}\left(H_2O\right)_6\right]^{2+}$

C. $\left[\overset{*}{Co}(CN)_6\right]^{3-}, \left[\overset{*}{Ni}(CN)_6\right]^{3-}$

D. $\left[\overset{*}{Ni}(en)_2\right]^{2+}, \left[\overset{*}{Sc}\left(H_2O\right)_6\right]^{3+}$

Answer: A

Watch Video Solution

37. 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

38. Following Sidgwick's rule of EAN, $Co(CO)_x$ will be.

A. $Co_2(CO)_4$

B. $Co_2(CO)_3$

C. $Co_2(CO)_8$

D. $Co_2(CO)_{10}$

Answer: C

Watch Video Solution

39. Choose the correct option regarding the following complex compound which follwos (F) and does not follow (NF) the Sidgwick EAN rule:

(I) $\left[\left(Ph_3P\right)_2PdCl_2\right]$

(II) $[NiBrCl(en)]$

(III) $Na_4\left[Fe(CN)_5NOS\right]$

(IV) $Cr(CO)_3(NO)_2$

A. $\begin{array}{cccc}(P) & (Q) & (R) & (S) \\ NF & NF & NF & NF\end{array}$

B. $\begin{array}{cccc}(P) & (Q) & (R) & (S) \\ F & F & NF & F\end{array}$

C. $\begin{array}{cccc}(P) & (Q) & (R) & (S) \\ NF & NF & F & F\end{array}$

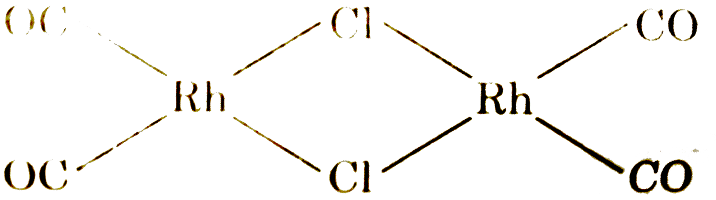
D.

(P)	(Q)	(R)	(S)
NF	NF	F	NF

Answer: C

Watch Video Solution

40. The effective atomic number of Rh (atomic number = 45) in the complex is :



A. 52

B. 54

C. 56

D. 50

Answer: A

Watch Video Solution

41. Which of the following complex will produce maximum amount of $AgCl \quad (ppt.)$ on reaction with excess of $AgNO_3$?

A. $PtCl_2.4NH_3$

B. $PtCl_2.2HCl$

C. $CoCl_3.4NH_3$

D. $PtCl_2.2NH_3$

Answer: A

Watch Video Solution

42. Both Co^{3+} and Pt^{4+} have a coordination number of six. Which of the following pair of complexes will show approximately the same electrical conductance for their 0.001 M aqueous solution ?

A. $CoCl_3.4NH_3$ and $PtCl_4.4NH_3$

B. $CoCl_3.3NH_3$ and $PtCl_4.5NH_3$

C. $CoCl_3.6NH_3$ and $PtCl_4.5NH_3$

D. $CoCl_3.6NH_3$ and $PtCl_4.3NH_3$

Answer: C

Watch Video Solution

43. Which of the following complexes has lowest molar conductance ?

A. $\left[Co\left(NH_3\right)_6\right]\left[Cr\left(NO_2\right)_6\right]$

B. $\left[Cr\left(NH_3\right)_5(NO)_2\right]\left[Co\left(NH_3\right)\left(NO_2\right)_5\right]$

C. $\left[Cr\left(NH_3\right)_4\left(NO_2\right)_2\right]\left[Co\left(NH_3\right)_2\left(NO_2\right)_4\right]$

D. $\left[Co\left(NH_3\right)_5\left(NO_2\right)\right]\left[Cr\left(NH_3\right)\left(NO_2\right)_5\right]$

Answer: C

Watch Video Solution

44. If two Cl^- ions are precipitated by $AgNO_3$ from $PtCl_4.4NH_3$, find formula of complex :

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

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

C. $\left[Pt\left(NH_3\right)_2Cl_2\right]Cl_2$

D. $\left[Pt\left(NH_3\right)_6\right]Cl_2$

Answer: B

Watch Video Solution

45. Which of the following complex is heteroleptic type?

A. $\left[Cr\left(CO_3\right)(NO)_2\right]$

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

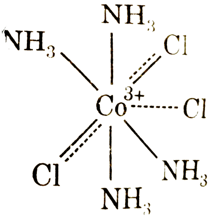
C. $Pt\left[\left(NH_3\right)_4Cl_2\right]Cl_2$

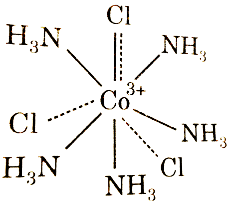
D. (a) and (c) both

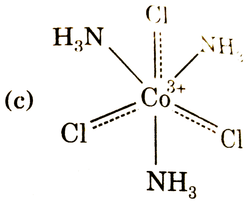
Answer: D

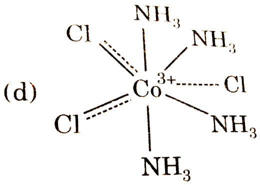
Watch Video Solution

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

A. 

B. 

C. 

D. 

Answer: C

Watch Video Solution

47. All of the following obey Sidgwick effective atomic number rule except :

A. $Ni(CO)_4$

B. $Fe(CO)_5$

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

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

Answer: D

Watch Video Solution

48. The effective atomic number of iron in complex $\left[\eta^5 - C_5H_5\right)Fe(II)(CO)_2Cl\right]$ is .

A. 34

B. 36

C. 38

D. 32

Answer: B

Watch Video Solution

49. During the race of complex compounds, finish line is fixed achieving EAN value equal to the atomic number of corresponding inert gas. Then which of the following complex is present at the finish line ?

A. $\left[Co\left(NO_2\right)_6\right]^{4-}$

B. $\left[Mn(CO)_5\right]$

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

D. $Fe_3\left[Fe(CN)_6\right]_2$

Answer: C

Watch Video Solution

50. Which of the following are not postulates of Werner?

(P) In co-ordination compounds, metals show two types of linkage (valencies) primary and secondary

(Q) The primary valencies are normally ionisable. These are satisfied by negative ions.

(R) The secondary valency is equal to the co-ordination number and is fixed for a metal

(S) The ions/groups bound by the primary and secondary linkages to the metal have characteristic spatial arrangements corresponding to different coordination numbers

(T) Octahedral, Tetrahedral and Square planar geometrical shapes are more common in co-ordination compounds of transition metals

A. (P), (Q), (R) and (S)

B. (S) and (T)

C. (S)

D. (P), (Q), and (R)

Answer: C

Watch Video Solution

51. Identify heteroleptic complex having oxidatio number +1 of the central metal atom :

A. $\left[Co(CN)_4\right]^{3-}$

B. $\left[PtCl_3\left(C_2H_4\right)\right]^{-}$

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

D. None of these

Answer: D

Watch Video Solution

52. Which of the following complex follow Sidgwick rule of EAN ?

$(Pt - 78, Ag - 47, Fe - 26, V - 23)$

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

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

C. $\left[Ag(CN)_2\right]^-$

D. $\left[Pt(en)_2Cl_2\right]^{2+}$

Answer: D

Watch Video Solution

53. When 0.1 mol $CoCl_3(NH_3)_5$ 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: B

▶ Watch Video Solution

54. Give the correct increasing order of electrical conductivity of aqueous solution of following complex entities :

$(P)\left[Pt(NH_3)_6\right]Cl_4$ $(Q)\left[Cr(NH_3)_6\right]Cl_3$

(R) $\left[Co(NH_3)_4Cl_2\right]Cl$ $(S)\left[K_2\left[PtCl_6\right]\right]$

A. $R < S < Q < P$

B. $S < R < Q < P$

C. $Q < P < S < R$

D. $P < Q < S < R$

Answer: A

Watch Video Solution

---

55. When potassium hexachloridoplatinate (IV) is dissolved in water, the solution :

A. Contains 6 ions per molecule

B. Reacts with $AgNO_3$ to give 6 moles of $AgCl$

C. Does not contain any Cl^- ion

D. Contains K^+, Pt^{4+} and Cl^(-) ions

Answer: C

Watch Video Solution

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

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

B. $\left[Pt\left(NH_3\right)_2Cl_4\right]$

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

57. How many atoms are covalently bonded to the chromium atom in $Cr\left(NH_3\right)_4Cl_3$?

A. 3

B. 4

C. 6

D. 7

Answer: C

Watch Video Solution

58. Which pair of two isomeric complexes is difficult to differentiate by measuring molar electrical conductivity ?

A. $\left[Co\left(NH_3\right)_5SO_4\right]Cl, \left[Co\left(NH_3\right)_5Cl\right]SO_4$

B. $\left[Co\left(H_2O\right)_6Cl_3\right], \left[Co\left(H_2O\right)_4Cl_2\right]Cl.2H_2O$

C. $\left[Pt\left(NH_3\right)_3NO_2\right]Cl, \left[Pt\left(NH_3\right)_3ONO\right]Cl$

D. $\left[Pt\left(NH_3\right)_4Cl_2\right]Br_2, \left[Pt\left(NH_3\right)_6\right]Cl_4$

Answer: C

Watch Video Solution

59. Find the difference in EAN of the complexes :

$$\left[Ti\left(\sigma - C_5H_5\right)_2\left(\pi - C_5H_5\right)_2\right] \text{ and } \left[Cr\left(C_6H_6\right)_2\right]$$

A. 2

B. 4

C. zero

D. 3

Answer: A

Watch Video Solution

60. Which of the following compound statement is correct for $[Co(EDTA)]^-$ complex compound?

A. Number of $N - Co - O$ linkages are '8'

B. Coordination number of central metal atom in complex is '6'

C. EAN value of central metal atom in complex is '36'

D. All of these

Answer: D

Watch Video Solution

61. Which of the following compound/ion is π - *bonded* organometallic compound(s) as well as follow Sidgwick EAN rule?

A. Ferrocene

B. Zeise's salt

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

D. Cis-platin

Answer: A

Watch Video Solution

62. Find the value of x in $H_x\left[Mn(CO)_5\right]$:

A. 2

B. -1

C. 1

D. -2

Answer: C

Watch Video Solution

63. Which of the following complexes follow Sidgwick EAN rule?

A. $Fe\left(\eta^5 - C_5H_5\right)_2\Big]$

B. $K\left[PtCl_3\left(\eta^2 - C_2H_4\right)\right]$

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

D. $\left[Mn(CO)_6\right]$

Answer: A

Watch Video Solution

D.VBT, CFT, Hybridisation

1. The complex $\left[Pt\left(NH_3\right)_4\right]^{2+}$ has .... Structure :

A. Square planar

B. tetrahedral

C. pyramidal

D. pentagonal

Answer: C

Watch Video Solution

2. What is the shape of $Fe(CO)_5$ molecule ? Given that its dipole moment = 0.

A. Tetrahedral

B. Octahedral

C. Trigonal bipyramidal

D. Square pyramidal

Answer: D

Watch Video Solution

3. Which of the following complex is not correctly matched with its geometry ?

A. $\left[NiCl_2\left(Ph_3P\right)_2\right]$ - 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

Answer: D

Watch Video Solution

4. The number of unpaired electrons in d^6, low spin, octahedral complex is :

A. 4

B. 2

C. 1

D. 0

Answer: B

Watch Video Solution

5. 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. TTT

B. TFT

C. FTF

D. TFF

Answer: C

Watch Video Solution

6. Low spin complex is formed by :

A. sp^3d^2 hybridization

B. sp^3d hybridization

C. d^2sp^3 hybridization

D. sp^3 hybridization

Answer: D

Watch Video Solution

7. Which of the following is a high spin complex ?

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

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

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

D. $\left[FeF_6\right]^{3-}$

Answer: C

Watch Video Solution

8. Which has maximum paramagnetic character ?

A. $\left[Cu\left(H_2O\right)_4\right]^{2+}$

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

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

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

Answer: D

Watch Video Solution

9. Which of the following is non-planar with respect to central atom ?

A. $\left[Pd_2\left\{P\left(C_6H_5\right)_3\right\}_2Cl_4\right]$

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

C. $\left[PtCl_4\right]^{2-}$

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

Answer: B

Watch Video Solution

10. $\left[RhF_6\right]^{3-}$ complex ion is :

A. Outer orbital complex

B. Inner orbital complex

C. Neither outer nor inner orbital complex

D. Heteroleptic complex

Answer: D

Watch Video Solution

11. Which of the following molecule do not have the same number of unpaired electron?

A. d^7 octahedral low spin

B. d^5 octahedral low spin

C. d^9 tetrahedral

D. d^6 octahedral low spin

Answer: D

Watch Video Solution

12. Among the following pair of complexes, in which case the $\triangle_0$ value is higher for the first one?

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

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

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

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

Answer: D

Watch Video Solution

13. $CuSO_4 + NH_4OH \rightarrow$ Deep blue soluble
excess complex salt

The correct statement regarding the complex is/are :

A. It has square planar geometry.

B. It is paramagnetic in nature .

C. It gives black precipitate of CuS when treated with H_2S.

D. All of these

Answer: D

Watch Video Solution

14. Which of the following is incorrect option ?

$CuI_2 + KI \rightarrow K_3\left[CuI_4\right]$

complex salt

A. oxidation state of central atom decreases during the formation of complex.

B. Complex is tetrahedral.

C. Hybridisation of the complex is sp^3.

D. Hybridisation of the complex is dsp^2.

Answer: D

Watch Video Solution

15. The number of unpaired electrons present in complex ion $\left[FeF_6\right]^{3-}$ is:

A. 5

B. 4

C. 6

D. 0

Answer: A

Watch Video Solution

16. For cis platin which option is incorrect ?

A. It is used for cancer treatment

B. EAN is 86

C. Hybridisation is dsp^2

D. its dipole moment $\neq 0$

Answer: B

Watch Video Solution

17. The crystl field splitting energy for octahedral complex $\left(\Delta_0\right)$ and that for tetrahedral complex $\left(\Delta_1\right)$ rae related as :

A. $\triangle_t = \frac{4}{9} \triangle_0$

B. $\triangle_t = 0.5 \triangle_0$

C. $\triangle_t = 0.33 \triangle_0$

D. $\triangle_t = \frac{9}{4} \triangle_0$

Answer: A

Watch Video Solution

18. Which of the following complexes has a geometry different from others ?

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

B. $Ni(Co)_4$

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

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

Answer: C

Watch Video Solution

19. $FeSO_4 + KCN(excess) \rightarrow \text{complex} \quad X$

Which of the following option incorrect regarding complex X ?

A. It has d^2sp^3 hybridisation.

B. It is an inner orbital complex.

C. It is an diamagnetic complex.

D. It is an high spin complex.

Answer: D

Watch Video Solution

20. Consider the following complex ions.

$\left[CrCl_6\right]^{3-}$ $\left[Cr\left(H_2O\right)_6\right]^{3+}$

$\left[Cr\left(NH_3\right)_6\right]^{3+}$ $\left[Cr(CN)_6\right]^{3-}$

The correct order of $\triangle_0$ is :

A. $P > Q > R > S$

B. $P < R < Q < S$

C. $P < Q < R < S$

D. $P < Q < S < R$

Answer: C

Watch Video Solution

21. Which of the following complexes have a maximum number of unpaired electrons ?

A. $Ni(CO)_4$

B. $\left[Co\left(NH_3\right)_4\left(NO_2\right)_2\right]^+$

C. $\left[Ag(CN)_2\right]^-$

D. $\left[CuBr_4\right]^{2-}$

Answer: D

Watch Video Solution

22. Which of the following complex is a low spin complex ?

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

B. $\left[PtCl_4\right]^{2-}$

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

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

Answer: A

Watch Video Solution

23. The tetrahedral $\left[CoI_4\right]^{2-}$ and square planar $\left[PdBr_4\right]^{2-}$ complex ions are respectively :

A. low spin, high spin

B. high spin, low spin

C. both low spin

D. both high spin

Answer: B

Watch Video Solution

---

24. Which of the following can act as reducing agent ?

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

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

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

D. All of these

Answer: A

Watch Video Solution

25. Complex of $HgCo.4SCN$ has two isomers X and Y then, which of the following option is incorrect ?

A. X and Y are different in structure

B. Oxidation of Hg and Co are same in both the complex

C. X has $\triangle_0 < P$

D. both have same hybridisation.

Answer: D

Watch Video Solution

26. Which of the following complex will be paramagnetic ? (Assume all central atom have $t_{2g}^{6}e_{g^{0}}$ configuration).

A. $\left[FeCl(CN)_4\left(O_2\right)\right]^{4-}$

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

C. $\left[Fe\left(NH_3\right)_6\right]Cl_2$

D. $\left[Fe(CN)_5\left(O_2\right)\right]^{-5}$

Answer: A

Watch Video Solution

27. The compound which does not show paramagnetism is

A. $\left[Cu\left(NH_3\right)_4Cl_2\right]$

B. $[Ag(NH)_3)_2]Cl$

C. NO

D. NO_2

Answer: B

Watch Video Solution

28. Which of the following statement is correct for the complex $K_4\left[Fe(CN)_5O_2\right]$? [Fe having $t_{2g}^6 e_{g^0}$ configuration]

A. d^2sp^3 and diamagnetism

B. sp^3d^2 and diamagnetism

C. d^2sp^3 and paramagnetism

D. sp^3d^2 and paramagnetism

Answer: C

Watch Video Solution

29. In $\left[\left(H_2O\right)_4Co - (O - O) - Co\left(H_2O\right)_4\right]CL_5$ complex, Co has $t_{2g}^{6}e_{g}^{0}$ configuration, this complex is :

A. diamagnetic

B. paramagnetic

C. oxidation state of Co is $+2$

D. none of these

Answer: B

Watch Video Solution

30.

$$\left[\left(H_2O\right)_4Co\left(O_2\right)_2Co\left(H_2O\right)_4\right]\left(SO_4\right)_2 \xrightarrow{[X]\,\text{reagent}} \left[\left(H_2O\right)_4Co\left(O_2\right)_2Co\left(H_2O\right)_4\right.$$

(I) (II)

In both the complex Co has $t_{2g}^{6}e_{g}^{0}$ configuration. Which option is incorrect ?

A. Complex (I) is Paramagnetic

B. Complex (II) is Diamagnetic

C. (X) is oxidising agent

D. (X) is reducing agent

Answer: C

Watch Video Solution

31. Correct option regarding the following chemical reaction : (State T for True and F for False)

$$Cd\left(NO_3\right)_2 + KCN_{\text{excess}} \rightarrow \text{Complex X} \xrightarrow{H_2S} ppt.\,'y'$$

(P) Complex X is sp^3 hybridised

(Q) ppt. Y is yellow in colour

(R) Complexes X is an example of imperfect complex

(S) Complex X is a diamagnetic complex

A. TTTT

B. TTTF

C. FTTF

D. FFTT

Answer: A

View Text Solution

32. Which of the following option is incorrect regarding following process :

$$M(\text{impure}) + Co \xrightarrow{\triangle} Product(X) \xrightarrow{\triangle} M(\text{pure}) + CO$$

A. X is a high spin complex

B. It is Mond's process

C. X is tetrahedral in shape

D. X is diamagnetic in nature

Answer: A

Watch Video Solution

33. The correct order of $\triangle_0$ for the given complexes, would be :

$(P)\left[CoF_6\right]^{3-}$ $(Q)\left[Co\left(H_2O\right)_6\right]^{3+}$

$(R)\left[Co\left(NH_3\right)_6\right]^{3+}$ $(S)\left[Rh\left(NH_3\right)_6\right]^{3+}$

A. $P > Q > R > S$

B. $P > Q > S > R$

C. $S > R > Q > P$

D. $S > R > P > Q$

Answer: C

Watch Video Solution

34. Which of the following is not planar ?

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

B. $\left[PtCl_4\right]^{2-}$

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

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

Answer: D

Watch Video Solution

35. Which of the following statement(s) is/are correct regarding $Ni(CO)_4$?

(P) It has tetrahedral geometry.

It is diamagnetic in nature.

(R) It has all $Ni - C$ bonds of equal length.

A. P, Q

B. P, R

C. Q, R

D. P, Q, R

Answer: D

Watch Video Solution

36. Which of the following cation forms inner orbital octahedral complex with NH_3 ?

A. Ni^{2+}

B. Fe^{2+}

C. Pt^{2+}

D. Pt^{4+}

Answer: D

Watch Video Solution

37. Which of the following set of species are non-planar as well as d_{z^2} orbital used in hybridisation ?

A. $\left[Co\left(NH_3\right)_6\right]Cl_3, \left[PtCl_4\right]^{2-}, \left[Ni(CO)_4\right]$

B. $\left[Ni\left(CO_4\right)\right], Fe(CO)_5, XeO_3F_2$

C. $XeO_3F_2, PCl_5, Ni(CO)_4,$

D. $\left[Co\left(NH_3\right)_6\right]Cl_3, XeO_3F_2, Fe(CO)_5$

Answer: D

Watch Video Solution

38. Which of the following option is correct regarding $\left[Fe\left(H_2O\right)_5NO\right]SO_4$?

(P) Fe in $+2$ oxidation state

(Q) It obey's Sidgwick EAN rule

It is an outer orbital complex

(S) NO ligand has $+1$ oxidation state.

A. FFTT

B. FTTT

C. FFFF

D. FTFT

Answer: A

Watch Video Solution

39. The colourless and paramagnetic compound is :

A. $Na_3\left[FeF_6\right]$

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

C. $\left[Fe(bipy)_3\right]Cl_3$

D. $Fe_4\left[Fe(CN)_6\right]_3$

Answer: A

View Text Solution

40. Which of the following is most easily oxidised ?

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

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

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

D. $\left[Co(en)_3\right]^{2+}$

Answer: A

Watch Video Solution

41. The geometry of $FeCl_4^{2-}, FeCl_2\left(PPh_3\right)_2$ and $AuCl_4^-$ would be respectively.

A. All square planar

B. All tetrahedral

C. Tetrahedral, tetrahedral and square planar

D. Tetrahedral, square planar and tetrahedral

Answer: C

Watch Video Solution

42. It is non experimental fact that $Cs_2[CuCl_4]$ is orange coloured but $(NH_4)_2[CuCl_4]$ is yellow. It is further known that total paramagnetic moment of a unpaired electron is due to spin as well as due to nature of orbital , 'd' orbital contributing more than 's' or 'p'. Thus the total paramgentic moment of orange compound is found to be more than that of yellow compound. Then which of the following is correct?

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

B. Anion of orange compound is square planar and that of yellow is tetrahedral

C. Both the anions are tetrahedral

D. Both the anions are square planar

Answer: A

Watch Video Solution

43. All the following complexes show a decrease in their weights when placed in a magnetic balance. Then Which of these has square planar geometry?

A. $Ni(CO)_4$

B. $K\left[AgF_4\right]$

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

D. None of these

Answer: B

Watch Video Solution

44. It is an experimental fact that : $DMG + Ni(II)\text{salt} + NH_4OH \rightarrow$ Red precipitate

Which of the following is wrong about this red precipitate ?

A. It is a non-ionic complex

B. It involves intra molecular H-bonding

C. $Ni(II)$ is sp^2 hybridized

D. It is a diamagnetic complexes is :

Answer: C

Watch Video Solution

45. The correct order for the CFSE (numerical value) for the following complexes is :

Complex	P	Q	R	S
Formula	$[CoF_6]^{3-}$	$[Co(CN)_6]^{3-}$	$\left[Co\left(NH_3\right)_6\right]^{3+}$	$\left[Co\left(H_2O\right)_6\right]^{3+}$

A. $P > Q > R > S$

B. $P > Q > S > R$

C. $S > R > P > Q$

D. $R > Q > P > S$

Answer: B

Watch Video Solution

46. A square planar complex is formed by hybridisation of which atomic orbitals?

A. s, p_x, p_y, p_{yz}

B. $s, p_x, p_y, p_{x^2-y^2}$

C. s, p_x, p_y, d_{z^2}

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

Answer: B

Watch Video Solution

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

A. $18000cm^{-1}$

B. $16000cm^{-1}$

C. $8000cm^{-1}$

D. $2000cm^{-1}$

Answer: C

Watch Video Solution

48. In nitroprusside ion, the iron and NO exist as $Fe(II)$ and NO^{+} rather than Fe^{III} and NO. These forms can be differentiated by

A. estimating the concentration of iron

B. measuring the concentration of CN^{-}

C. measuring the solid state magnetic moment

D. theremally decomposing compound

Answer: C

Watch Video Solution

49. The complex ions $\left[Fe(CN)_6\right]^{3-}$ and $\left[Fe(CN)_6\right]^{4-}$ ________.

A. Are both octahedral and paramagnetic

B. Are both octahedral and diamagnetic

C. Have same structure but opposite magnetic character

D. Have different structure but opposite magnetic character

Answer: C

Watch Video Solution

50. Which of the following statements is correct for complex $\left[Cr\left(NH_3\right)(CN)_4(NO)\right]^{2-}$(given that n=1)?

A. It is d^2sp^3 hybridized.

B. The chromium is in $+1$ oxidation state.

C. It is heteroleptic complex and its aqueous solution is colourd .

D. All of these

Answer: D

Watch Video Solution

51. Which of the following complex involves d^2sp^3 hybridization ?

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

B. $\left[Co\left(F_6\right]^{3-}$

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

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

Answer: A

View Text Solution

52. Which is true for the complex $\left[Ni(en)_2\right]^{2+}$?

A. Paramagnetism, dsp^2, square planar, coordination number of $Ni = 2$

B. Diamagnetism, dsp^2, square planar, coordination number of $Ni = 4$

C. Diamagnetism, sp^3, tetrahedral, coordination number of $Ni = 4$

D. Paramagnetism, sp^(3), tetrahedral, coordination number of $Ni = 4$

Answer: B

Watch Video Solution

53. The crystal field -splitting for Cr^{3+} ion in octahedral field changes for ligands I^-, H_2O, NH_3, CN^- and the increasing order is :

A. $I^- < H_2O < NH_3 < CN^-$

B. $CN^- < I^- < H_2O < NH_3$

C. $CN^- < NH_3 < H_2O < I^-$

D. $NH_3 < H_2O < I^- < CN^-$

Answer: A

Watch Video Solution

54. 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) $[Fe(H_2O))_6]^{2+}$

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

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

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

(a) IV,I,II,III

(b) *I, II, III, IV*

(c) *III, II, IIV*

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

A. S, P, Q, R

B. P, Q, R, S

C. R, Q, P, S

D. Q, R, P, S

Answer: A

Watch Video Solution

55. Which of the following statement is false ?

A. Complex of $Pt(+II)$ and $Au(+III)$ are square planar-including with weak field ligands such as halide ions.

B. In tetrahedral complex, the t_{2g} orbitals are nearer to the direction of the ligands.

C. For d^0, d^5, d^{10} arrangements the CFSE is zero in both octahedral and tetrahedral complexes with weak field ligands.

D. None of the above

Answer: D

Watch Video Solution

56. The $\left[Fe(CN)_6\right]^{3-}$ complex ion :

A. exhibits planar geometry

B. is diamagnetic

C. should be very stable

D. has 2 unpaired electrons

Answer: C

Watch Video Solution

57. Consider the following statements :

(P) $\left[Mn\left(H_2O\right)_4\right]SO_4$ is paramagnetic and square planar

(Q) Crystal field splitting energy $\left(i.e. \quad \Delta_0\right)$, in $\left[Cr\left(H_2O\right)_6\right]^{3+}$ is higher than in $\left[Cr\left(H_2O\right)_6\right]^{2+}$

(R) Wilkinson catalyst $\left[RhCl\left(Ph_3P\right)_3\right]$, a red-violet complex is diamagnetic and square planar.

(S) $Hg\left[Co(SCN)_4\right]$, a deep blue complex is paramagnetic and tetrahedral.

and of these select the correct set from the given options.

A. P and S only

B. Q, R and S only

C. P, R and S only

D. P, Q, R and S

Answer: D

Watch Video Solution

58. Which of the following statement about $Fe(CO)_5$ is correct ?

A. It is paramagnetic and high spin complex

B. It is diamagnetic and high spin complex

C. It is diamagnetic and low spin complex

D. It is paramagnetic and low spin complex

Answer: C

Watch Video Solution

59. Which of the following statements is not true ?

A. $MnCl_4^-$ ion has tetrahedral geometry and is paramagnetic .

B. $\left[Mn(CN)_6\right]^{2-}$ ion has octahedral geometry and is paramagnetic .

C. $\left[Cu(CN)_4\right]^{3-}$ has square planar geometry and is diamagnetic.

D. $\left[Ni\left(Ph_3P\right)_2Br_3\right]$ has trigonal bipyramidal geometry and is paramagnetic.

Answer: C

Watch Video Solution

60. For the correct assignment of electronic configuration of a complex, the valence bond theory often requires the measurement of

A. molar conductance

B. optical activity

C. magnetic moment

D. dipole moment

Answer: C

Watch Video Solution

61. A complex of certain metal has the magnetic moment of 4.91 BM whereas another complex of the same metal with same oxidation state has zero magnetic moment. The metal ion could be :

A. Co^{2+}

B. Mn^{2+}

C. Fe^{2+}

D. Fe^{3+}

Answer: C

Watch Video Solution

62. Which of the following is correct for the complex $\left[NiBr_2\left(PPH_3\right)_2\right]$?

A. It is square planar with one unpaired electron.

B. It is tetrahedral with two unpaired electrons.

C. It is square planar and diamagnetic.

D. It is tetrahedral with one unpaired electron.

Answer: B

▶ Watch Video Solution

63. Which of the following statement is not correct ?

(a) $\left[Ni\left(H_2O\right)_6\right]^{2+}$ and $\left[Ni\left(NH_3\right)_6\right]^{2+}$ have same value of CFSE

(b) $\left[Ni\left(H_2O\right)_6\right]^{2+}$ and $\left[Ni\left(NH_3\right)_6\right]^{2+}$ have same value of magnetic moment

A. Only P

B. Only Q

C. Both P and Q

D. None of these

Answer: A

Watch Video Solution

64. Both $\left[Ni(CO)_4\right]$ and $\left[Ni(CN)_4\right]^{2-}$ are diamagnetic. The hybridisations of nickel in these complexes respectively, are

A. sp^3, sp^3

B. sp^3, dsp^2

C. dsp^2, sp^3

D. dsp^2, sp^2

Answer: B

Watch Video Solution

65. 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

66. The complex $\left[Fe\left(H_2O\right)_5NO\right]^{2+}$ is formed in the 'brown ring test' for nitrates. Choose the incorrect statement for the complex.

A. Its magnetic moment is approximately 3.9 BM

B. The oxidation state of iron is $+1$

C. The hybridization of central metal ion is sp^3d^2

D. The brown colour of the ring is due to d - d transition

Answer: D

Watch Video Solution

67. $\left[Fe(en)_2\left(H_2O\right)_2\right]^{2+} + en \rightarrow \text{complex(X)}$. The correct statement about the complex (X) is

A. It is a low spin complex

B. It is diamagnetic

C. It shows geometrical isomerism

D. (a) and (b) both

Answer: D

Watch Video Solution

68. Which of the following complexes are low spin diamagnetic ?

$(P)K_4\left[Os(CN)_6\right]$ $(Q)\left[Mo(CO)_6\right]$

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

select the correct answer using the codes given below :

A. P, Q and R

B. P and Q only

C. P and R only

D. Q and R only

Answer: B

Watch Video Solution

69. Which of the following statements is incorrect ?

A. Potassium amminetetracyanidonitronsoniumchromate(I) having $\mu = 1.73BM$ has d^2sp^3 hybridization.

B. $K_3\left[AlF_6\right] + BF_3 \rightarrow AlF_3 + 3K\left[BF_4\right]$

C. $\left[Cr\left(NH_3\right)_6\right]Cl_3$ and $\left[Cu\left(NCCH_3\right)_4\right]\left[BF_4\right]$ both are coloured

D. $\left[Cr\left(NH_3\right)_4Cl_2\right]Br$ can show ionization isomerism with $\left[Cr\left(NH_3\right)_4ClBr\right]Cl$

Answer: C

Watch Video Solution

70. For Co(II), (Choose incorrect statement):

A. tetrahedral complexes are generally formed with monodentate anionic ligands like N_3^-, OH^- etc.

B. planar complexes are formed with bidentate monoanionic like dmg, o-aminophenoxide etc.

C. planar complexes are also formed with a neutral bidentate ligands like ethylenediamine.

D. none of these

Answer: D

View Text Solution

71. Which of the following are square planar complexes ?

$(P)\left[AuCl_4\right]^-$ $(Q)\left[Pt(Cl)_4\right]^{2-}$

$(R)\left[Mn(Br)_4\right]^{2-}$ $(S)\left[Cu\left(NH_3\right)_4\right]^{2+}$

select the correct answer using the codes given below :

A. P and Q only

B. Q and R only

C. Q and S only

D. P, Q and S only

Answer: D

View Text Solution

72. Which of the following complexes is correctly matched with their geometrics ?

A. $\left[Co(py)_4\right]^{2+}$ square planar

B. $\left[Cu(CN)_4\right]^{3-}$ -tetrahedral

C. $\left[Fe(CO)_4\right]^{2-}$ tetrahedral

D. All of these

Answer: D

Watch Video Solution

73. Which one of the following has a square planar geometry ? [At. no. Co=27, Ni=28, Fe=26, Pt=78]

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

B. $\left[PtCl_4\right]^{2-}$

C. $\left[CoCl_4\right]^{2-}$

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

Answer: B

Watch Video Solution

---

74. 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. FTF

B. TTF

C. TTT

D. FFF

Answer: C

Watch Video Solution

75. 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: D

Watch Video Solution

76. Among $\left[Ni(CN)_4\right]^{4-}$, $\left[Ni\left(PPh_3\right)_3Br\right]$ and $\left[Ni(dmg)_2\right]$ species, the hybridisation state of the Ni-atoms are respectively:

A. dsp^2, dsp^2, sp^3

B. sp^3, sp^3, dsp^2

C. sp^3, dsp^2, dsp^2

D. dsp^2, sp^3, dsp^2

Answer: B

Watch Video Solution

77. 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 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

78. Which of the following has dsp^2 hybridization and is diamagnetic in nature ?

$(P)Na_4[Cr(CO)_4]$ $(Q)[Ni(DMG)_2]$

$(R)[PtHBr(Pet_3)_2]$ $(S)[Ag(SCN)_4]^{3-}$

$(T)[AuBr_4]^-$

A. P, Q, S only

B. P, R, S, T only

C. Q, R, T only

D. R, T only

Answer: C

Watch Video Solution

79. Which one is an outer orbital complex ?

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

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

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

D. $\left[Fe(CN)_5\right]^{4-}$

Answer: A

Watch Video Solution

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

A. both square planar

B. tetrahedral and square planar respectively

C. both tetrahedral

D. square planar and tetrahedral respectively

Answer: B

Watch Video Solution

81. The geometry ion which hs no d electrons in the central metal atom is : [Atomic number $Cr = 24, Mn = 25, Fe = 26, Co = 27$]

A. $\left[MnO_4\right]^{-}$

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

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

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

Answer: A

Watch Video Solution

82. The species having tetrahedral shape 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: D

Watch Video Solution

83. Which one of the following high-spin complexes has the largest CFSE (Crystal Field stabilization energy) ?

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

B. $\left[Cr\left(H_2O_6\right)\right]^{2+}$

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

D. $\left[Cr\left(H_2O_6\right)\right]^{3+}$

Answer: D

Watch Video Solution

84. The hybridization of $\left[CoF_6\right]^{3-}$ and $\left[Co\left(C_2O_4\right)\right\}^{3-}$ are :

A. both sp^3d^2

B. both d^2sp^3

C. sp^3d^2 and d^2sp^3 respectively

D. d^2sp^3 and sp^3d^2 respectively

Answer: C

Watch Video Solution

85. The total crystal field stabilization energy (CFSE) for the complexes $\left[Co\left(H_2O\right)_6\right]^{3+}$ and $\left[CoF_6\right]^{3-}$ are respectively : (P is the pairing energy)

A. $-24dq+2P$ and $-24dq+2P$

B. $-24dq+2P$ and $-4.0dq$

C. $-4.0dq$ and $-4.0dq$

D. $4.0dq$ and 0

Answer: B

Watch Video Solution

86. 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 chloridotris(triphenylphosphine)rhodium(I)

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

D. It is a paramagnetic complex

Answer: A

Watch Video Solution

87. The spin-only magnetic moment [in units of Bohr magneton, $\left(\mu_B \text{ of } Ni^{2+}\right)$ in aqueous solution would be (atomic number of $Ni = 28$)

A. 2.84

B. 4.80

C. 0

D. 1.73

Answer: A

Watch Video Solution

88.

$$K_6\left[(CN)_5 \quad Co-O-O-Co(CN)_5\right]_{(X)} \xrightarrow{\text{oxidizes}} K_5\left[(CN)_5Co-O-O-Co(CN)_5\right]_{(Y}$$

In both the complexes Co have $t_{20}.^{6}e_{g}^{\circ}$ configuration.

The bond energy of $(O-O)$ in X ans Y is :

A. bond energy of $(O-O)$ in $Y <$ bond energy of $(O-O)$ in X.

B. bond energy of $(O-O)$ in $X <$ bond energy of $(O-O)$ in Y.

C. bond energy of $(O-O)$ in X=bond energy of $(O-O)$ in Y.

D. bond energy of $(O-O)$in X and bond energy of $(O-O)$ in y can't be comparable.

Answer: B

Watch Video Solution

89. The coordination number and the oxidation state of the element 'E' in the complex $\left[E(en)_2\left(C_2O_4\right)\right]NO_2$ (where (en) is ethylenediamine) are, respectively

A. 4 and 2

B. 4 and 3

C. 6 and 3

D. 6 and 2

Answer: C

Watch Video Solution

90. Which of the following is not correctly matched ?

A. $\left[Fe(en)_3\right]^{3+}$ - sp^3d^2 and paramagnetic

B. $\left[FeCl_4\right]^{2-}$ - sp^3 and paramagnetic

C. $\left[Fe(CN)_6\right]^{3-}$ - d^2sp^3 and paramagnetic

D. $\left[Fe(CO)_2\left(NO^+\right)_2\right]$ - sp^3 and diamagnetic

Answer: A

Watch Video Solution

91. The complex $K_4\left[Zn(CN)_4\left(O_2\right)_2\right]$ is oxidised into $K_2\left[Zn(CN)_4\left(O_2\right)_2\right]$, then which of the following is correct ?

A. Zn (II) is oxidised into Zn (IV)

B. Paramagnetic moment decreases

C. O - O bond length increases

D. Paramagnetic moment increases

Answer: D

Watch Video Solution

92. Allthe following complexes show a decrease in their weights when placed in a magnetic balance. Then which of the these has square planar geometry ?

A. Q, R, T

B. P, Q, R

C. P, R, S

D. None of these

Answer: D

Watch Video Solution

93. The geometry of $\left[Co(CO)_4\right]^-$ and $\left[Cd(CN)_4\right]^{2-}$ are :

A. both square planar

B. both tetrahedral

C. tetrahedral and square planar, respectively

D. square planar and tetrahedral, respectively

Answer: B

Watch Video Solution

94. In which option ,properties of the given three complexes are correct ?

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

A. Square planar, paramagnetic, $\mu = \sqrt{8}B.M.$

B. $\mu = 0$, tetrahedral, diamagnetic

C. Diamagnetic, $\mu = \sqrt{8}B.M.$,square planar

D. Square planar, diamagnetic ,tetrahedral

Answer: B

Watch Video Solution

95. If $\triangle_0$ is crystal field splitting energy and P is mean pairing energy per pair then stablizing energy of complex $\left[FeF_6\right]^{4-}$ is :

A. $-2.4\triangle_0 + 3P$

B. $-2.0\triangle_0 + 3P$

C. $-1.6\ \triangle_0 + P$

D. $-0.4\ \triangle_0$

Answer: D

Watch Video Solution

96. Which of the following is inner orbital complex as well as diamagnetic in nature ?

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

B. MnO_4^{2-}

C. $[Fe(EDTA)]^-$

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

Answer: D

Watch Video Solution

97. Consider the following complexes :

$[NiCl_4]^{2-}, [Ni(CN)_4]^{2-}, [Ni(CO)_4]^0$

What is the similarity in all three complexes ?

A. Oxidation number and EAN of metal

B. Geometry and hybridisation

C. Magnetic nature and number of σ bonds

D. Coordination number and type of metal

Answer: D

Watch Video Solution

98. $[Ni(CN)_4]^{2-}$ and $[NiCl_4]^{2-}$ have similarity but not in :

A. magnetic moment

B. C.N. and O.N.

C. structure

D. both (a) and (c)

Answer: D

Watch Video Solution

99. For which of the following d^n configuration of octahedral complex(es), cannot exist in both high spin and low spin forms ?

$(P)d^3 \quad (Q)d^5$

$(R)d^6 \quad (S)d^8$

A. Q and R

B. P and R

C. P and S

D. R and S

Answer: C

Watch Video Solution

100. The correct order of energies of d-orbitals of metal ion in a square planar complex is

A. $d_{xy} = d_{yz} = d_{zx} > d_{x^2-y^2} = d_{z^2}$

B. $d_{x^2-y^2} = d_{z^2} = d_{xy} > d_{yz} = d_{zx}$

C. $d_{x^2-y^2} > d_{z^2} > d_{xy} > d_{yz} = d_{yz}$

D. $d_{x^2-y^2} > d_{xy} > d_{z^2} > d_{zx} = d_{yz}$

Answer: D

Watch Video Solution

101. According to crystal field theory (CFT) :

A. order of increasing field strength of ligands is : $F^- > H_2O > NH_3$

B. If pairing energy exceeds the magnitude of crystal field splitting then pairing occurs

C. d^4 to d^7 co-ordination entities are more stable for strong field as compared to weak field cases

D. Tetrahedral complexes have sufficiently large splitting energy to force pairing and therefore, high spin configuration are rarely observed.

Answer: C

Watch Video Solution

102. Which amongst following is called spin paired complex ?

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

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

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

D. All complexes with strong field ligands

Answer: A

Watch Video Solution

103. Which of the following complexes are tetrahedral but spin free ?

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

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

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

D. Both (a) and (b)

Answer: A

Watch Video Solution

104. Which of the following is not a shortcoming of VBT ?

(P) Quantitative interpretation of magnetic data

(Q) Colour exhibited by coordination compounds

(R) Quantitative interpretation of the thermodynamic of kinetic stabilities of co-ordination compounds

(S) Exact predictions regarding the octahedral structures of 6 co-ordination complexes

(U) It does not distinguish between weak and strong ligands.

A. P, Q, R, U

B. T

C. S, T

D. Q, R and S

Answer: B

View Text Solution

105. If crystal field theory is completely followed, then which of the following statements must be true ?

A. Anionic ligands such as OH^- should exert greater splitting effect than netural ligands such as H_2O

B. Complexes will have partial covalent bonds between ligands and central atom

C. Colour of complexes cannont be explained

D. Complexes will have pure covalent bonds between ligands and central atom

Answer: A

Watch Video Solution

---

106. Ruby is aluminium oxide $\left(Al_2O_3\right)$ containing about $0.5 - 1\,\%\, Cr^{3+}$ ions $\left(d^3\right)$, which are randomly distributed in positions normally occupied by Al^{3+} choose the only incorrect statement :

A. Cr^{3+} is incorporated into the alumina lattice as octahedral chromium (III) complexes

B. d-d transitions at these centres give rise to colour

C. In Emarald, Cr^{3+} ions occupy octahedral sites in the mineral beryl $\left(Be_3Al_2Si_6O_{18}\right)$

D. The absorption bands seen in the Emarlad, shift to longer wavelength, namely yellow-red and blue, causing Ruby to transmit light in green region.

Answer: D

View Text Solution

107. For $\left[FeF_6\right]^{3-}$ and $\left[CoF_6\right]^{3-}$, the statement that is correct is :

A. both are coloured

B. both are colourless

C. $\left[FeF_6\right]^{3-}$ is coloured and $\left[CoF_6\right]^{3-}$ is colourless

D. $\left[FeF_6\right]^{3-}$ is colourless and $\left[CoF_6\right]^{3-}$ is coloured

Answer: D

Watch Video Solution

108. Which of the following complex ions has electrons that are symmetrically filled in both t_{2g} and e_g orbitals ?

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

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

C. $\left[FeF_6\right]^{3-}$

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

Answer: C

Watch Video Solution

109. Which of the following statement is false ?

A. $[NiCl]_4]^{2-}$ ion is paramagnetic and tetrahedral but $\left[PtCl_4\right]^{2-}$ is diamagnetic and square planar

B. $\left[CoF_6\right]^{3-}$ ion is paramagnetic but $\left[NiF_6\right]^{2-}$ ion is diamagnetic and low spin

C. $\triangle_0$ order $\left[CrCl_6\right]^{3-} < \left[Cr\left(NH_3\right)_6\right]^{3+} < \left[Cr(CN)_6\right]^{3-}$

D. bis(dimethylglyoximato)nickel(II) is diamagnetic and tetrahedral complex

Answer: D

Watch Video Solution

110. The number of unpaired electrons in d^6, low spin, octahedral complex is :

A. 4

B. 2

C. 1

D. 0

Answer: D

Watch Video Solution

111. Which of the following option is correct for $\left[Fe\left(H_2O\right)_6\right]^{2+}$ and $\left[Co\left(H_2O\right)_6\right]^{3+}$?

A. both have same magnetic moment

B. both are high spin complex

C. $\triangle_0 > P$ for both

D. Splitting gap is different in both

Answer: D

Watch Video Solution

112. Which of the following complex does not have tetrahedral geometry ?

A. $\left[Co(CO)_4\right]^-$

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

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

D. $\left[Ni(CO)_4\right]^0$

Answer: B

Watch Video Solution

113. Which of the following complex acts as good reducing agent ?

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

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

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

D. $\left[Co\left(NO_2\right)_6\right]^{4-}$

Answer: D

Watch Video Solution

114. Which of the following statement is correct for $\left[NiCl_2(NH_3)_2\right]^0$ (spin magnetic moment =0) ?

A. It is optically active complex

B. It is high spin complex

C. It is tetrahedral complex

D. It has two stereo isomers

Answer: D

Watch Video Solution

115. Which of the following order is correct for $\triangle_0 / \triangle_t / \triangle_{sp}$?

A. $\left[Fe(SCN)_6\right]^{3-} > \left[Fe(C_2O_4)_3\right]^{3-}$

B. $\left[Co(H_2O)_3F_3\right] > \left[Co(H_2O)_6\right]^{3+}$

C. $\left[NiF_6\right]^{-2} > \left[NiF_6\right]^{4-}$

D. $\left[Fe\left(H_2O\right)_6\right]^{2+} > \left[Fe\left(H_2O\right)_6\right]^{3+}$

Answer: C

Watch Video Solution

116. Select the correct statement about $\left[CoF_6\right]^{3-}$:

A. It is labile complex

B. It is low spin complex

C. Spin only magnetic moment of complex is 3.87 B.M.

D. All of these

Answer: A

Watch Video Solution

117. The complex $\left[Pt\left(NH_3\right)_4\right]^{2+}$ has .... Structure :

A. Square planar

B. tetrahedral.

C. pyramidal

D. pentagonal

Answer: A

Watch Video Solution

118. Which of the following complex ion has tetrahedral arrangement ?

A. $\left[AuCl_4\right]^-$

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

C. $\left[FeCl_4\right]^-$

D. All are having tetrahedral structure

Answer: C

Watch Video Solution

119. The pair of species having square planar shapes for both is :

A. $\left[Fe(CO)_4\right]^-, XeF_4$

B. $\left[Ni(CN)_4\right]^{2-}, CCl_4$

C. $\left[Cu\left(NH_3\right)_4\right]^{2+}, \left[PtCl_4\right]^{2-}$

D. SF_4, PCl_4^+

Answer: C

Watch Video Solution

120. Select incorrect characteristics about $\left[Zn(gly)_2\right]^0$:

A. It is diamagnetic in nature

B. It is shows optical isomerism

C. It is shows geometrical isomerism

D. It has four N - Zn - O bond angles

Answer: C

Watch Video Solution

---

121. Which of the following is not correctly matched (P : Pairing energy)?

A. $\left[Co\left(H_2O\right)_6\right]^{3+} \; : \; \triangle_0 < P \; : \; Paramag \neq tic$

B. $\left[NiF_6\right]^{2-} \; : \; \triangle_0 > P \; : \; Diamag \neq tic$

C. $\left[RhF_6\right]^{3-} \; : \; \triangle_0 > P \; : \; Diamag \neq tic$

D. $\left[Fe\left(NH_3\right)_6\right]^{2+} \; : \; \triangle_0 < P \; : \; Paramag \neq tic$

Answer: A

Watch Video Solution

122. Select correct statement :

A. The $d_{x^2-y^2}$ and d_{z^2} orbitals are called e_g orbitals for octahedral splitting

B. The d_{xy}, d_{xz} and d_{yz} orbitals lie between the axes and collectively called t_{2g} orbitals

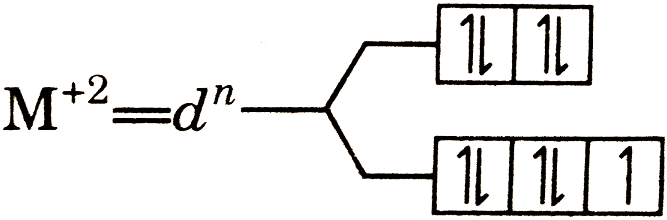
C. both are correct

D. none is correct

Answer: C

Watch Video Solution

123. Consider following electronic configuration of outer most d-electrons of a coloured metal ion in $\left[M\left(H_2O\right)_6\right]^{2+}$



Select correct statement :

A. It is ground state electronic configuration

B. It violates Hunds rule of maximum multiplicity

C. M in given complex can be either Cu or Zn

D. It is excited state observed after absorption of suitable visible light

Answer: D

Watch Video Solution

E. Stability, Colour and Magnetic Properties of Complexes

1. 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

2. The pair in which both species have same magnetic moment (spin only value) is .

A. $\left[Cr\left(H_2O\right)_6\right]^{2+}, \left[CoCl_4\right]^{2-}$

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

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

D. $\left[CoCl_4\right]^{2-}, \left[Fe\left(H_2O\right)_6\right]^{2+}$

Answer: B

Watch Video Solution

3. Which of the following complexes is diamagnetic ?

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

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

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

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

Answer: A

Watch Video Solution

4. 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

5. You are given the following two complex X and Y which are isomer of each other , X is Hg $\left[Co(SCN)_4\right]$. It is further given that 'spin only' magnetic moment of X is found to be 3.78 B.M. and that of Y is 1.73 B.M. Then which of the following is correct ?

A. Anion of X will be tetrahedral and that of Y will be square planar

B. Anion of X will be square planar but that of Y will be tetrahedral

C. Both the anions will be tetrahedral

D. Both the anions will be square planar

Answer: A

Watch Video Solution

---

6. $\left[Ni(CN)_4\right]^{2-}$ and $\left[NiCl_4\right]^{2-}$ have similarity but not in :

A. magnetic moment

B. C.N. and O.N.

C. geometry

D. both (a) and ©

Answer: D

Watch Video Solution

7. Select the correct statement .

A. Complex ion $\left[MoCl_6\right]^{3-}$ is paramagnetic

B. Complex ion $\left[Co(en)_3\right]^{3+}$ is diamagnetic

C. Both (a) and (b) are correct

D. None of correct

Answer: C

Watch Video Solution

8. Amongst $Ni(CO)_4$, $\left[Ni(CN)_4\right]^{2-}$ and $NiCl_4^{2-}$:

A. $Ni(CO)_4$ and $NiCl_4^{2-}$ are diamagnetic and $\left[Ni(CN)_4\right]^{2-}$ is paramagnetic.

B. $NiCl_4^{2-}$ and $\left[Ni(CN)_4\right]^{2-}$ are diamagnetic and $Ni(CO)_4$ is paramagnetic.

C. $Ni(CO)_4$ and $\left[Ni(CN)_4\right]^{2-}$ are diamagnetic and $NiCl_4^{2-}$ is paramagnetic.

D. $Ni(CO)_4$ is diamagnetic and, $NiCl_4^{2-}$ and $\left[Ni(CN)_4\right]^{2-}$ are paramagnetic.

Answer: C

Watch Video Solution

9. In complexes more stability is shown by :

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

Answer: C

Watch Video Solution

10. Give the correct order of stability is shown by :

$(P)\left[Al\left(H_2O\right)_6\right]Cl_3$

$(Q)\left[Al\left(H_2O\right)_5Cl\right]Cl_2.\ H_2O$

$(R)\left[Al\left(H_2O\right)_4Cl_2\right]Cl.2H_2O$

`(S) [Al(H_(2)O)_(3)Cl_(3)].3H_(2)O

A. $P < Q < R < S$

B. $P > R > Q > S$

C. $P > Q > R > S$

D. $P > Q > S > R$

Answer: C

Watch Video Solution

11. Which of the following complexes is least likely to exist ?

A. $Hg(OH)_4^{2-}$

B. $Zn(OH)_4^{2-}$

C. HgI_4^{2-}

D. $PtCl_4^{2-}$

Answer: A

View Text Solution

12. For the reaction $Ni^{2+} + 4NH_3 \rightarrow \left[Ni\left(NH_3\right)_4\right]^{2+}$, at equilibrium is 0.5M. Then the instability constant of the complex will be approximately equal to :

A. 1.0×10^{-5}

B. 1.5×10^{-16}

C. 1.0×10^{7}

D. 1.5×10^{-17}

Answer: C

View Text Solution

13. An ion M^{2+} forms the complexes.

$\left[M\left(H_2O\right)_6\right]^{2+}$ $\left[M(en)_3\right]^{2+}$ $\left[MBr_6\right]^{4-}$

Match the complex with the appropriate colour respectively :

A. Green, blue and red

B. Blue, red and green

C. Green, red and blue

D. Red, blue and green

Answer: B

Watch Video Solution

14. In the following complexes :

$(P)NiSO_4 + KCN(Xs) \rightarrow comp \le x' I'$

$(Q)FeCl_3 + KCN(Xs) \rightarrow comp \le x' II'$

$(R)FeSO_4 + KCN(Xs) \rightarrow comp \le x' III'$

$(S)CuSO_4 + KCN(Xs) \rightarrow Comp \le x' IV'$

Correct order of stability of complexes is :

A. $P > Q > R > S$

B. $Q > P > R > S$

C. $Q > R > P > S$

D. $R > Q > P > S$

Answer: A

View Text Solution

15. When hydrochloric aicd is addded to cobalt and nitrate solution at room temperautre, the following reaction takes place and the reaction mixture becomes blue. On cooling the mixture it becomes pink. On the basis of this information mark the corect ansewer.

$\left[Co\left(H_2O\right)_6\right]\text{pink}^{3+}(aq) + 4CI^- \Leftrightarrow$

$CoCI_4\text{blue}^{2-}(aq) + 6H_2O(l)$

A. $\triangle H = 0$ for the reaction

B. $\triangle H > 0$ for the reaction

C. $\triangle H < 0$ for the reaction

D. $\triangle H$ can not be concluded

Answer: B

Watch Video Solution

16. Of the following complex ions, the one that probably has the largest overall formation constant, K_f is :

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

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

C. $\left[Co\left(NH_3\right)_2\left(H_2O\right)_4\right]^{3+}$

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

Answer: D

Watch Video Solution

17. The magnetic moment of a complex ion is $2.83BM$ The complex ion is

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

(b) $\left[Cu(CN)_6\right]^{2-}$

(c) $\left[V\left(H_2O\right)_6\right]^{3+}$

(d) $\left[MnCI_4\right]^{2-}$.

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

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

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

D. $\left[MnCl_4\right]^{2-}$

Answer: A

Watch Video Solution

18. Compound A gives blue colour solution with excess of NH_4OH, it gives chocolate brown colour with $K_4\left[Fe(CN)_6\right]$. Complex A is :

A. $CuSO_4$

B. $PbSO_4$

C. $ZnSO_4$

D. $BiCl_3$

Answer: A

View Text Solution

19. $K_4\left[Fe(CN)_6\right]$ is slightly yellow coloured due to :

A. charge transfer

B. more polarization plane

C. unpaired electrons

D. none of these

Answer: A

Watch Video Solution

20. MnO_4^- is of intense pink colour, though Mn is in$(+7)$ oxidation state.It is due to:

A. Oxygen gives colour to it

B. Charge transfer when Mn $(7+)$ gives its electron to oxygen and oxidise to Mn $(8+)$ temporaily

C. Charge transfer when oxygen gives its electron to Mn $(7+)$ changing in Mn $(6+)$ temporaily

D. none is correct explanation

Answer: C

Watch Video Solution

21. Among $TiF_6^{2-}, CoF_6^{3-}, Cu_2Cl_2$ and $NiCl_4^{2-}$ the colourless species are :

A. CoF_6^{3-} and $NiCl_4^{2-}$

B. TiF_6^{2-} and CoF_6^{3-}

C. $NiCl_4^{2-}$ and Cu_2Cl_2

D. TiF_6^{2-} and Cu_2Cl_2

Answer: D

Watch Video Solution

22. Aqueous solution of Ni^{2+} contains $\left[Ni(H_2O)_6\right]^{2+}$ 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 cannot be predicted theoretically

Answer: A

Watch Video Solution

23. The comple $\left[Fe(H_2O)_6NO\right]^{2+}$ is formed in the brown ring test fro nitrates when freshly prepared $FesO_4$ solution is added to aqueous solution of NO_3^- ions followed by addition of conc. H_2SO_4. Select correct statement about this complex.

A. colour changes 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

24. Aqueous solution of nickel sulphate on treating with pyridine and then adding a solution of sodium nitrite gives dark blue crystals of :

A. $\left[Ni(py)_4\right]SO_4$

B. $\left[Ni(py)_2\left(NO_2\right)_2\right]$

C. $\left[Ni(py)_4\right]\left(NO_2\right)_2$

D. $\left[Ni(py)_3\left(NO_2\right)\right]_2SO_4$

Answer: C

Watch Video Solution

25. The spin only magnetic moment value of $Cr(CO)_6$ is

A. 0

B. 2.84

C. 4.9

D. 5.92

Answer: A

Watch Video Solution

26. 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 BM

B. 3.87 BM

C. 5.92 BM

D. 1.73 BM

Answer: C

Watch Video Solution

27.

$$\left[\left(NH_3\right)_5Co - O - O - Co\left(NH_3\right)_5\right]^{4+} \overset{\left[S_2O_8\right]^{2-}}{\rightarrow} \text{oxidise}\left[\left(NH_3\right)_5Co - O - O - Co\left(N\right.\right.$$

(Brown) (Green)

The magnetic moment of green complex is 1.7 BM and for brown complexes magnetic moment is zero. $(O - O)$ is same in all respect in both the complexes. The oxidation state of Co in brown complex and green complex respectively are :

A. $\begin{array}{l} III \quad III \text{ and } IV \quad III \\ brown \quad green \end{array}$

B. $III \quad II$ and $III \quad III$
$brown \quad green$

C. $III \quad III$ and $III \quad II$
$brown \quad green$

D. $III \quad IV$ and $III \quad III$
$brown \quad green$

Answer: A

Watch Video Solution

28. Which of the following pairs will show the same magnetic moment ('spin only') ?

A. $\left[Cr\left(H_2O\right)_6\right]^{3+}$ and $\left[Fe\left(H_2O\right)_5NO\right]^{2+}$

B. $\left[Mn(CN)_6\right]^{4-}$ and $\left[Fe(CN)_6\right]^{3-}$

C. $\left[Ni(CO)_4\right]$ and $\left[Zn\left(NH_3\right)_4\right]^{2+}$

D. All of these

Answer: D

Watch Video Solution

29. What will be the correct order for the wavelengths of absorption in the visible region for the following:

$$\left[Ni\left(NO_2\right)_6\right]^{4-}, \left[Ni\left(NH_3\right)_6\right]^{2+}, \left[Ni\left(H_2O\right)_6\right]^{2+}?$$

A. $P > Q > R$

B. $Q > P > R$

C. $R > Q > P$

D. $Q > R > P$

Answer: A

Watch Video Solution

30. Which one of the following statement is false for nickel-dimethyglyoximate complex ?

A. The stability of complex is only due to the presence of intra-molecular hydrogen bonding.

B. The complex is stable because tridentate dimethyl glyoxime ligand forms a five membered chelate rings.

C. The complex is stable as it has five membered chelate rings as well as intra molecular hydrogen bonding.

D. (a) and (b) both.

Answer: A

Watch Video Solution

31. Which one of the cyano complexes would exhibit the lowest value of para magnetic behaviour ?

(At. No. Cr = 24, Mn = 25, Fe = 26, Co = 27)

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

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

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

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

Answer: A

Watch Video Solution

32. 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 of alkali.

B. copper hydroxide is amphoteric.

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

D. in acidic solution protons coordinates with ammonia molecules are not forming NH_4^+ ions and NH_3 molecules are not available.

Answer: D

Watch Video Solution

33. The spin magnetic moment of cobalt in the compound $Hg\left[Co(SCN)_4\right]$ is

A. $\sqrt{3}$

B. $\sqrt{8}$

C. $\sqrt{15}$

D. $\sqrt{24}$

Answer: C

Watch Video Solution

34. 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. TTT

B. FFT

C. TFT

D. TTF

Answer: A

Watch Video Solution

35. The correct order of magnetic moments (only spin value in BM) among is :

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

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

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

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

Answer: D

Watch Video Solution

36. Which of the following complexes would have minimum $[Ag^+]$ concentration in solution ?

A. $[Ag(NH_3)_2]^+$

B. $[Ag(S_2O_3)_2]^{3-}$

C. $[Ag(CN)_2]^-$

D. All have equal $[Ag^+]$

Answer: C

View Text Solution

37. From the stability constant (hypothetical vlues) , given below, predict which is the most stable complex ?

A. $Cu^2 + 4NH_3 \rightarrow \left[Cu\left(NH_3\right)_4\right]^{2+}, K = 4.5 \times 10^{11}$

B. $Cu^2 + 4CN^- \rightarrow \left[Cu(CN)_4\right]^{2-}, K = 2.0 \times 10^{27}$

C. $Cu^2 + 2en \rightarrow \left[Cu(en)_2\right]^{2+}, K = 3.0 \times 10^{15}$

D. $Cu^2 + 4H_2O \rightarrow \left[Cu\left(H_2O\right)_4\right]^{2+}, K = 9.5 \times 10^{8}$

Answer: B

Watch Video Solution

38. Which of the following set of species are coloured as well as diamagnetic ?

$(P)\left[Cl_2 \text{ and } Br_2\right]$

$(Q)[AgBr \text{ and } AgI]$

$(R)\left[Na_2\left[Fe(CN)_5NO\right]\right.$ and $\left[Fe\left(H_2O\right)_5NO\right]SO_4\left.\right]$

$(S)\left[Na_2\left[Fe(CN)_5NO\right]\right.$ and $Na_4\left[Fe(CN)_5NOS\right]\left.\right]$

A. P, Q, S

B. P, R, Q

C. P, Q, R, S

D. P, S, Q

Answer: A

View Text Solution

39. Which of the following statements is not correct ?

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

B. $\left[Cr\left(NH_3\right)_6\right]Cl_3$ is a coloured compound.

C. $K_3\left[VF_6\right]$ is a colourless compound.

D. $\left[Cu\left(NCCH_3\right)_4\right]\left[BF_4\right]$ is a colourless compound.

Answer: C

Watch Video Solution

40. What is the ratio of uncomplexed to complexed to complexed Zn^{2+} ion in a solution that is $10 M \text{in} NH_3$. If the stability constant of $\left[Zn\left(NH_3\right)_4\right]^{2+}$ is 3×10^9?

A. 3.3×10^{-9}

B. 3.3×10^{-11}

C. 3.3×10^{-14}

D. 3×10^{-13}

Answer: C

Watch Video Solution

41. Which of the following statements is incorrect ?

A. N_2 and C_2 molecules contain both σ and πe bonds

B. Cu^{2+} is more stable than Cu_+ in aqueous medium

C. The electrical conductivity of metals cannot be explained by electron sea model.

D. (a) and (C) both

Answer: D

Watch Video Solution

42. What is the magnetic moment of $K_3\left[FeF_6\right]$?

A. 3.87 BM

B. 4.98 BM

C. 5.91 BM

D. 6.92 BM

Answer: C

Watch Video Solution

43. Select the correct order for the wavelength of absorption for the given complexes :

A. $[Cr(CN)_6]^{3-} = [CrCl_6]^{3-} = [Cr(NH_3)_6]^{3+} = [Cr(H_2O)_6]^{3+}$

B. $[CrCl_6]^{3-} > [Cr(H_2O)_6]^{3+} > [Cr(NH_3)_6]^{3+} > [Cr(CN)_6]^{3-}$

C. $[Cr(CN)_6]^{3-} > [Cr(NH_3)_6]^{3+} > [Cr(H_2O)_6]^{3+} > [CrCl_6]^{3-}$

D. $[Cr(CN)_6]^{3-} > [Cr(H_2O)_6]^{3+} > [CrCl_6]^{3-} > [Cr(NH_3)_6]^{3+}$

Answer: B

Watch Video Solution

44. A complex $K_x[MnF_6]$ has magnetic moment 4.9BM what will be the oxidation state of Mn and value of x :

A. $Mn \quad (II), x = 4$

B. $Mn \quad (III), x = 3$

C. $Mn \quad (IV), x = 2$

D. $Mn \quad (V), x = 1$

Answer: B

Watch Video Solution

45. Maximum number of atoms which are in the same plane in $\left[Ni(CO)_4\right]$

:

A. 3

B. 2

C. 9

D. 5

Answer: D

Watch Video Solution

46. Which amongst the following has zero magnetic moment ?

A. $K\left[Cr\left(H_2O\right)_2\left(C_2O_4\right)_2\right].3H_2O$

B. $CrCl_3(py)_3$

C. $K_4\left[Mn(CN)_6\right]$

D. $\left[Co\left(NH_3\right)_5Cl\right]CL_2$

Answer: D

Watch Video Solution

47. Which ion has the highest magnetic moment value ?

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

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

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

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

Answer: B

Watch Video Solution

48. Choose the incorrect statement :

A. $FeSO_4$ solution mixed with $\left(NH_4\right)_2SO_4$ solution in $1:1$ molar ratio gives test of Fe^{2+} ion

B. $CuSO_4$ solution mixed with aqueous ammonia in $1:1$ molar ratio gives test of Cu^{2+} ion

C. $Aq. CuSO_4$ solution (blue in colour) gives a green precipitate with aqueous potassium fluoride

D. $Aq. CuSO_4$ solution (blue in colour) gives a bright green solution with aqueous potassium chloride

Answer: B

View Text Solution

49. Find pK if K is the overall complex dissociation equilibrium constant for $\left[Cu\left(NH_3\right)_4\right]^{2+}$ ion, given that β_4 for this complex is 2.0×10^{13} :

A. 13.3

B. 12.7

C. 13.7

D. 12.3

Answer: A

Watch Video Solution

50. Choose the correct statement for the complex $\left[Al\left(H_2O\right)_6\right]^{3+}$:

A. It has the same hybridisation as

$\left[Ti\left(H_2O\right)_6\right]^{3+}$, $\left[V\left(H_2O\right)_6\right]^{3+}$. $\left[TiF_6\right]^{3-}$ and $\left[V\left(H_2O\right)_6\right]^{2+}$

B. It has different magnetic property as compared to $\left[Cr\left(NH_3\right)_6\right]^{3+}$

C. It has same magnetic property as compared to $\left[MnF_6\right]^{2-}$ but different hybridisation

D. Both (a) and (b)

Answer: D

Watch Video Solution

51. For the complex ML_2, Stepwise formation constants

$M + L \rightarrow ML$

$ML + L \rightarrow ML_2$ are 4 and 3 respectively. Hence, overall stability constant for $M + 2L \rightarrow ML_2$ is :

A. 12

B. 7

C. 1.33

D. 0.75

Answer: A

Watch Video Solution

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

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

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

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

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

Answer: B

Watch Video Solution

53. The colour of the coordination compounds depends on the crystal field splitting. What will be the correct order of absorption of wavelength of light of the visible region, for the complexes, $\left[Co\left(NH_{3\,-}\,(6)\right]^{3+}.\left[Co(CN)_6\right]^{3+}.\left[Co\left(H_2O\right)_6\right]^{3+}$

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

Answer: C

Watch Video Solution

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

A. $\left[CoCl_6\right]^{4-}$

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

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

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

Answer: C

Watch Video Solution

55. The nature of $CsAuCl_3$ is (this compound contains Au in two oxidation states and there is no Au - Au bond) :

A. diamagnetic

B. paramagnetic

C. ferromagnetic

D. antiferromagnetic

Answer: A

Watch Video Solution

56. $\left[Cr\left(H_2O\right)_6\right]Cl_3$ (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. $3d_{xy}^1, 3d_{yz}^1, 3d_{xz}^1$

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

C. $3d_{x^2-y^2}^1, 3d_{z^2}^1, 3d_{xz}^1$

D. $3d_{xy}^1, 3d_{x^2-y^2}^1, 3d_{yz}^1$

Answer: A

Watch Video Solution

57. Which of the following chemical species is tetrahedral, diamagnetic as well as coloured ?

A. CrO_4^{2-}

B. MnO_4^{2-}

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

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

Answer: A

Watch Video Solution

58. The colour of $Co\left(H_2O\right)_6^{2+}$ is best attributed to electronic transitions :

A. between different n levels in the metal.

B. between the metal's d orbitals.

C. from the Co^{2+} ion to water molecules.

D. during ionization.

Answer: B

Watch Video Solution

59. Out of the following pairs (of complexes), in which option, first complex is more stable than second complex :

A. $\left[Co\left(NO_2\right)_6\right]^{4-}$ and $\left[Co\left(NO_2\right)_6\right]^{3-}$

B. $\left[Co\left(H_2O\right)_6\right]^{2+}$ and $\left[Co\left(NH_3\right)_6\right]^{2+}$

C. $[Co(trien)]^{2+}$ and $\left[Co(en)_2\right]^{2+}$

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

Answer: C

Watch Video Solution

60. Which change in $\left[Mn(CN)_6\right]^{4-}$ results in symmetrical ditribution of electrons in non-degenerate d- orbitals of metal ion ?

$(P)\left[Mn(CN)_6\right]^{4-} \overset{\text{oxidation}}{\rightarrow} by O_2\left[Mn(CN)_6\right]^{3-}$

$(Q)\left[Mn(CN)_6\right]^{4-} \overset{\text{reduction}}{\rightarrow} by Zn\left[Mn(CN)_6\right]^{5-}$

A. P only

B. Q only

C. P and Q both

D. None of these

Answer: B

Watch Video Solution

F.Isomerism in Coordination Compounds

1. The complexes $\left[Pt\left(NH_3\right)_4\right]\left[PtCl_6\right]$ and $\left[Pt\left(NH_3\right)_4Cl_2\right]\left[PtCl_4\right]$ are :

A. linkage isomers

B. optical isomers

C. Co-ordination isomers

D. ionization isomers

Answer: C

Watch Video Solution

2. $\left[Co\left(NH_3\right)_5NO_2\right]Cl_2$ and $\left[Co\left(NH_3\right)_5ONO\right]Cl_2$ are related to each other as :

A. Geometrical isomers

B. linkage isomers

C. coordination isomers

D. ionization isomers

Answer: B

Watch Video Solution

3. 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: B

Watch Video Solution

4. Geometrical isomerism is found in coordination compounds having coordination number:

A. 2

B. 3

C. 4 (tetrahedral)

D. 6

Answer: D

Watch Video Solution

5. 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

6. In the reaction

$\left[CoCI_2\left(NH_3\right)_4\right]^{\oplus} \rightarrow^{cl}\left[CoCI_3\left(NH_3\right)_3\right] + NH_3$, only one isomer of the complex product is obtained. Is the initial complex cis or trans ? .

A. compound is in cis form

B. compound is in trans form

C. compound is in both (cis and trans) forms

D. can't be predicted

Answer: B

Watch Video Solution

7. 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

8. Which of the following is not optically active?

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

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

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

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

Answer: D

Watch Video Solution

9. Geometrical isomerism can be shown by :

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

B. $Na_2\left[Cd\left(NO_2\right)_4\right]$

C. $\left[PtCl_4I_2\right]$

D. $\left[Pt\left(NH_3\right)_3Cl\right]\left[Au(CN)_4\right]$

Answer: C

Watch Video Solution

10. For the square planar complex $\left[Pt\left(NH_3\right)_{NH_2OH}(py)\left(No_2\right)\right]^{\oplus}$ how many geometrical isomers are possible .

A. 2

B. 3

C. 4

D. 5

Answer: B

Watch Video Solution

11. Which of the following would exhibit geometrical as well as optical isomerism ?

A. $\left[Pt(en)_3\right]^{4+}$

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

C. $\left[PtCl_6\right]^{2-}$

D. $\left[Pt(gly)_2Cl_2\right]$

Answer: D

Watch Video Solution

12. The number of geometrical isomers and optical isomers of $\left[Pt\left(NH_3\right)(Br)(Cl)(Py)\right]$ are respectively.

A. 2, 0

B. 3, 2

C. 3, 0

D. 2, 2

Answer: C

Watch Video Solution

13. The complex entity which shows geometrical as well as optical isomerism, is :

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

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

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

D. All of these

Answer: A

Watch Video Solution

14. Which of the following complex compound exhibits geometrical isomerism ?

A. $\left[CoCl\left(NH_3\right)_4\left(H_2O\right)\right]$

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

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

D. All of these

Answer: D

Watch Video Solution

---

15. Which of the following will exhibit more than ten isomers ?

A. $[Co(en)ClBrI(CN)]$

B. $\left[Co(gly)ClBr(NC)NO_2\right]$

C. $\left[Co(gly)ClBr(CN)NO_2\right]$

D. All of the above

Answer: D

Watch Video Solution

16. How many total possible isomers are present for $\left[Pt(CN)_2\left(NO_2\right)_2\right]^{2-}$?

A. 2

B. 4

C. 10

D. 19

Answer: D

View Text Solution

17. Coordination number, oxidation state and number of isomers in $K_3\left[Cr\left(C_2O_4\right)_3\right]$ are respectively :

A. 6, $+3$, 2

B. 4, $+2$ and 2

C. 3, $+3$, 3

D. 3, 0 and 3

Answer: A

Watch Video Solution

18. The total number of optically active isomers of $\left[Pt(en)_2Cl_2\right]^{2+}$ is :

A. 2

B. 3

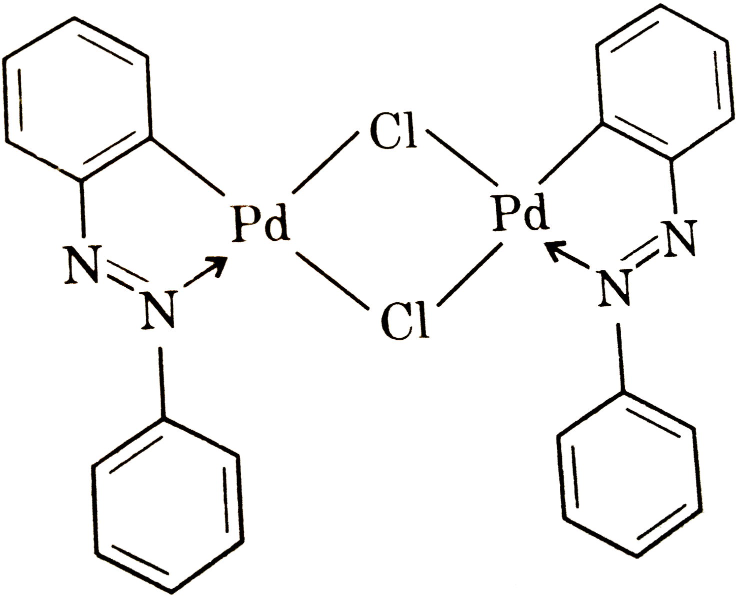
C. 4

D. 6

Answer: A

Watch Video Solution

19. Select the correct statement regarding the complex given below :



A. It exhibits geometrical isomerism

B. It is optically active

C. The central metal ion Pd^{2+} is sp^3 hybridised

D. It exhibits coordination position isomerism

Answer: A

Watch Video Solution

20. Which of the following complex does not show geometrical isomerism

?

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

B. $\left[Co\left(NH_3\right)_3\left(NO_2\right)_3\right]$

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

D. $\left[Pt(gly)_2\right]$

Answer: C

Watch Video Solution

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

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

B. Hexachloridoplatinum (IV) tetraamine dicynidoplatinate (IV)

C. Amminebromidochoridomethylamineplatinum (II)

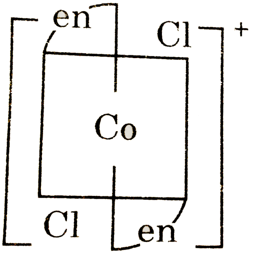
D. Cis-dichlorido (ethylenediamine) platinum (II)

Answer: C

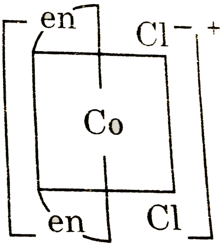
Watch Video Solution

22. Which of the following ions are optically active ?

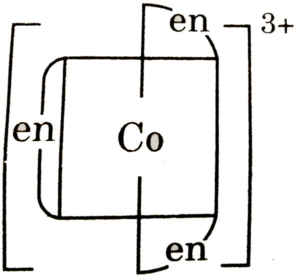
(P)



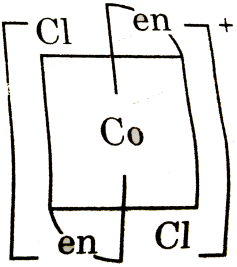
(Q)



(R)



(S)



A. P only

B. Q only

C. Q and R

D. S only

Answer: C

Watch Video Solution

23. In which case racemic mixture is obtained on mixing its mirror images in $1:1$ molar ratio ?

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

B. $\left[Ni(DMG)_2\right]$

C. cis - $\left[Cu(gly)_2\right]$

D. In all of these

Answer: A

Watch Video Solution

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

A. ionisation, optical

B. hydrate, optical

C. geometrical, optical

D. Coordination, geometrical

Answer: C

Watch Video Solution

25. Which of the following complexes exhibit chirality ?

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

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

C. cis - $\left[RhCl_2\left(NH_3\right)_4\right]^+$

D. mer - $\left[Co\left(NO_2\right)_3(dien)\right]$

Answer: A

Watch Video Solution

26. Which of the following polymerisation isomers of the compound having empirical formula $\left[Cr\left(NH_3\right)_3\left(NO_2\right)_3\right]^+$ has the lowest molecular mass ?

A. $\left[Cr\left(NH_3\right)_4\left(NO_2\right)_2\right]^+\left[Cr\left(NH_3\right)_2\left(NO_2\right)_4\right]^-$

B. $\left[Cr\left(NH_3\right)_6\right]^{3+}\left[Cr\left(NO_2\right)_6\right]^{3-}$

C. $\left[Cr\left(NH_3\right)_5\left(NO_2\right]^{2+}\left[Cr\left(NH_3\right)\left(NO_2\right)_5\right]^{2-}$

D. All of the above

Answer: D

Watch Video Solution

27. 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

28. On treatment of $\left[Pt\left(NH_3\right)_4\right]^{2+}$ with concentrated HCl, two compounds (P) and (Q) having the same formula, $\left[Pt\left(NH_3\right)_2CL_2\right]$ are obtained, (P) can be converted into (Q) by boiling with dilute HCl. A soution of (P) reacts with oxalic acid to form $\left[Pt\left(NH_3\right)_2\left(C_2O_4\right)\right]$ whereas (Q) does not react. Point out the correct statement of the following :

A. (P) cis, (Q) trans, both tetrahedral

B. (P) cis, (Q) trans, both square planar

C. (P) trains, (Q) cis, both tetrahedral

D. (P) trans, (Q) cis, both square planar

Answer: B

Watch Video Solution

29. Which of the following complexes shows ionization isomerism ?

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

B. $\left[Cr(en)_2\right]Cl_2$

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

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

Answer: D

Watch Video Solution

30. Which of the following will show optical isomeris ?

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

31. Which kind of isomerism is shown by the complex $\left[Co\left(NH_3\right)_5(ONO)\right]SO_4$?

1. Ionisation isomerism 2.Linkage isomerism

3. Geometrical isomerism 4. Optical isomerism.

A. P, Q, R and S are correct

B. P, R and S are correct only

C. P and Q are correct only

D. Q, R and S are correct only

Answer: C

Watch Video Solution

32. Which of the following complexes show geometrical as well as optical isomerism ?

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

$(Q)\left[Rh(en)_2Cl_2\right]^{+}$

$(R)\left[Co\left(NH_3\right)_2(Cl)_2(en)\right]^{+}$

Select the correct answer using the codes given below :

A. P only

B. P and Q only

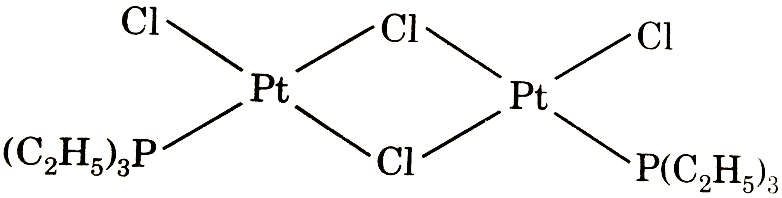
C. Q and R only

D. All P, Q, R

Answer: C

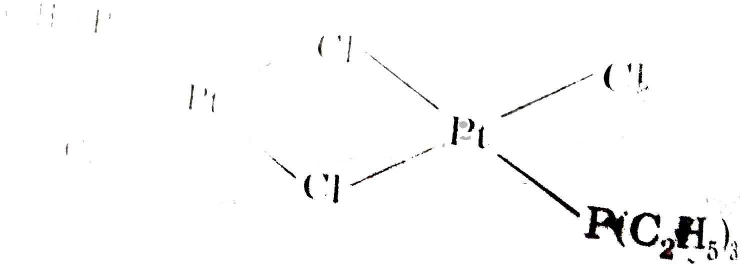
Watch Video Solution

33. The complexes given below show :



and

" and "



A. optical isomerism

B. Co-ordination isomerism

C. geometrical isomerism

D. bridged isomerism

Answer: C

Watch Video Solution

34. Give the total number of possible structural isomers of the compound

$\left[Cu(NH_3)_4\right]\left[PtCl_4\right]$.

A. 3

B. 5

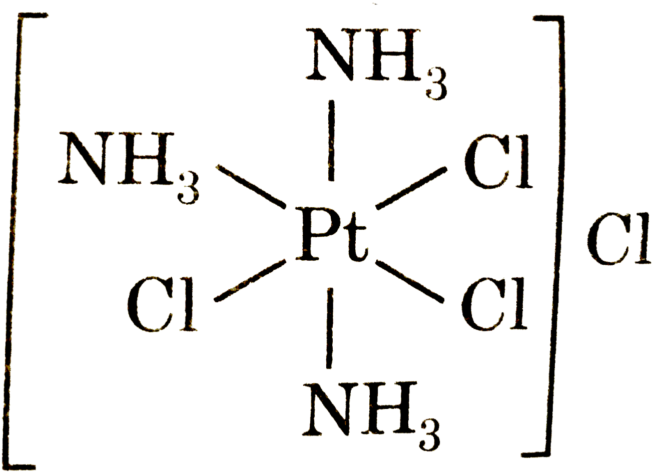
C. 4

D. 6

Answer: C

Watch Video Solution

35. IUPAC name of given complex is :



A. triamminetrichloridoplatinum (IV) chloride

B. triamminetrichloridopaltinum (II) chloride

C. mer-triamminetrichloridoplatinum (IV) chloride

D. trans-triamminetrichloridoplatinum (IV) chloride

Answer: C

Watch Video Solution

36. 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. $\left[Co\left(H_2O\right)_6\right]Cl_3$ and $\left[Cr\left(H_2O\right)_6Cl\right]Cl_2.\,H_2O$

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

Answer: D

Watch Video Solution

37. 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 pentaamminenitrito-N - chromium (III) tetrachlorozincate (II)

(II) It shows geometrical isomerism

(III) It shows linkage isomerism

(IV) It shows coordination isomerism`

A. R, S only

B. P, R and S only

C. Q, R, S only

D. P, Q, R and S

Answer: B

Watch Video Solution

38. Which of the following statement is correct ?

A. Geometrical isomerism is not observed in complexes of coordination number 4 having tetrahedral geometry

B. Square planar complexes generally do not show geometrical isomerism

C. The square planar complexes of general formule Ma_3b or Mab_3 exhibits cis-trans isomerism

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

Answer: A

Watch Video Solution

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

A. two optically active isomers : d and l forms

B. 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

40. Which of the following complex will show optical activity ?

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

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

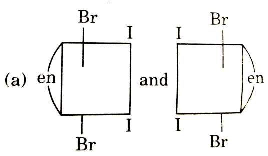
C. *cis* - $\left[Co\left(NH_3\right)_2(en)_2\right]^{3+}$

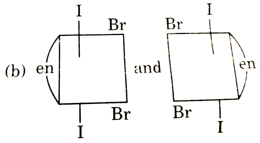
D. *trans* - $\left[Co\left(NH_3\right)_2(en)_2\right]^{3+}$

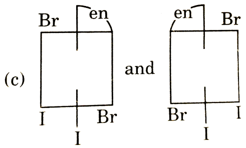
Answer: C

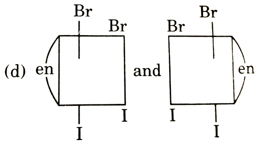
Watch Video Solution

41. 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

42. Consider the following statements and select the correct option using the codes given.

(i) $\left[Cr\left(NH_3\right)_6\right]\left[Cr(NH)_6\right]$ and $\left[Cr\left(NH_3\right)_4(CN)_2\right]\left[Cr\left(NH_3\right)_2(CN)_4\right]$ are coordination isomers.

(ii) $\left[Cr(py)_2\left(H_2O\right)_2Cl_2\right]Cl$ and $\left[Cr(py)_2\left(H_2O\right)Cl_3\right]H_2O$ are ligand isomers.

(iii) $\left[Pt(NH_3)_4Br_2\right]Cl_2$ and $\left[Pt(NH_3)_4Cl\right]Br_2$ are linkage isomers.

(iv) $\left[NiCl_2(PPh_3)_2\right.$(tetrahedral) exhibitsgeometrical isomerism.

A. (P) only

B. (P) and (R) only

C. (Q) and (R) only

D. (R) and (S) only

Answer: A

Watch Video Solution

43. Which of the following has an optical isomer?

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

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

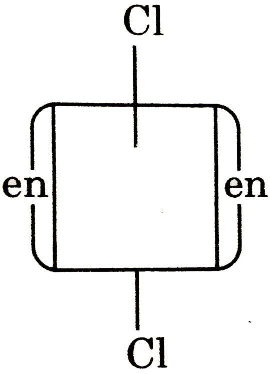
C. $\left[Co(en)_2(NH_3)_2\right]^{3+}$

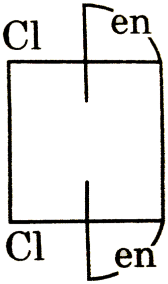
D. $\left[Co\left(NH_3\right)_3Cl\right]^+$

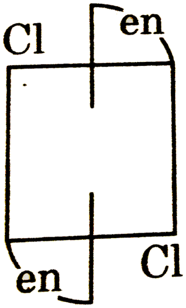
Answer: C

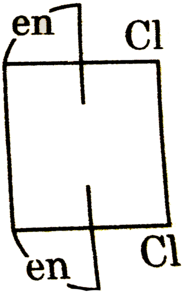
Watch Video Solution

44. Which of the following pairs of structure shows geometrical isomerism ?

(P)


(Q)


(R)


(S)


A. P with R

B. Q with S

C. P with Q

D. none of these

Answer: C

Watch Video Solution

45. Which of the following pairs represents linkage isomers?

A. $\left[Pd\left(PPh_3\right)_2(NCS)_2\right]$ and $\left[Pd\left(PPh_3\right)_2(SCN)_2\right]$

B. $\left[Co\left(NH_3\right)_5No_3\right]SO_4$ and $\left[Co\left(NH_3\right)_5\left(SO_4\right)\right]No_3$

C. $\left[Pt\left(NH_3\right)_4Br_2\right]$ and $\left[PtBr_2\left(NH_3\right)_4\right]Cl_2$

D. $\left[Cu\left(NH_3\right)_4\right]\left[PtCl_4\right]$ and $\left[Pt\left(NH_3\right)_4\right]\left[CuCl_4\right]$

Answer: A

Watch Video Solution

46. Select the correct statement regarding $\left[Pt\left(CH_3 - CH\left(NH_2\right)COO\right)Cl_2\right]^-$

A. It exhibits both geometrical and optical isomerism

B. It exhibits only optical isomerism

C. It exhibits only geometrical isomerism

D. It has 3 stereo isomers

Answer: B

Watch Video Solution

47. The diamagnetic complex which has two geometrical and 4 optically active isomers is :

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

B. $\left[Pt(en)_2Cl_2\right]^{2+}$

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

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

Answer: A

Watch Video Solution

48. 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. 4, 4, 4

B. 2, 2, 2

C. 2, 2, 4

D. 4, 2, 4

Answer: D

Watch Video Solution

49. Which of the following compounds show optical isomerism?

I. *cis* - $\left[Co\left(NH_3\right)_4Cl_2\right]^+$

II. Trans - $\left[Co(en)_2Cl_2\right]^+$

III. Cis - $\left[Co(en)_2cl_2\right]^+$

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

Choose the correct answer form the codes given below.

A. P and Q

B. Q and R

C. R and S

D. P, R and S

Answer: C

Watch Video Solution

50. Which one has largest number of isomers ?

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

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

C. $\left[Ir\left(PhR_3\right)_2H(CO)\right]^{2+}$

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

Answer: A

Watch Video Solution

51. Which of the following statement is incorrect ?

A. $\left[NiBr_2\left(Pet_3\right)_2\right]$ and $\left[Cu\left(NH_3\right)_5Cl\right]^{2+}$ have same geometrical but different magnetic properties.

B. $\left[Co\left(NH_3\right)_3Cl\right]Cl_2$ and $K_4\left[Cr(CN)_6\right].3H_2O$ both are inner orbital complexes but the former is diamagnetic and later one is paramagnetic with two unpaired electrons.

C. $\left[Co\left(NH_3\right)_2Cl_2(en)\right]^+$ can have total five stereo isomeric forms.

D. Complex $\left[Pt\left(NH_3\right)_4\right]\left[PtCl_6\right]$ can show coordination isomerism.

Answer: C

Watch Video Solution

52. Which of the following statements is not true about the complex ion $\left[Pt(en)_2Cl_2\right]^{2+}$?

A. It has two geometrical isomers-cis and trans.

B. Both the cis and trans isomers display optical activity.

C. Only the cis isomer displays optical activity.

D. Only the cis isomer has non-superimposable mirror image.

Answer: B

Watch Video Solution

53. Of the following complex ions, one exhibits isomerism. That is :

A. $\left[Ag(NH_3)_2\right]^+$

B. $\left[Co(NH_3)_5NO_2\right]^{2+}$

C. $\left[Pt(en)Cl_2\right]$

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

Answer: B

Watch Video Solution

54. Which of the following will be able to show geometrical isomerism ?

A. Ma_3b

B. $M(AA)_2$

C. $M(AB)(CD)$

D. Ma_4

Answer: C

Watch Video Solution

55. The number of geometrical isomers for octahedral $\left[Co\left(NH_3\right)_2Cl_4\right]^-$ and square planar $\left[AuCl_2Br_2\right]^-$ respectively are :

A. 1, 2

B. 2, 2

C. 3, 2

D. 2, 3

Answer: B

Watch Video Solution

56. Select the correct statement from the following :

A. $\left[Sc\left(H_2O\right)_6\right]^{3+}$ and $\left[Ti\left(H_2O\right)_6\right]^{3+}$ both are colourless.

B. $Co\left(NH_3\right)_4Br_2Cl$ has ionization isomers and geometrical isomers.

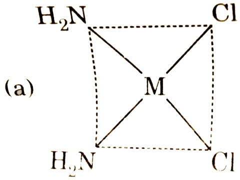
C. $\left[Pd\left(NO_2\right)_2\left(NH_3\right)_2\right]$ is square planar and show geometrical as well as linkage isomerism.

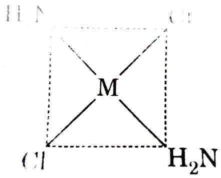
D. Both (b) and (C) are correct.

Answer: D

Watch Video Solution

57. Which of the following isomers of $\left[M\left(NH_3\right)_2Cl_2\right]$ would react with silver oxalate $\left(Ag_2C_2O_4\right)$?

A. 

B. 

C. Both (a) and (b)

D. None of these

Answer: A

Watch Video Solution

58. Which of the following is correct regarding $\left[Pt\left(NH_3\right)_2(CN)_2\right]$?

A. It exhibits linkage isomerism as well as geometrical isomerism.

B. It exhibits optical isomerism.

C. It exhibits ionisation isomerism.

D. It exhibits only linkage isomerism.

Answer: A

Watch Video Solution

59. The complex which exhibits geometrical as well as optical isomerism is

:

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

B. $\left[Pt(gly)_2\right]$

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

D. $K_3\left[Co(Ox)_3\right]$

Answer: A

Watch Video Solution

60. How many isomers possible for $[Co(gly)(dmg)(en)]^{+1}$?

A. 2

B. 3

C. 4

D. None of these

Answer: C

Watch Video Solution

---

61. Which of the following does not show fac-mer isomerism ?

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

B. $\left[Co(dien)Cl_3\right]$

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

D. All of these

Answer: C

Watch Video Solution

62. Which of the following statements are true ?

A. In $\left[PtCl_2\left(NH_3\right)_2\right]^{2+}$ the cis form is optically inactive while trans form is optically active

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

C. In Mabcd, square planar complexes show both optical as well as geometrical isomerism

D. In Mabcd tetrahedral complex, optical isomerism can not be observed

Answer: B

Watch Video Solution

63. 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 $\left[Pt(BRr)(Cl)(I)\left(NO_2\right)(Py)\right]$

respectively ?

A. 3 and 15

B. 3 and 30

C. 4 and 15

D. 4 and 30

Answer: B

Watch Video Solution

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

A. Linkage isomerism

B. ionization isomerism

C. Coordination isomerism

D. No isomerism

Answer: D

Watch Video Solution

65. How many total possible isomers are present in the following complex ?

$$\left[Co(gly)NH_3H_2O(CN)\left(NO_2\right)\right]$$

A. 24

B. 48

C. 96

D. 12

Answer: C

Watch Video Solution

66. Which of the following will exhibit geometrical as well as optical isomerism ?

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

B. mer - $\left[Co(dien)Cl_3\right]$

C. $\left[PtCl_6\right]^{2-}$

D. $\left[Pt(gly)_2Cl_2\right]$

Answer: D

Watch Video Solution

67. How many total possible isomers are present in the following complex ?

$\left[Co(en)NH_3\left(H_2O\right)(Cl)\left(NO_2\right)\right]$

A. 24

B. 48

C. 96

D. 12

Answer: A

Watch Video Solution

68. Total possible linkage isomers of $K_4\left[Fe(CN)_5\left(NO_2\right)\right]$ is :

A. 12

B. 10

C. 6

D. 4

Answer: A

Watch Video Solution

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

A. 2

B. 3

C. 4

D. 6

Answer: C

Watch Video Solution

70. $\left[Cr\left(NH_3\right)_5Br\right]Cl$ 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

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

A. Optical and geometrical isomerism

B. Geometrical isomerism

C. Optical isomerism

D. No isomerism

Answer: C

Watch Video Solution

72. Which one of the following statements are correct for the complex

$\left[Co\left(NH_3\right)_4(Cl)\left(NO_2\right)\right]Cl$?

(P) Cobalt is in $+III$ oxidation state involving d^2sp^3 hybridization.

(Q) Cobalt is in $+III$ oxidation state involving sp^3d^2 hybridization.

(R) It shows ionisation as well as linkage isomerism.

(S) It also shows geometrical isomerism.

A. P, R and S only

B. Q, R and S only

C. P and S only

D. Q and S only

Answer: A

Watch Video Solution

73. Which of the following statements are true ?

A. In $\left[PtCl_2(NH_3)_2\right]^{2+}$ the cis form is optically inactive while trans form is optically active

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

C. In Mabcd, square planar complexes show both optical as well as geometrical isomerism

D. In Mabcd tetrahedral complex, optical isomerism can not be observed

Answer: B

Watch Video Solution

74. If a complex, Ma_4b_2 (where M is a central atom and a and b are mondentate ligands) has trigonal prismatic geometry, the total number of possible geometrical isomers would be :

A. 4

B. 2

C. 3

D. 5

Answer: C

Watch Video Solution

75. Which of the following complexes would exhibit only geometrical isomerism ?

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

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

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

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

Answer: A

Watch Video Solution

76. The total possible number of optically inactive isomers of the complex $\left[Pt\left(NH_3\right)_2FClBrI\right]$ would be :

A. 6

B. 12

C. 3

D. 15

Answer: C

Watch Video Solution

77. Which kind of isomerism is exhibited by octahedral $\left[Co\left(NH_3\right)_4Br_2\right]CI$? .

A. Geometrical and ionization

B. Geometrical and optical

C. Optical and ionization

D. Geometrical only

Answer: A

Watch Video Solution

78. $\left[Co\left(NH_3\right)_4(SCN)_2\right]^+$ and $\left[Co\left(NH_3\right)_4(NCS)_2\right]^+$ are :

A. ionisation isomers

B. linkage isomers

C. coordination isomers

D. geometrical isomers

Answer: B

Watch Video Solution

79. Which of the following isomerism is exhibited by the complexes, $\left[Co(gly)_3\right]$?

A. Geometrical

B. Optical

C. Linkage

D. Both (a) and (b)

Answer: D

Watch Video Solution

80. Select the correct statement :

A. Potassium ferrocyanide and potassium ferricyanide can be differentiated by measuring the solid state magnetic moment.

B. The complex $\left[Co\left(NH_3\right)_5Br\right]SO_4$ and $\left[Co\left(NH_3\right)_5SO_4\right]Br$ can be differntiated by adding aqueous solution of barium chloride .

C. The complex $\left[Co\left(NH_3\right)Cl\right]Br$ and $\left[Co\left(NH_3\right)_5Br\right]Cl$ can be differentiated by adding aqueous solution of silver nitrate.

D. All of these

Answer: D

Watch Video Solution

81. Complex compound $[Cr(NCS)\left(NH_3\right)_5]\left[ZnCl_4\right]$ will be,

A. Colourless and diamagnetic

B. Green coloured and diamagnetic

C. Green coloured and shows coordination isomerism

D. Diamagnetic and shows linkage isomerism

Answer: C

Watch Video Solution

82. Which of the following is true about the complex $\left[PtCl_2\left(NH_3\right)OH_2\right]$?

[Atomic number of $Pt = 78$]

(P) It will have two geometrical isomeric forms, cis and trans

(Q) The hybridisation state of $Pt(II)$ is sp^2

(R) It is a square planar complex

(S) It is a diamagnetic complex

(T) It can show hydrate isomerism

(U) It is tetrahedral complex

A. P, R, S

B. Q, S, T

C. Q, T, U

D. P,T,U

Answer: A

Watch Video Solution

83. Which of the following complex is optically inactive but its other geometrical isomer is optically active ?

A. trans-tetraaquadichloridocobalt(III) nitrate

B. Mer-triaquatrifluoridocobalt(III)

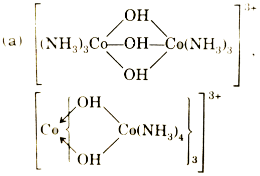
C. Trans-diamminebise(ethane 1, 2 diamine) cobalt(III)chloride

D. Trans-diamminedichloridoplatinum(II)

Answer: C

Watch Video Solution

84. Which of the following complexes are polymerisation isomers ?

A. 

B. $\left[Pt(NH_3)_4\right]\left[PtCl_4\right], \left[Pt(NH_3)_4\right]\left[Pt(NH_3)Cl_3\right]_2$

C. $\left[Pt(NH_3)_2Cl_2\right], \left[Pt(NH_3)_3Cl\right]_2\left[PtCl_4\right]$

D. All of these

Answer: D

View Text Solution

85. Type of isomerism which may be possible for the six coordinated complex of metal M having formula of $Cr(NO_2)_2.6H_2O$:

A. Hydrate isomerism

B. Linkage isomerism

C. Geometrical isomerism

D. All are possible

Answer: D

Watch Video Solution

86. Which of the following pair of complexes are co-ordination isomers ?

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

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

C. $\left[Co\left(H_2O\right)_6\right]Cl_3$ and $\left[Co\left(H_2O\right)_5Cl\right]C1.2H_2O$

D. None of these

Answer: D

Watch Video Solution

87. Which of the following complex among the given options is not the hydrate isomer of others ?

A. $\left[Co\left(H_2O\right)_4\left(NO_2\right)_2\right]Cl_2.\,H_2O$

B. $\left[Co\left(H_2O\right)_3\left(NO_2\right)_2\right]Cl_2.\,H_2O$

C. $\left[Co\left(H_2O\right)_6\right]Cl\left(NO_2\right)_2$

D. None of these

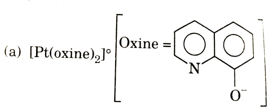
Answer: B

Watch Video Solution

88. Select which complex have structural and stereo both type of isomers

:

A.



B. $\left[Pt(en)_2Cl_2\right]Cl_2$

C. $\left[Pt\left(NH_3\right)_3\left(NO_2\right)\right]Cl$

D. $\left[Cr\left(H_2O\right)_4Cl_2\right]Cl.2H_2O$

Answer: D

Watch Video Solution

89. Which of the following complex/ion only show linkage isomerism ?

A. $\left[Co\left(NH_3\right)_4\left(H_2O\right)Cl\right]CN$

B. $\left[Co\left(NH_3\right)_5SCN\right]^{2+}$

C. $\left[Co\left(H_2O\right)_6\right]Cl_3$

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

Answer: B

Watch Video Solution

90. Which of the following complexes may show atleast three type of isomerism, namely ionisation, hydrate and linkage ?

A. $\left[Co\left(H_2O\right)_5Cl\right]S_2O_3$

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

C. $\left[Cr\left(H_2O\right)_5\left(NO_2\right)\right]SO_4$

D. $\left[Ni\left(H_2O\right)_6\right]SO_4$

Answer: C

Watch Video Solution

91. 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 (hydrate)

C. Polymerisation isomerism

D. co-ordination isomerism

Answer: B

Watch Video Solution

92. Select the complex which show both structural and stereo isomerism :

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

B. $\left[Pt\left(NH_3\right)_5Cl\right]Br_3$

C. $\left[Pt(en)_2Cl_2\right]Br_2$

D. $\left[Pt\left(NH_3\right)_2(Cl)(Br)\right]$

Answer: C

Watch Video Solution

93. Select which is heteroleptic complex and show fac-mer isomerism :

A. $PtCl_2.2NH_3$

B. $PtCl_4.4NH_3$

C. $PtCl_2.4NH_3$

D. $PtCl_4.3NH_3$

Answer: D

Watch Video Solution

94. Which of the following complex exists as dextro and laevo form ?

A. $##GRB_{O}RG_{C}HM_{V}01_{Q}B_{C}05_{E}01_{430} \_ 001##$

B. $##GRB_{O}RG_{C}HM_{V}01_{Q}B_{C}05_{E}01_{430} \_ O02##$

C. $[AgFClBrI]^{\ominus}$

D. $##GRB_{O}RG_{C}HM_{V}01_{Q}B_{C}05_{E}01_{430} \_ O03##$

Answer: B

View Text Solution

95. Which complex does not show geometrical isomerism but show optical isomerism ?

A. $\left[M(AA)_2a_2\right]$

B. $\left[M(AA)a_4\right]$

C. $[Mabcd]$ tetrahedral

D. $[Mabcd]$ square palanar

Answer: C

Watch Video Solution

96. The complex $\left[Pt(py)\left(H_2O\right)\left(NH_3\right)\left(NO_2\right)ClBr\right]$ has :

A. 10 geometrical isomers, each one is optically active

B. 10 geometrical isomers, five of them are optically active

C. 15 geometrical isomers, each one is optically active

D. 15 geometrical isomers, each one is optically inactive

Answer: C

Watch Video Solution

97. Which of the following statement is correct ?

A. Tetrahedral complex does not show optical isomerism

B. cis and trans isomers of $\left[M(AA)_3\right]^{n\pm}$ are optically active

C. $[Mabcdef]^{n\pm}$ has 15 optically active isomers

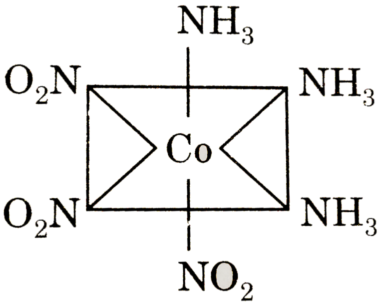
D. $\left[Ma_3b_3\right]^{n\pm}$ has two stereo isomers

Answer: D

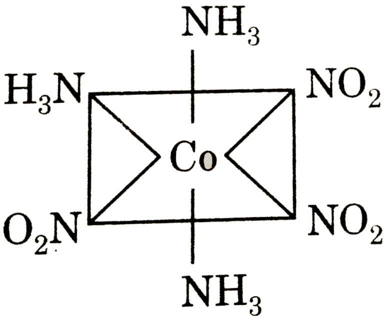
Watch Video Solution

98. Two molecules having same molecular formula are drawn for your refference

A.

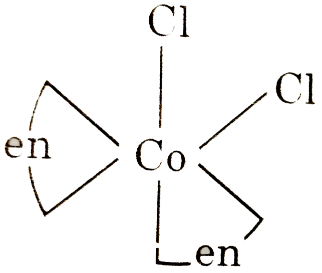


B.

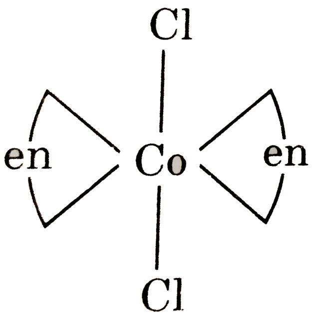


Set–I (A & B)

C.



D.



Set–II (C & D)

Choose the correct statements :

A. Pair of molecules in Set-I are structural isomers of each other

B. At least one molecule in Set-I can exhibit optical isomerism

C. A molecule represents facial and B represents meridonial isomer of the type $\left[Ma_3b_3\right]$

D. Set-II molecules have one more stereo isomer which is optically inactive

Answer: C

Watch Video Solution

99. 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: A

Watch Video Solution

100. Due to the presence of ambidenate ligands coordination compounds show isomerism. Palladium complexes of the type $\left[Pd\left(C_6H_5\right)_2(SCN)_2\right]$ & $\left[Pd\left(C_6H_5\right)_2(NCS)_2\right]$ are

A. linkage isomers

B. coordination isomers

C. ionisation isomers

D. geometrical isomers

Answer: A

Watch Video Solution

101. Four statements for the following reaction given below

$$\left[CoCl_2(NH_3)_4\right]^+ \rightarrow \left[CoCl_3(NH_3)_3\right] + NH_3$$

(P) Only one isomer is produced if the ractant complex ion is a trans isomer

(Q) Three isomers are produced if the reactant complex ion is a cis isomer

(R) Two isomers are produced if the reactant complex ion is trans isomer

(S) Two isomers are produced if the reactant complex is cis isomer

The correct statements are :

A. P and Q

B. R and S

C. P and S

D. Q and R

Answer: C

Watch Video Solution

102. The complex that shows optical activity is :

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

B. cis-$\left[CoCl_2(en)_2\right]^+$

C. trans-$\left[PtCl_2\left(NH_3\right)_2\right]$

D. $\left[CoCl_2\left(NH_3\right)_2(en)^+\right]$

Answer: B

Watch Video Solution

103. The correct statement on the isomerism associated with the following complex ions.

$I\left[Ni\left(H_2O\right)_5NH_3\right]^{2+}$

$II.\ \left[Ni\left(H_2O\right)_4\left(NH_3\right)_2\right]^{2+}$

$III.\ \left[Ni\left(H_2O\right)_3\left(NH_3\right)_3\right]^{2+}$

A. (P) and (Q) show geometrical and optical isomerism

B. (Q) and (R) show geometrical and optical isomerism

C. (P) and (Q) show only geometrical isomerism

D. (Q) and (R) show only geometrical isomerism

Answer: D

Watch Video Solution

104. In coordination compounds , the hydrate isomers differ in ________.

A. the number of water molecule of hydration only

B. the number of water molecules present as ligands

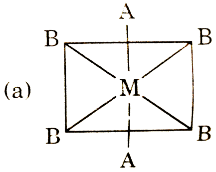
C. Both (a) and (b)

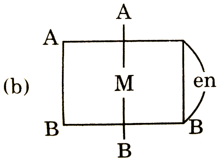
D. their coordination number of the metal atom

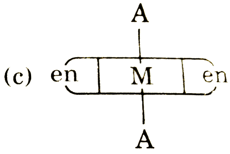
Answer: C

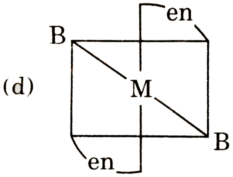
Watch Video Solution

105. The phenomenon of optical activity will be shown by:

A. 

B. 

C. 

D. 

Answer: B

Watch Video Solution

106. Find the pair of compounds in which both show geometrical as well as optical isomerism :

A. $M(AA)_3$ and $M(AB)_3$

B. $\left[M(AA)_2a_2\right]$ and $[M(AA)ab]$

C. $\left[Zn(gly)_2\right]$ and $\left[NiCl_4\right]^{2-}$

D. None of these

Answer: D

Watch Video Solution

107. Two complex compounds with same representation $\left[CoCl_2\left(NH_3\right)_4\right]Cl$ have different colours then select the correct statement :

A. Both are structural isomers of each other

B. Both are stereoisomers of each other

C. Both have same conductivity relative to one mole of electrolyte

D. Both (b) and (c) are correct.

Answer: D

Watch Video Solution

108. In which of the following pairs both the complex show optical isomerism? .

A. cis-$\left[Cr\left(C_2O_4\right)_2Cl_2\right]^{3-}$, trans-$[Co(NH_3 \_ (4)Cl_2]$

B. $[Co(en)_3Cl_3$, cis-$[Co(en)_2Cl_2]Cl$

C. $[PtCl(dien)Cl$, $[NiCl_2Br_2]^{2-}$

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

Answer: B

Watch Video Solution

109. which of the following complexes show ionization isomerism ?

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

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

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

D. $\left[CoBr\left(NH_3\right)_5\right]SO_4$

Answer: D

Watch Video Solution

110. 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: B

Watch Video Solution

111. How many different isomers exist for the octahedral complex $\left[Co\left(NH_3\right)_4Cl_2\right]^+$?

A. 1

B. 2

C. 3

D. 4

Answer: B

Watch Video Solution

112. How many isomers exist for the octahedral compound, $Pt\left(NH_3\right)_2Cl_4$?

A. 1

B. 2

C. 3

D. 4

Answer: B

Watch Video Solution

113. How many isomers exist for a square planar platinum compound which has four different groups attached to the platinum atom ?

A. one

B. two

C. three

D. four

Answer: C

Watch Video Solution

114. How many isomers of octahedral $Co\left(NH_3\right)_3Cl_3$ are there ?

A. 2

B. 3

C. 4

D. 5

Answer: A

Watch Video Solution

115. How many isomers exist for the $\left[Co\left(NH_3\right)_4Cl_2\right]^+$ and $\left[Co(en)_2Cl_2\right]^+$ ions, respectively ? $\left[en = H_2NC_2H_4NH_2\right]$

A. 2 and 2

B. 2 and 3

C. 3 and 2

D. 3 and 3

Answer: B

Watch Video Solution

116. Which of the following complex is incorrectly matched against their indicated properties ?

A. $\left.\begin{array}{l}\left[Co(en)_3\right]\left[Cr(CN)_6\right] \text{ and} \\ \left[Cr(en)_3\right]\left[Co(CN)_6\right]\end{array}\right\}$ Co-ordination isomers

B. $\left.\begin{array}{l}\left[Co(py)_2(H_2O)Cl_2\right] \text{ and} \\ \left[Co(py)_2(H_2O)_2Cl_2\right]Cl.\,H_2O\end{array}\right\}$ Ionisation isomers

C. $CrCl_3(H_2O)_6$ - Do not show G.I and O.I.

D. $Co(en)_2Cl_2NO_2$ - Can show Ionisation isomerism

Answer: B

Watch Video Solution

117. Which of the following complex will have three isomeric forms ?

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

B. $\left[Cr\left(NO_3\right)_3\left(NH_3\right)_3\right]$

C. $K_3\left[Co\left(C_2O_4\right)_2Cl_2\right]$

D. $K_3\left[Co\left(C_2O_4\right)_3\right]$

Answer: C

Watch Video Solution

118. Total number of geometrical isomers of $\left[M(AB)c_2d_2\right]$:

A. 4

B. 7

C. 6

D. 8

Answer: A

Watch Video Solution

119. Number of geometrical isomer(s) of square planar complex $\left[RhCl\left(PPh_3\right)\left(H_2O\right)(CO)\right]$ is :

A. 0

B. 2

C. 3

D. 4

Answer: C

Watch Video Solution

120. Which of the following complex is not hydrate isomer of $\left[Cr\left(H_2O\right)_6\right]Cl_3$?

A. $\left[Cr\left(H_2O\right)_3Cl_3\right].3H_2O$

B. $\left[Cr\left(H_2O\right)_5Cl\right]Cl_2.3H_2O$

C. $\left[Cr\left(H_2O\right)_4Cl_2\right]Cl.2H_2O$

D. None of these

Answer: A

Watch Video Solution

121. Which type of isomerism may be shown by this complex $\left[Ru\left(NH_3\right)_4\left(H_2O\right)\left(S_2O_3\right)\right]NO_3$

A. Ionisation isomerism

B. Linkage isomerism

C. Geometrical isomerism

D. All of these

Answer: D

Watch Video Solution

122. $\left[Pt(Ox)(py)_2\left(O_2\right)\left(H_2O\right)\right]$ Select correct statement about this complex :

A. Oxidation state of O_2 is -1

B. EAN of pt is 86

C. Complex will show geometrical as well as optical isomerism

D. Both (b) and (C)

Answer: D

Watch Video Solution

123. Which of the following does not show optical activity ?

A. $[Co(EDTA)]^-$

B. $[Pt(bn)_2]^{2+}$

C. $[Pt(pn)_2]^{2+}$

D. $[Pt(en)_2]^{2+}$

Answer: D

View Text Solution

124. Select the pair of hydrate isomers in which both hydrate isomers have two stereoisomeric form :

A. $[Co(NH_3)_5(H_2O)](NO_3)_3$ and $[Co(NH_3)_5(NO_3](NO_3)_2.\ H_2O$

B. $[Pt(H_2O)_4Cl_2]Br_2$ and $[Pt(H_2O)_4Br_2]Cl_2$

C. $[Co(NH_3)_4(H_2O)Cl]Cl_2$ and $[Co(NH_3)_4Cl_2]Cl.\ H_2O$

D. $\left[Cr\left(H_2O\right)_5Cl\right]Cl_2.H_2O$ and $\left[Cr\left(H_2O\right)_4Cl_2\right]Cl.2H_2O$

Answer: C

View Text Solution

G. Organometallic Compounds, Synergic Bonding

1. Which one is not an organometallic compound ?

A. RMgX

B. $\left(C_2H_5\right)_4Pb$

C. $\left(CH_3\right)Sn$

D. C_2H_5ONa

Answer: D

Watch Video Solution

2. In Ziesses salt C=C bond length is :

$$\text{Note}: \left\{\begin{array}{l} C - C\text{bond length in enthance is } 1.54\text{Å} \\ C = C\text{bond length in enthance is } 1.34\text{Å} \\ C \equiv C\text{bond length in enthance is } 1.20\text{Å} \end{array}\right\}$$

A. 1.37Å

B. 1.19Å

C. 1.87Å

D. 1.34Å

Answer: A

Watch Video Solution

3. Which is not a π-bonded complex ?

A. Ziese's salt

B. Ferrocene

C. bis(benzene) chromium

D. Tetraethyl lead

Answer: D

Watch Video Solution

4. What is wrong about the compound $K\left[Pt\left(\eta^2 - C_2H_4\right)Cl_3\right]$?

A. It is called Ziese's salt

B. It is a π - *bonded* complex

C. Oxidation number of Pt is $+4$

D. Four ligands surround the platinum atom

Answer: C

Watch Video Solution

5. 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

6. Which of the following has d_{c-o} (Carbon-oxygen bond length) longer than that of free CO molecule ?

A. $Ni(CO)_4$

B. $Fe(CO)_5$

C. $Cr(CO)_6$

D. All of these

Answer: D

Watch Video Solution

7. Among the following metal carbonyl carbonyl C-O bond is strongest in :

A. $\left[Mn(CO)_6\right]^+$

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

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

D. $\left[Ti(CO)_6\right]^{2-}$

Answer: A

Watch Video Solution

8. Which of the following metal carbonyl C-O bond length is minimum ?

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

B. $\left[Mn(CO)_6\right]^+$

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

D. $\left[Ti(CO)_6\right]^{2-}$

Answer: B

Watch Video Solution

9. Which of the following metal carbonyl C-O bond length is minimum ?

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

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

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

D. $\left[Ti(CO)_6\right]^{2-}$

Answer: B

Watch Video Solution

10. Which of the following is the strongest π - $acid$ for π - $acceptor$?

A. $F - C = C - F$

B. $H - C \equiv C - H$

C. $H_2C = CH_2$

D. $H - C \equiv C - NH_2$

Answer: A

Watch Video Solution

11. The correct order of $\pi - acid$ nature is :

A. $PF_3 > CO > PCl_3 > PPh_3$

B. $CO > PF_3 > PCl_3 > PPh_3$

C. $PF_3 > CO > PPh_3 > PCl_3$

D. \

Answer: A

Watch Video Solution

12. Consider the following complexes

$(P)\left[Cr(CO)_x\right]$ $(Q)\left[Cr(CO)_{x-1}PF_3\right]$

If PF_3 is better π acceptor than `CO, what will be the order of bond length of CO in complexes (P) and (Q) :

A. $P > Q$

B. $Q > P$

C. $P = Q$

D. can not be compared

Answer: A

Watch Video Solution

13. Which of the following statements is correct for $Ni(CO)_4$ and $\left[Co(CO)_4\right]^-$?

A. Both are paramagnetic

B. Both are isostructural and isoelectronic

C. Both involve d^3s hybridisation

D. Synergic bonding is not involved

Answer: B

Watch Video Solution

14. Which of the following has highest $C-C$ bond length among the following ?

A. $\left[PtCl_3\left(C_2H_4\right)\right]^-$

B. $\left[PtCl_3\left(C_2F_4\right)\right]^-$

C. C_2H_4

D. C_2F_4

Answer: B

▶ Watch Video Solution

15. Wilkinson's catalyst conatains :

A. rhodium

B. iron

C. aluminium

D. cobalt

Answer: A

▶ Watch Video Solution

16. Which of the following has the shortest N - N bond length ?

A. $[Ru(NH_3 \_ (5)N_2]^{3+}$

B. N_2H_4

C. N_2H_2

D. N_2

Answer: D

Watch Video Solution

17. Consider the complex given below

$\left[\left(NH_3\right)_5\overset{\text{II}}{Ru}\left(N_2\right)\overset{\text{II}}{Ru}\left(NH_3\right)_5\right]^{4+}$ and the statements regarding it .

(i) N-N bond length is longer than that in free N_2 molecule.

(ii) It is diamagnetic having $t_{2g}^4e_g^2$ configuration of each Ru^{2+} ion .

(iii) Back bonding is involved in this

The correct statement(s) is/are :

A. Only (i)

B. Only(i) and (ii)

C. Only (ii) and (iii)

D. all of these.

Answer: B

Watch Video Solution

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

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

B. $\left[Mn(CO)_6\right]^+$

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

D. $\left[Ti(CO)_6\right]^{2-}$

Answer: D

Watch Video Solution

19. Which of the following has maximum C-O bond length ?

A. CO

B. CO_2

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

D. CO_3^{2-}

Answer: D

Watch Video Solution

20. If the bond length of CO bond in carbon monoxide is 1.128Å, then what is the value of CO bond length in $Fe(CO)_5$?

A. 1.158Å

B. 1.128Å

C. 1.72Å

D. 1.118Å

Answer: A

Watch Video Solution

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

A. $\left[Mn(CO)_6\right]^+$

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

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

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

Answer: B

Watch Video Solution

22. Select the correct order of C-O bond length :

A. $Co > Fe(CO)_5$

B. $\left[M(CO)_4\left(PF_3\right)_2\right] < \left[M(CO)_5\left(PF_3\right)\right]$

C. $CO_3^{2-} < CO$

D. $\left[V(CO)_6\right]^- > \left[Ti(CO)_6\right]^{2-}$

Answer: B

Watch Video Solution

23. Which of the following has the shortest Cr-C bond length ?

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

B. $\left[Cr\left(NH_3\right)_3(CO)_3\right]$

C. $\left[Cr\left(PF_3\right)_3(CO)_3\right]$

D. $\left[Cr\left(PPh_3\right)_3(CO)_3\right]$\

Answer: B

Watch Video Solution

24. Which of the following is an oxidizing agent ?

A. $Mn(CO)_5$

B. $Fe(CO)_5$

C. $Mn_2(CO)_{10}$

D. $Fe_2(CO)_9$

Answer: A

Watch Video Solution

25. Which of the following statements is correct ?

A. A Werner postulated the use of two types of linkage (primary and secondary) by a metal atom/ion in a coordination compound .

B. Wilkinson catalyst is used for the hydrogenation of alkenes.

C. Metal carbonyl possess both π and σ bonds.

D. All of these.

Answer: D

Watch Video Solution

26. Which options is incorrect for $K_4\left[Fe(CN)_6\right]$:

A. CN^- is ambidentate ligand

B. it has ionic and 5 coordinate bonds

C. its effective atomic number is 36

D. total number of π - $bonds$ in this complexes is 12

Answer: B

Watch Video Solution

27. Which of the following is correct for the Zeise's salt ?

A. The complex ion is square planar

B. The central metal ion, platinum, is in $+II$ oxidation state

C. $H_2C = CH_2$ molecule is perpendicular to the $PtCl_3$ plane

D. All of these

Answer: D

Watch Video Solution

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

A. π - $character$ only

B. both σ and π characters

C. ionic character only

D. σ - $character$ only

Answer: B

Watch Video Solution

29. π bonding is not involved in

A. ferrocene

B. Dibenzenechromium

C. Zeise's salt

D. Grignard's reagent

Answer: D

Watch Video Solution

30. Which of the following statement is correct with respect to the metal carbonyl of Ist transition series ?

A. As M - $C\pi$ bonding increases, the C-O bond length increases .

B. As positive charge on the central metal atom increases, the C-O bond length increases.

C. As electron density on the central metal atom increases, the C-O bond length increases.

D. (a) and (c) both

Answer: D

Watch Video Solution

31. Which amongst the following are organometallic compounds ?

(P) $Al_2\left(CH_3\right)_6$ $(Q)K\left[PtCl_3.\ C_2H_2\right]$

$(R)N\left(CH_3\right)_3$

A. P only

B. R only

C. P and Q only

D. P, Q and R

Answer: C

Watch Video Solution

32. The number of σ bonds in Zeise's salt is :

A. 4

B. 6

C. 7

D. none of these

Answer: D

Watch Video Solution

33. Which has aromatic ring in complex ?

A. DMG in dimethylglyoximate

B. Cyclopentadienyl anion in ferrocene

C. Both (a) and (b)

D. None of these

Answer: B

Watch Video Solution

34. Which has largest C-O bond length in the given, complexes ?

A. $Ni(CO)_4$

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

C. $\left[Co(CO)_4\right]^-$

D. $\left[Cu(CO)_4\right]^+$

Answer: B

Watch Video Solution

35. In metal carbonyls, metal ligand σ bond is formed by :

A. Vacant orbital of metal and lone pair of carbon

B. Vacant d-orbital and occupied $\pi^{\cdot}$ orbital of ligand

C. Occupied d-orbital and vacant $\pi^{\cdot}$ orbital of ligand

D. Vacant orbital of metal and lone pair of oxygen

Answer: A

Watch Video Solution

36. Which of the following ligand is not π-acceptor ligand ?

A. π - $C_3H_5^-$

B. π - $C_5H_5^-$

C.

D. PF_3

Answer: C

Watch Video Solution

37. Which of the following molecule has lower v_{c-o} (stretching vibration frequency of C-O bond) ?

A. $\left[Pt(CO)_2Cl_2\right]$

B. $\left[PtCl_3(CO)\right]^{\ominus}$

C. Both have equal v_{c-o}

D. None of these

Answer: B

▶ Watch Video Solution

38. Select the correct statement for Zeise's salt :

A. The C=C bond is present in same plane to the $PtCl_3$ group

B. C-C bond length of ethylene is higher in complex than C-C bond length of ethylene in isolated condition

C. The formula f Zeise's salt is $\left[Fe\left(\pi - C_5H_5\right)_2\right]$

D. The formula of Zeise's salt is $K\left[PtCl_3\left(C_2(CN)_4\right)\right]$

Answer: B

Watch Video Solution

39. Which of the following has lower stretching frequency for C-O bond ?

A. $\left[Mn(CO)_6\right]^+$

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

C. Both have equal stretching frequency

D. None of these

Answer: B

Watch Video Solution

40. Select the correct statement :

A. $\left[V(CO)_6\right]$ can act as oxidizing agent

B. The d_{C-O} in bridging carbonyl group is longer than that of terminal carbonyl group

C. Ligands such as CO, $\overset{\ominus}{CN}$ and $\overset{+}{NO}$ are π - $acceptor$ ligand

D. All are correct

Answer: D

Watch Video Solution

41. Arrange the following complex in increadsing order of stretching vibrational frequency of C-O bond :

$(P)\left[\left(PPh_3\right)_3Mo(CO)_3\right]$ $(Q)\left[\left(Ph_2PCl\right)_3Mo(CO)_3\right]$

$(R)\left[\left(PhPCl_2\right)_3Mo(CO)_3\right]$ $(S)\left[\left(PCl_3\right)_3Mo(CO)_3\right]$

A. $P > Q > R > S$

B. $P = S > R > Q$

C. $S = P > Q > R$

D. $P < Q < R < S$

Answer: D

Watch Video Solution

42. The V-C distance in $V(CO)_6$ and $\left[V(CO)_6\right]^-$ are repectively (in pm) :

A. 200, 200

B. 193, 200

C. 200, 193

D. 193, 193

Answer: C

Watch Video Solution

43. Identify the correct order :

A. $\left[V(CO)_6\right]^- < \left[Cr(CO)_6\right]$(C-O bond length order)

B. $H_2 < He$ (Boiling point order)

C. $NH_2^- > H_2O$ (Bond angle order)

D. All are correct

Answer: C

Watch Video Solution

44. Tetracyanoethylene has a formal $C = C$ double bond length of X in the free ligand but in the complex $\left[Pt\left\{C_2(CN)_4\right\}Cl_3\right]^-$ the C-C bond length will be :

A. Greater than X

B. Less than X

C. Equal to X

D. None of these

Answer: A

Watch Video Solution

45. Which of the following has lower viscosity?

A. $\left[Mn(CO)_6\right]^+$

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

C. Both have equal stretching frequency

D. None of these

Answer: B

Watch Video Solution

46. Which of the following species show(s) synergi bonding ?

A. $\left[Mo(CO)_6\right]$

B. $\left[Mn(CO)_6\right]^-$

C. $\left[Ni(CN)_4\right]^{-4}$

D. All of the above species have synergic bonding

Answer: D

Watch Video Solution

47. Arrange the following compoound according to d_{C-C} order :

$(P)C_2F_4 \quad (Q)C_2H_4$

$(R)\left[PtCl_3\left(C_2H_4\right)\right]^-$

A. $P > Q > R$

B. $R > Q > P$

C. $Q > P > R$

D. $Q > R > P$

Answer: B

Watch Video Solution

48. Which of the following is ann oxidizing agent?

A. $Mn(CO)_5$

B. $Fe(CO)_5$

C. $Mn_2(CO)_{10}$

D. $Fe_2(CO)_9$

Answer: A

Watch Video Solution

49. If H_2 molecule is acting as ligand via oxidate addition :

$$\left[Ir^{I}(CO)ClL_2\right]\text{(Vaska's complex)} + H_2 \rightarrow \left[Ir^{III}(CO)Cl\left(H_2\right)L_2\right], L = PPh_3$$

then, choose the correct statement about the H_2 molecule fate before and after reaction .

A.

Before	Trasition State	After
$B.O = 1$	1σ-donor,$\sigma(*)$ - acceptor	$B.O. = 0$

B.

Before	Trasition State	After
$B.O = 1$	1σ-donor,$\sigma(*)$ - acceptor	$B.O. = 1$

C.

Before	Trasition State	After
$B.O = 1$	1σ-donor,$\pi(*)$ - acceptor	$B.O. = 0$

D.

Before	Trasition State	After
$B.O = 1$	$1\sigma^{*}$-donor,σ - acceptor	$B.O. = 0$

Answer: A

Watch Video Solution

50. Which of the following factor is responsible for the π character in metal carbon bond $(M - C)$ in carbonyl complexes ?

A. Overlap and donation from the lone pair of C into a vacant (hybrid) metal orbital to form a $M \leftarrow C$ bond

B. Overlap and the donation from a filled d_{xz} or d_{yz} orbital on M into a vacant antibonding π_p^* orbital on CO to form a $M \rightarrow C$ bond

C. Overlap and the donation from the lone pair on vacant (hybrid) metal orbital into C to form a $M \rightarrow C$ bond

D. Overlap and the donation from a filled vacant antibonding π_p^* orbital on C into d_{xz} or d_{yz} orbital on M to form $M \leftarrow C$ bond

Answer: B

Watch Video Solution

51. Select the incorrect statement about metal carbonyl complex compounds :

A. Metal carbon bond in metal carbonyls possess both σ and Π characters

B. Due to synergic bonding metal carbon bond becomes weak

C. Due to synergic bonding carbon oxygen bond strength decreases

D. In metal carbonyls, extent of synergic bonding will increase with increase in negative charge on central metal ion

Answer: B

Watch Video Solution

52. Identify the type of bond character between Ni and CO lidgand in $\left[Ni(CO)_4\right]$:

A. σ character only

B. π - $bond$ character only

C. bothσ and π bond character

D. none of these

Answer: C

Watch Video Solution

REASONING TYPE

1. Statement-1: In $\left[Co(en)_3\right]Cl_3$, the coordination number of Co^{3+} ion is 3.

Statement-2: 'en' is a bidentate ligand.

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 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

2. Statement-1: The geometrical isomers of the complex $\left[M\left(NH_3\right)_4Cl_2\right]$ are optically inactive.

Statement-2: Both geometrical isomers of the complex $\left[M\left[NH_3\right)_4Cl_2\right]$ possess axis 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 explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

Watch Video Solution

3. Statement-1: $\left[Co^{II}(NH)_3\right)_6]^{2+}$ is not readily oxidized to $\left[Co^{III}\left(NH_3\right)_6\right]^{3+}$ when air is bubbled through it.

Statement-2: Crystal field stabilization energy of $Co(+III)$ with a d^6 configuration is higher then for Co(+III) with a d^7 arrangement.

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 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. Statement-1: In the coordination complex $\left[Pt\left(NH_3\right)_4Cl_2\right]Br_2$, a yellow prcipitate of $AgBr$ is obtained on treating it with $AgNO_3$.

Statement-2: Bromide ions are present as counter ions in the ionization sphere.

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 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

5. Statement-1:Coordination number of cobalt in the complex $\left[Co(en)_3\right]^{3+}$ is six.

Statement-2: Ethylenediamine acts as a bidentate ligand.

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 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

6. Statement-1: Charge on the complex of ferric ion with EDTA is minus one.

Statement-2: EDTA is a hexadentate ligand.

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 explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

Watch Video Solution

7. Statement-1: In the complex $\left[Co\left(NH_3\right)_3Cl_3\right]$, chloride ions staisfy the primary valencies as well as the secondary valencies of cobalt metal.

Statement-2: $\left[Co\left(NH_3\right)_3Cl_3\right]$ shows geometrical as well as the optical isomerism.

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 explanation 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

8. Statement-1: The complex $\left[Cr(SCN)\left(NH_3\right)_5\right]Cl_2$ is linkage isomeric with $\left[Cr(NCS)\left(NH_3\right)_5\right]Cl_2$.

Statement-2: SCN^- is an ambident ligand in which there are two possible coordination sites.

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 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

9. Statement-1: $\left[Ni(CN)_4\right]^{2-}$ is a paramagnetic complex.

Statement-2: The complex is inner orbital complex.

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 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

10. The question consist of two statements each, printed as Assertion and Reason. While answering these questions you are required to choose any one of the following four responses:

Assertion: The $\left[Ni(en)_3\right]Cl_2$ has higher stability than $\left[Ni\left(NH_3\right)_6\right]Cl_2$

Reason: In $\left[Ni(en)_3\right]Cl_2$, the geometry around Ni is octahedral.

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 explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

Watch Video Solution

11. Assertion : Potassium ferrocyanide is diamagnetic whereas potassium ferricyanide is paramagnetic.

Reason : Crystal field splitting in ferrocyanide ion is greater than that of ferricyanide ion.

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 explanation 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

12. Statement-1: NF_3 is a weaker ligand than $N(CH_3)_3$.

Statement-2: NF_3 ionises to give F^- ions in aqueous solution.

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 explanation 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

13. Statement-1: $\left[NiF_6\right]^{4-}$ and $\left[NiF_6\right]^{2-}$ both are high spin complexes.

Statement-2: F^- is weak field ligand.

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 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

14. Statement-1: The species $\left[CuCl_4\right]^{2-}$ exists but $\left[CUI_4\right]^{2-}$ does not.

Statement-2: $\left[NiCl_2\left(PPh_3\right)_2\right]$ have tetrahedral 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 explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

Watch Video Solution

15. Statement I $\left[Fe\left(H_2O\right)_5NO\right]SO_4$ is paramagnetic

Statement II The Fe in $\left[Fe\left(H_2O\right)_5NO\right]SO_4$ has three unpaired electrons .

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 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

16. Statement-1: Triethylenetrtraamine is bidentate monoanion.

Statement-2: Complex containing propylenediamine ligand shows ligand isoemrism.

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 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

---

17. Statement-1: The oxidation state of Mo in the oxido complex species $\left[Mo_2O_2\left(C_2H_4\right)_2\left(H_2O\right)_2\right]^{2+}$ is +3.

Statement-2: The C_2H_4 and H_2O are neutral ligands whereas O in as anionic ligand.

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 explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

Watch Video Solution

18. Statement-1: $\left[Co^{III}(gly)_3\right]$ is called inner-metallic complex or inner complex.

Statement-2: Both the coordination number and charge of the cation are satisfied simultaneously by ligands.

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 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

19. Statement-1: All tetrahedral complexes are mainly high spin and the low spin configurations are rarely observed.

Statement-2: Δ_t is always much smaller even with stronger field ligands and it is never energetically favourable to pair up the electrons.

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 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

20. Statement-1: CO, CN^{-}, NO^{+} and phospines ligands act as π acceptor.

Statement-2: In $\left[Mn^{VII}O_4\right]^{-}$ and $\left[Cr^{VI}O_4\right]^{2-}$, the ligands act as π donor and transfer charge from ligands to metal in π interactions as well as σ interactions.

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 explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

Watch Video Solution

21. Statement-1: The value of Δ_0 for M^{3+} complexes are always much higher than value for M^{2+} complexes (for the same set of ligands)

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 explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

22. 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 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

23. Statement-1: $\left[Co\left(NH_3\right)_5SO_4\right]Br$ and $\left[Co\left(NH_3\right)_5Br\right]SO_4$ are ionization isomers.

Statement-2: They can distinguished by adding $AgNO_3$ solution and $BaCl_2$ solution respectively.

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 explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

Watch Video Solution

24. Statement-1: In OC-M-CO if one CO is replaced by better π - $acceptor$ ligand than CO, then stretching frequency of C-O bond increases.

Statement-2: If replaced ligand is better π - $acceptor$, it will reduce the flow of electron in the π^* orbital of CO.

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 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

25. Statement-1: $\left[Co(en)_3\right]^{3+}$ show stereoisomerism.

Statement-2: EAN value of $\left[Co(en)_3\right]^{3+}$ is 36.

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 explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

Watch Video Solution

26. Statement-1: In Zeise's salt C-C bond order regarding ethylene molecule is less than two.

Statement-2: Ethylene accepts electron pair from filled d-orbital of Pt^{2+} into its vacant bonding M.O.

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 explanation 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

27. Statement-1: $\left[V(CO)_6\right]$ cannot act as oxidising agent.

Statement-2: It can be reduced by reducing agent.

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 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

28. Statement-2: Hund's rule violates in $\left[Co(CN)_6\right]^{3-}$ complex ion.

Statement-2: Degeneracy of d orbitals is lost under any field ligand.

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 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

29. Assertion: Complex ion $\left[Co\left(NH_3\right)_6\right]^{2+}$ is readily oxidized to $\left[Co\left(NH_3\right)_6\right]^{3+}$

Reason: Unpaired electron in complex ion $\left[Co\left(NH_3\right)_6\right]^{2+}$ is present in 4p orbital.

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 explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

Watch Video Solution

30. Statement-1: Aqueous $CuSO_4$ solution on reaction with excess of aqueous KCN forms $K_3\left[Cu(CN)_4\right]$.

Statement-2: CuS is obtained when $H_2S(g)$ is passed through $K_3\left[Cu(CN)_4\right]$

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 explanation 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

31. Statement-1: $\left[Ti\left(H_2O\right)_6\right]^{3+}$ is violet in colour while Ti^{3+} is colourless.

Statement-2: Light correspondign to dnergy of blue-green region is absorbed by the complex to excite the electron from t_{2g} level to e_g level.

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 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

32. Statement-1: Toxic metal ions are removed by the chelating ligands.

Statement-2: Chelate complexes tend to be more stable.

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 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

33. Assertion (A) $\left[Cr\left(H_2O_6\right)\right]Cl_2$ and $\left[Fe\left(H_2O\right)_6\right]Cl_2$ are reducing in nature.

Reason (R) Unpaired electrons are present in their d-orbitals.

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 explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

Watch Video Solution

34. Assertion (A) Linkage isomerism arises in coordination compounds containing ambidnetate ligand.

Reason (R) Ambidentate ligand has two different donor atoms.

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 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

35. Statement-1: Complexes of MX_6 and MX_5L type (X and L are unidentate) do not show geometrical isomerism.

Statement-2: Geometrical isomerism is not shown by complexes of coordination number 6.

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 explanation 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

36. Assertion (A) $\left[Fe(CN)_6\right]^{3-}$ ion shows magnetic moment corresponding to two unpaired electrons.

Reason (R) Because it has d^2sp^3 type hybridisation.

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 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

37. Statement-1: $\left[Cu\left(NH_3\right)_4\right]^{2+}$ and $\left[Cu\left(CN_4\right)\right]^{3-}$ ions are coloured.

Statement-2: $\left[Cu\left(NH_3\right)_4\right]^{2+}$ involves dsp^2 hybridization with one unpaired electron.

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 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

38. Statement-1: NH_2NH_2 athough possesses two electron pairs for donation but cannot act as a chelating agent .

Statement-2: The coordination by NH_2NH_2 leads to a three member highly unstable strained ring.

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 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

39. Statement-1: In the reaction $\left[CoCl_2\left(NH_3\right)_4\right]^+ + Cl^- \rightarrow \left[CoCl_3\left(NH_3\right)_3\right] + NH_3$, when reactant is in cis-form two isomers of the product are obtained.

Statement-2: Third chloride ions replaces an ammonia cis to both chloride ion or trans to one of the chloride ion.

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 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

40. Statement-1: The complex $CoBr_3 4NH_3.2H_2O$ has molar conductivity corresponding to 1:3 electrolyte.

Statement-2: The formula of the compound is $\left[Co\left(H_2O\right)_2\left(NH_3\right)_4\right]Br_3$.

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 explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

Watch Video Solution

41. Statement-1: The correct distribution of 3d electrons of chromium in the complex $\left[Cr\left(H_2O\right)_6\right]Cl_3$ is $3d_{xy}^2, 3d_{zy}^1, 3d_{zx}^0$.

Statement-2: The complex has a magnetic moment of 3.83 BM.

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 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

42. Statement-1: The correct order for the wave length of absorption in the visible region is : $\left[Ni\left(NO_2\right)_6\right]^{4-} < \left[Ni\left(NH_3\right)_6\right]^{2+} < \left[Ni\left(H_2O\right)_6\right]^{2+}$

Statement-2: The stability of different complexes depends on the strength of the ligands field of the various ligands.

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 explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

Watch Video Solution

---

43. Statement-1: The *cis* - $\left[CoCl_2(en)_2\right]^+$ has two enantiomers.

Statement-2: en in a bidentate mono anion.

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 explanation 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

44. Statement-1: All known monouclear complexes of chromium with $+3$ oxidation state, irrespective of the strength of the ligand must have three unpaired electrons.

Statement-2: In complex $\left[Cr\left(NH_3\right)_4BrCl\right]Cl$,the 'spin only' magnetic is close to 3.87 BM.

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 explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

Watch Video Solution

45. Statement-2: The 'spin only' magnetic moment of green complex, potassium amminetetracyanidonitrosonium chromate(I) is 1.73 BM.

Statement-2: To have two d-orbital empty for d^2sp^3 hybridization, the pairing of electrons take place having behind one unpaired electron as CN^- is a stronger field ligand.

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 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

46. Statement-1: The mineral corudum, Al_2O_3 is colourless when pure. However, when various M^{3+} transition metal ion are present in trace amounts, various coloured gemstones metal ion.

Statement-2: The colours are produced due to electronic transitions within d-orbitals (called d-d transitions) of a transition metal ion.

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 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

47. Statement-2: All pseudohalide ions are not stronger coordinating ligands than the halide ion and hence the complex formed by pseudohalide ions are of high spin.

Statement-2: The halide ions have higher values of electronegativity in their corresponding periods.

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 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

48. Statement-1: Pentaamminethiocyanato-N-chromium(III) tetrachloridozincate(II) is a coloured compound and is an example of ionisation isomerism.

Statement-2: The compound is paramagnetic and therfore, d-d transition is possible.

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 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

49. Statement-1: $K_3\left[VF_6\right]$ and $KMnO_4$ are coloured compounds.

Statement-2: The colour of the compound is attributed to d-d transition in both the compounds.

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 explanation 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

50. Statement-1: $\left[FeCl_2(SCN)_2\right]^{2-}$, (high spin complex) can exist as diastereoisomers.

Statement-2: In tetrahedral geometry, all positions are identical to each other.

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 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

51. Statement-1: When the ligands are stronger, the distribution of six electrons of Co^{3+} ions is $d_{xy}^2, d_{yz}^2 \text{ and } d_{zx}^2$

Statement-2: t_{2g} orbitals corresponds to $d_{xy}, d_{yz} \text{ and } d_{z^2}$.

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 explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

Watch Video Solution

---

52. Statement-1: $\left[Co\left(NO_2\right)_6\right]^{4-}$ and $\left[Co\left(NO_2\right)_6\right]^{3-}$ both complex involve d^2sp^3 hybridization but former is paramagnetic and later one diamagnetic.

Statement-2: In $\left[Co\left(NO_2\right)_6\right]^{4-}$ one of the 3d electrons jumps to 4d orbital making the two d-orbitals empty for d^2sp^3 hybridization. NO_2 is a stronger ligand which favours the pairing of electrons and therefore, d^2sp^3 hybridization.

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 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

53. Statement-1: Acetylaceotne complexes of the metal ions are more stable than the corresponding ethylenediamine complexes.

Statement-2: Acetylacetone complexes of the metal ions contain a six membered conjugate chelate rings and the resonance in its chelate ion is an additional factor contributing to the stability.

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 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

54. Statement-1: Among the complexes $\left[Fe(CN)_6\right]^{4-}$ and $\left[Fe\left(NH_3\right)_6\right]^{2+}$, former complex absorbs the light of shorter wavelength.

Statement-2: The crystal field splitting depends upon the strength of the ligands and charge on the metal ion.

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 explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

Watch Video Solution

55. Statement-1: $\left[Co(en)\left(NO_2\right)_2(pn)\right]^+$ ion exists in four geometrical forms : two are cis and two are trans.

Statement-2:en (symmetrical ligand) and pn (unsymmetrical ligand) are etylene diamine and 1, 2-diamino propane repectively forming complex of the type $M(AA)(AB)a_2$.

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 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

56. Statement-1: In Zeise's salt relative to free ethylene, the C-C bond is lengthened slightly from 133.7 pm to 137.5 pm.

Statement-2: The bond between the ethylene molecule and the metal ion may be considered as a dative $\sigma\text{ - }bond$ to an available orbital on the metal in Zeise's salt.

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 explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

Watch Video Solution

57. Statement-1: $Cs_2\left[CoF_6\right]$ is an inner orbital complex with one unpaired electron.

Statement-2: According to the spectrochemical series F^- is weak field ligans.

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 explanation for Statement-1.

C. Statement-1 is True, Statement-2 is False.

D. Statement-1 is False, Statement-2 is True.

Answer: B

Watch Video Solution

---

58. Statement-1: $\left[Co\left(NH_3\right)_6\right]^{2+}$ when exposed to air, is more easily oxidised into $\left[Co\left(NH_3\right)_6\right]^{3+}$ as compared to oxidation of Co^{2+} into Co^{3+} in gaseous state.

Statement-2: In $\left[Co\left(NH_3\right)_6\right]^{2+}$ electron is to be removed from 4d, and in $Co^{2+}(g)$, electron is removed from 3d.

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 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

---

59. Statement-1: In $Mn_2(CO)_{10}$ molecule, there are total 70 electrons in both Mn atoms.

Statement-2: $Mn_2(CO)_{10}$ molecule acts as a strong oxidising agent.

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 explanation 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

MULTIPLE OBJECTIVE TYPE QUESTION

1. Which of the following complexes or molecules has/ have N-N bond length greater than that in free N_2 molecule?

A. $\left[Ru\left(NH_3\right)_5\left(N_2\right)\right]^+$

B. $\left[Ni\left(Pme_3\right)_3\left(N_2\right)\right]$

C. $\left[CoH\left(PPh_3\right)_3\left(N_2\right)\right]$

D. N_2O

Answer: A::B::C::D

Watch Video Solution

2. Select the correct statement(s) about the complex, $\left[Pt\left(S_5\right)_3\right]^{2-}$.

A. It contians S_5^{2-} anion which is a chelating ligand.

B. Its geometry is octahedral.

C. Hybridisation of pt is d^2sp^3.

D. The complex ion is chiral.

Answer: A::B::C::D

Watch Video Solution

3. Which of the following are coloured due to the charge transfer ?

A. $KMnO_4$

B. $K_2Cr_2O_7$

C. $\left[Fe\left(H_2O\right)_5NO\right]SO_4$

D. $Fe\left[Fe(CN)_6\right]_3$

Answer: A::B::C::D

Watch Video Solution

4. Which of the following compelxes would exhibit both geometrical as well as optical isomerism?

A. $\left[Pt(\text{ox})_2\left(NH_3\right)_2\right]$

B. $\left[Zn(gly)_2\right]$

C. $\left[Pt(gly)_2\right]$

D. $\left[Co(gly)_3\right]$

Answer: A::D

Watch Video Solution

5. Which of the following pair of species are paramagnetic and coloured ?

A. $MnO_4^{2-}, \left[Ti\left(H_2O\right)_6\right]^{3+}$

B. $\left[Zn\left(NH_3\right)_4\right]^{2+}, VO_4^{3-}$

C. MnO_4^{2-}, S_8

D. $MnO_4^{2-}, \left[Ti\left(H_2O\right)_6\right]^{2+}$

Answer: A::D

Watch Video Solution

6. Which of the following complexes follow EAN rule ?

A. $Ni(CO)_4$

B. $\left[V(CO)_6\right]$

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

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

Answer: A::C

Watch Video Solution

7. Which of the following is/are paramagnetic complex(es)?

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

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

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

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

Answer: A::D

Watch Video Solution

8. Consider the complex $\left[CoH\left(N_2\right)\left(PPh_3\right)_3\right]$ having trigonal bipyramidal geometry in which cobalt is dsp^3 hybridised. Select the correct statements regarding the given complex.

A. IUPAC name of the complex is hydridodinitrogentris (triphenylphospine) cobalt (I).

B. It is diamagnetic in nature.

C. N_2 occupies axial position.

D. N-N bond length is longer than free N_2 molecule.

Answer: B::C::D

Watch Video Solution

9. Consider the following complexes.

(P) $\left[Cr(CO)_5\left(PF_3\right)\right]$ $(Q)\left[Cr(CO)_5\left(PCl_3\right)\right]$

Select the correct options.

A. Both P and Q have longer CO bond length than free CO molecule.

B. P has shorter CO bond length than Q.

C. P has longer Cr-C bond length than Q.

D. PF_3 is a better π - $acceptor$ than PCl_3.

Answer: A::B::C::D

Watch Video Solution

10. The complexes having different CO bond length is/are :

A. $Mn_2(CO)_{10}$

B. $Co_2(CO)_8$

C. $Fe_2(CO)_9$

D. $Fe(CO)_5$

Answer: B::C::D

Watch Video Solution

11. Which of the following statemets are correct regarding :

$H_2P - PH - PH - PH - PH_2$

A. It exhibits optically isomerism

B. It has two optically inactive isomers.

C. It has two optically active isomers.

D. It has three diastereomers.

Answer: A::B::C::D

View Text Solution

12. Potassium hexachloroplatinate, $K_2\left[PtCl_6\right]$ adopts anti-fluorite crystal structure. The correct informations about ideal $K_2\left[PtCl_6\right]$ crystal is/ are:

A. K^+ ions occupy all the tetrahedral voids.

B. The unit cell is FCC with respect to $PtCl_6^{2-}$ ions.

C. The coordination number of $PtCl_6^{2-}$ ions is 4.

D. The coordination number of $PtCl_6^{2-}$ ions is 8.

Answer: A::B::D

View Text Solution

13. Select the correct statements regarding $\left[Pt(en)(pn)Cl_2\right]^{2+}$ ion.

A. It exhibits optical isomerism

B. It exhibits geometrical isomerism.

C. All isomers are optically active

D. It is diamagnetic in nature

Answer: A::B::C::D

Watch Video Solution

14. Which of the following pairs of name and formula of complexes is correct ?

A. Tetraamminecopper(II) sulphate .... $\left[Cu\left(NH_3\right)_4\right]SO_4$

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

C. Potassium hexacyanidoferrate(III) .... $K_4\left[Fe(CN)_6\right]$

D. Potassium amminepentachloridoplatinate(IV) .... $K\left[PtCl_5\left(NH_3\right)\right]$

Answer: A::B::D

Watch Video Solution

15. The effective atomic number of $Co(CO)_4$ is 35 and hence is less stable. It attains stability by

A. oxidation of Co

B. reduction of Co

C. dimerization

D. none

Answer: B::C

Watch Video Solution

16. In Which of the following pair fo complexes the central metal/ions do have same effective atomic number ?

A. $\left[Cr(CO)_6\right]$ and $\left[Fe(CO)_5\right]$

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

C. $\left[Cu\left(CN_4\right)\right]^{3-}$ and $\left[Ni(CO)_4\right]$

D. $\left[V(CO)_6\right]^{-}$ and $\left[Co\left(NO_2\right)_6\right]^{3-}$

Answer: A::C::D

Watch Video Solution

17. Which of the following statement is/are correct ?

A. $Ni(CO)_4$- Tetrahedral, paramagnetic

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

C. $Ni(dmg)_{2-}$- Square planar, diamagnetic

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

Answer: B::C::D

Watch Video Solution

18. Which of the following is/are correctly matched ?

A. $\left[Co\left(Pme_3\right)_4\right]$ - sp^3 and one unpaired electron.

B. $\left[Ni(en)_3\right]\left(NO_2\right)_2$ - sp^3d^2 and two unpaired electrons.

C. $\left[V\left(NH_3\right)_6\right]Cl_3$ - sp^3d^2 and two unpaired electrons.

D. $\left[Mn\left(NO^+\right)_3(CO)\right.$ - sp^3 and diamagnetic.

Answer: A::B::D

Watch Video Solution

19. Spin only' magnetic moment of Ni in $\left[Ni(dmg)_2\right]$ is same as that found in :

A. Ni in $\left[NiCl_2\left(PPh_3\right)_2\right]$

B. Mn in $\left[MnO_4\right]^-$

C. Co in $\left[CoBr_4\right]^{2-}$

D. Pt in $\left[Pt\left(H_2O\right)_2Br_2\right]$

Answer: B::D

Watch Video Solution

20. Which of the following statements is/are correct ?

A. The stability constant of $\left[Co\left(NH_3\right)_6\right]^{3+}$ is greater than that of $\left[Co\left(NH_3\right)_6\right]^{2+}$

B. Among F^-, Cl^-, Br^- and I^-, F^- forms more stable complexes due to small size.

C. $\left[Cu\left(NH_3\right)_4\right]^{2+}$ is thermodynamically more stable than $\left[Zn\left(NH_3\right)_4\right]^{2+}$

D. Among $\left[Fe(CN)_6\right]^{3-}, \left[Fe\left(H_2O\right)_6\right]^{2+}$ and $\left[Fe(en)_3\right]^{3+}, \left[Fe(CN)_6\right]^{3-}$ is most stable.

Answer: A::C

View Text Solution

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

A. CNS^-

B. NO_2^-

C. CN^-

D. NO_3^-

Answer: A::B::C

Watch Video Solution

22. In which of the following complexes more than one type of structural isomerism is possible ?

A. $\left[Co\left(NH_3\right)_5\left(NO_2\right)\right]Cl$

B. $\left[Co\left(NH_3\right)_5\left(H_2O\right)\right]\left(NO_2\right)_3$

C. $\left[Pt\left(NH_3\right)_4\right]\left[Pt(SCN)_4\right]$

D. $\left[Cr\left(NH_3\right)_4\left(NO_2\right)_2\right]\left(NO_3\right)_2$

Answer: A::B::C::D

Watch Video Solution

23. Which of the following will produce a white precipitate upon reacting with $AgNO_3$?

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

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

C. $K_2\left[Pt(en)_2Cl_2\right]$

D. $\left[Fe(en)_3\right]Cl_3$

Answer: A::D

Watch Video Solution

24. Which of the following statement is/are correct?

A. $\left[Ag\left(NH_3\right)_2\right]^+$ is linear with sp hybridised Ag^+ ion.

B. $NiCl_4^{2-}$, VO_4^{3-} 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 hybridisation of the metal ions.

D. $Fe(CO)_5$ have trigonal bipyramidal structure with dsp^3 hybridised iron.

Answer: A::B::C::D

Watch Video Solution

25. Which of the following exhibit geometrical isomerism (M stands for a metal, and a and b are ligands)?

A. Ma_2b_2

B. Ma_2b_4

C. Ma_5b

D. Ma_6

Answer: A::B

Watch Video Solution

26. Which of the following are π - $bonded$ organometallic compounds ?

A. Ferrocene

B. Diethyl zinc

C. Ethylmagnesium iodide

D. Dibenzene chromium

Answer: A::D

Watch Video Solution

27. Which one of the following is an inner orbital complex as well as diamagnetic in nature?

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

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

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

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

Answer: D

Watch Video Solution

---

28. Which of the following statement is/are false for $\left[TiCl_4\right]^-$ and $\left[FeCl_4\right]^-$?

A. Both tetrahedral and diamagnetic.

B. Both tetrahedral but former is diamagnetic and later is paramagnetic.

C. Square planar and tetrahedral respectively and both are paramagnetic.

D. Solutions of both complexes are coloured.

Answer: A::C::D

View Text Solution

29. 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

30. Which of the following is/are inner orbital complexes as well as paramagnetic with magnetic moment equal to 3.78 (approximate)?

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

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

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

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

Answer: B::C

View Text Solution

31. Which of the following is/are paramagnetic ?

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

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

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

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

Answer: D

Watch Video Solution

32. 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. 80ml

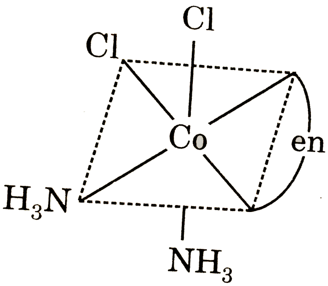
D. 20ml

Answer: B

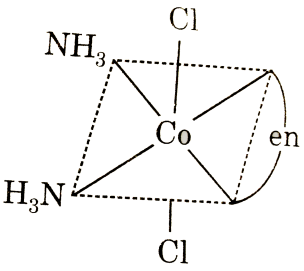
Watch Video Solution

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

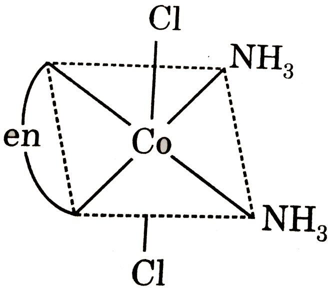
(P)



(Q)



(R)



A. P and Q are geometrical isomers

B. Q and R optical isomers

C. P and R optical isomers

D. Q and R are geometrical isomers

Answer: B::C::D

Watch Video Solution

34. Consider the following statements.

(P) Blue salt $K_4\left[Mn(CN)_6\right].3H_2O$ is isostructural with the hexacyanoferrate (II) and the former complex is paramagnetic but later one is diamagnetic.

(Q) In the series of isoelectronic species $\left[V(CO)_6\right]^-$, $\left[Cr(CO)_6\right]$ and $\left[Mn(CO)_6\right]^+$,from the vanadium to manganese complexes there is reduction in the strength of the bonding between metal and carbon and an increase in that in the carbonyl group (i.e.CO).

(R) Chlorotritriphenylphosphinerhodium (I) is a square planar diamagnetic complex which is used as a homogeneous catalyst in hydrogenation of alkenes.

(S) Like $\left[Co\left(NH_3\right)_4Cl_2\right]^+$ ion, $\left[Co(en)_2Cl_2\right]^+$ ion can exist in cis and trans forms adn neither can display optical activity.

(T) $Ni(CO)_4$ and $NiCl_2\left(PPh_3\right)_2$ have same hybridization but different, magnetic moment and effective atomic number.

A. P, R and T

B. Q, R and S

C. Q, R and T

D. R, S and T

Answer: A::C

View Text Solution

35. The compound Na_2IrCl_6 reacts with triphenylphosphine in diethyleneglycol in an atmosphere of CO to give $\left[IrCl(CO)\left(PPh_3\right)_2\right]$.

(Atomic number of Ir=77)

Which of the following statements is/are correct ?

A. The IUPAC name of the complex is carbonylchloridobis (triphenylphosphine) iridium(I).

B. The hybridization of the metal ion is sp^3.

C. The magnetic moment (spin only) of the complex is zero.

D. The complex shows geometrical as well as ionization isomerism.

Answer: A::C

Watch Video Solution

36. The compound(s) that exhibits(s) geometrical isomerism is/are

A. $[Pt(en)Cl_2$

B. $\left[Pt(en)_2\right]Cl_2$

C. $\left[Pt(en)_2Cl_2\right]Cl_2$

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

Answer: C::D

Watch Video Solution

37. The type of isomerism present in nitropentaamminechromium(III) chloride is :

A. optical

B. linkage

C. ionization

D. polymerization

Answer: B::C

Watch Video Solution

38. Which statement about coordination number of a cation is true?

A. Most metal ions exhibit only a single characteristic coordination number

B. The coordination number is equal to the number of ligands bonded to the metal atom

C. The coordination number is determined solely by the tendency to surround the metal atom with the same number of electrons as one of the rare gases.

D. For most cations, the coordination number depends on the size, structure and charge of the liagands.

Answer: B::D

Watch Video Solution

---

39. Which of the following statement(s) is/are correct ?

A. $\left[Co\left(NH_3\right)_6\right]^{3+}$, $\left[Co(CN)_6\right]^{3-}$ and $\left[Co\left(NO_2\right)_6\right]^{3-}$ are diamagnetic involving d^2sp^3 hybridization.

B. $\left[Zn\left(NH_3\right)_4\right]^{2+}$, $\left[FeCl_4\right]^{-}$ and $\left[Ni(CO)_4\right]$ are diamagnetic involving sp^3 hybridisation.

C. The magnetic moment of $\left[Fe\left(H_2O\right)_6\right]^{3+}$ is 5.92 BM. and that of $\left[Fe(CN)_6\right]^{3-}$ is 1.73 B.M.

D. The magnetic moment of $K_4\left[MnF_6\right]$ and $K_3\left[FeF_6\right]$ are same.

Answer: A::C::D

Watch Video Solution

40. Which of the following statement(s) is/are correct with respect to the crystal field theory ?

A. It considers only the metal ion d-orbital and gives no consideration at all to other metal orbitals.

B. It cannot account for the π - $bond \in g$ in complexes.

C. The ligands are point charges which are either ions or neutral molecuels.

D. The magnetic properties can be explained in term of splitting of d-orbital enetgies in different cystal field.

Answer: A::B::C::D

View Text Solution

41. Consider the following statements :

Statement-1: Generally, square planar complexes show geometrical isomerism but do not exhibit optical isomerism because they do not possess plane of symmetry.

Statement-2: $\Delta_t = \frac{4}{9}\Delta_0$

Statement-3: In octahedral complexes each electron entering the t_{2g} orbitals stabilizes the complex ion by 0.4 Δ_0 and each electron entering the e_g orbital destabilizes the complex by an amount of 0.6 Δ_0.

Select the correct statement from the codes given below.

A. Statement-1 and statement-3 are correct

B. Statement-1 and statement-3 are correct

C. Statement-1 is incorrect

D. Statement-2 and statement-3 are incorrect

Answer: B::C

Watch Video Solution

42. For the given set of complexes :

$(P)\left[Co(CN)_6\right]^{3-}$ and $\left[Co\left(H_2O\right)_6\right]^{3+}$

$(Q)\left[Co\left(H_2O\right)_6\right]^{3+}$ and $\left[Rh\left(H_2O\right)_6\right]^{3+}$

$(R)\left[Co\left(H_2O\right)_6\right]^{3+}$ and $\left[CoF_6\right]^{3-}$

$(S)\left[Co\left(NH_3\right)_6\right]^{3+}$ and $\left[CoF_6\right]^{3-}$

Select the correct order for Δ_0:

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

B. $\left[Co\left(H_2O\right)_6\right]^{3+}$gt $\left[CoF_6\right]^{3-}$

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

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

Answer: A::BD

Watch Video Solution

43. Tetrahedral complexes are generally favoured :

A. where the ligands are bulky

B. when the ligands are stronger

C. where the electronic configuration of the central metal is $d^0d^5 \text{ or } d^{10}$ (with weak field ligands) as there is no CSFE.

D. when the central metal ion has pseudo noble gas electron configuration, i.e.$(n-1)d^{10}ns^0np^0$.

Answer: A::C

Watch Video Solution

44. Which of the following statements is/are true for $\left[Pt\left(NH_3\right)\left(H_2O\right)(Cl)_2\right]$?

A. It has diamagnetic character

B. It has square planar geometry

C. It shows geometrical and optical isomerism

D. It shows only geometrical isomerism

Answer: A::B::D

Watch Video Solution

45. Which of the following statement is/are correct ?

A. In $K_3\left[Fe(CN)_6\right]$, the ligand satisfies only the secondary valencies of ferric ion.

B. In $K_3\left[Fe(CN)_6\right]$, the ligand satisfies both primary and secondary valencies of ferric ion.

C. In $K_3\left[Fe(CN)_6\right]$, the ligand satisfies only the secondary valencies of ferrous ion.

D. In $\left[Cu\left(NH_3\right)_4\right]SO_4$, the ligand satisfies only the secondary valencies of copper.

Answer: B::D

Watch Video Solution

46. Which of the following statement is/are incorrect for the complex $\left[Cr\left(H_2O\right)_6\right]Cl_3$?

A. It has a magnetic moment of 3.83 BM.

B. The distribution of 3d electrons is $3dxy^1, 3dyz^1, 3dzx^1$.

C. The ligand satisfies both primary and secondary valencies of chromium

D. It shows co-ordination as well as hydrate isomerism.

Answer: C::D

Watch Video Solution

47. Which statement is/are incorrect ?

A. $\left[Ni\left(PPh_3\right)_2Br_2\right]$- tetrahedral and paramagnetic.

B. $\left[Ni(CO)_4\right]$-tetrahedral and diamagnetic.

C. $\left[Ni(CN)_4\right]^{2}$-square planar and diamagnetic.

D. $\left[Ni(Cl)_4\right]^{2-}$-square planar and diamagnetic.

Answer: A::B::C

Watch Video Solution

48. Which of the following statements is/are true for the complexes, $\left[Fe\left(H_2O\right)_6\right]^{2+}, \left[Fe(CN)_6\right]^{4-}, \left[Fe\left(C_2O_4\right)_3\right]^{2-}$ and $\left[Fe(CO)_5\right]$?

A. only $\left[Fe\left(C_2O_4\right)_3\right]^{3-}$ shows optical isomerism.

B. $\left[Fe\left(C_2O_4\right)_3\right]^{3-}$ is less stable than $\left[Fe(CN)_6\right]^{4-}$.

C. All complexes have same effective atomic number.

D. $\left[Fe(CO)_5\right]$ show back bonding.

Answer: A::D

Watch Video Solution

49. $\left[CoCl_2(en)_2\right]Br$ will show :

A. coordination position isomerism

B. ionization isomerism

C. geometrical isomerism

D. optical isomerism.

Answer: B::C::D

Watch Video Solution

50. Select the correct statement(s).

A. $[Co(EDTA)]^-$ has two optical isomers.

B. $\left[Co\left(NH_3\right)_5\left(NO_2\right)\right]^{2+}$ show linkage isomerism.

C. For $\left[Pt\left(NH_3\right)BrClI\left(NO_2\right)py\right]$, theoretically fifteen different geometrical isomers are possible.

D. $\left[Cr\left(H_2O\right)_4Cl_2\right].2H_2O$ is an example of hydrate as well as linkage isomerism.

Answer: A::B::C

Watch Video Solution

51. A complex compound of one cobalt (III) ion, two 'en' molecules, two chloride ions and one nitrate ion will show:

A. linkage isomerism

B. ionisation isomerism

C. geometrical isomerism

D. optical isomerism

Answer: B::C::D

Watch Video Solution

52. A complex containing cobalt(III) ion is associated with two diaminopropane molecules and two chloride ion forming an octahedral geometry. The complex ion will show :

A. ligand isomerism

B. geometrical isomerism

C. optical isomerism

D. ionization isomerism

Answer: A::B::C

Watch Video Solution

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

A. cis - $\left[Cr(en)_2Cl_2\right]$ and cis - $\left[Co\left(NH_3\right)_4Cl_2\right]$

B. $\left[Co(gly)_3\right]$ and cis - $\left[CoCl_2(en)_2\right]$

C. $\left[Pt(en)Cl_2\right]$ and fac - $\left[Ni\left(NH_3\right)_3Cl_3\right]$

D. mer - $\left[Co\left(NO_3\right)_3\left(NH_3\right)_3\right]$ and $\left[PtCl_2(en)\right]$

Answer: A::C

Watch Video Solution

54. Which of the following is true for the complex $Co\left(NO_2\right)(Cl)_2.5NH_3$ (Co is in $+III$ oxidation state)?

A. It shows linkage isomerism

B. It show ionisation isomerism

C. If is inner orbital complex

D. It is diamagnetic.

Answer: A::B::C::D

Watch Video Solution

55. Which of the following complexes can exist as diastereoisomers ?

A. $\left[Cr\left(NH_3\right)_2Cl_4\right]^-$

B. $\left[Co\left(NH_3\right)_5Br\right]^{2+}$

C. $\left[FeCl_2(NCS)_2\right]^{2-}$

D. $\left[PtCl_2Br_2\right]^{2-}$

Answer: A::D

Watch Video Solution

56. Which of the following statement(s) is/are correct ?

A. Cis - $\left[Pt\left(NH_3\right)_2Cl_2\right]$ is used as an anticancer species.

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

C. In the silver electroplating of copper, $K\left[Ag(CN)_2\right]$ is used in place of $AgNO_3$.

D. CN^- ions show the reducing as well as complexing properies towards metal species.

Answer: A::B::C::D

View Text Solution

57. Select the correct statement.

A. Chelating effect is maximum for five and six membered rings

B. Greater the charge on the central metal cation, greater the value of $\Delta(CFSE)$

C. In complex ion $\left[CoF_6\right]^{3-}, F^-$ is a weak field ligand, so that $\Delta_{oct} < P(\text{ Pairing energy })$ and it is low spin complex.

D. $\left[CoCl_2\left(NH_3\right)_2(en)\right]^{\ominus}$ complex ion will have four different isomers.

Answer: A::B::D

Watch Video Solution

58. Which of the following statements is/are true?

A. In ferrocyanide ion, the effective atomic number is 36

B. Chelating ligands are atleast bidentate ligands

C. $\left[CrCl_2(CN)_2\left(NH_3\right)_2\right]^{2+}$ and $\left[CrCl_3\left(NH_3\right)_3\right]$ both have d^2sp^3 hybridisation

D. As the number of rings in complex increases, stability of complex (chelate) also increases

Answer: A::B::C::D

Watch Video Solution

59. Which one of the following statement(s) is/are false ?

A. Weak ligands like F^-, Cl^- and OH^- usually form low spin complexes.

B. Strong ligand 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 high spin complex

Answer: A::B::D

Watch Video Solution

60. Choose the correct statement(s).

A. $\left[Ag\left(NH_3\right)_2\right]^{2+}$, is linear with sp hybridised Ag^+ ion

B. $NiCl_4^{2-}$, VO_4^{3-} 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 hybridisation of the metal ions.

D. $Fe(CO)_5$ has trigonal bipyramidal structure with $d_{z^2}sp^3$ hybridised iron.

Answer: A::B::C::D

Watch Video Solution

61. 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 complexes, optical isomerism cannot be observed

Answer: A::C::D

Watch Video Solution

62. Which of the following statements are correct ?

A. π - C_5H_5 ligand will be named as η^6 - $cyclopentadienyl$

B. π - C_3H_5 ligand will be named as η^3 - $allyl$

C. The correct order of boiling point for CH_4 and CH_4 is $CCl_4 > CH_4$

D. The boiling point order for H_2 and He is just reverse order of its molecular weight

Answer: B::C::D

Watch Video Solution

63. Select similarity between : $\left[Co\left(NH_3\right)_4\left(H_2O\right)Cl\right]Cl_2$ and $\left[Co\left(NH_3\right)_4Cl_2\right]Cl.\,H_2O$

A. Oxidation number and coordination number of metal

B. Cl^- and H_2O are the ligands

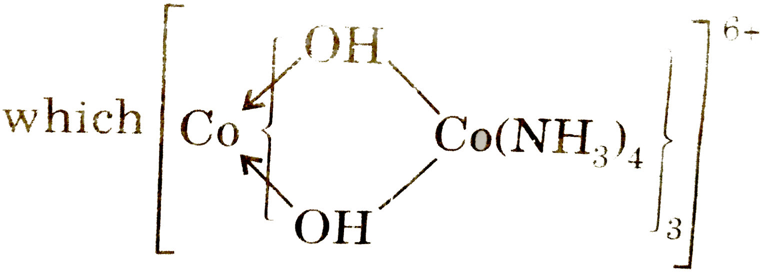
C. Amount of precipitate with $AgNO_3$ solution (by equimolar 1 litre solution both)

D. Number of Co-N linkages

Answer: A::D

Watch Video Solution

64. Select the correct statement(s) about complex in which



All the cobalts are in same oxidation state.

A. Oxidation number of each cobalt is $+3$

B. It is a bridging complex

C. It has total 18, O-Co-N bond angle

D. It has an ambidentate ligand

Answer: A::D

View Text Solution

65. Which of the following is/are bidentate chelating ligand ?

A. $\left[NH_3CH_2CH_2NH_3\right]^{2+}$

B. $NH\left(CH_2CO_2^-\right)_2$

C. $H_2N - CH_2 - C| |o - O$

D.

Answer: C::D

View Text Solution

66. Which of the following complex is heteroleptic ?

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

B. $PtCl_4.4NH_3$

C. $PtCl_2.4NH_3$

D. $PtCl_4.3NH_3$

Answer: B::C::D

Watch Video Solution

67. Find the correct match out of following :

A.

$$\left[Co\left(NH_3\right)_4\left(H_2O\right)Cl\right]Cl_2 = \text{ Tetraammineaquachloridocobalt(III) chloride}$$

B. $K_2\left[Zn(OH)_4\right] = \text{ Potassium tetrahydroxidozincate(II)}$

C. $K_3\left[Al\left(C_2O_4\right)_3\right] = \text{ Potassium trioxalatotaluminate(III)}$

D.

$$\left[CoCl_2(en)_2\right]Cl = \text{ Dichloridobis(ethane-1, 2-diamine)cobalt(III) chloride}$$

Answer: A::B::C::D

View Text Solution

68. Select the correct IUPAC name from the following.

A. $H\left[AuCl_4\right]$: Hydrogen tetrachloridoaurate(III)

B. $\left[PtCl_6\right]^{2-}$: Hexachloridopaltinate(IV) ion

C. $\left[Cu\left(NH_3\right)_4\right]SO_4$: Tetraaminecopper(II) sulphate

D. $\left[Cr(en)_3\right]Cl_3$: Tris (ethylenediamine)Chromium(III) chloride

Answer: B::C::D

Watch Video Solution

69. If $\left(\eta^5 - C_5H_5\right) M\left(C_2H_4\right)_2$ follows EAN rule, the central metal atom/ion would be :

A. $Co(Z = 27)$

B. $Fe(Z = 26)$

C. $Ni(Z = 28)$

D. $Rh(Z = 45)$

Answer: A::D

Watch Video Solution

---

70. Select correct about the complex salt formed by the combination of cation of tris(ethylenediamine)platinum(IV)chloride and Anion of sodium tetrachoridolplatinate(II).

A. It is $\left[Pt\left(NH_2CH_2CH_2NH_2\right)_3\right]\left[PtCl_4\right]$

B. It is $\left[Pt\left(NH_2CH_2CH_2NH_2\right)_3\right]\left[PtCl_6\right]$

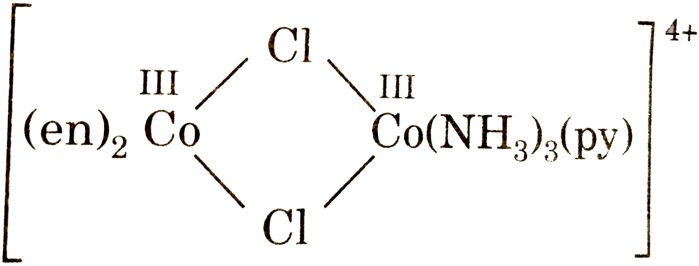
C. Coordination number of metal is six in cation and four in anion

D. IUPAC name of salt = tris(ethylenediamine)platinum(IV) tetrachloridoplatinate(II)

Answer: C::D

Watch Video Solution

71. Select type of isomerism in :



A. Linkage isomerism

B. Optical isomerism

C. Geometrical isomerism

D. Co-ordination position isomer

Answer: B::C::D

Watch Video Solution

72. Select which is/are isomer of each other :

A. $\left[Pt\left(NH_3\right)_4\left(NO_2\right)_2\right]SO_4$

B. $\left[Pt\left(NH_3\right)_4(ONO)_2\right]SO_4$

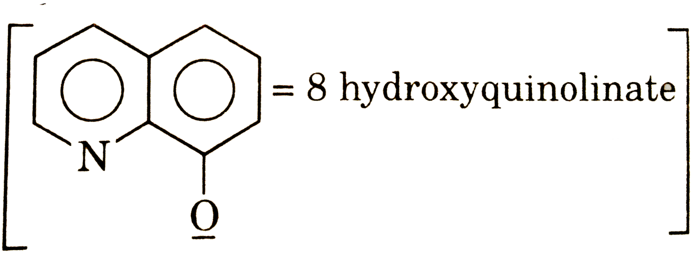
C. $\left[Pt\left(NH_3\right)_4\left(NO_2\right)(ONO)\right]SO_4$

D. $\left[Pt\left(NH_3\right)_4\left(SO_4\right)\right]NO_2$

Answer: A::B::C

Watch Video Solution

73. Select correct about : Bis(8-hydroxyquinolinato)zinc(II) compoound :



A. It is diamagnetic in nature

B. It shows optical isomerism

C. It shows geometrical isomerism

D. It has four N-Zn-O bond angles

Answer: A::B::D

Watch Video Solution

74. Which of the following statement is incorrect ?

A. IUPAC name of $\left[Co(en)_3\right]_2\left(SO_4\right)_3$ is tris(ethane-1, 2-diamine)cobalt(III) trisulphate

B. Iron(III) hexacyanoferrate(III) has formula $Fe\left[Fe(CN)_6\right]$

C. Geometrical isomerism is possible in tetrahedral complex having formula $[Mabcd]^{n\pm}$

D. Optical isomers are mirror images that are superimposable on one another

Answer: A:::D

View Text Solution

75. Which of the following molecule(s)/ion(s) can show optical isomerism ?

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

B. $\left[PtCl_2\left(NH_3\right)_2\right]$

C. $[Fe(EDTA)]^-$

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

Answer: A::C::D

Watch Video Solution

76. Which of the following compounds are resolvable into d or 1-forms ?

A. $\left[ZnCl_2(en)\right]$

B. $\left[Be(acac)_2\right]$

C. $\left[Co(gly)_3\right]$

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

Answer: C::D

Watch Video Solution

77. Select incorrect statement about the complex : cis - $\left[Rh(H)(CO)\left(Pme_3\right)_2\right]$

A. It is a chiral complex

B. It is a polar complex

C. Its trans form is chiral

D. Its trans form in non-polar

Answer: A::C::D

Watch Video Solution

78. Select the correct statements about Ma_2bcde

A. It has 6 cis geometrical isomers with respect to two a

B. It has 3 trans isomers with respect to two a

C. It has 15 steroisomers

D. It has 12 optically active and 3 optically inactive isomers

Answer: A::B::C::D

Watch Video Solution

79. In which of the following complex(s) spin only magnetic moment is independent, from the nature of ligand. (L=monodentate ligand) :

A. $\left[\overset{II}{Ni}L_4\right]$

B. $\left[\overset{II}{Ni}L_6\right]$

C. $\left[\overset{III}{Fe}L_6\right]$

D. $\left[\overset{III}{Cr}L_6\right]$

Answer: B::D

Watch Video Solution

80. Which of the following species is/are coloured ?

A. $K_2Cr_2O_7$

B. CrO_2Cl_2

C. $Na\left[Ag(CN)_2\right]$

D. $Cl_2(g)$

Answer: A::B::D

Watch Video Solution

81. Which of the following complexes is/are tetrahedral ?

A. $\left[PtBr_4\right]^{2-}$

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

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

D. $\left[NiCl_2\left(PPh_3\right)_2\right]$

Answer: C::D

Watch Video Solution

82. Which of the following molecules is/are planar ?

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

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

C. I_2Cl_6

D. $\left[PtCl_4\right]^{2-}$

Answer: B::C::D

Watch Video Solution

83. $VCl_3(THF)_3 \xrightarrow[CO,\,\Delta,\,pressure]{Mg,\,ZnI_2} Na\left[V(CO)_6\right] \xrightarrow{H^+} \left[V(CO)_6\right]$

Select the correct statement about $\left[V(CO)_6\right]$

A. It acts as reducing agent

B. It acts as oxidising agent

C. E.A.N value of V is 35

D. E.A.N value of V is 36

Answer: B::C

Watch Video Solution

84. Which of the following names is/are correct for the compound

$Na\left[CoCl_2\left(NO_2\right)\left(\sigma\text{ - }C_3H_5\right)\left(NH_3\right)_2\right]$?

A. Sodium allyldiamminedichloridonitrito-N_conaltate (III)

B. Sodium diamminedichloridoallylnitrito-N-cobaltate (III)

C. Sodium diamminedichloridocyclopropylnitrito-N_cobaltate (III)

D. Sodium diamminecyclopropylnitrito-N-dichloridocobaltate (III)

Answer: A::C

Watch Video Solution

85. Identify pair of neutral co-ordination entity amongst the following

$(P)\left[CoCl_3\left(NH_3\right)_3\right]$ $(Q)\left[Ni(CO)_4\right]$

$(R)\left[PtCl_2\left(NH_3\right)_2\right]$ $(S)K_4\left[Fe(CN)_6\right]$

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

A. P and T

B. P and Q

C. Q and R

D. S and T

Answer: B::C

Watch Video Solution

86. $EDTA^{4-}$ is an important ligand. Which statement about this ligand is/are true ?

A. It is a hexadentate ligand

B. It can bind through two oxygen and four nitrogen atoms to a central metal ion

C. It is a flexidentate ligand

D. IUPAC name of the ligand is ethylenediaminetriacetato

Answer: A::C

Watch Video Solution

87. Choose the correct statement about Metal Carbonyls :

A. Decacarbonyl-dimanganese(0) is made up of two square pyramidal $Mn(CO)_5$ units joined by a Mn-Mn bond

B. Octahedral-dicobalt(0) has a Co-Co bond bridged by two CO groups

C. $M - C\pi - bond$ is formed by the donation of a pair of electrons from a filled d-orbital of metal into the vacant antibonding π^* orbital of carbon monoxide

D. A total of ten M-C $\sigma bonds$ are present in $\left[Co_2(CO)_8\right]$ complex

Answer: A::B::C::D

Watch Video Solution

88. Choose the correct statement(s) :

A. Chlorophyll is a co-oridination compound of magnesium

B. Haemoglobin is a co-ordination compound of iron

C. Vitamin B_{12} is a co-ordination compound of cobalt

D. Zeise's salt is used in chemotheraphy for cancer patients

Answer: A::B::C

Watch Video Solution

89. $CoCl_3.6NH_3$ can form 4 different types of complexes (According to Werner). Which of the following cannot exhibit optical isomerism as well as geometrical isomerism ?

A. $\left[Co\left(NH_3\right)_5Cl\right]Cl_2$ - Purple colour

B. $\left[Co\left(NH_3\right)_4Cl_2\right]Cl$ - Green colour

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

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

Answer: A::B::C

Watch Video Solution

90. Which of the following complexes are capable of showing geometrical isomerism ?

A. $Pt\left(NH_3\right)_2Cl_2$

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

C. $CoCl_2(en)_2$

D. $Pt\left(NH_3\right)_4^{2+}$

Answer: A::B::C

Watch Video Solution

91. Choose the correct statement(s).

A. Tetrahedral complexes do not show geometrical isomerism beacause the realtive positions of the unidentate ligands attached to the central metal atom are the same with respect to each other

B. $\left[Co(en)_3\right]]^{3+}$ has two stereoisomers both of which are optically active

C. $\left[Co(en)_3\right]^{2+}$ has three stereoisomers out of which only two are optical isomers

D. $trans$ - $\left[CrCl_2(\mathrm{ox})_2\right]^{3-}$ is an optical isomer of cis - $\left[CrCl_2(\mathrm{ox})_2\right]^{3-}$

Answer: A::B

Watch Video Solution

92. Choose the incorrect statement(s).

A. $\left[Co\left(NH_3\right)_5\left(NO_2\right]Cl_2$ is obtained as the yellow form, in which the nitrate ligand is bound through oxygen (-ONO) and as the red form in which the nitrate ligand is bound through nitrogen $\left(-NO_2\right)$

B. $\left[Pt\left(NH_3\right)_2Cl_2\right]\left[Pt\left(NH_3\right)_2Br_2\right]$ is a co-ordination isomer of $\left[Pt\left(NH_3\right)_4\right]\left[PtCl_2Br_2\right]$

C. A complex with molecular formula $CoSO_4Br.5NH_3$ on treatment with $AgNO_3$ can give either white ppt or yellow precipitate

D. $CrCl_3.6NH_3$ can exhibit solvate isomerism, very similar to ionisation isomerism

Answer: A::B

View Text Solution

93. Werner's theory could not explain :

A. Directional properties of bonds in co-ordinaton compounds

B. Characteristic magnetic and optical properties of co-ordination compounds

C. Why only certain elements possess the remarkable property of forming co-ordination compounds

D. Why co-ordination number 6 gives octahedral complexes only\

Answer: A::B::C

View Text Solution

94. In which of the ion pairs, magnetic property depends on the strngth of ligand present in the complex ?

A. Ti^{3+}, V^{3+}

B. Cr^{3+}, Mn^{4+}

C. Cr^{2+}, Mn^{3+}

D. Mn^{2+}, Fe^{3+}

Answer: C::D

Watch Video Solution

95. Which of the following ions can form paramagnetic as well as diamagnetic complexes (without considering magnetic property of ligands)?

A. Fe^{2+}

B. Co^{3+}

C. Ni

D. Fe^{3+}

Answer: A::C::D

Watch Video Solution

96. Find the number of unpaired electrons in each case

$\left[Mn(CN)_6\right]^{3-} = x \quad \left[FeF_6\right]^{3-} = t$

$\left[MnCl_6\right]^{3-} = y \quad \left[CoF_6\right]^{3-} = u$

$\left[Fe(CN)_6\right]^{3-} = z \quad \left[Co\left(H_2O\right)_3F_3\right] = v$

Hence, find the correct relationship between x, y, z, t, u, v

A. $y - u = v$

B. $y^2 + (x + z)^2 = t^2 + v^2$

C. $x^2 + z - t = y^2 - u^2 + v^2$

D. $x + y + z + t + u > u^2$

Answer: A::B::C

Watch Video Solution

97. Four complexes are given :

$(P)\left[CoCl\left(NH_3\right)_5\right]^{2+} \quad (Q)\left[Co\left(NH_3\right)_5\left(H_2O\right)\right]^{3+}$

$(R)\left[Co\left(NH_3\right)_6\right]^{3+}$ $(S)\left[Co(CN)_6\right]^{3-}$

All of them exhibit at least one of the following 4 colours viz, violet, red, yellow orange, pale yellow. One of them absorbs light in the U.V. region. Choose the correct statement(s).

A. Order of wavelength of light absorbed : $P > Q > R > S$

B. S must be violet in colour

C. R must have absorbed wavelength of blue colour light

D. Q must be pale yellow in colour

Answer: A::C

Watch Video Solution

98. In which of the following, the central metal atom is behaving as a lewis acid ?

A. $\left[NiCl_2\left(H_2O\right)_4\right]$

B. $\left[CoCl\left(NH_3\right)_5\right]^{2+}$

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

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

Answer: A::B::C::D

Watch Video Solution

99. Choose the correct statement(s) :

A. $\left[Co\left(NH_3\right)_6\right]^{2+}$ is an inner orbital complex whereas $\left[Ni\left(NH_3\right)_6\right]^{2+}$ is an outer orbital complex

B. $\left[Fe\left(H_2O\right)_6\right]^{3+}$ is strongly paramagnetic whereas $\left[Fe(CN)_6\right]^{3-}$ is weakly paramagnetic.

C. $\left[Ni(CO)_4\right]$ is tetrahedral and paramagnetic

D. $\left[NiCl_4\right]^{2-}$ is tetrahedral and diamagnetic

Answer: A::B

Watch Video Solution

100. In $Pt\left(C_2H_4\right)_2\left(C_2F_4\right)_2$ molecule, in which the platinum and all eight carbon atoms are almost coplanar, choose the correct statement(s).

A. C-C distance is greater in C_2F_4 than C_2H_4

B. Pt - $C\left(ofC_2H_4\right)$ distance is greater than Pt - $C\left(ofC_2F_4\right)$

C. If C_2H_4 is replaced by $C_2(CN)_4$ in the complex, then C-C distance is greater in $C_2(CN)_4$ than C_2F_4. (double bond length)

D. In case of $\underset{2}{\underline{C}}(CN)_4$ in the complex, above, the underlined C-hybridisationis $\lim_{n \to 3} sp^n$.

Answer: A::B::C::D

Watch Video Solution

101. Which of the chelating ligands maintain hapticity equal to denticity ?

A. η^5 - C_5H_5

B. η^6 - C_6H_6

C. η^2 - NO_3^-

D. η^2 - CO_3^{2-}

Answer: C::D

View Text Solution

102. Consider following 4 complexes :

$(P)\left[Cr(CO)_5\left(Pet_3\right)\right]$ $(Q)\left[Cr(CO)_5\left(PPh_3\right]\right.$

$(R)\left[Fe(CO)_5\right]$ $(S)\left[Fe(CO)_4\left(Pet_3\right)\right]$

Choose the correct statement.

A. P will havel lower C-O stretching frequency and a longer metal carbon bond than Q.

B. P will have lower C-O stretching frequency and a shorter metal carbon bond than Q.

C. R has higher C-O stretching frequency and a longer metal carbon bond than S.

D. S has higher C-O stretching frequency and a longer metal carbon bond than R.

Answer: B::C

Watch Video Solution

103. VBT model for $\left[MnCo(CO)_9\right]$ suggests :

A. It is a heteronuclear carbonyl

B. It has d^2sp^3 hybridisation of Mn

C. It has dsp^3 hybridisation of Co

D. The Mn-Co bond is formed by overlapping of Mn and Co hybrid orbital, each orbital bearing an unpaired electron.

Answer: A::B::C::D

Watch Video Solution

104. Which of the following are paramagnetic ?

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

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

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

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

Answer: B::C

Watch Video Solution

105. Which of the following can show coordination isomerism ?

A. $[Cu(CN)_4][PtCl_4]$

B. $[Fe(NH_3)_6]_2[Pt(CN)_6]_3$

C. $[Pt(NH_3)_4][PtCl_4]$

D. $[Pt(NH_3)_5(Py)]Cl_3$

Answer: A::B::C

View Text Solution

106. Which is/are correct statement(s)?

A. $[Co(en)_3][Cr(CN)_6]$ will show coordination isomerism

B. $[Mn(CO)_5(SCN)]$ will show linkage isomerism

C. $[Co(NH_3)_5(NO_3)]$ SO_4 will show ionisation isomerism

D. None is correct

Answer: A::B::C

View Text Solution

107. Atomic number of Mn. Fe and Co are 25, 26 and 27 respectively. Which of the following inner orbital octahedral complex ions are diamagnetic ?

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

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

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

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

Answer: A::C

Watch Video Solution

108. Atomic number of Mn, Fe, Co and Ni are 25, 26, 27 and 28 respectively. Which of the following outer orbital octahedral complexes have same number of unpaired electrons ?

A. $\left[MnCl_6\right]^{3-}$

B. $\left[FeF_6\right]^{3-}$

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

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

Answer: A::C

Watch Video Solution

109. Which of the following options are correct for $\left[Fe(CN)_6\right]^{3-}$ complex ?

A. d^2sp^3 hybridisation

B. sp^3d^2 hybridisation

C. paramagnetic

D. diamagnetic

Answer: A::C

Watch Video Solution

110. An aqueous pink solution of cobalt (II) chloride changes to deep blue on addition of excess of HCl. This is because ....

A. $\left[Co\left(H_2O\right)_6\right]^{2+}$ is transformed into $\left[CoCl_6\right]^{4-}$

B. $\left[Co\left(H_2O\right)_6\right]^{2+}$ is transformed into $\left[CoCl_4\right]^{2-}$

C. tetrahedral complexes have samaller crystal field splitting than octahedral complexes

D. tetrahedral complexes have larger cystal field splitting than octahedral complex.

Answer: B::C

Watch Video Solution

111. Which of the following complexes are homoleptic ?

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

B. $\left[Co\left(NH_3\right)_4Cl_2\right]^{+}$

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

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

Answer: A::C

Watch Video Solution

112. Which of the following complexes are heteroleptic ?

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

B. $\left[Fe\left(NH_3\right)_4Cl_2\right]^{+}$

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

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

Answer: B::D

Watch Video Solution

113. Identify the optically active compounds from the following :

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

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

C. cis - $\left[Co(en)_2Cl_2\right]^{+}$

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

Answer: A::C

Watch Video Solution

114. Identify the correct statements for the behaviour of ethane-1, 2-diamine as a ligand :

A. It is a netural ligand

B. It is a didentate ligand

C. It is a chelating ligand

D. It is a unidentate ligand

Answer: A::B::C

Watch Video Solution

115. Which of the following complexes show linkage isomerism ?

A. $\left[Co\left(NH_3\right)_5\left(NO_2\right)\right]^{2+}$

B. $\left[Co\left(H_2O\right)_5CO\right]^{3+}$

C. $\left[Cr\left(NH_3\right)_5SCN\right]^{2+}$

D. $\left[Fe(en)_2Cl_2\right]^{+}$

Answer: A::C

Watch Video Solution

116. Which of the following complex(es) is paramagnetic as well as low spin ?

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

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

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

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

Answer: A

Watch Video Solution

117. In which of the following geometry around metal is tetrahedral and colour is due to charge transfer spectra (LMCT) ?

A. MnO_4^-

B. CrO_4^{2-}

C. CrO_2Cl_2

D. $Cr_2O_7^{2-}$

Answer: A::B::C::D

Watch Video Solution

118. Which of the following complex ion of Ag cation have correct indicated properties, where L is a weak monodentate neutral ligand?

A. $\left[AgL_2\right]^+$: linear and diamagnetic

B. $\left[AgL_4\right]^+$:tetrahedral and paramagnetic

C. $\left[AgL_6\right]^{2+}$: octahedral and paramagnetic

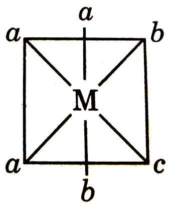
D. $\left[AgL_4\right]^{3+}$: square planar and diamagnetic

Answer: A::C::D

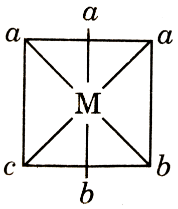
Watch Video Solution

119. Which of the following type of complex(s) is/are optically inactive ?

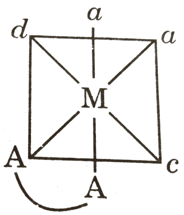
A. (a)



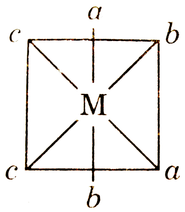
B. (b)



C. (c)



D. (d)



Answer: A::B

Watch Video Solution

120. Select the correct statements :

A. The smaller the ligand, the closer it comes to the metal ion and thus the greater the repulsion between ligand and the electrons present in the d-orbital of central atom that is why $I^- < Br^- < CI^- < F^-$ are present in spectrochemical series as order.

B. Aminoethanethiolate complex of $Pt(II)$, $\left[Pt\left(NH_2CH_2CH_2S\right)_2\right]$ has no enantiomers but has geometrical isomers while aminoethanethiolate complex of $coba < (II)$, $\left[Co\left(NH_2CH_2CH_2S\right)_2\right]$ has no enantiomers and no geometrical isomers.

C. $\left[Ni\left(H_2O\right)_6\right]^{2+}$ is green, $\left[Ni\left(NH_3\right)_6\right]^{2+}$ is deep blue and $\left[Ni(CN)_4\right]^{2-}$ is yellow because $\left[Ni\left(H_2O\right)_6\right]^{2+}$ has absorbed red colour , $\left[Ni\left(NH_3\right)_6\right]^{2+}$ has absorbed orange colour and $\left[Ni(CN)_4\right]^{2-}$ has absorbed violet indigo colour.

D. $\left[Fe\left(C_2O_4\right)_3\right]^{3-}$ complex ion has d^2sp^3 hybridisation, is inner orbital complex and low spin.

Answer: A::C

View Text Solution

121. Correct order of Wave length of light absorbed(nm) by Co-ordination entity

P: $\left[CoCl\left(NH_3\right)_5\right]^{2+}$

Q: $\left[Co\left(NH_3\right)_5\left(H_2O\right)\right]^{3+}$

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

S: $\left[Co(CN)_6\right]^{3+}$

T: $\left[Cu\left(H_2O\right)_4\right]^{2+}$

A. $P > R > Q$

B. $T > P > Q > R > S$

C. $P > Q > R$

D. $T > Q > P > R > S$

Answer: B::C

Watch Video Solution

122. Which of the following orders are correct ?

A. $\left[Fe(CO)_4\right]^{2-} < \left[Co(CO)_4\right]^{-} < \left[Ni(CO)_4\right] \Rightarrow$ Stretching vibrational frequency of C-O bond

B. $\left[Mn(CO)_5\right]^{-} < \left[Mn(CO)_6\right]^{+} \Rightarrow$ EAN of central metal ion

C. $Trien = imda^{2-} \Rightarrow \text{ Denticity of ligand}$

D. $\left[Ni(en)_3\right]^{2+} < \left[Ni\left(NH_3\right)_2(en)_2\right]^{2+} \Rightarrow$ Number of stereo isomers

Answer: A::D

Watch Video Solution

123. Which of the following chemical species act as ambindentate ligand ?

A. 'S_(2)O_(3)^(2-)`

B. NO_2^-

C. CN^-

D. SCN^-

Answer: A::B::C::D

Watch Video Solution

124. Which of the following chemical can act as non-classical ligand(s) ?

A. CO

B. C_2H_4

C. NO^+

D. PR_3

Answer: A::B::C::D

Watch Video Solution

125. Which of the following is/are the characteristics of ferrocene ?

A. Cyclolpentadienyl act as a π - don or ligand

B. Fe is in $(+ 2)$ oxidation state

C. It is an organometallic compound

D. It has metal-carbon bond

Answer: A::B::C::D

Watch Video Solution

126. In case of $\left[Mn\left(NH_3\right)_6\right]^{2+}$:

A. Relation in between Δ_0 and P is $\Delta_0 < P$

B. Two unpaired electrons are present in axial d-orbital of Mn^{2+}

C. Hybridisation of central metal atom of complex is d^2sp^3

D. d-orbitals involved in hybridisation of central atom are d_{x^2} and d_{xy}

Answer: A::B

Watch Video Solution

127. Which of the following species(s) act as reducing agent.

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

B. $\left[Co\left(NO_2\right)_6\right]^{4-}$

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

D. $\left[Mn(CO)_6\right]$

Answer: A::B::D

Watch Video Solution

128. Which of the following does not represent the correct squence of indicated properties ?

A. $\left[FeF_6\right]^{3-} > \left[NiF_6\right]^{3-}$: Magnetic moment

B. $\left[Fe(CN)_6\right]^{3-} < \left[Fe\left(NH_3\right)_6\right]^{3+}$:stability constant

C. $Ni > CaO > BeO$: Basic character

D. $F_2 < Cl_2 < Br_2 < T_2$: Colour intensity

Answer: B::C

View Text Solution

129. Which of the following statement(s) is/are correct ?

A. $Ni(CO)_4$ is diamagnetic and sp^3 hybridised

B. Complex ion $\left[Cu(CN)_4\right]^{3-}$ is paramagnetic and Cu^+ ion is dsp^2 hybridised

C. $\left[MnBr_4\right]^{2-}$ ion is paramagnetic and sp^3 hybridised

D. Vaska's Catalyst i.e. $\left[IrCl(CO)\left(PPh_3\right)_2\right]$ is diamagnetic and Ir^+ ion is dsp^2 hybridised .

Answer: A::C::D

Watch Video Solution

130. Which of the following is/are act as reducing agent ?

A. $Na_2S_2O_3$

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

C. SO_2

D. PbO_2

Answer: A::B::C

Watch Video Solution

COMPREHENSION 1

1. 18 electron rule: Valence shell of a transition metal consists of nine valence orbitals of (n-1) d, ns and np sub-shells, which can accommodate 18 electrons. When a metal complex has 18 valence electrons, it is said to have achieved the same electronic cofiguration as the noble gas at the end of the period. The rule and its exception are similar to the application of the octet rule of main group elements. The rule is not helpful for complexes of the s-block metals, the lanthanides or actinides. Effective atomic number is the total number of electrons possesed by the central possesed by the central metal atom/ion including the electrons contributed by the ligands. It is obvious that if a central transition metal atom/ion achieves 18 electrons in its valence shell, it attains the nearest noble gas cofiguration, which is known as effective atomic numbr (EAN) rule.

[Atomic number :Cr=24, Fe=26, Cu=29, Ni=28, Rh=45]

Which of the following does not obey EAN rule or 18 electron rule ?

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

B. $\left[Fe(Ox)_3\right]^{4-}$

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

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

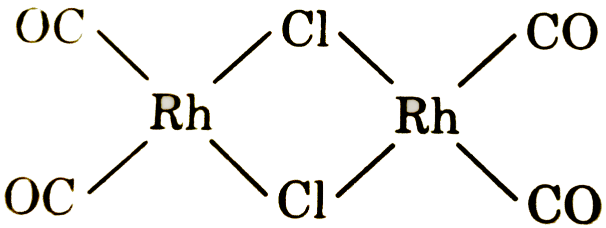
Answer: D

Watch Video Solution

2. 180 electron rule: Valence shell of a transition metal consists of nine valence orbitals of (n-1) d, ns and np sub-shells, which can accommodate 18 electrons. When a metal complex has 18 valence electrons, it is said to have achieved the same electronic cofiguration as the noble gas at the end of the period. The rule and its exception are similar to the application of the octet rule of main group elements. The rule is not helpful for complexes of the s-block metals, the lanthanides or actinides. Effective atomic number is the total number of electrons possesed by the central possesed by the central metal atom/ion including the electrons contributed by the ligands. It is obvious that if a central transition metal atom/ion achieves 18 electrons in its valence shell, it attains the nearest noble gas cofiguration, which is known as effective atomic numbr (EAN) rule.

[Atomic number :Cr=24, Fe=26, Cu=29, Ni=28, Rh=45]

The effective atomic number of Rhodium in



is :

A. 54

B. 52

C. 56

D. 53

Answer: B

Watch Video Solution

3. 180 electron rule: Valence shell of a transition metal consists of nine valence orbitals of (n-1) d, ns and np sub-shells, which can accommodate 18 electrons. When a metal complex has 18 valence electrons, it is said to have achieved the same electronic cofiguration as the noble gas at the end of the period. The rule and its exception are similar to the application of the octet rule of main group elements. The rule is not helpful for complexes of the s-block metals, the lanthanides or actinides. Effective atomic number is the total number of electrons possesed by the central possesed by the central metal atom/ion including the electrons contributed by the ligands. It is obvious that if a central transition metal atom/ion achieves 18 electrons in its valence shell, it attains the nearest noble gas cofiguration, which is known as effective atomic numbr (EAN) rule.

[Atomic number :Cr=24, Fe=26, Cu=29, Ni=28, Rh=45]

18 electron rule is applicable to :

A. s-block elements

B. p-block elements

C. d-block elements

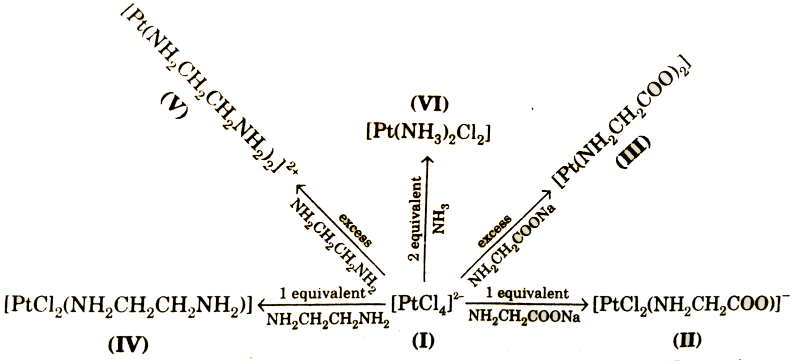
D. f-block elements

Answer: C,

View Text Solution

COMPREHENSION 2

1.



All these complexes are square planar about Pt^{II}.Square planar complexes show geometrical isomerism provided ligands are proper. A bidentate ligand (like ethylenediamine, glycinato) does not attach itself in anti-position. If the ligands present in square planar complexes do not contain chiral or asymmetric center, such complexes do not show optical isomerism due to presence of plane of symmetry.

Optical isomerism is shown by :

A. IV

B. V

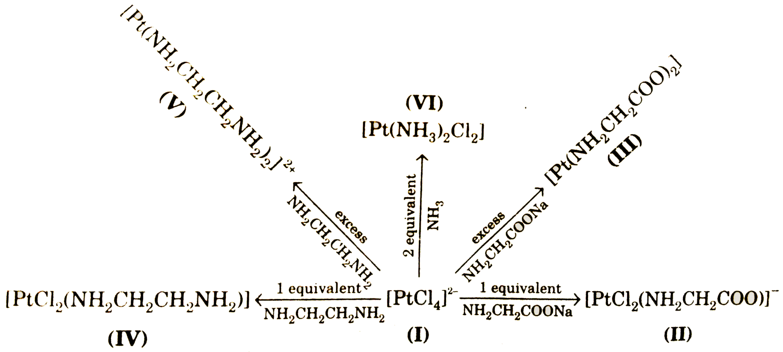
C. III

D. none of these

Answer: D

Watch Video Solution

2.



All these complexes are square planar about Pt^{II}.Square planar complexes show geometrical isomerism provided ligands are proper. A bidentate ligand (like ethylenediamine, glycinato) does not attach itself in anti-position. If the ligands present in square planar complexes do not contain chiral or asymmetric center, such complexes do not show optical isomerism due to presence of plane of symmetry.

Geometrical isomerism is exhibited by

A. II, III, VI

B. III, IV, V

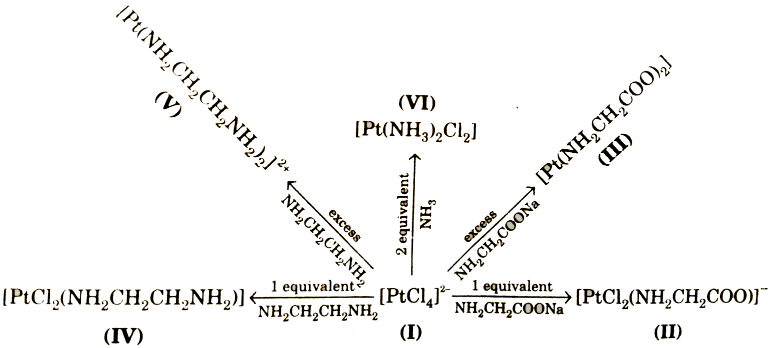
C. III, IV, VI

D. II, IV, VI

Answer: A

Watch Video Solution

3.



All these complexes are square planar about Pt^{II}.Square planar complexes show geometrical isomerism provided ligands are proper. A bidentate ligand (like ethylenediamine, glycinato) does not attach itself in anti-position. If the ligands present in square planar complexes do not contain chiral or asymmetric center, such complexes do not show optical isomerism due to presence of plane of symmetry.

Which of the following is not possible ?

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

B. Cis - $\left[Pt(gly)_2\right]$

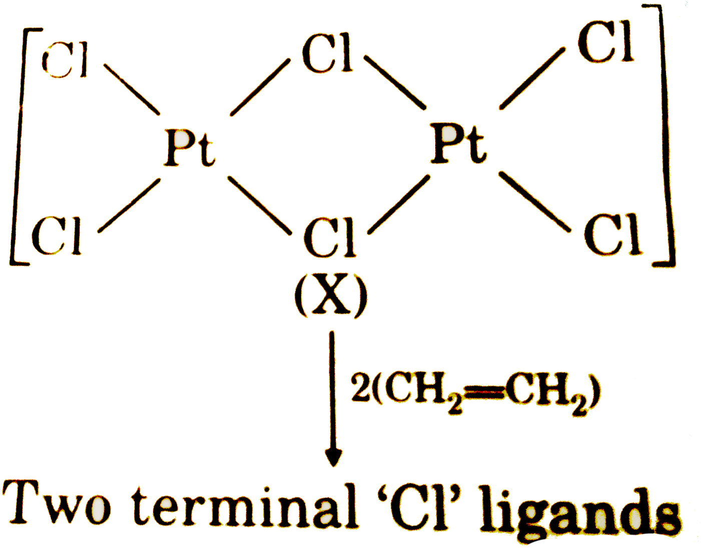
C. $Trans$ - $\left[PtCl_2(gly)\right]^-$

D. $Trans$ - $\left[Pt(gly)_2\right]$

Answer: C,

Watch Video Solution

COMPREHENSION 3



1.

Both (X) and (Y) are square planar complexes about Pt^{II}

Which of the following is/are correct ?

A. Effective atomic number of both (X) and (Y) would remain same

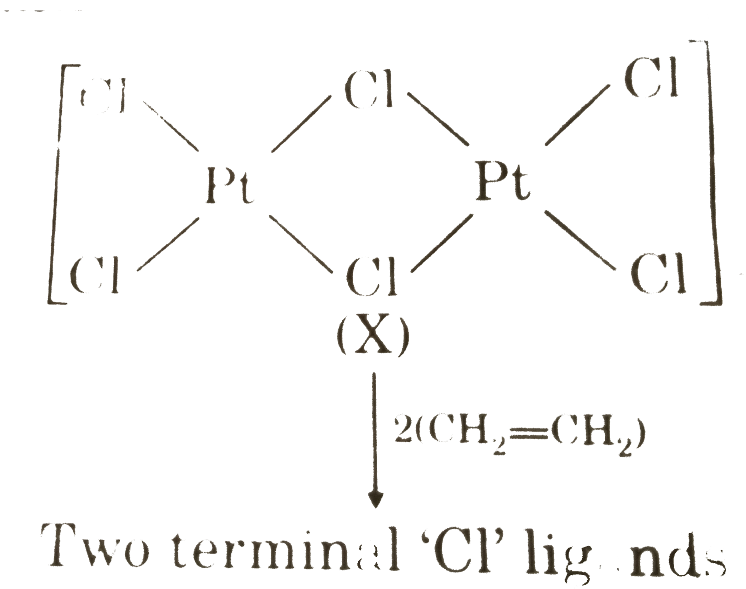
B. Ethene acts as 2 electron donor

C. Bridging Cl ligand is 4 electron donor

D. All of these

Answer: D

Watch Video Solution



2.

Both (X) and (Y) are square planar complexes about Pt^{II}

Which of the following isomerism(s) is/are exhibited by the complex (Y)?

A. Coordination isomerism

B. Geometrical isomerism

C. Optical isomerism

D. Linkage isomerism

Answer: B

Watch Video Solution

COMPREHENSION 4

1. Complex compound are molecular compounds which rectain their identities even when dissolved in water. They do not give all the simple ions in solution but instead furnish complex ions with complicated structures. The complex compounds are often called coordination compounds because certain groups called ligands are attached to the central metal ion by coordinate or dative bonds. Coordination compounds exhibit isomerism, both structural and stereoisomerism. The structure, magnetic property, colour and electrical properties of complexes are explained by various theories.

Arrange the following compounds in order of their Molar conductance :

$(P)K\left[Co\left(NO_2\right)_4\left(NH_3\right)_4\left(NH_3\right)_2\right]$

(Q) $\left[Cr(ONO)_3\left(NH_3\right)_3\right]$

$(R)\left[Cr\left(NO_2\right)\left(NH_3\right)_5\right]_3\left[Co\left(NO_2\right)_6\right]_2$

$(S)Mg\left[Cr\left(NO_2\right)_5\left(NH_3\right)\right]$

A. $Q < P < S < R$

B. $P < Q < R < S$

C. $Q < P < R < S$

D. $S < R < Q < P$

Answer: A

Watch Video Solution

2. Complex compounds are molecular compounds which retain their identities even when dissolved in water. They do not give all the simple ions in solution but instead furnish complex ions. The complex compounds are often called coordination compounds because certain groups called ligands are attached to the central metal ion by coordinate or dative bonds. coordination compounds exhibit isomerism, both structural and stereoisomerism. the structure, magnetic property, colour and electrical properties of complexes are explained by various theories:

Q. The oxidation number, coordination number and magnetic moment in the following complex is:

$$\left[Cr\left(C_2O_4\right)_2\left(NH_3\right)_2^-\right]$$

A. $O.N. = +4, C.N. = 4 \text{ and } EAN = 36$

B. $O.N. = +3, C.N. = 4 \text{ and } EAN = 36$

C. $O.N. = -1, C.N. = 4 \text{ and } EAN = 33$

D. $O.N. = +3, C.N. = 6 \text{ and } EAN = 33$

Answer: D

Watch Video Solution

3. Complex compound are molecular compounds which rectain their identities even when dissolved in water. They do not give all the simple ions in solution but instead furnish complex ions with complicated structures. The complex compounds are often called coordination compounds because certain groups called ligands are attached to the central metal ion by coordinate or dative bonds. Coordination compounds exhibit isomerism, both structural and stereoisomerism. The structure, magnetic property, colour and electrical properties of complexes are explained by various theories.

In which of the following pairs, both the complexes have the same geometry but different hybridisation ?

A. $K_2[NiCl_4], K_2[Ni(CN)_4]$

B. $Na_3[CoF_6], [Co(NH_3)_6]Cl_3$

C. $Ni(CO)_4, K_2[Ni(CN)_4]$

D. $[Cu(NH_3)_4]SO_4, [Ni(NH_3)_6]Cl_2$

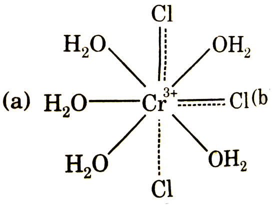
Answer: B

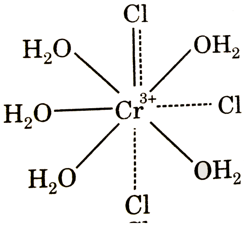
Watch Video Solution

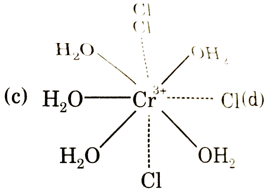
COMPREHENSION 5

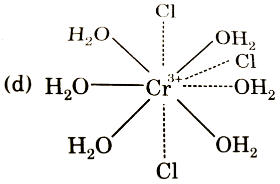
1. A, B and C are three complexes of chromium (III) with the empirical formula $H_{12}O_6Cl_3Cr$. All the three complexes have water and chloride ion as ligands. Complex A does not react with concentrated H_2SO_4, whereas complexes B and C lose 6.75% and 13.5% of their original weight, respectively, on treatment with concentrated H_2SO_4.

According to the Werner theory, the structure of complex A is represented by :

A. 

B. 

C. 

D. 

Answer: D

Watch Video Solution

2. A, B and C are three complexes of chromium (III) with the empirical formula $H_{12}O_6Cl_3Cr$. All the three complexes have water and chloride ion as ligands. Complex A does not react with concentrated H_2SO_4, whereas complexes B and C lose 6.75% and 13.5% of their original weight, respectively, on treatment with concentrated H_2SO_4.

Complexes A, B and C are not distinguished by:

A. molar conductivity data

B. by using P_4O_{10}

C. qualitative test by $AgNO_3$

D. quantitative test by $AgNO_3$

Answer: C

View Text Solution

---

3. A, B and C are three complexes of chromium (III) with the empirical formula $H_{12}O_6Cl_3Cr$. All the three complexes have water and chloride ion as ligands. Complex A does not react with concentrated H_2SO_4, whereas complexes B and C lose 6.75% and 13.5% of their original weight, respectively, on treatment with concentrated H_2SO_4.

Which type of isomerism is possible in complex C?

A. Geometrical

B. Hydration

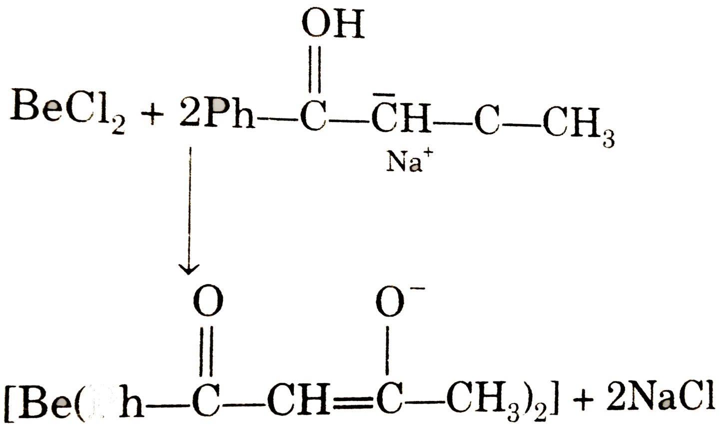
C. Co-ordnation

D. Both (a) and (b)

Answer: D

Watch Video Solution

COMPREHENSION 6



$$BeCl_2 + 2Ph-\overset{\overset{OH}{\|}}{C}-\underset{Na^+}{\bar{C}H}-C-CH_3 \downarrow [Be(Ph-\overset{\overset{O}{\|}}{C}-CH=\overset{\overset{O^-}{|}}{C}-CH_3)_2] + 2NaCl$$

Complex (X)

1.

The complex (X) has tetrahedral geometry. The correct name of the complex (X) is :

A. bis(benzoylacetononato)beryllium (II)

B. dibenzoylacetonatoberyllium (II)

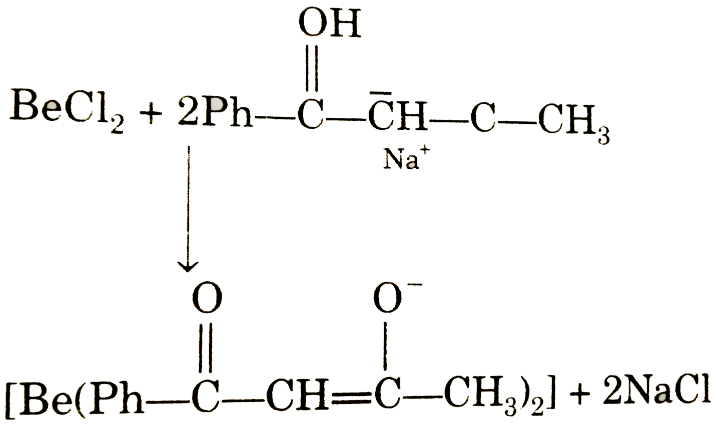
C. bis(benzoylacetonato)beryllate (II)

D. bis(acetylacetonato)beryllium (II)

Answer: A

View Text Solution

2.



$$BeCl_2 + 2Ph-\overset{\overset{OH}{\|}}{C}-\underset{Na^+}{\bar{C}H}-C-CH_3 \longrightarrow [Be(Ph-\overset{\overset{O}{\|}}{C}-CH=\overset{\overset{O^-}{|}}{C}-CH_3)_2] + 2NaCl$$

Complex (X)

Which of the following statement is correct fo(X).

A. It is optically inactive

B. It is optically active

C. It does not follow EAN or octet rule

D. It has S_4 axis of symmetry

Answer: B

View Text Solution

COMPREHENSION 7

1. According to cystal field theory, interaction between central metal atom/ion and ligand is electrostatic in nature. In free metal ions, the five d-orbitals are degenerate. However, in a ligand field e.g., tetrahedral, octahedral, square planar, square pyramidal, trigonal bipyramidal, the degeneracy of 5d-orbitals is lost.

If lobes of d-orbitals of central metal atom/ion are along the axes through which ligands are approaching, the energy of corresponding d-orbital is raised more than the d-orbitals having lobes between teh axes. e.g., octahedral complexes, square planar complexes, square pyramidal compexes.

Which of the following orbitals has the highest energy in square pyramidal ligand field ?

A. d_{xy}

B. d_{z^2}

C. $d_{x^2-y^2}$

D. $d_{yz}, d(zx)$

Answer: C

Watch Video Solution

2. According to cystal field theory, interaction between central metal atom/ion and ligand is electrostatic in nature. In free metal ions, the five d-orbitals are degenerate. However, in a ligand field e.g., tetrahedral, octahedral, square planar, square pyramidal, trigonal bipyramidal, the degeneracy of 5d-orbitals is lost.

If lobes of d-orbitals of central metal atom/ion are along the axes through which ligands are approaching, the energy of corresponding d-orbital is raised more than the d-orbitals having lobes between teh axes. e.g., octahedral complexes, square planar complexes, square pyramidal compexes.

The correct order Δ_o, Δ_t and Δ_{sp} (where o, t and sp stand for octahedral, tetrahedral and square planar fileds respectively) is :

A. $\Delta_o > \Delta_{sp} > \Delta_t$

B. $\Delta_{sp} > \Delta_o > \Delta_t$

C. $\Delta_{sp} > \Delta_t > \Delta_o$

D. $\Delta_o > \Delta_t > \Delta_{sp}$

Answer: B

Watch Video Solution

COMPREHENSION 8

1. Ligands are electron pair donor groups. Ambidentate ligands are those ligands where two different atoms can donate electron pair. The complex where ambidentate ligands are present shows linkage isomerism.

Total number of linkage isomers that are present in $Na_4\left[Fe(CN)_5NOS\right]$ is :

A. 18

B. 6

C. 8

D. 16

Answer: A

Watch Video Solution

2. Ligands are electron pair donor groups. Ambidentate ligands are those ligands where two different atoms can donate electron pair. The complex where ambidentate ligands are present shows linkage isomerism.

The correct name of linkage isomer of $\left[Co\left(NH_3\right)_5(SCN)\right]SO_4$

A. Pentaamminethiocyanato-S-cobalt (III) sulphate

B. Pentaamminethiocyanato-N-Cobalt (II) sulphate

C. Pentaamminethiocyanato-N-Cobalt (III) sulphate

D. Pentaamminecyanato-N-Cobalt (III) sulphate

Answer: C

Watch Video Solution

3. Total possible linkage isomers of $K_4\left[Fe(CN)_5\left(NO_2\right)\right]$ is :

A. 12

B. 10

C. 6

D. 4

Answer: A

Watch Video Solution

COMPREHENSION 9

1. $HCOONa \xrightarrow{350^{\circ}} \Delta Gas(X) + Residue(Y) \xrightarrow{CoCl_3} \text{Complex}(Z)$

Choose the correct statement regarding (X).

A. It is paramagnetic

B. Its bond order is one

C. It can't act as π - $acid$

D. It is a powerful oxidising agent.

Answer: B::D

Watch Video Solution

2. $HCOONa \xrightarrow{350^{\circ}} \Delta Gas(X) + Residue(Y) \xrightarrow{CoCl_3} \text{Complex}(Z)$

Complex (Z) is:

A. an outer orbital complex

B. optically active

C. oxidised when exposed to air

D. paramagnetic

Answer: B

Watch Video Solution

COMPREHENSION 10

1. Double salts are addition compounds which lose their identify in aqueous solution whereas complexes which are also addition compounds do not lose their identify in aqueous solution. The coordination compounds show isomerism and find application in photography , qualitative analysis, metallurgy, water purification and in the treatment of various diseases.

Which of the following statement is incorrect ?

A. Alum is a double salt

B. EDTA 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) rhodium(I) is effective heterogeneous catalyst for hydrogenation of alkenes.

Answer: C

Watch Video Solution

2. Double salts are addition compounds which lose their identify in aqueous solution whereas complexes which are also addition compounds do not lose their identify in aqueous solution. The coordination compounds show isomerism and find application 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 differentiated by silver nitrate solution.

D. (a) and (b) both.

Answer: D

Watch Video Solution

3. Double salts are addition compounds which lose their identify in aqueous solution whereas complexes which are also addition compounds do not lose their identify in aqueous solution. The coordination compounds show isomerism and find application in photography , qualitative analysis, metallurgy, water purification and in the treatment of various diseases.

Choose the correct option for 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

Answer: C

Watch Video Solution

COMPREHENSION 11

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. $\left[CoClBr(en)_2\right]H_2O$

B. $\left[CoCl(en)_2\left(H_2O\right)\right]BrCl$

C. $\left[CoBr(en)_2\left(H_2O\right)\right]Cl_2$

D. $\left[CoBrCl(en)_2\right]Cl.\,H_2O$

Answer: D

Watch Video Solution

2. 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 raction, the formula of the complex can be predicted. An isomer of the complex $Co(en)_2(H_2O)Cl_2Br$, on reaction with concentrated H_2SO_4 (dehydrating agent), 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 F^-, then the magnetic moment of the complex ion (due to spin only) will be :

A. 2.8 BM

B. 5.9 BM

C. 4.9 BM

D. 1.73 BM

Answer: C

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 raction, 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), suffers loss in weight and on reaction with $AgNO_3$ solution it gives a white precipitate which is soluble in $NH_3(aq)$.

Similarly if all the ligands in the coordination sphere br replaced by NO_2^-, then the magnetic moment of the complex ion (due to spin only) will be :

A. 1.73 BM

B. 0.0 BM

C. 4.9 BM

D. 5.9 BM

Answer: B

Watch Video Solution

4. 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 $Co(en)_2(H_2O)Cl_2Br$,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 $Pb(NO_3)_2$ 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

Answer: A

Watch Video Solution

5. 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 raction, the formula of the complex can be predicted. An isomer of the complex $Co(en)_2(H_2O)Cl_2Br$, on reaction with concentrated H_2SO_4 (dehydrating agent), suffers loss in weight and on reaction with $AgNO_3$ solution it gives a white precipitate which is soluble in $NH_3(aq)$.

The number of geometrical isomers of the formula fo the above original complex are (including the complex) :

A. 2

B. 3

C. 4

D. 1

Answer: A

Watch Video Solution

COMPREHENSION 12

1. Valence bond theory for bonding in transition metal complexes was developed by Pauling. From the valence bond point of view, formation of a complex involves reaction between Lewis bases (ligands) and a Lewis acid (metal atom or metal ion) with the formation of coordination covalent (or dative) bonds between them. The model utilizes hybridization of metal s, p and d valence orbitals to account for the observed structures and magnetic properies of complexes.

Valence bond theory is able to deal satisfactorily with many stereo chemical and magnetic properies but is has nothing to say about electronic spectra or the reason for the kinetic inertness of chromium (III) and low spin cobalt (III) octahedral complexes. To understand this and more other features of transition metal we must turn to other theories like crystal field theory etc.

Pure crystal field theory assumes that the only interaction between the metal ion and the ligands is an electrostatic or ionic one with the ligands being regarded as negative point charges. This theory is quite successful in interpreting many important properties of complexes.

Select the correct statement about the crystal field theory.

A. Metal-ligand bond in coordination compounds arises purely from electrostatic interaction between the metal ion and the ligand.

B. Metal-ligand bond in coordination compound is purely a covalent bond.

C. The pattern of splitting of the d-orbitals depends upon the nature of the cystal field.

D. Both (a) and (c).

Answer: D

Watch Video Solution

2. Valence bond theory for bonding in transition metal complexes was developed by Pauling. From the valence bond point of view, formation of a complex involves reaction between Lewis bases (ligands) and a Lewis acid (metal atom or metal ion) with the formation of coordination covalent (or dative) bonds between them. The model utilizes hybridization of metal s, p and d valence orbitals to account for the observed structures and magnetic properies of complexes.

Valence bond theory is able to deal satisfactorily with many stereo chemical and magnetic properies but is has nothing to say about electronic spectra or the reason for the kinetic inertness of chromium (III) and low spin cobalt (III) octahedral complexes. To understand this and more other features of transition metal we must turn to other theories like crystal field theory etc.

Pure crystal field theory assumes that the only interaction between the metal ion and the ligands is an electrostatic or ionic one with the ligands being regarded as negative point charges. This theory is quite successful in interpreting many important properties of complexes.

Which of the following is correct for the complex $\left[Ti\left(H_2O\right)_6\right]^{3+}$?

A. Hybridization of central metal ion of the complex is sp^3d^2.

B. The complex is paramagnetic containing one unpaired electron.

C. Hybridization of central metal ion of the complex is d^2sp^3.

D. Both (b) and (c).

Answer: D

Watch Video Solution

3. Valence bond theory for bonding in transition metal complexes was developed by Pauling. From the valence bond point of view, formation of a complex involves reaction between Lewis bases (ligands) and a Lewis acid (metal atom or metal ion) with the formation of coordination covalent (or dative) bonds between them. The model utilizes hybridization of metal s, p and d valence orbitals to account for the observed structures and magnetic properies of complexes.

Valence bond theory is able to deal satisfactorily with many stereo chemical and magnetic properies but is has nothing to say about electronic spectra or the reason for the kinetic inertness of chromium (III) and low spin cobalt (III) octahedral complexes. To understand this and more other features of transition metal we must turn to other theories like crystal field theory etc.

Pure crystal field theory assumes that the only interaction between the metal ion and the ligands is an electrostatic or ionic one with the ligands being regarded as negative point charges. This theory is quite successful in interpreting many important properties of complexes.

The hybridization of $\left[NiCl_2\left(PPh_3\right)_2\right]$ and $\left[NiCl_2.\left(Pme_3\right)_2\right]$ are respectively (consider PPh_3 a bulkier ligand than Pme_3) :

A. sp^3 and dsp^2

B. sp^3 and sp^3

C. dsp^2 and dsp^2

D. dsp^2 and sp^3

Answer: A

Watch Video Solution

COMPREHENSION 13

1. $Co^{2+}(aq) + SCN^{-}(aq) \rightarrow$ complex(X).

$Ni^{2+}(aq)$ + Dimethylglyoxime $\xrightarrow{NH_4OH}$ 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. tetrahiocyanato-S-cobalt (II) and bis(dimethylglyoximate) nickel(II).

B. tetrathiocyanato-S-cobaltate (II) and bis(dimethylglyoximato) nickel (II).

C. tetrathiocyanato-S-cobaltate (II) and bis(dimethylglyoximato) nickelate(II).

D. tetrathiocyanato-S-cobaltate (II) and bis(dimethylglyoximato) nickel(II).

Answer: B

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 square planar

B. both tetrahedral

C. square planar and tetrahedral

D. both square planar

Answer: A

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 diamagneitc and shows intermolecular H-bonding

C. (X) is paramagnetic with three unpaired electrons and (Y) is diamagnetic.

D. (X) and (Y) both are diamagnetic

Answer: C

Watch Video Solution

COMPREHENSION 14

1. $NiCl_2 \xrightarrow{KCN} HCN\text{Complex } A$

$NiCl_2 \xrightarrow{KCl} excess\text{Complex } B$

A and B complexes have the co-ordination number 4.

The IUPAC name of complexes A and B are respectively :

A. Potassium tetracyanonickelate(II) and Potassium tetrachloronickelate(II)

B. Potassium tetracyanonickel (II) and Potassium tetrachloronickel(II)

C. Potassium cyanonickelate(II) and Potassium chloronickel(II)

D. Potassium cyanonickel(II) and Potassium chloronickel(II)

Answer: A

Watch Video Solution

2. The coordination number of Ni^{2+} is 4.

$NiCl_2 + KCN(\text{excess}) \rightarrow A(\text{cyano comples})$

$NiCl_2 + conc.HCl(\text{excess}) \rightarrow B(\text{chloro complex})$

The hybridisation of A and B are

A. dsp^2

B. sp^2 and dsp^2

C. dsp^2 and sp^3

D. both sp^3

Answer: C

Watch Video Solution

3. The coordination number of Ni^{2+} is 4.

$NiCl_2 + KCN(\text{excess}) \rightarrow A(\text{cyano comples})$

$NiCl_2 + conc. HCl(\text{excess}) \rightarrow B(\text{chloro complex})$

Predict the magnetic nature of A and B.

A. Both diamagnetic.

B. A is diamagnetic and B is paramagnetic with one unpaired electrons.

C. A is diamagnetic and B is paramagnetic with two unpaired electrons.

D. Both are paramagnetic.

Answer: C

Watch Video Solution

COMPREHENSION 15

1. A metal complex $Cr(NH_3)_4Cl_2$ having molar conductivity corresponding to $1:1$ electrolyte have been isolated in two Forms (X) and (Y), (X) reacts with $AgNO_3$ giving white precipitate which turns yellow on reaction with sodium arsenite whereas (Y) gives a yellow precipitate soluble in concentrate NH_4OH

The correct formula and the IUPAC name of the complex (X) is :

A. $\left[Cr(NH_3)_4Cl_2\right]Br$ and tetraaminedichloridochromate(II) bromide.

B. $\left[Cr(NH_3)_4ClBr\right]Cl$ and tetraamminebromidochloridochromate(II) chloride.

C. $\left[Cr\left(NH_3\right)_4ClBr\right]Cl$ and tetramminebromidochloridochromium(III) chloride.

D. $\left[Cr\left(NH_3\right)_4ClBr\right]Cl$ and tetraamminebromidochloridochromium(III) chloride.

Answer: D

Watch Video Solution

2. A metal complex $Cr\left(NH_3\right)_4Cl_2$ having molar conductivity corresponding to $1:1$ electrolyte have been isolated in two Forms (X) and (Y), (X) reacts with $AgNO_3$ giving white precipitate which turns yellow on reaction with sodium arsenite whereas (Y) gives a yellow precipitate soluble in concentrate NH_4OH

The hybridization of chromium in complexes (X) and (Y) are :

A. both sp^3d^2

B. both d^2sp^3

C. d^2sp^3 and sp^3d^2 respectively

D. sp^3d^2

Answer: B

Watch Video Solution

3. A metal complex $Cr(NH_3)_4Cl_2$ having molar conductivity corresponding to $1:1$ electrolyte have been isolated in two Forms (X) and (Y), (X) reacts with $AgNO_3$ giving white precipitate which turns yellow on reaction with sodium arsenite whereas (Y) gives a yellow precipitate soluble in concentrate NH_4OH

Which of the following statements is true for the complex (X) and (Y) ?

A. The effective atomic number of chromium in both the complexes is 33.

B. Both can exist as diastereomers.

C. Both cis and trans forms of (X) have same dipole moment.

D. All of these

Answer: D

Watch Video Solution

4. A metal complex $Cr\left(NH_3\right)_4Cl_2$ having molar conductivity corresponding to $1:1$ electrolyte have been isolated in two Forms (X) and (Y), (X) reacts with $AgNO_3$ giving white precipitate which turns yellow on reaction with sodium arsenite whereas (Y) gives a yellow precipitate soluble in concentrate NH_4OH

The forms (X) and (Y) are example of :

A. linkage iosmers

B. ligand isomers

C. ionisation isomers

D. coordination position isomers

Answer: C

Watch Video Solution

5. A metal complex $Cr\left(NH_3\right)_4Cl_2$ having molar conductivity corresponding to $1:1$ electrolyte have been isolated in two Forms (X) and (Y), (X) reacts with $AgNO_3$ giving white precipitate which turns yellow on reaction with sodium arsenite whereas (Y) gives a yellow precipitate soluble in concentrate NH_4OH

Which of the following statements is true for the complex (Y) ?

A. Its trans form is non-planar

B. Its IUPAC name is tetraaminedichloridochromate(III) bromide.

C. Its 'spin only' magnetic moment is 3.83 BM.

D. All of these

Answer: C

Watch Video Solution

COMPREHENSION 16

1. A chemical performs the following reactions :

$(P)K_2\left[PtCl_4\right] + 2NH_3 \rightarrow A + 2KCl$

$(Q)\left[Pt\left(NH_3\right)_4\right]\Big(NO_3 \_ (2) + 2KCl \rightarrow B + 2NH_3 + 2KNO_3$

He finds that both A and B are white, crystalline compounds that give elemental analysis for empirical formula $PtCl_2\left(NH_3\right)_2$. However, A is most soluble in polar solvents, such as ethanol, while B is soluble in petroleum either and carbon tetrachloride.

The correct IUPAC name of complex A is :

A. cis-dichloridodiammineplatinate(II)

B. cis-diamminedichloridoplatinum(II)

C. trans-diamminedichloridoplatinum(II)

D. trans-diamminedichloridoplatinate(II).

Answer: B

Watch Video Solution

2. A chemical performs the following reactions :

$(P)K_2\left[PtCl_4\right] + 2NH_3 \rightarrow A + 2KCl$

$(Q)\left[Pt\left(NH_3\right)_4\right](NO_3 \_ (2) + 2KCl \rightarrow B + 2NH_3 + 2KNO_3$

He finds that both A and B are white, crystalline compounds that give elemental analysis for empirical formula $PtCl_2\left(NH_3\right)_2$. However, A is most soluble in polar solvents, such as ethanol, while B is soluble in petroleum either and carbon tetrachloride.

Which of the following statements is true for the complex A and B ?

A. Both the compounds react with silver oxalate to give white precipitate.

B. Only A reacts with silver oxalate to give white precipitate.

C. Only B reacts with silver oxalate to give white precipitate.

D. None of these react with silver oxalate.

Answer: B

Watch Video Solution

3. A chemical performs the following reactions :

$(P)K_2\left[PtCl_4\right] + 2NH_3 \rightarrow A + 2KCl$

$(Q)\left[Pt\left(NH_3\right)_4\right]\left(NO_3 \_ (2) + 2KCl \rightarrow B + 2NH_3 + 2KNO_3$

He finds that both A and B are white, crystalline compounds that give elemental analysis for empirical formula $PtCl_2\left(NH_3\right)_2$. However, A is most soluble in polar solvents, such as ethanol, while B is soluble in petroleum either and carbon tetrachloride.

Which of the following statement is true ?

A. Both A and B forms are diamagnetic involving square planar geometry.

B. Both A and B forms are a paramagnetic involving square planar geometry.

C. Both A and B form are diamagnetic involving tetrahedral geometry.

D. Both A and B forms are paramagneitc involving tetrahedral geometry.

Answer: A

Watch Video Solution

4. A chemical performs the following reactions :

$(P)K_2\left[PtCl_4\right] + 2NH_3 \rightarrow A + 2KCl$

$(Q)\left[Pt\left(NH_3\right)_4\right]\left(NO_{3\,-}(2) + 2KCl \rightarrow B + 2NH_3 + 2KNO_3\right.$

He finds that both A and B are white, crystalline compounds that give elemental analysis for empirical formula $PtCl_2\left(NH_3\right)_2$. However, A is most soluble in polar solvents, such as ethanol, while B is soluble in petroleum either and carbon tetrachloride.

Select the correct statement from the following statements.

A. A forms is used as anti-cancer

B. B form has some dipole moment

C. (a) and (b) both

D. None

Answer: A

Watch Video Solution

COMPREHENSION 17

1. Square planar complexes are generally formed by d^8 ions with strong field ligands. The crystal field splitting is larger for second and third row transition elements and for more highly charged species. All the complexes having $4d^8$ and $5d^8$ configuration are mostly square including those with weak field ligands such halide ions. Square planar complexes with coordination number four can show diastereoisomerism.

Which of the ions do not form the square planar complexes amongst the following ions ?

A. $Ni(+II)$ and $Rh(+I)$ with strong field ligands

B. $Rh(+I)$ and $Au(+III)$ with strong as well as weak field ligands.

C. $Pd(+II), Pt(+II)$ and $Au(+III)$ with strong as well as weak field ligands.

D. None of the above

Answer: D

Watch Video Solution

2. Square planar complexes are generally formed by d^8 ions with strong field ligands. The crystal field splitting is larger for second and third row transition elements and for more highly charged species. All the complexes having $4d^8$ and $5d^8$ configuration are mostly square including those with weak field ligands such halide ions. Square planar complexes with coordination number four can show diastereoisomerism.

Which of the following staements is true for the complex $\left[Ni\left(PPh_3\right)_2Br_2\right]$?

A. Hybridisation is the same as found in nickel $(+2)$ complex with strong field ligands like CN.

B. Hybridisation is the same as found in nickel (0) complex with strong field ligands like CO.

C. Hybridisation is the same as found in nickel $(+2)$ complex with weak field ligands like halide ions.

D. (b) and (c) both

Answer: D

Watch Video Solution

3. Square planar complexes are generally formed by d^8 ions with strong field ligands. The crystal field splitting is larger for second and third row transition elements and for more highly charged species. All the complexes having $4d^8$ and $5d^8$ configuration are mostly square including those with weak field ligands such halide ions. Square planar complexes with coordination number four can show diastereoisomerism.

Amongst the following complexes which has square planar geometry ?

A. $\left[RhCl(CO)\left(PPh_3\right)_2\right]$

B. $K_3\left[Cu(CN)_4\right]$

C. $K_2\left[Zn(CN)_4\right]$

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

Answer: A

Watch Video Solution

4. Square planar complexes are generally formed by d^8 ions with strong field ligands. The crystal field splitting is larger for second and third row transition elements and for more highly charged species. All the complexes having $4d^8$ and $5d^8$ configuration are mostly square including those with weak field ligands such halide ions. Square planar complexes with coordination number four can show diastereoisomerism.

Which one of the following square planar complexes will show geometrical isomerism ?

A. $[Pt(en)_2]^{2+}$

B. $[Pt(gly)_2]$

C. $[Pt(NH_3)_2Cl(NH_2CH_3)]Cl$

D. (b) and (c) both

Answer: D

Watch Video Solution

COMPREHENSION 18

1. Geometrical isomerism arises in heteroleptic complexes due to different possible geometrical arrangement of the ligands. Important examples of this behaviour are found with coordination number 4 and 6. Such isomerism is not possible for a tetrahedral geometry but it is possible for square planar as well as octahedral complexes. Optical square planar as well as octahedral complexes. Optical square planar as well as octahedral complexes. Optical isomers are mirror images that cannot be superimposed on one another. These are called enantiomers. Optical isomerism is common in octahedral complexes involving bedentate ligands.

The total number of isomers possible for the complex $\left[Co(en)_2Cl_2\right]^+$ is :

A. 3

B. 4

C. 5

D. 2

Answer: A

Watch Video Solution

2. Geometrical isomerism arises in heteroleptic complexes due to different possible geometrical arrangement of the ligands. Important examples of this behaviour are found with coordination number 4 and 6. Such isomerism is not possible for a tetrahedral geometry but it is possible for square planar as well as octahedral complexes. Optical square planar as well as octahedral complexes. Optical square planar as well as octahedral complexes. Optical isomers are mirror images that cannot be superimposed on one another. These are called enantiomers. Optical isomerism is common in octahedral complexes involving bedentate ligands.

For which of the following complexes, are optical isomers possible ?

$(P)\left[Cr(\mathrm{ox})_3\right]^{3-}$ $(Q)\left[Cr\left(NH_3\right)_4(\mathrm{ox})\right]^{+}$

$(R)\left[Co(\mathrm{ox})_2\left(NH_3\right)_2\right]^{-}$

Select the correct answer using the codes given below :

A. P only

B. P and Q only

C. P and R only

D. P, Q and R

Answer: C

Watch Video Solution

3. Geometrical isomerism arises in heteroleptic complexes due to different possible geometrical arrangement of the ligands. Important examples of this behaviour are found with coordination number 4 and 6. Such isomerism is not possible for a tetrahedral geometry but it is possible for square planar as well as octahedral complexes. Optical square planar as well as octahedral complexes. Optical square planar as well as octahedral complexes. Optical isomers are mirror images that cannot be superimposed on one another. These are called enantiomers. Optical isomerism is common in octahedral complexes involving bedentate ligands.

Which one of the following statements is false ?

A. $\left[cis\text{ - }Pt\left(NH_3\right)_2Cl_2\right]$ will have some dipole moment

B. $\left[cis\text{ - }Pt\left(NH_3\right)_2Cl_2\right]$ will show geometrical as well as optical isomerism.

C. $cis\text{ - }\left[CrCl_2(\text{ox})_2\right]$ is a chiral molecules.

D. (a) and (b) both

Answer: B

Watch Video Solution

4. Geometrical isomerism arises in heteroleptic complexes due to different possible geometrical arrangement of the ligands. Important examples of this behaviour are found with coordination number 4 and 6. Such isomerism is not possible for a tetrahedral geometry but it is possible for square planar as well as octahedral complexes. Optical square planar as well as octahedral complexes. Optical square planar as well as octahedral complexes. Optical isomers are mirror images that cannot be superimposed on one another. These are called enantiomers. Optical isomerism is common in octahedral complexes involving bedentate ligands.

Which of the following complexes will show geometrical isomerism ?

A. $Cs\left[FeCl_4\right]$

B. $CrCl_3(py)_3$

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

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

Answer: B

Watch Video Solution

5. Geometrical isomerism arises in heteroleptic complexes due to different possible geometrical arrangement of the ligands. Important examples of this behaviour are found with coordination number 4 and 6. Such isomerism is not possible for a tetrahedral geometry but it is possible for square planar as well as octahedral complexes. Optical square planar as well as octahedral complexes. Optical square planar as well as octahedral complexes. Optical isomers are mirror images that cannot be superimposed on one another. These are called enantiomers. Optical isomerism is common in octahedral complexes involving bedentate ligands.

Select the correct statement.

A. Both $\left[NiCl_2\left(PPh_3\right)_2\right]$ and its analogous Pd(II) show geometrical isomerism.

B. $\left[CoBrCl(en)_2\right]$ will show geometrical isomerism but is chiral compound.

C. cis - $\left[Co\left(NH_3\right)_4Br_2\right]^+$ can exist as enantiomer

D. A complex of palladium (II) with two chloride ions and two thiocyanate ions will show linkage as well as geometrical isomerism.

Answer: D

Watch Video Solution

COMPREHENSION 19

1. Splitting energy $\left(\Delta_0\right)$ can usually be measured form the absorption spectra of the complex ions. In simple cases when light is absorbed by a complex ion, an electron in one of the lower energy orbitals is excited to one of the higher energy orbital. The energy corresponding to the frequency of absorbed light is equal to Δ_0. If value of Δ_0 for the complex is in visible region, the complex is coloured and the value of Δ_0 lies in ultraviolet or infrared region, the complex is colourless. For octahedral complexes, the cyrstal field stabilisation energy is given by $CFSE = +\left[-0.4t_{2g}N + 0.6e_gN_1\right]\Delta_0$ Where N and N_1 are number of electrons in t_{2g} and e_g orbitals respectively.

The value of CFSE can be used for the correction of the experimental values of heats of hydration of divalent can be obtained by substracting the calculated CFSE values form the experimental values.

The value of crystal field splitting $\left(\Delta_0\right)$ for $\left[Ti\left(H_2O\right)_6^{3+}\right.$ is 243 kj mol^{-1}. The crystal field stabilisation energy (CFSE) in this complex is : (in kj mol^{-1})

A. $-\frac{3}{5} \times 243$

B. $-\frac{2}{5} \times 243$

C. $-3 \times \frac{2}{5} \times 243$

D. -243

Answer: B

Watch Video Solution

2. Splitting energy $\left(\Delta_0\right)$ can usually be measured form the absorption spectra of the complex ions. In simple cases when light is absorbed by a complex ion, an electron in one of the lower energy orbitals is excited to one of the higher energy orbital. The energy corresponding to the frequency of absorbed light is equal to Δ_0. If value of Δ_0 for the complex is in visible region, the complex is coloured and the value of Δ_0 lies in ultraviolet or infrared region, the complex is colourless. For octahedral complexes, the cyrstal field stabilisation energy is given by $CFSE = +\left[-0.4t_{2g}N + 0.6e_gN_1\right]\Delta_0$ Where N and N_1 are number of electrons in t_{2g} and e_g orbitals respectively.

The value of CFSE can be used for the correction of the experimental values of heats of hydration of divalent can be obtained by substracting the calculated CFSE values form the experimental values.

Which of the following statements is correct ?

A. Zinc (II) ion has a zero CFSE for any geometry.

B. A solution of $\left[Ti\left(H_2O\right)_6\right]^{3+}$ is purple as the value of Δ for the H_2O complex is in the visible region.

C. Solution of $\left[Fe(CN)_6\right]^{4-}$ and $\left[Fe\left(H_2O\right)_6\right]^{2+}$ appear colourless in dilute solutions.

D. All of these

Answer: D

Watch Video Solution

---

3. Splitting energy $\left(\Delta_0\right)$ can usually be measured form the absorption spectra of the complex ions. In simple cases when light is absorbed by a complex ion, an electron in one of the lower energy orbitals is excited to one of the higher energy orbital. The energy corresponding to the frequency of absorbed light is equal to Δ_0. If value of Δ_0 for the complex is in visible region, the complex is coloured and the value of Δ_0 lies in ultraviolet or infrared region, the complex is colourless. For octahedral complexes, the cyrstal field stabilisation energy is given by $CFSE = +\left[-0.4t_{2g}N + 0.6e_gN_1\right]\Delta_0$ Where N and N_1 are number of electrons in t_{2g} and e_g orbitals respectively.

The value of CFSE can be used for the correction of the experimental values of heats of hydration of divalent can be obtained by substracting the calculated CFSE values form the experimental values.

The heat of hydration of Cr^{2+} ion is $-450k\ cal/mol.$ For $\left[Cr\left(H_2O\right)_6\right]^{2+}, \Delta_0 = 13,900\ \ cm(-1)$. What heat of hydration would be, if there were no crystal field stabilisation energy ?

A. $-426k\ \ cal/\text{mole}$

B. $-245k\ \ cal/\text{mole}$

C. $-4.84k\ \ cal/\text{mole}$

D. none of these

Answer: A

Watch Video Solution

COMPREHENSION 20

1. 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.

The increase in bond length in CO as compared to carbon monoxide is due to :

A. the donation of lone pair of electrons from the carbon into a vacant orbital of the metla atom.

B. the donation of a pair of electrons form a filled d-orbital of metal into the vacant antibonding π^* orbital of carbon monoxide.

C. (a) and (b) both

D. none.

Answer: B

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 of the following statement is false for nickel carbonyl $\left[Ni(CO)_4\right]$?

A. It is a colourless compound.

B. The Ni-C-O group is linear.

C. The four carbonyl group are lying at the corners of a regular tetrahedron.

D. The metal-carbon bond length (for $\sigma \quad bond$) does not alter.

Answer: D

Watch Video Solution

3. 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 ?

$(P)Ni(CO)_4 \quad (Q)Fe(CO)_5$

$(R)V(CO)_6$ $(S)Cr(CO)_6$

Select the correct answer from the codes given below :

A. P and Q only

B. Q, R and S only

C. Q and S only

D. P, Q and S only

Answer: C

Watch Video Solution

4. 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 carbonyl involves the d^2sp^3

hybridization for the formation of metal-carbon σ *bonds* and is paramagnetic ?

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

B. $\left[V(CO)_6\right]$

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

D. $\left[W(CO)_6\right]$

Answer: B

Watch Video Solution

5. 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 of the following statement is correct for metal carbonyls ?

A. In general, the effective atomic number for a stable monomeric of the next inert gas except $\left[V(CO)_6\right]$.

B. The metal-carbon bond in metal carbonyls posses both s and p character.

C. The C-O bond length in $\left[Cr(CO)_6\right]$ is greater than that in $\left[W(CO)_6\right]$

D. All of these

Answer: D

Watch Video Solution

COMPREHENSION 21

1. Sidgwick EAN rule says that complex compound has the tendency to achieve the EAN of 36, 54 and 86 for first, second and third transition series elements.

Which of the following complex acts as reducing agent based on Sidgwick EAN rule ?

A. $Mn(CO)_5$

B. $Mn_2(CO)_{10}$

C. $Mn(CO)_6$

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

Answer: C

Watch Video Solution

2. Sidgwick EAN rule says that complex compound has the tendency to achieve the EAN of 36, 54 and 86 for first, second and third transition series elements.

Which of the following complex follows sidgwick EAN rule ?

A. $\left[Ag\left(S_2O_3\right)_2\right]^{3-}$ (when only S atom is the donor atom)

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

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

D. $\left[Mo\left(\sigma\text{ - }C_5H_5\right)Br\left(NH_3\right)_2\right]$

Answer: B

Watch Video Solution

3. Sidgwick EAN rule says that complex compound has the tendency to achieve the EAN of 36, 54 and 86 for first, second and third transition series elements.

Which of following statement is not correct regarding complex "Ferrocene".

A. EAN of central atom in ferrocene is not equal to its nearest noble gas

B. Molecule is having aromtic character

C. It has sandwich like structure

D. Two rings act as π - donor ligand

Answer: A

Watch Video Solution

COMPREHENSION 22

1. Complex compounds which have same molecular formula but have different structural arrangements of ligands around central metal atom or ion are called structural isomers and phenomenon is named as structural isomerism.

Which of the following compounds is/are polymerisation isomerof $\left[Fe(NO_2)_3(NH_3)_3\right]$.

(P) $\left[Fe(NO_2)(NH_3)_5\right]\left[Fe(NO_2)_5(NH_3)\right]$

(Q) $\left[Fe(NO_2)_2(NH_3)_4\right]_2\left[Fe(NO_2)_5(NH_3)\right]$

(R) $\left[Fe(NO_2)(NH_3)_5\right]\left[Fe(NO_2)_4(NH_3)_2\right]_2$

(S) $\left[Fe(NO_2)_2(NH_3)_4\right]\left[Fe(NO_2)_4(NH_3)_2\right]$

Choose the correct code :

A. Q, R

B. Q, R, S

C. P, S

D. P, Q, R, S

Answer: D

Watch Video Solution

2. Complex compounds which have same molecular formula but have different structural arrangements of ligands around central metal atom or ion are called structural isomers and phenomenon is named as structural isomerism.

How many more coordination isomers are possible of the following complex compound.

$$\left[PtCl_2(NH_3)_4\right]\left[Pt(SCN)_4\right]$$

A. 5

B. 6

C. 8

D. 9

Answer: C

Watch Video Solution

3. Complex compounds which have same molecular formula but have different structural arrangements of ligands around central metal atom or ion are called structural isomers and phenomenon is named as structural isomerism.

Select incorrect match :

A.

$\left[CO\left(NO_2\right)\left(H_2O\right)(en)_2\right]Cl_2, \left[CoCl\left(NO_2\right)(en)_2\right]Cl.\,H_2O$ - Hydrate isome

B.

$\left[Cu\left(NH_3\right)_4\right]\left[PtCl_4\right], \left[CuCl_2\left(NH_3\right)_2\right]\left[PtCl_2\left(NH_3\right)_2\right]$ - Coordination is

C.

$\left[Ni(CN)\left(H_2O\right)\left(NH_3\right)_4\right]Cl, \left[NiCl\left(H_2O\right)\left(NH_3\right)_4\right]CN$ - Ionization isomer

D.

$\left[Cr(NCS)\left(NH_3\right)_5\right]\left[ZnCl_4\right], \left[Cr(SCN)\left(NH_3\right)_5\right]\left[ZnCl_4\right]$ - Linkage isome

Answer: B

Watch Video Solution

COMPREHENSION 23

1. When a transition metal ion (usually) is involved in octahedral complex formation, the five degenerate d-orbitals split into two set of degenerate orbitals $(3 + 2)$. Three degenerate orbitals of lower energy $\left(d_{xy}, d_{yz}, d_{zx}\right)$ and a set of degenerate orbitals of higher energy $\left(d_{x^2-y^2} \text{ and } d_{z^2}\right.$. The orbitals with lower energy are called t_{2g} orbitals and those with higher energy are called e_g orbitals.

In octahedral complexes, positive metal ion may be considered to be present at the centre and negative ligands at the corner of a regular octahedron. As lobes of $d_{x^2-y^2}$ and d_{z^2} lie along the axis, i.e., along the ligands, the repulsions are more and so, high is the energy. The lobes of the remaining three d-orbitals lie between the Axis i.e., between the ligands. The repulsions between them are less, so lesser the energy. In the octahedral complexes, if metal ion has electrons more than 3, then for pairing them, the options are

(i) Pairing may start with 4th electron in t_{2g} orbitals.

(ii) Pairing may start normally with 6th electron when t_{2g} and e_g orbitals are singly filled.

In which of the following configurations, hybridisation and magnetic moment of octahedral complexes are independent of nature of ligands.

(P) d^3 configuration of any metal cation

(Q) d^6 configuration of IIIrd transition series metal cation

(R) d^8 configuration of Ist transition series metal cation

(S) d^7 configuration of any metal cation

Select the correct code:

A. R, S

B. P, R, S

C. P, Q, S

D. P, Q, R

Answer: D

Watch Video Solution

2. When a transition metal ion (usually) is involved in octahedral complex formation, the five degenerate d-orbitals split into two set of degenerate orbitals $(3 + 2)$. Three degenerate orbitals of lower energy $\left(d_{xy}, d_{yz}, d_{zx}\right)$ and a set of degenerate orbitals of higher energy $\left(d_{x^2-y^2} \text{ and } d_{z^2}\right.$. The orbitals with lower energy are called t_{2g} orbitals and those with higher energy are called e_g orbitals.

In octahedral complexes, positive metal ion may be considered to be present at the centre and negative ligands at the corner of a regular octahedron. As lobes of $d_{x^2-y^2} \text{ and } d_{z^2}$ lie along the axis, i.e., along the ligands, the repulsions are more and so, high is the energy. The lobes of the remaining three d-orbitals lie between the Axis i.e., between the ligands. The repulsions between them are less, so lesser the energy. In the octahedral complexes, if metal ion has electrons more than 3, then for pairing them, the options are

(i) Pairing may start with 4th electron in t_{2g} orbitals.

(ii) Pairing may start normally with 6th electron when t_{2g} and e_g orbitals are singly filled.

Which of the following electronic arrangement is/are possible for inner orbital octahedral complex.

(P) $t_{2g}^{3}e_{g}^{2}$ $(Q)t_{2g}^{6}e_{g}^{1}$

(R) $t_{2g}^{3}e_{g}^{0}$ $(S)t_{2g}^{4}e_{g}^{2}$

Select the correct code :

A. P, S

B. Q, R

C. R only

D. R, S

Answer: C

Watch Video Solution

3. When a transition metal ion (usually) is involved in octahedral complex formation, the five degenerate d-orbitals split into two set of degenerate orbitals $(3 + 2)$. Three degenerate orbitals of lower energy $\left(d_{xy}, d_{yz}, d_{zx}\right)$ and a set of degenerate orbitals of higher energy $\left(d_{x^2-y^2} \text{ and } d_{z^2}\right.$. The orbitals with lower energy are called t_{2g} orbitals and those with higher energy are called e_g orbitals.

In octahedral complexes, positive metal ion may be considered to be present at the centre and negative ligands at the corner of a regular octahedron. As lobes of $d_{x^2-y^2} \text{ and } d_{z^2}$ lie along the axis, i.e., along the ligands, the repulsions are more and so, high is the energy. The lobes of the remaining three d-orbitals lie between the Axis i.e., between the ligands. The repulsions between them are less, so lesser the energy. In the octahedral complexes, if metal ion has electrons more than 3, then for pairing them, the options are

(i) Pairing may start with 4th electron in t_{2g} orbitals.

(ii) Pairing may start normally with 6th electron when t_{2g} and e_g orbitals are singly filled.

Select incorrect match for the following complexes.

A. $\left[IrF_6\right]^{3-}(\Delta > P)$

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

C. $Fe(CO)_5(\Delta > P)$

D. $\left[PdCl_2(SCN)_2\right]^{2-}(\Delta > P)$

Answer: B

Watch Video Solution

COMPREHENSION 24

1. Two important physical evidence support the synergic bonding in non-classical complexes-bond lengths and vibrational spectra. Vibrational spectra is based on the fact that the compression and extension of a bond may be analogous to the behaviour of spring and obeys Hooke's law.

$\bar{v} = \frac{1}{2\pi c}\sqrt{\frac{K}{\mu}} cm^{-1}$ Where, K=force constant of the bond which is directly proportional to bond strngth

μ = reduced mass of ligand

$\bar{v}$ = stretching frequency of the CO bond

C = velocity of light

In which of the following complex, stretching frquency for C-O bond is least as well as bond energy of M-C bond is highest ?

A. $[(dien)Mo(CO)_3]$

B. $[(Et_3P)_3Mo(CO)_3]$

C. $[(F_3P)_3Mo(CO)_3]$

D. $[(Cl_3P)_3Mo(CO)_3]$

Answer: A

Watch Video Solution

2. Two important physical evidence support the synergic bonding in non-classical complexes-bond lengths and vibrational spectra. Vibrational spectra is based on the fact that the compression and extension of a bond may be analogous to the behaviour of spring and obeys Hooke's law.

$\bar{v} = \frac{1}{2\pi c}\sqrt{\frac{K}{\mu}}\, cm^{-1}$ Where, K=force constant of the bond which is directly proportional to bond strngth

μ = reduced mass of ligand

$\bar{v}$ = stretching frequency of the CO bond

C = velocity of light

In compound $\left[M(CO)_N\right]^Z$ the correct match for highest M-C bond length for given M, N and Z respectively

A. $\begin{array}{ccc} M & N & Z \\ Ti & 6 & 0 \end{array}$

B. $\begin{array}{ccc} M & N & Z \\ Ti & 6 & -1 \end{array}$

C. $\begin{array}{ccc} M & N & Z \\ Ti & 6 & -2 \end{array}$

D. $\begin{array}{ccc} M & N & Z \\ Ti & 6 & +1 \end{array}$

Answer: D

Watch Video Solution

3. Two important physical evidences supporting the synergic bonding in non-classical complexes are bond lengths and vibrational spectra. Vibrational spectra is based on the fact that the compression and extension of a bond may be analogous to the behaviour of a spring and obeys Hook's law.

$$\bar{v} = \frac{1}{2\pi c}\sqrt{\frac{k}{\mu}}cm^{-1}$$

where, k=force force constant of the bond which is directly proportional to bonnd strength of CO μ = reduced mass of ligand

$\bar{v}$=stretching frequency of the CO bond

c=velocity of light

Q. In which of the following ligand, σ-bond order does not change during synergic bonding in their respective complexes:

A. CO

B. NO

C. $CH_2 = CH_2$

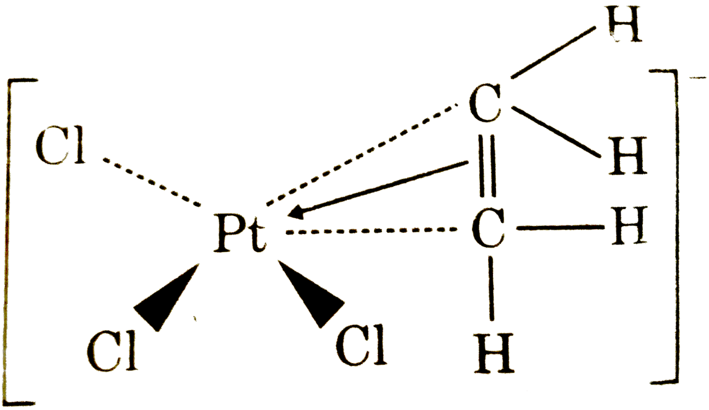
D. Pet_3

Answer: D

Watch Video Solution

COMPREHENSION 25

1. Anionic part of Zeise's salt is an organometallic compound :



In Zeise's salt, IR stretching vibrational frequency of the C=C bond .... with respect to free ethylene molecule.

A. Decreases

B. Increases

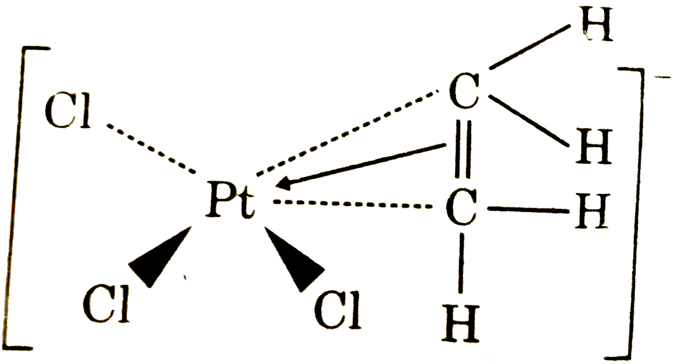
C. Remains same

D. None of these

Answer: A

Watch Video Solution

2. Anionic part of Zeise's salt is an organometallic compound :



The H-C-H bond angles in Zeise's salt are about :

A. 115°, intermediate between the ideal values for sp^2 and sp^3 hybridisation

B. 135°, intermediate between the ideal values for sp and sp^2 hybridisation

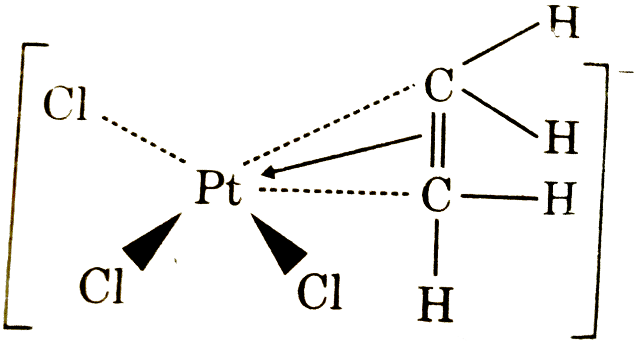
C. 120° exactly

D. 97° intermediate between the ideal values for sp^3 and sp^2 hybridisation.

Answer: A

Watch Video Solution

3. Anionic part of Zeise's salt is an organometallic compound :



Select the correct statement for Zeise's salt :

A. The carbon atom exhibits some electrophilic characte

B. C-C bond length in Zeise's salt is only about 4pm longer than that in C_2H_4 and it is about 16 pm longer in tetracyano ethylene complex

C. The structure of Zeise's salt shows the two carbon atoms are at the perpendicular plane to the $PtCl_3$ plane.

D. All are correct

Answer: D

Watch Video Solution

COMPREHENSION 26

1. Nickelocene, $\left[Ni\left(\eta^5\text{-}C_5H_5\right)_2\right]$ is a bright green reactive solid conveniently prepared by adding a solution of $NiCl_2$ in dimethyl sulphoxide to a solution to a of KC_5H_5 in 1, 2 dimethoxyethane.

What is the E.A.N of Ni in above complex ?

A. 35

B. 36

C. 38

D. None of these

Answer: C

Watch Video Solution

2. Nickelocene, $\left[Ni\left(\eta^5\text{-}C_5H_5\right)_2\right]$ is a bright green reactive solid conveniently prepared by adding a solution of $NiCl_2$ in dimethyl sulphoxide to a solution to a of KC_5H_5 in 1, 2 dimethoxyethane.

What is the oxidation state of nickel in the above complex ?

A. 0

B. $+3$

C. $+2$

D. None of these

Answer: C

Watch Video Solution

COMPREHENSION 27

1. Werner proposed coordination theory to explain the properties and stuructures of various metal ammines of cobalt, chromium, platinum, etc. It was first successful attempt which satisfactorily described the formation of coordination compounds from stable molecules.

Which of the following has four number of ions in aqueous solution ?

A. $K_4[Fe(CN)_6]$

B. $K_2[PtCl_6]$

C. $[Co(NH_3)_6]Cl_3$

D. $[Ni(CO)_4]$

Answer: C

Watch Video Solution

2. Werner proposed coordination theory to explain the properties and stuructures of various metal ammines of cobalt, chromium, platinum, etc. It was first successful attempt which satisfactorily described the formation of coordination compounds from stable molecules.

Which of the following compound has 2 primary valencies ?

A. $CoCl_3.6H_2O$

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

C. $CrCl_3.6H_2O$

D. None of these

Answer: B

Watch Video Solution

3. Werner proposed coordination theory to explain the properties and stuructures of various metal ammines of cobalt, chromium, platinum, etc. It was first successful attempt which satisfactorily described the formation of coordination compounds from stable molecules.

Which of the following has higher molar conductance ?

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

B. $\left[Co\left(NH_3\right)_5SO_4\right]Br$

C. Both (a) and (b)

D. None of these

Answer: A

Watch Video Solution

COMPREHENSION 28

1. Crystal field theory was proposed by H.beths (1929) and Van Vleck (1932) and as originally applied to ionic crystals to explain their optical properties and is, therefore, called crystal field theory, however, this theory was applied to the study of coordination compounds in 1950 and this theory accounts for more satisfactory expalnation for the properties of complexes especially colour and magnetism.

What is the hybridisation of $\left[Ni\left(H_2O\right)_6\right]^{2+}$?

A. sp^3d^2

B. d^2sp^3

C. sp^3d

D. dsp^3

Answer: A

Watch Video Solution

2. Crystal field theory was proposed by H.beths (1929) and Van Vleck (1932) and as originally applied to ionic crystals to explain their optical properties and is, therefore, called crystal field theory, however, this theory was applied to the study of coordination compounds in 1950 and this theory accounts for more satisfactory expalnation for the properties of complexes especially colour and magnetism.

What is the geometry of $\left[Co\left(NH_3\right)_6\right]^{2+}$?

A. Octahedral

B. Tetrahedral

C. Square planar

D. Square pyramidal

Answer: A

Watch Video Solution

---

3. Crystal field theory was proposed by H.beths (1929) and Van Vleck (1932) and as originally applied to ionic crystals to explain their optical properties and is, therefore, called crystal field theory, however, this theory was applied to the study of coordination compounds in 1950 and this theory accounts for more satisfactory expalnation for the properties of complexes especially colour and magnetism.

Which of the following complex is paramagnetic in nature ?

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

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

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

D. None of these

Answer: B

Watch Video Solution

COMPREHENSION 29

1. Ligands can be classified by various ways, based upon charges, denticity and interaction between ligand and central atom.

Which of the following ligand is unsymmetrical bidentate ligand as well as having chiral centre which cannot be made symmetrical at all giving rotation around any single bond ?

A. pn

B. bn

C. gly^-

D. dmg^-

Answer: A

View Text Solution

2. Ligands can be classified by various ways, based upon charges, denticity and interaction between ligand and central atom.

Which of the following ligand is of ambidentate type ?

A. NO_3^-

B. $C_2O_4^{2-}$

C. $S_2O_3^{2-}$

D. None of these

Answer: C

Watch Video Solution

COMPREHENSION 30

1. Inspired by Alfred Werner (1866-1919), a KOTA student decided to reconduct a similar experiment on unknown salt samples of $MCl_3 . xNH_3$. The student found that some of the chloride ions could be prdipitated as AgCl on adding silver nitrate solution. He found that this salt was of 4 years (based on colour). He labelled these complexes as A (yellow complex) B(purple complex), C (Green complex), D (violet complex).

He found that moles of AgCl precipitated (per mole of salt) in one case was 3, one case it was 2, and in two cases it was one.

He then measured the electrical conductivity of various salt solutions and found that D had the lowest value.

He then measured the boiling point of solutions of A, B, C, D and found that B had the 2nd highest boiling point, Based on the above information, answer the following questions.

If all the complexes taken by the student were cystalline, then, what is the possible molecular formula of the complex having least boiling point?

A. $MCl_3 .6NH_3$

B. $MCl_3.5NH_3$

C. $MCl_3.4NH_3$

D. $MCl_3.2NH_3$

Answer: C

Watch Video Solution

2. Inspired by Alfred Werner (1866-1919), a KOTA student decided to reconduct a similar experiment on unknown salt samples of $MCl_3.\ xNH_3$. The student found that some of the chloride ions could be prdipitated as AgCl on adding silver nitrate solution. He found that this salt was of 4 years (based on colour). He labelled these complexes as A (yellow complex) B(purple complex), C (Green complex), D (violet complex).

He found that moles of AgCl precipitated (per mole of salt) in one case was 3, one case it was 2, and in two cases it was one.

He then measured the electrical conductivity of various salt solutions and found that D had the lowest value.

He then measured the boiling point of solutions of A, B, C, D and found that B had the 2nd highest boiling point, Based on the above information, answer the following questions.

What is the relationship between C and D (if C, had the lowest boiling point)?

A. Ammoniated isomers

B. Structural isomers

C. Both (a) and (b)

D. Geometrical isomers

Answer: D

Watch Video Solution

3. Inspired by Alfred Werner (1866-1919), a KOTA student decided to reconduct a similar experiment on unknown salt samples of $MCl_3. xNH_3$. The student found that some of the chloride ions could be prdipitated as AgCl on adding silver nitrate solution. He found that this salt was of 4 years (based on colour). He labelled these complexes as A (yellow complex) B(purple complex), C (Green complex), D (violet complex).

He found that moles of AgCl precipitated (per mole of salt) in one case was 3, one case it was 2, and in two cases it was one.

He then measured the electrical conductivity of various salt solutions and found that D had the lowest value.

He then measured the boiling point of solutions of A, B, C, D and found that B had the 2nd highest boiling point, Based on the above information, answer the following questions.

If atomic number of M is 27, then number of N-M-N bond angles in A will be :

A. 21

B. 15

C. 10

D. 6

Answer: B

Watch Video Solution

4. Inspired by Alfred Werner (1866-1919), a KOTA student decided to reconduct a similar experiment on unknown salt samples of $MCl_3 . xNH_3$. The student found that some of the chloride ions could be prdipitated as AgCl on adding silver nitrate solution. He found that this salt was of 4 years (based on colour). He labelled these complexes as A (yellow complex) B(purple complex), C (Green complex), D (violet complex).

He found that moles of AgCl precipitated (per mole of salt) in one case was 3, one case it was 2, and in two cases it was one.

He then measured the electrical conductivity of various salt solutions and found that D had the lowest value.

He then measured the boiling point of solutions of A, B, C, D and found that B had the 2nd highest boiling point, Based on the above information, answer the following questions.

The order of electrical conductivity for the 4 complexes will be :

A. $B > A > C > D$

B. $C = B > D > A$

C. $C > D > B = A$

D. $A > B > C = D$

Answer: D

Watch Video Solution

---

5. Inspired by Alfred Werner (1866-1919), a KOTA student decided to reconduct a similar experiment on unknown salt samples of $MCl_3 . xNH_3$. The student found that some of the chloride ions could be prdipitated as AgCl on adding silver nitrate solution. He found that this salt was of 4 years (based on colour). He labelled these complexes as A (yellow complex) B(purple complex), C (Green complex), D (violet complex).

He found that moles of AgCl precipitated (per mole of salt) in one case was 3, one case it was 2, and in two cases it was one.

He then measured the electrical conductivity of various salt solutions and found that D had the lowest value.

He then measured the boiling point of solutions of A, B, C, D and found that B had the 2nd highest boiling point, Based on the above information, answer the following questions.

The student took 2.675 g sample of A (Atomic weight of central atom=59) and dissolved it in water to form 1 L solution whose molar conductance was found to be 200 $\Omega^{-1}cm^2mol^{-1}$ What is the specific conductance of the solution ?

A. $2 \times 10^{-3}\Omega^{-1}cm^{-1}$

B. $2 \times 10^{-4}\Omega^{-1}cm^{-1}$

C. $0.2 \quad \Omega^{-1}cm^{-1}$

D. $0.4 \quad \Omega^{-1}cm^{-1}$

Answer: A

Watch Video Solution

COMPREHENSION 31

1. The coordination compounds are of great importance. These compounds are widely present in the mineral, plant and animal worlds and are known to play many important functions in the area of analytical chemistry, metallurgy, biological systems, industry and medicine.

Which of the following reagents can be used for qualitative and quantitative analysis (based on colour reactions) as well as for estimation of hardness of water ?

A. EDTA

B. DMG

C. α - $nitroso$ - β - $naphthol$

D. Cupron

Answer: A

Watch Video Solution

2. The coordination compounds are of great importance. These compounds are widely present in the mineral, plant and animal worlds and are known to play many important functions in the area of analytical chemistry, metallurgy, biological systems, industry and medicine.

In which of the following processes, co-ordination complex formation/usage is done for extraction of metals ?

A. Mc Artur Forrest cyanide process

B. Mond's process

C. Both (a) and (b)

D. None of these

Answer: C

Watch Video Solution

COMPREHENSION 32

1. In the complex, basic beryllium acetate $\left[Be_4O\left(CH_3COO\right)_6\right]$ it is known that $'\overset{*}{O}'$ is acting as bridge for all 4 beryllium and $\left(CH_3COO-\right)$ as a bridiging ligand for any two berylliums, in pairs. Now, answer the following questions :

Number of Be-O-Be bond angles in the complex =x

Number of O-Be-O bond angles in the complex=y

Find the value of $\frac{y}{x}$

A. 5

B. 4

C. 6

D. 3

Answer: B

Watch Video Solution

2. In the complex, basic beryllium acetate $\left[Be_4O\left(CH_3COO\right)_6\right]$ it is known that $'\overset{*}{O}'$ is acting as bridge for all 4 beryllium and $\left(CH_3COO^-\right)$ as a bridiging ligand for any two berylliums, in pairs. Now, answer the following questions :

Choose the correct set of hybridisation for Be and $\overset{*}{O}$ in the complex :

A. sp, sp^3

B. sp^3, sp^3

C. sp^2, sp^2

D. sp, sp

Answer: B

Watch Video Solution

3. In the complex, basic beryllium acetate $\left[Be_4O\left(CH_3COO\right)_6\right]$ it is known that $'\overset{*}{O}'$ is acting as bridge for all 4 beryllium and $\left(CH_3COO^-\right)$ as a bridiging ligand for any two berylliums, in pairs. Now, answer the following questions :

Identify the ligand which is ambidentate and has three different donor sites available :

A. NCS^-

B. NOS^-

C. CNO^-

D. all of these

Answer: B

Watch Video Solution

COMPREHENSION 33

1. According to werner, the arrangement of 6 groups around the metal centre within the co-ordination sphere can lead to three possible geometries (For Q. 1 and Q. 2) : planar hexagon, trigonal prism and octahedral. For a particular geometry, if the groups (i.e. ligands) are arranged in different ways then the possibility of geometrical isomerism will arise.

A complex $\left[PtCl_2\left(NH_3\right)_4\right]^{2+}$ in WERNER 'S universe has a total 3 stereo-isomers possible. If Werner was present, then, according to him, what can be the probable shape of the complex ?

A. planar hexagon

B. trigonal prison

C. octahedron

D. both (a) and (b)

Answer: D

Watch Video Solution

2. According to werner, the arrangement of 6 groups around the metal centre within the co-ordination sphere can lead to three possible geometries (For Q. 1 and Q. 2) : planar hexagon, trigonal prism and octahedral. For a particular geometry, if the groups (i.e. ligands) are arranged in different ways then the possibility of geometrical isomerism will arise.

If in RENREW'S universe, $\left[PtBrCl\left(NH_3\right)Py\right]$ complex was found to have two stereo-isomers, then according to Werner, which inference can be correct ?

(P) Complex must be square planar

(Q) Complex may be tetrahedral

(R) Complex may show geometrical isomerism

(S) Complex must exhibit optical isomerism

A. P, Q

B. Q, R

C. Q, S

D. P,S

Answer: B

Watch Video Solution

COMPREHENSION 34

1. The realtive stabilities of metal carbonyls and their ions can be explained on the basis of a rule which is known as $18e^-$ rule. If number of valence shell electrons of the metal + number of electrons donated by bonded CO groups comes to be 18 electrons, then carbonyl is said to be stable.

Which of the following complexes are following $18e^{-}$ rule?

A. $Ni(CO)_4$

B. $Fe(CO)_5$

C. $Cr(CO)_6$

D. $V(CO)_6$

Answer: A,B,C

Watch Video Solution

2. The realtive stabilities of metal carbonyls and their ions can be explained on the basis of a rule which is known as $18e^{-}$ rule. If number of valence shell electrons of the metal + number of electrons donated by bonded CO groups comes to be 18 electrons, then carbonyl is said to be stable.

Some heteroleptic/noncarbonyl complexes also follow 18 electron rule.

Identify the number of complexes following the rule.

$$[Mn(CO)_5], [Co(CO)_4]\left[\left(\eta^5 - C_5H_5\right)_2Fe\right],$$
$$\left[(CO)_5\left(PF_3\right)\right]^+, \left[\left(\eta^5 - C_5H_5\right)\left[Cr(NO)_4\right], Fe(CO)_2Cl\right],$$
$$\left[Fe(CO)_2(NO)_2\right], \left[Fe(CO)_5\right], \left[Mn_2(CO)_{10}\right]$$

A. 7

B. 8

C. 9

D. 6

Answer: A

Watch Video Solution

COMPREHENSION 35

1. Both double salt as well as complexes are formed by combination of two or more stable compounds in stoichiometric ratio.However, they differ in the fact that double salt dissociate into simple ions completely when dissolved in water but in complex salt, complex ions doesn't dissociate into ions.

Which of the following statements is correct for complex formed by combination of one mole of $PtCl_4$ and four mole NH_3?

A. It can show geometrical isomerism

B. It does not follow sidgwick rule

C. It does not show ionization isomerism

D. It gives white ppt with $AgNO_3$

Answer: A,C,D

Watch Video Solution

2. Both double salt as well as complexes are formed by combination of two or more stable compounds in stoichiometric ratio.However, they differ in the fact that double salt dissociate into simple ions completely when dissolved in water but in complex salt, complex ions doesn't dissociate into ions.

Which of the following correct about alums ?

A. Alums are double salt.

B. Li^+ cation does not form alums

C. Aq. Solution of alums are always colourless

D. In alums two type of cations are present

Answer: A,B,D

Watch Video Solution

COMPREHENSION 36

1. Crystal field theory considers purely ionic bond between metal and ligand. The five d-orbitals in an isolated gaseous metal are degenerate. The degeneracy of the d-orbitals is lost in prsence of ligand which is known as splitting of d-orbitals.

Calculate crystal field stabilization energy in $\left[Co\left(C_2O_4\right)_3\right]^{3-}$ in terms of Δ_0

A. $-2.4\Delta_0$

B. $+2.4\Delta_0$

C. $-3.6\Delta_0$

D. $-1.8\Delta_0$

Answer: A

Watch Video Solution

---

2. Crystal field theory considers purely ionic bond between metal and ligand. The five d-orbitals in an isolated gaseous metal are degenerate. The degeneracy of the d-orbitals is lost in prsence of ligand which is known as splitting of d-orbitals.

Complex in which $t(2g)^3$ electronic configuration is not observed.

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

B. $\left[CrF_6\right]^{3-}$

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

D.

Answer: C

Watch Video Solution

COMPREHENSION 37

1. As originally developed, cystal field theory was used to describe the electronic structure of metal ion crystals, where they are surrounded by oxide ions or other anions that create an electrostatic filed with symmetry dependent on the crystal structure.

If for the complex $K_4\left[FeL_6\right]$ the value of $\Delta_0 = 22000 \quad cm^{-1}$. Find out the value of crystal pairing energy. Where L is uninegative monodentate ligand.

A. $-46200 \quad cm^{-1}$

B. $-52800 \quad cm^{-1}$

C. $+2200 \quad cm^{-1}$

D. $-22200 \quad cm^{-1}$

Answer: B

Watch Video Solution

2. As originally developed, cystal field theory was used to describe the electronic structure of metal ion crystals, where they are surrounded by oxide ions or other anions that create an electrostatic filed with symmetry dependent on the crystal structure.

Total number of nodal planes of the orbitals involved in hybridisation of central metal ion in complex $\left[MnO_4\right]^-$ is :

A. 6

B. 4

C. 2

D. 3

Answer: A

Watch Video Solution

COMPREHENSION 38

1. In certain cases, achiral ligands can become chiral on coordination to a metal, leading to a complex that is chiral. Usually the non-chiral ligand contains a donor that rapidly inverts as a free ligand, but that becomes locked in one configuration on co-ordination. An example is $MeNHCH_2CH_2NHMe$, where two N atoms become chiral centres on co-ordination to a metal atom. Consider two bidentate ligands for square planar complexes only :

$AA \rightarrow Me - NH - CH_2 - CH_2 - NHMe$

$CD \rightarrow Me - NH - CH_2 - CH_2 - NH_2$

Total number of chiral and achiral complexes obtained from $M(AA)_2$ Will be respectively :

A. 2, 1

B. 4, 2

C. 4, 3

D. 2, 2

Answer: C

Watch Video Solution

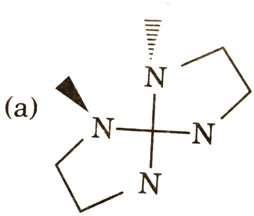
2. In certain cases, achiral ligands can become chiral on coordination to a metal, leading to a complex that is chiral. Usually the non-chiral ligand contains a donor that rapidly inverts as a free ligand, but that becomes locked in one configuration on co-ordination. An example is $MeNHCH_2CH_2NHMe$, where two N atoms become chiral centres on co-ordination to a metal atom. Consider two bidentate ligands for square planar complexes only :

$AA \rightarrow Me - NH - CH_2 - CH_2 - NHMe$

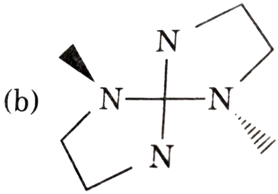
$CD \rightarrow Me - NH - CH_2 - CH_2 - NH_2$

In the complex solution $\left[M(CD)_2\right]$, identify the complex isomer which does not have any mirror planes but is nor chiral.

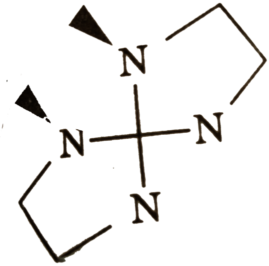
A.



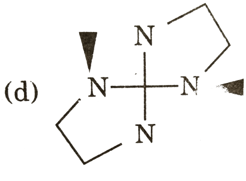
B.



C.



D.

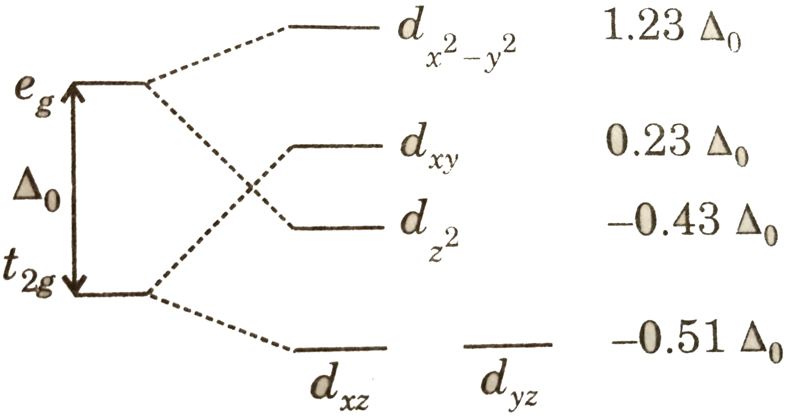


Answer: B

Watch Video Solution

COMPREHENSION 39

1. The splitting diagram for square planar complexes is more complex than for octahedral and tetrahedral complexes and is shown below with the relative energies of each orbital.



Calculate crystal field stabilisation energy for a diamagnetic square planar d^8 metal complex with the help of above diagram neglecting pairing energy (P)

A. $-2.88\Delta_0$

B. $-2.44\Delta_0$

C. $-1.65\Delta_0$

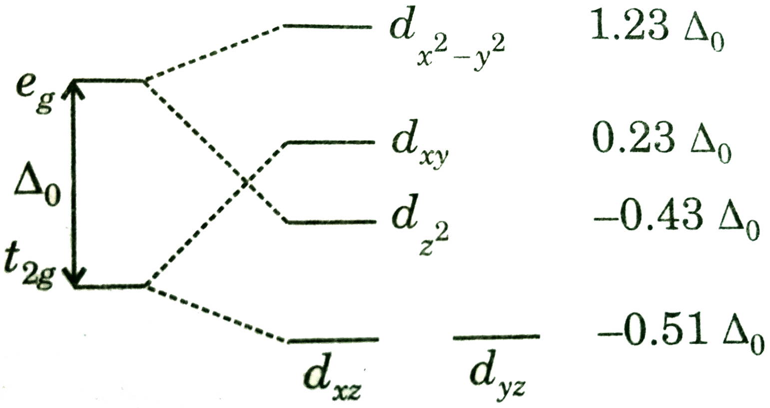
D. $-4.84\Delta_0$

Answer: B

Watch Video Solution

---

2. The splitting diagram for square planar complexes is more complex than for octahedral and tetrahedral complexes and is shown below with the relative energies of each orbital.



Which of the following set of de^- have same crystal field stabilisation energy value for tetrahedral complex neglecting pairing energy (P) :

$(P) d^1, d^6 \quad (Q) d^2, d^7$

$(R) d^3, d^8 \quad (S) d^4, d^9$

$(T) d^5, d^{10}$

A. Only T

B. Q, R and T

C. P, Q and S

D. P, Q, R, S and T

Answer: D

Watch Video Solution

COMPREHENSION 40

1. Isomers in coordination chemistry include many types. In structural isomers hydrate or solvent isomers, ionisation isomers and coordination isomers have same overall formula but have different ligands attached to the central atom or ion.

The term linkage isomerism or ambidentate isomerism are used for cases of bonding through different through different atoms of the same ligand. Stereoisomers have the same ligands, but differ in the geometric arrangement of the ligands.

Which of the following is not correctly matched against indicated isomerism ?

A. $\left[Co\left(NH_3\right)_4\left(H_2O\right)Cl\right]Br$, : Ionisation isomerism

B. $\left[Rh\left(PPh_3\right)_2(CO)(NCS)_2\right]$: Linkage isomerism

C. $\left[Pt\left(NH_3\right)_4\right]\left[\left(PtCl_4\right)\right]$: Coordination isomerism

D. $\left[Zn(gly)_2\right]$tetrahedral : Geometrical isomerism

Answer: D

Watch Video Solution

2. Isomers in coordination chemistry include many types. In structural isomers hydrate or solvent isomers, ionisation isomers and coordination isomers have same overall formula but have different ligands attached to the central atom or ion.

The term linkage isomerism or ambidentate isomerism are used for cases of bonding through different through different atoms of the same ligand.

Stereoisomers have the same ligands, but differ in the geometric arrangement of the ligands.

$Ma_3.b_3$ complex has two geometrical forms(I) Facial (II) Meridonial then which of the following statement is incorrect ?

A. In facial isomer three same ligands occupy adjacent positions on octahedron face

B. In meridional isomers same ligands are present at 90° and 180° angles

C. In facial isomer same ligands are present only at 90° angle

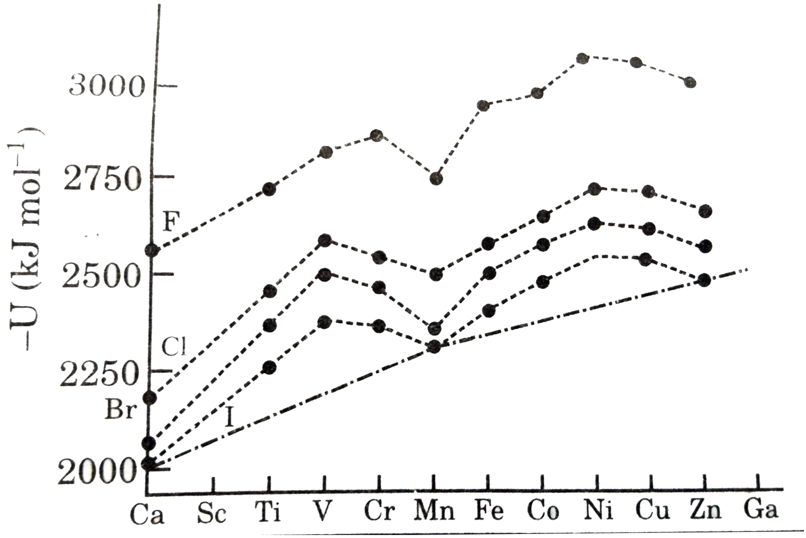
D. Both isomers (facial and meridonial) are optically active

Answer: D

Watch Video Solution

COMPREHENSION 41

1. Though CFT is used for explaining transition metal complexes yet it can also be used for explaining the variation of lattice energies of transition metal compounds. For example halides of bivalent metal ions of 3d-series $(MX_2$. It is found that in the crystal of such metal halides each metal ion is octahedrally surrounded by halides ions and vice-versa, hence these compounds can be treated at par with octahedral complexes. In the following figure, variation of lattice energy of MX_2 is given with atomic number of metal ions.



If a graph is plotted for the hydration of M^{3+} ions with the atomic number of metal of 4th period metals from Ca to Ga then the species which are lying at minima of curve will be :

A. Ca, Mn, Zn

B. Sc, Mn, Ga

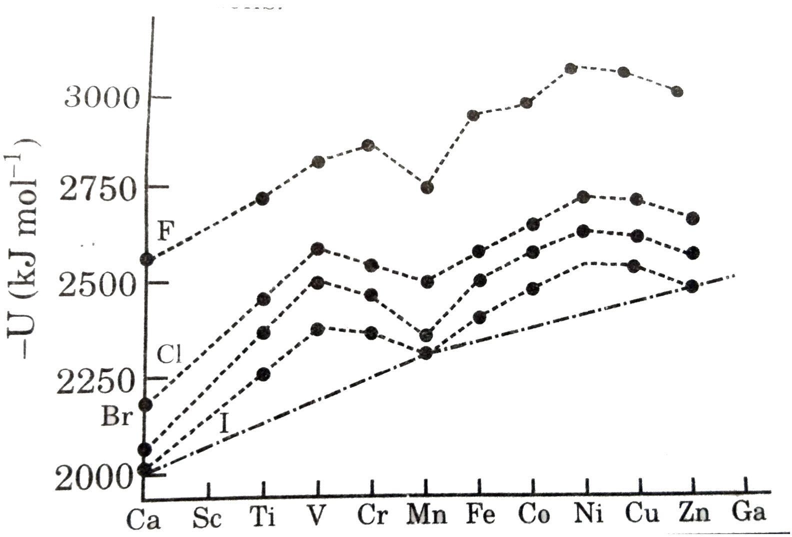
C. Sc, Fe, Ga

D. Ca, Fe, Zn

Answer: C

View Text Solution

2. Though CFT is used for explaining transition metal complexes yet it can also be used for explaining the variation of lattice energies of transition metal compounds. For example halides of bivalent metal ions of 3d-series $(MX_2$. It is found that in the crystal of such metal halides each metal ion is octahedrally surrounded by halides ions and vice-versa, hence these compounds can be treated at par with octahedral complexes. In the following figure, variation of lattice energy of MX_2 is given with atomic number of metal ions.



In which of the following complexes, the metal ion has lowest ionic radius?

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

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

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

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

Answer: B

Watch Video Solution

COMPREHENSION 42

1. Trans-effect (a kinetic phenomenon) indicates the labilisation at the trans-position during the nucleophilic substitution.

The ligand which can weaken its trans bond more is considered to have its more trans influence. Trans-effect series :

$CN^-, CO > H^- > Ph^- > NO_2^-, I^- > Br^- > Cl^- > NH_3 > OH^- > H_2O$

$\left[PtCl_4\right]^{2-} \xrightarrow{NH_3} 2eq.\text{products :}$

A. $100\ \%\ cis$ - $\left[Pt\left(NH_3\right)_2Cl_2\right]$

B. $100\ \%\ trans$ - $\left[Pt\left(NH_3\right)_2Cl_2\right]$

C. Mixture of diastereomers with % trans $>$ % cis

D. Mixture of diastereomers with % cis $>$ % trans

Answer: A

Watch Video Solution

2. Trans-effect (a kinetic phenomenon) indicates the labilisation at the trans-position during the nucleophilic substitution.

The ligand which can weaken its trans bond more is considered to have its more trans influence. Trans-effect series :

$CN^-, CO > H^- > Ph^- > NO_2^-, I^- > Br^- > Cl^- > NH_3 > OH^- > H_2O$

$\left[Pt(NH_3)_4\right]^{2+} \xrightarrow{Cl^-} 2eq.\text{products}$:

A. $100\ \%\ cis$ - $\left[Pt(NH_3)_2Cl_2\right]$

B. $100\ \%\ trans$ - $\left[Pt(NH_3)_2Cl_2\right]$

C. Mixture of diastereomers with % trans $>$ % cis

D. Mixture of diastereomers with % cis $>$ % trans

Answer: B

Watch Video Solution

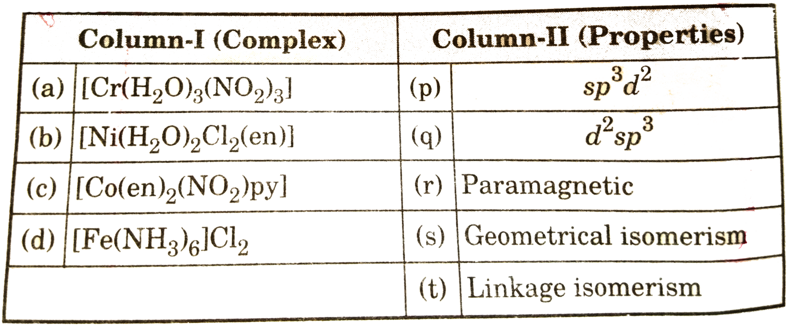
MATCH THE COLUMN TYPE

1.

	Column I		Column II
(a)	$\left[Pt\left(NH_3\right)ClBrI\right]^-$	(p)	Square planar
(b)	$\left[Pt\left(NH_3\right)ClBrNO_2\right]^-$	(q)	$EAN = 84$
(c)	$\left[Pt\left(NH_3\right)Cl(CN)_2\right]^-$	(r)	Linkage isomers are 3
		(t)	Linkage isomers are 4

Watch Video Solution

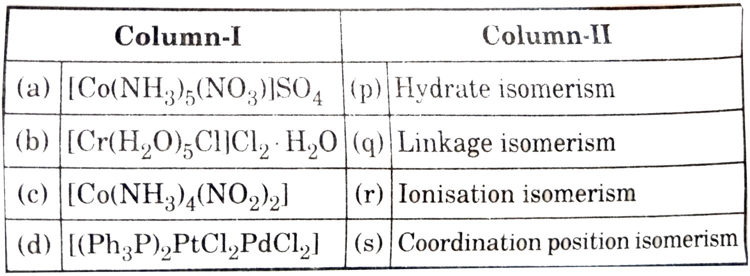
2. Match the following columns



Column-I (Complex)		Column-II (Properties)	
(a)	$[Cr(H_2O)_3(NO_2)_3]$	(p)	sp^3d^2
(b)	$[Ni(H_2O)_2Cl_2(en)]$	(q)	d^2sp^3
(c)	$[Co(en)_2(NO_2)py]$	(r)	Paramagnetic
(d)	$[Fe(NH_3)_6]Cl_2$	(s)	Geometrical isomerism
		(t)	Linkage isomerism

Watch Video Solution

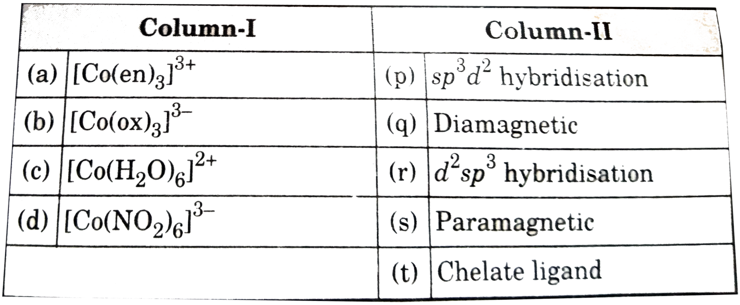
3. Match the following columns



	Column-I		Column-II
(a)	$[Co(NH_3)_5(NO_3)]SO_4$	(p)	Hydrate isomerism
(b)	$[Cr(H_2O)_5Cl]Cl_2 \cdot H_2O$	(q)	Linkage isomerism
(c)	$[Co(NH_3)_4(NO_2)_2]$	(r)	Ionisation isomerism
(d)	$[(Ph_3P)_2PtCl_2PdCl_2]$	(s)	Coordination position isomerism

Watch Video Solution

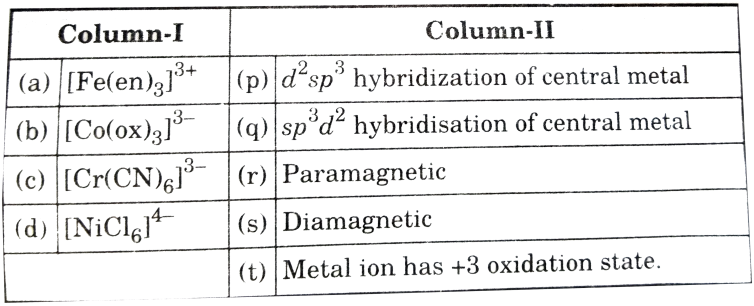
4. Match the following columns



	Column-I		Column-II
(a)	$[Co(en)_3]^{3+}$	(p)	sp^3d^2 hybridisation
(b)	$[Co(ox)_3]^{3-}$	(q)	Diamagnetic
(c)	$[Co(H_2O)_6]^{2+}$	(r)	d^2sp^3 hybridisation
(d)	$[Co(NO_2)_6]^{3-}$	(s)	Paramagnetic
		(t)	Chelate ligand

Watch Video Solution

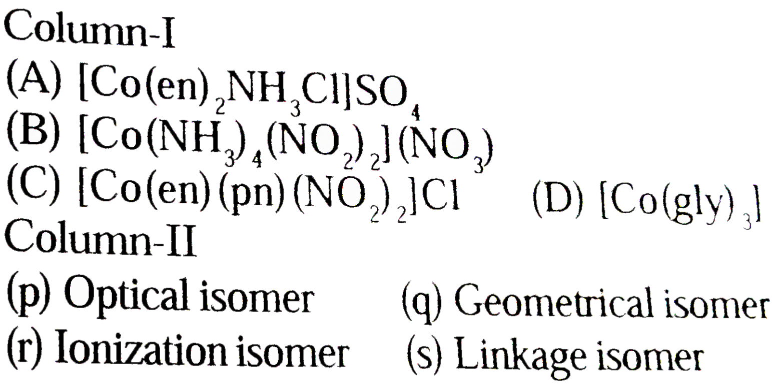
5. Match the following columns



Column-I		Column-II	
(a)	$[Fe(en)_3]^{3+}$	(p)	d^2sp^3 hybridization of central metal
(b)	$[Co(ox)_3]^{3-}$	(q)	sp^3d^2 hybridisation of central metal
(c)	$[Cr(CN)_6]^{3-}$	(r)	Paramagnetic
(d)	$[NiCl_6]^{4-}$	(s)	Diamagnetic
		(t)	Metal ion has +3 oxidation state.

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

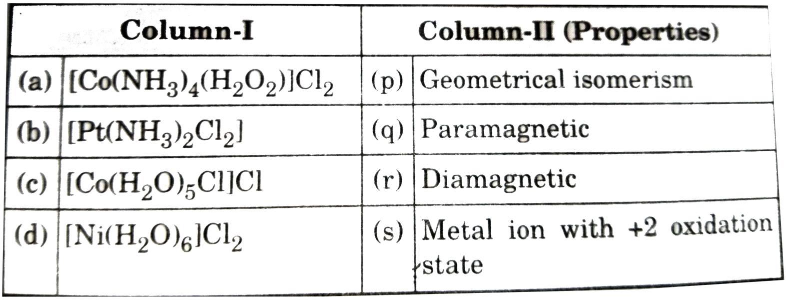
(q) Geometrical isomer

(r) Ionization isomer

(s) Linkage isomer

Watch Video Solution

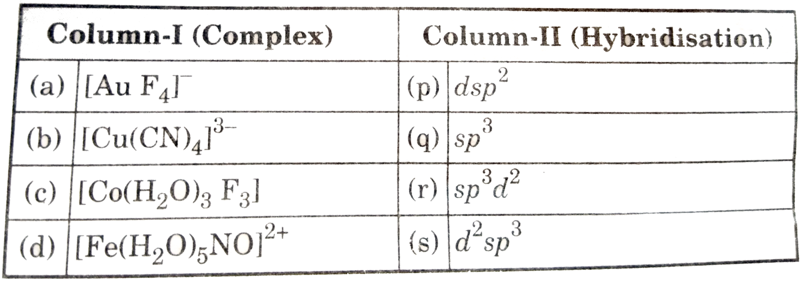
7. Match the following columns



	Column-I		Column-II (Properties)
(a)	$[Co(NH_3)_4(H_2O_2)]Cl_2$	(p)	Geometrical isomerism
(b)	$[Pt(NH_3)_2Cl_2]$	(q)	Paramagnetic
(c)	$[Co(H_2O)_5Cl]Cl$	(r)	Diamagnetic
(d)	$[Ni(H_2O)_6]Cl_2$	(s)	Metal ion with +2 oxidation state

Watch Video Solution

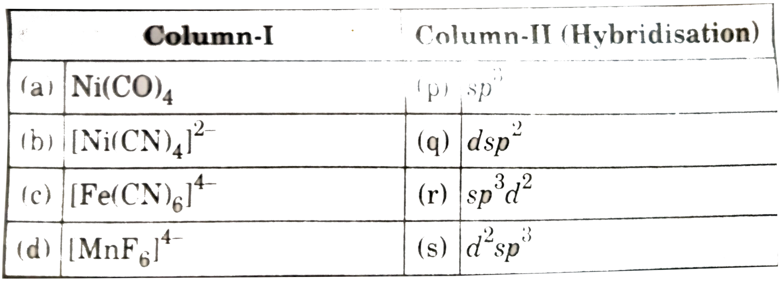
8. Match the following columns



	Column-I (Complex)		Column-II (Hybridisation)
(a)	$[Au\ F_4]^-$	(p)	dsp^2
(b)	$[Cu(CN)_4]^{3-}$	(q)	sp^3
(c)	$[Co(H_2O)_3\ F_3]$	(r)	sp^3d^2
(d)	$[Fe(H_2O)_5NO]^{2+}$	(s)	d^2sp^3

Watch Video Solution

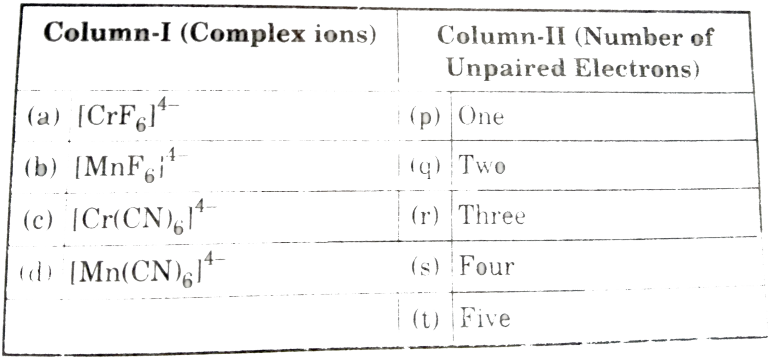
9. Match the following columns



Column-I		Column-II (Hybridisation)	
(a)	$Ni(CO)_4$	(p)	sp^3
(b)	$[Ni(CN)_4]^{2-}$	(q)	dsp^2
(c)	$[Fe(CN)_6]^{4-}$	(r)	sp^3d^2
(d)	$[MnF_6]^{4-}$	(s)	d^2sp^3

Watch Video Solution

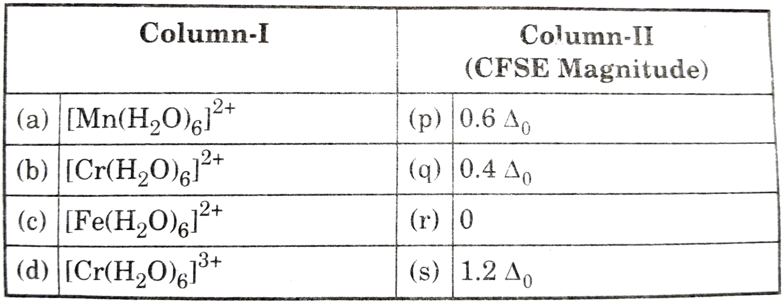
10. Match the following columns



Column-I (Complex ions)		Column-II (Number 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

Watch Video Solution

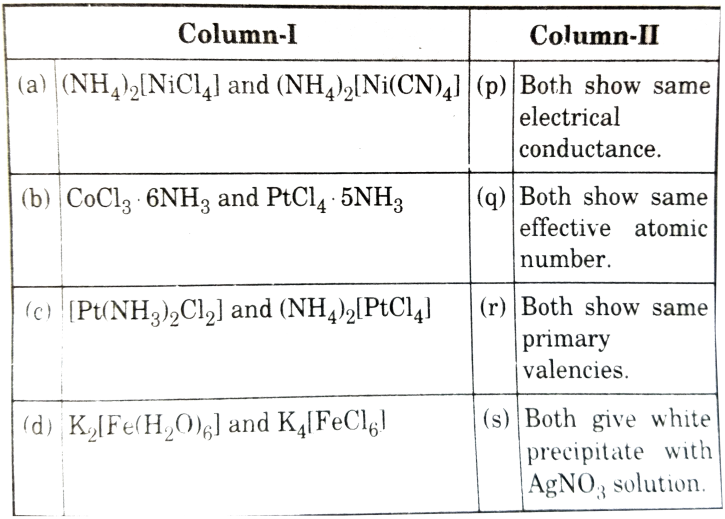
11. Match the following columns



	Column-I		Column-II (CFSE Magnitude)
(a)	$[Mn(H_2O)_6]^{2+}$	(p)	$0.6\ \Delta_0$
(b)	$[Cr(H_2O)_6]^{2+}$	(q)	$0.4\ \Delta_0$
(c)	$[Fe(H_2O)_6]^{2+}$	(r)	0
(d)	$[Cr(H_2O)_6]^{3+}$	(s)	$1.2\ \Delta_0$

Watch Video Solution

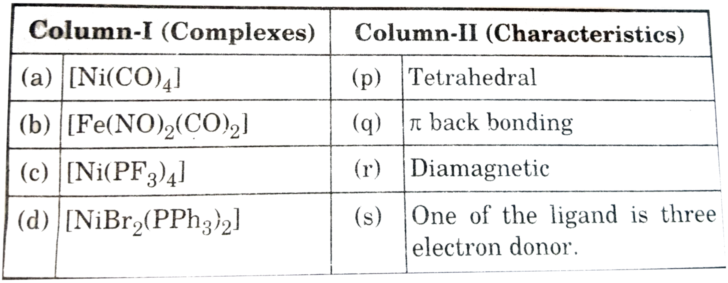
12. Match the following columns



	Column-I		Column-II
(a)	$(NH_4)_2[NiCl_4]$ and $(NH_4)_2[Ni(CN)_4]$	(p)	Both show same electrical conductance.
(b)	$CoCl_3 \cdot 6NH_3$ and $PtCl_4 \cdot 5NH_3$	(q)	Both show same effective atomic number.
(c)	$[Pt(NH_3)_2Cl_2]$ and $(NH_4)_2[PtCl_4]$	(r)	Both show same primary valencies.
(d)	$K_2[Fe(H_2O)_6]$ and $K_4[FeCl_6]$	(s)	Both give white precipitate with $AgNO_3$ solution.

Watch Video Solution

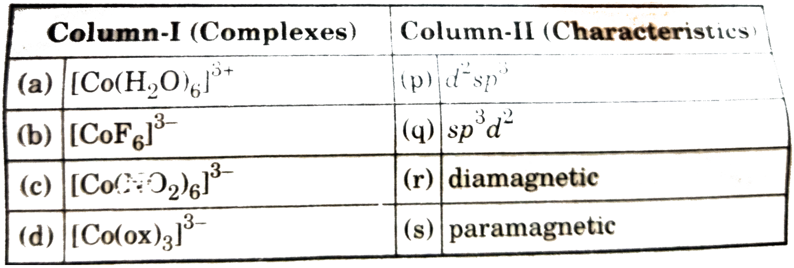
13. Match the following columns



Column-I (Complexes)		Column-II (Characteristics)	
(a)	$[Ni(CO)_4]$	(p)	Tetrahedral
(b)	$[Fe(NO)_2(CO)_2]$	(q)	π back bonding
(c)	$[Ni(PF_3)_4]$	(r)	Diamagnetic
(d)	$[NiBr_2(PPh_3)_2]$	(s)	One of the ligand is three electron donor.

Watch Video Solution

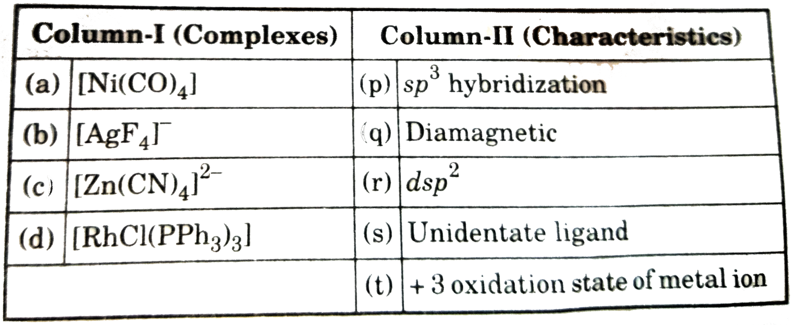
14. Match the following columns



Column-I (Complexes)		Column-II (Characteristics)	
(a)	$[Co(H_2O)_6]^{3+}$	(p)	d^2sp^3
(b)	$[CoF_6]^{3-}$	(q)	sp^3d^2
(c)	$[Co(NO_2)_6]^{3-}$	(r)	diamagnetic
(d)	$[Co(ox)_3]^{3-}$	(s)	paramagnetic

Watch Video Solution

15. Match the following columns

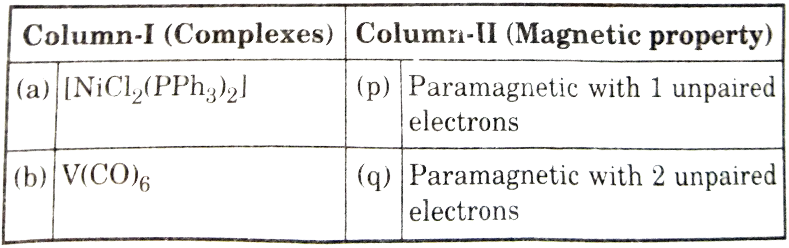


Column-I (Complexes)		Column-II (Characteristics)	
(a)	$[Ni(CO)_4]$	(p)	sp^3 hybridization
(b)	$[AgF_4]^-$	(q)	Diamagnetic
(c)	$[Zn(CN)_4]^{2-}$	(r)	dsp^2
(d)	$[RhCl(PPh_3)_3]$	(s)	Unidentate ligand
		(t)	+ 3 oxidation state of metal ion

Watch Video Solution

---

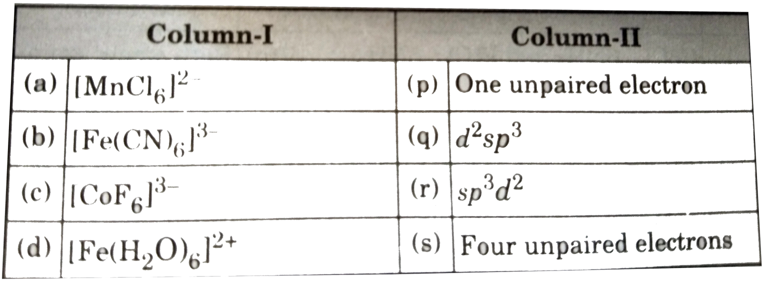
16. Match the column :



Column-I (Complexes)		Column-II (Magnetic property)	
(a)	$[NiCl_2(PPh_3)_2]$	(p)	Paramagnetic with 1 unpaired electrons
(b)	$V(CO)_6$	(q)	Paramagnetic with 2 unpaired electrons

Watch Video Solution

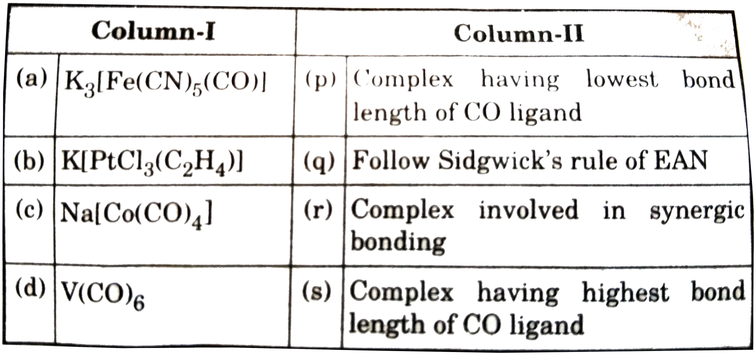
17. Match the following columns



	Column-I		Column-II
(a)	$[MnCl_6]^{2-}$	(p)	One unpaired electron
(b)	$[Fe(CN)_6]^{3-}$	(q)	d^2sp^3
(c)	$[CoF_6]^{3-}$	(r)	sp^3d^2
(d)	$[Fe(H_2O)_6]^{2+}$	(s)	Four unpaired electrons

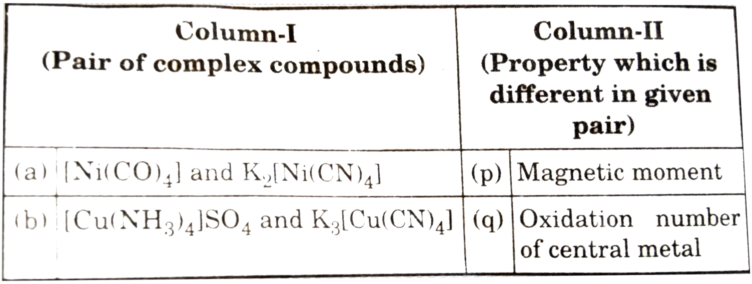
Watch Video Solution

18. Match the following columns



	Column-I		Column-II
(a)	$K_3[Fe(CN)_5(CO)]$	(p)	Complex having lowest bond length of CO ligand
(b)	$K[PtCl_3(C_2H_4)]$	(q)	Follow Sidgwick's rule of EAN
(c)	$Na[Co(CO)_4]$	(r)	Complex involved in synergic bonding
(d)	$V(CO)_6$	(s)	Complex having highest bond length of CO ligand

Watch Video Solution

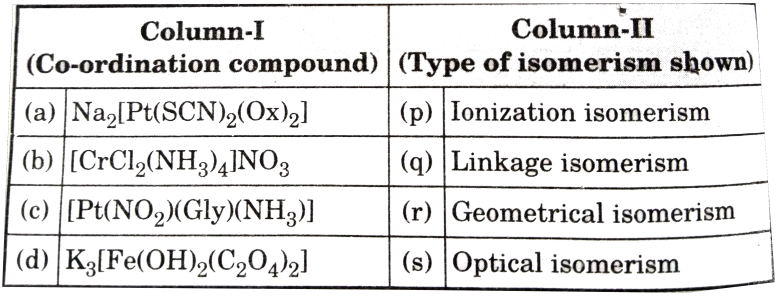


Column-I (Pair of complex compounds)		Column-II (Property which is different in given pair)	
(a)	$[Ni(CO)_4]$ and $K_2[Ni(CN)_4]$	(p)	Magnetic moment
(b)	$[Cu(NH_3)_4]SO_4$ and $K_3[Cu(CN)_4]$	(q)	Oxidation number of central metal

19.

View Text Solution

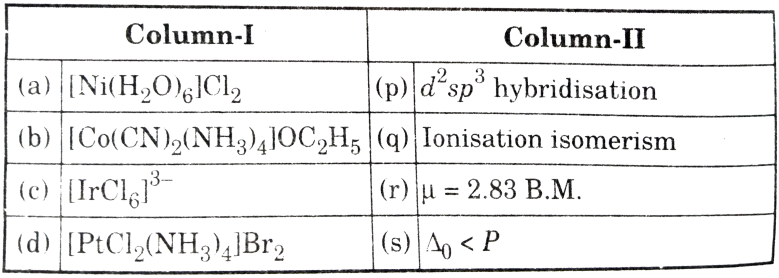
20. Match the Column-I to Column-II :



Column-I (Co-ordination compound)		Column-II (Type of isomerism shown)	
(a)	$Na_2[Pt(SCN)_2(Ox)_2]$	(p)	Ionization isomerism
(b)	$[CrCl_2(NH_3)_4]NO_3$	(q)	Linkage isomerism
(c)	$[Pt(NO_2)(Gly)(NH_3)]$	(r)	Geometrical isomerism
(d)	$K_3[Fe(OH)_2(C_2O_4)_2]$	(s)	Optical isomerism

Watch Video Solution

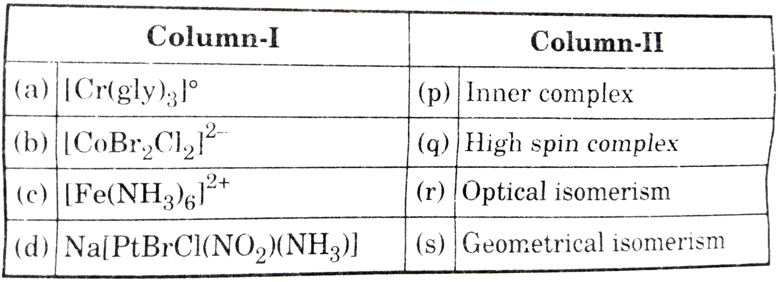
21. Match the following columns



Column-I		Column-II	
(a)	$[Ni(H_2O)_6]Cl_2$	(p)	d^2sp^3 hybridisation
(b)	$[Co(CN)_2(NH_3)_4]OC_2H_5$	(q)	Ionisation isomerism
(c)	$[IrCl_6]^{3-}$	(r)	$\mu = 2.83$ B.M.
(d)	$[PtCl_2(NH_3)_4]Br_2$	(s)	$\Delta_0 < P$

Watch Video Solution

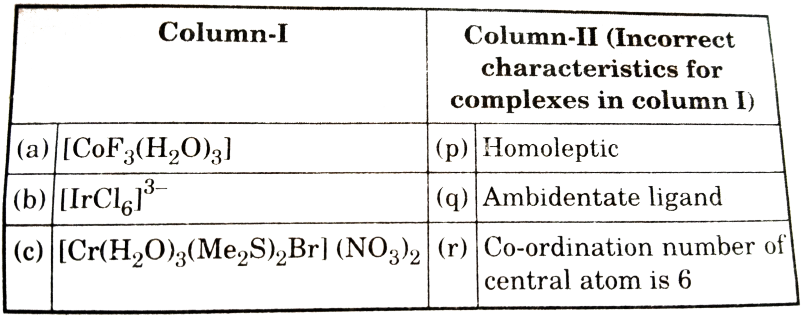
22. Match the following columns



Column-I		Column-II	
(a)	$[Cr(gly)_3]^\circ$	(p)	Inner complex
(b)	$[CoBr_2Cl_2]^{2-}$	(q)	*High spin complex*
(c)	$[Fe(NH_3)_6]^{2+}$	(r)	Optical isomerism
(d)	$Na[PtBrCl(NO_2)(NH_3)]$	(s)	Geometrical isomerism

Watch Video Solution

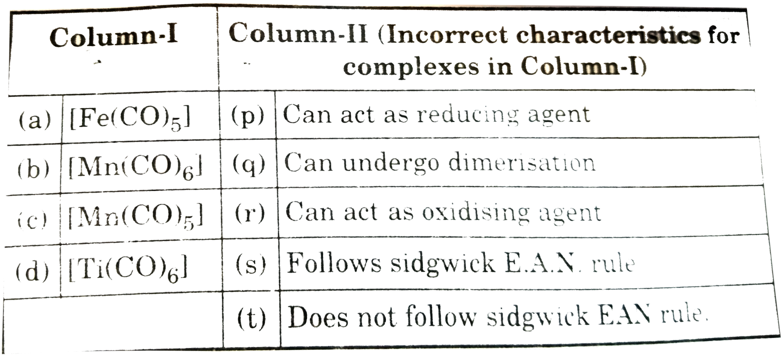
23. Match the following columns



Column-I		Column-II (Incorrect characteristics for complexes in column I)	
(a)	$[CoF_3(H_2O)_3]$	(p)	Homoleptic
(b)	$[IrCl_6]^{3-}$	(q)	Ambidentate ligand
(c)	$[Cr(H_2O)_3(Me_2S)_2Br]\ (NO_3)_2$	(r)	Co-ordination number of central atom is 6

Watch Video Solution

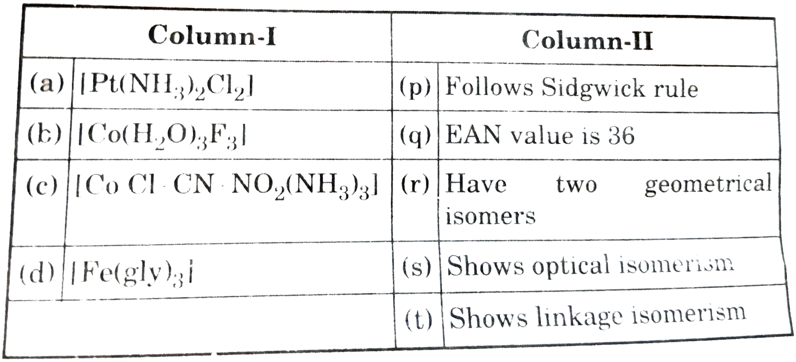
24. Match the following columns



Column-I		Column-II (Incorrect characteristics for complexes in Column-I)	
(a)	$[Fe(CO)_5]$	(p)	Can act as reducing agent
(b)	$[Mn(CO)_6]$	(q)	Can undergo dimerisation
(c)	$[Mn(CO)_5]$	(r)	Can act as oxidising agent
(d)	$[Ti(CO)_6]$	(s)	Follows sidgwick E.A.N. rule
		(t)	Does not follow sidgwick EAN rule.

Watch Video Solution

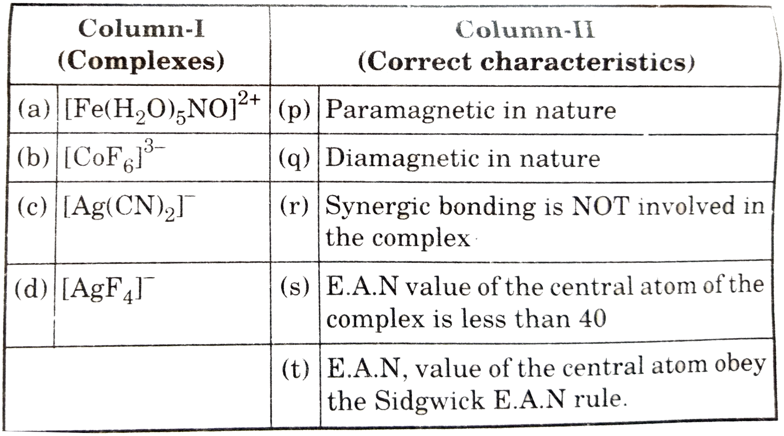
25. Match the following columns



Column-I		Column-II	
(a)	$[Pt(NH_3)_2Cl_2]$	(p)	Follows Sidgwick rule
(b)	$[Co(H_2O)_3F_3]$	(q)	EAN value is 36
(c)	$[Co\ Cl \cdot CN \cdot NO_2(NH_3)_3]$	(r)	Have two geometrical isomers
(d)	$[Fe(gly)_3]$	(s)	Shows optical isomerism
		(t)	Shows linkage isomerism

Watch Video Solution

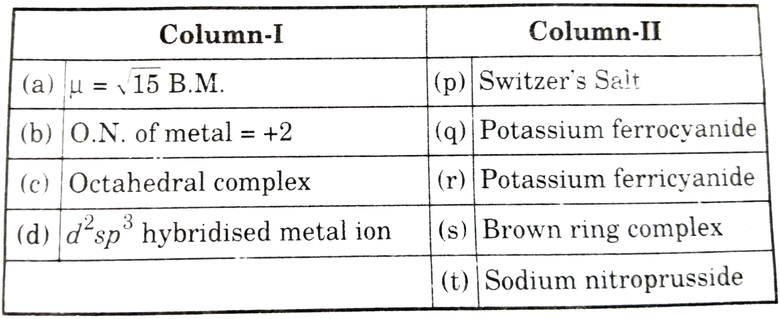
26. Match the following columns



Column-I (Complexes)		Column-II (Correct characteristics)	
(a)	$[Fe(H_2O)_5NO]^{2+}$	(p)	Paramagnetic in nature
(b)	$[CoF_6]^{3-}$	(q)	Diamagnetic in nature
(c)	$[Ag(CN)_2]^-$	(r)	Synergic bonding is NOT involved in the complex
(d)	$[AgF_4]^-$	(s)	E.A.N value of the central atom of the complex is less than 40
		(t)	E.A.N, value of the central atom obey the Sidgwick E.A.N rule.

Watch Video Solution

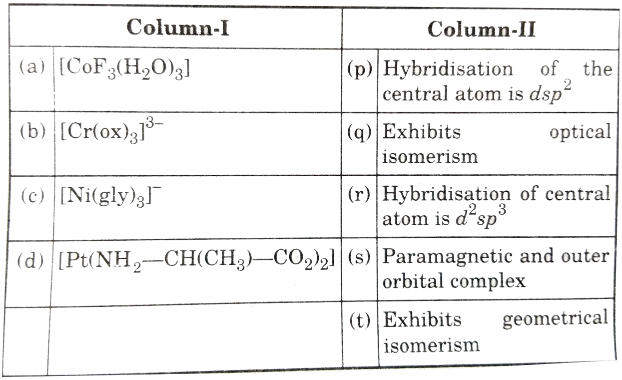
27. Match the following columns



Column-I		Column-II	
(a)	$\mu = \sqrt{15}$ B.M.	(p)	Switzer's Salt
(b)	O.N. of metal = +2	(q)	Potassium ferrocyanide
(c)	Octahedral complex	(r)	Potassium ferricyanide
(d)	d^2sp^3 hybridised metal ion	(s)	Brown ring complex
		(t)	Sodium nitroprusside

Watch Video Solution

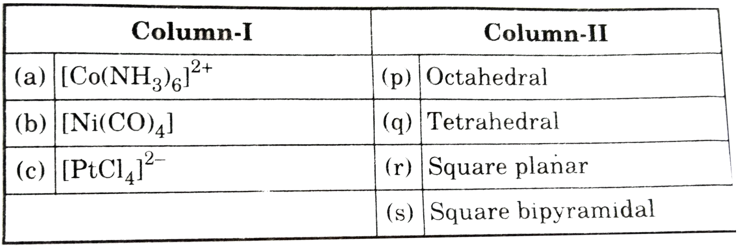
28. Match the following columns



Column-I		Column-II	
(a)	$[CoF_3(H_2O)_3]$	(p)	Hybridisation of the central atom is dsp^2
(b)	$[Cr(ox)_3]^{3-}$	(q)	Exhibits optical isomerism
(c)	$[Ni(gly)_3]^-$	(r)	Hybridisation of central atom is d^2sp^3
(d)	$[Pt(NH_2—CH(CH_3)—CO_2)_2]$	(s)	Paramagnetic and outer orbital complex
		(t)	Exhibits geometrical isomerism

Watch Video Solution

29. Match the following columns



Column-I		Column-II	
(a)	$[Co(NH_3)_6]^{2+}$	(p)	Octahedral
(b)	$[Ni(CO)_4]$	(q)	Tetrahedral
(c)	$[PtCl_4]^{2-}$	(r)	Square planar
		(s)	Square bipyramidal

Watch Video Solution

$$\underset{(X)}{[Ni(H_2O)_6]^{2+}_{(aq)}} + en(aq) \rightarrow \underset{(Y)}{[Ni(H_2O)_4(en)]^{2+}_{(aq)}} + 2H_2O$$

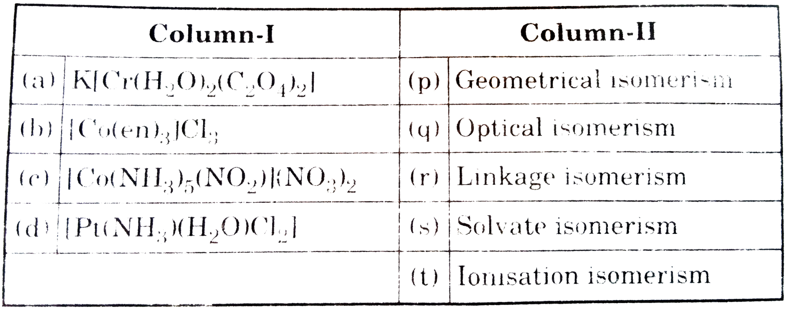
$$[Ni(H_2O)_4(en)]^{2+}_{(aq)} + en(aq) \rightarrow \underset{(Z)}{[Ni(H_2O)_2(en)_2]^{2+}_{(aq)}} + 2H_2O$$

$$[Ni(H_2O)_2(en)_2]^{2+}_{(aq)} + en(aq) \rightarrow \underset{(T)}{[Ni(en)_3]^{2+}_{(aq)}} + 2H_2O$$

30. Match the colours of X, Y, Z, T from the list given

View Text Solution

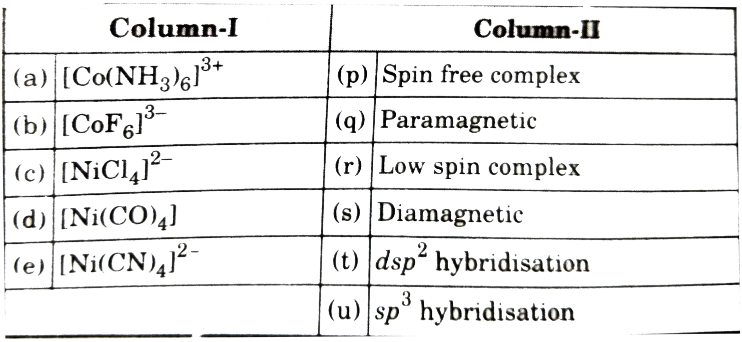
31. Match the following columns



	Column-I		Column-II
(a)	$K[Cr(H_2O)_2(C_2O_4)_2]$	(p)	Geometrical isomerism
(b)	$[Co(en)_3]Cl_3$	(q)	Optical isomerism
(c)	$[Co(NH_3)_5(NO_2)](NO_3)_2$	(r)	Linkage isomerism
(d)	$[Pt(NH_3)(H_2O)Cl_2]$	(s)	Solvate isomerism
		(t)	Ionisation isomerism

Watch Video Solution

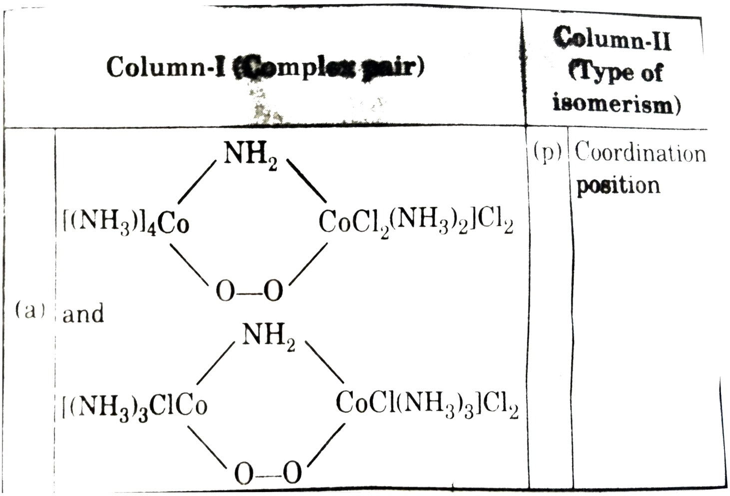
32. Match the following columns



	Column-I		Column-II
(a)	$[Co(NH_3)_6]^{3+}$	(p)	Spin free complex
(b)	$[CoF_6]^{3-}$	(q)	Paramagnetic
(c)	$[NiCl_4]^{2-}$	(r)	Low spin complex
(d)	$[Ni(CO)_4]$	(s)	Diamagnetic
(e)	$[Ni(CN)_4]^{2-}$	(t)	dsp^2 hybridisation
		(u)	sp^3 hybridisation

Watch Video Solution

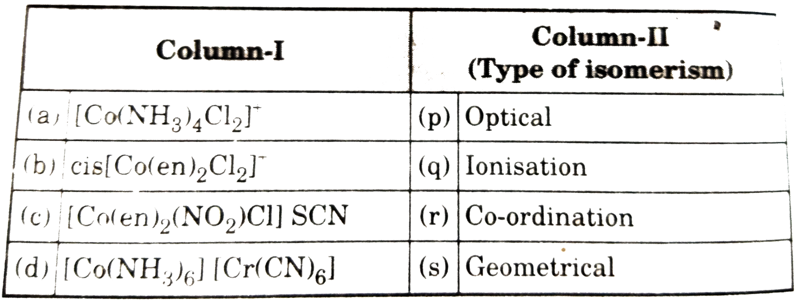
33. Match the following columns



	Column-I (Complex pair)		Column-II (Type of isomerism)
(a)	$[(NH_3)]_4Co$ (bridged by NH_2 and O—O) $CoCl_2(NH_3)_2]Cl_2$ and $[(NH_3)_3ClCo$ (bridged by NH_2 and O—O) $CoCl(NH_3)_3]Cl_2$	(p)	Coordination position

Watch Video Solution

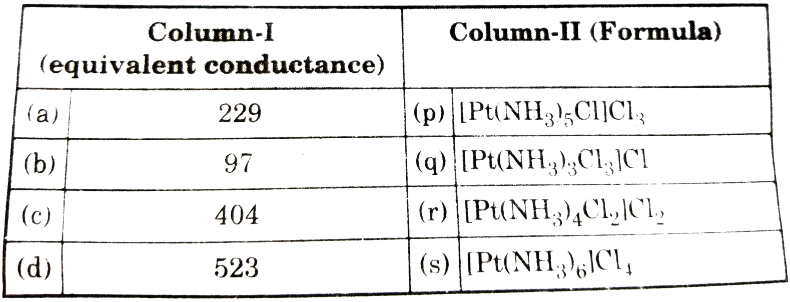
34. Match the following columns



	Column-I		Column-II (Type of isomerism)
(a)	$[Co(NH_3)_4Cl_2]^+$	(p)	Optical
(b)	$cis[Co(en)_2Cl_2]^+$	(q)	Ionisation
(c)	$[Co(en)_2(NO_2)Cl]$ SCN	(r)	Co-ordination
(d)	$[Co(NH_3)_6]$ $[Cr(CN)_6]$	(s)	Geometrical

Watch Video Solution

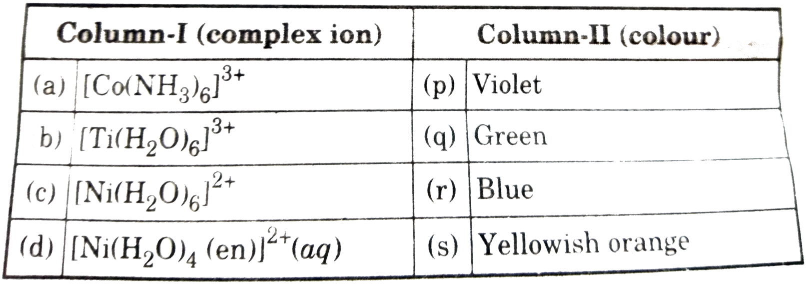
35. Match the following columns



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)	$[Pt(NH_3)_6]Cl_4$

Watch Video Solution

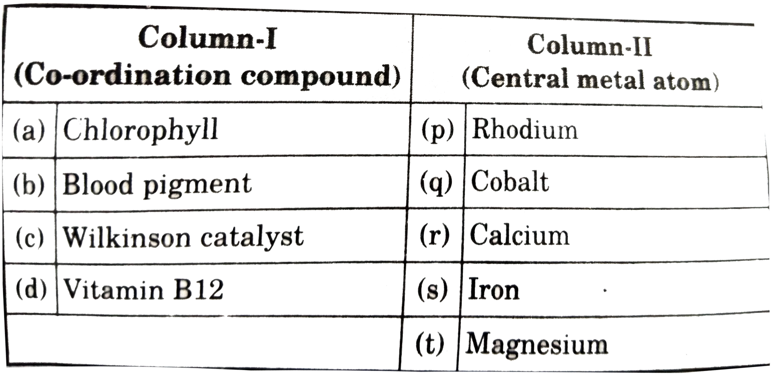
36. Match the following columns



Column-I (complex ion)		Column-II (colour)	
(a)	$[Co(NH_3)_6]^{3+}$	(p)	Violet
b)	$[Ti(H_2O)_6]^{3+}$	(q)	Green
(c)	$[Ni(H_2O)_6]^{2+}$	(r)	Blue
(d)	$[Ni(H_2O)_4(en)]^{2+}(aq)$	(s)	Yellowish orange

Watch Video Solution

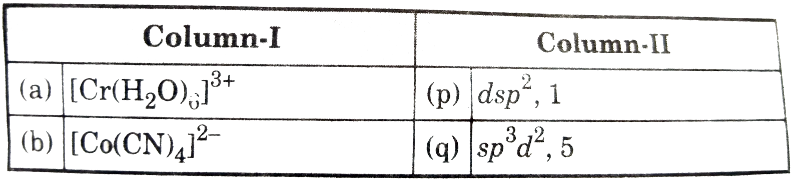
37. Match the following columns



	Column-I (Co-ordination compound)		Column-II (Central metal atom)
(a)	Chlorophyll	(p)	Rhodium
(b)	Blood pigment	(q)	Cobalt
(c)	Wilkinson catalyst	(r)	Calcium
(d)	Vitamin B12	(s)	Iron
		(t)	Magnesium

Watch Video Solution

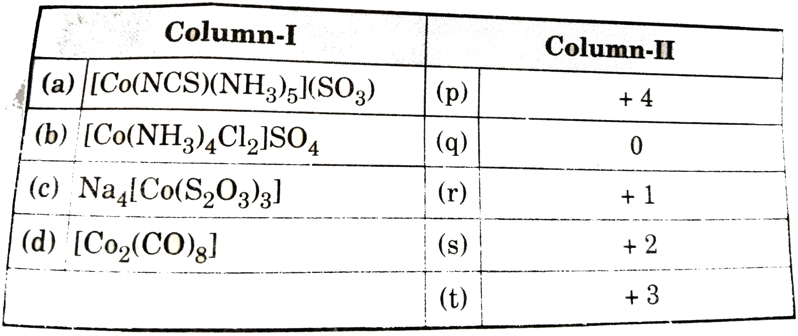
38. Match the complex ions given in Column-I with the hybridisation and number of unpaired electrons given in Column-II :



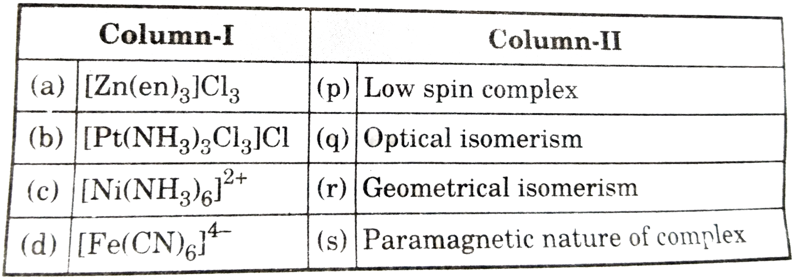
	Column-I		Column-II
(a)	$[Cr(H_2O)_6]^{3+}$	(p)	dsp^2, 1
(b)	$[Co(CN)_4]^{2-}$	(q)	sp^3d^2, 5

Watch Video Solution

39. Match the complex given in Column-I with the oxidation state of cobalt present in it (given in Column_II)



Column-I		Column-II	
(a)	$[Co(NCS)(NH_3)_5](SO_3)$	(p)	+ 4
(b)	$[Co(NH_3)_4Cl_2]SO_4$	(q)	0
(c)	$Na_4[Co(S_2O_3)_3]$	(r)	+ 1
(d)	$[Co_2(CO)_8]$	(s)	+ 2
		(t)	+ 3

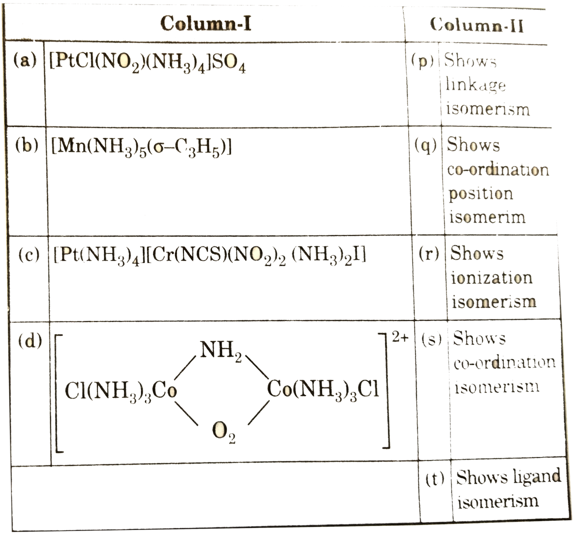


Column-I		Column-II	
(a)	$[Zn(en)_3]Cl_3$	(p)	Low spin complex
(b)	$[Pt(NH_3)_3Cl_3]Cl$	(q)	Optical isomerism
(c)	$[Ni(NH_3)_6]^{2+}$	(r)	Geometrical isomerism
(d)	$[Fe(CN)_6]^{4-}$	(s)	Paramagnetic nature of complex

40.

Note : One to one match only.

41.



	Column-I		Column-II
(a)	$[PtCl(NO_2)(NH_3)_4]SO_4$	(p)	Shows linkage isomerism
(b)	$[Mn(NH_3)_5(\sigma\text{–}C_3H_5)]$	(q)	Shows co-ordination position isomerim
(c)	$[Pt(NH_3)_4][Cr(NCS)(NO_2)_2(NH_3)_2I]$	(r)	Shows ionization isomerism
(d)	$\left[Cl(NH_3)_3Co \overset{NH_2}{\underset{O_2}{\diamond}} Co(NH_3)_3Cl\right]^{2+}$	(s)	Shows co-ordination isomerism
		(t)	Shows ligand isomerism

View Text Solution

SBJECTIVE TYPE

1. Find the total number of optically active compounds in $[Zn(bn)(en)]Cl_2$.

Watch Video Solution

2. Find the total number of ligands which act as π - $aep \rightarrow r$.

$O^2, F^-, CO, CH_3NC, CN^-, CH_3O^-, OH^-, CH_2 = CH_2, NO^+, PF_3, AsF_3$

[If your answer is 2, write your answer is 2, write it as 0002.]

View Text Solution

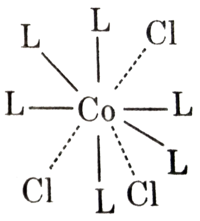
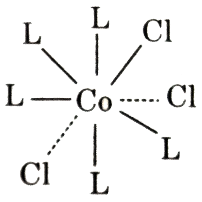
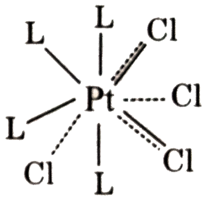
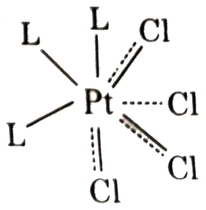
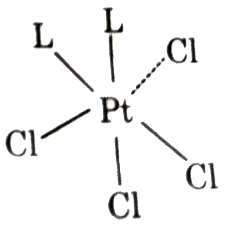
3. How many of the following species would have C-O bond length longer than that of free CO molecule.

$\left[V(CO)_6\right]^-, \left[Ti(CO)_6\right]^{2-}, \left[CO\left(NH_3\right)_3(CO)_3\right]^{3+}, \left[Cr(CO)_6\right], HMn(CO)_5, Mn_2$

[Write your answer as 0003, if it is 3.]

View Text Solution

4. How many of the modern formula are correctly matched with the structures preicted by werner's coordination theory ?

Modern Formula		Werner's structure
(P)	$[Co(NH_3)_6]Cl_3$	 'L' stands for NH_3
(Q)	$[Co(NH_3)_5Cl]Cl_2$	
(R)	$[Pt(NH_3)_4Cl_2]Cl_2$	
(S)	$[Pt(NH_3)_3Cl_3]Cl$	
(T)	$[Pt(NH_3)_2Cl_4]$	

Write your answer as 0004 if your answer is 4.

Watch Video Solution

5. Find the sum of optically active isomers of both $\left[Pt(gly)_2Cl_2\right]$ and $\left[Co(en)_2Cl_2\right]$.

Watch Video Solution

6. Find the total number of diamagnetic complexes.

$K_3\left[Fe(CN)_6\right], \left[Co\left(NH_3\right)_6\right]Cl_3, Na_3\left[Co(Ox)_3\right], \left[Ni\left(H_2O\right)_6\right]Cl_2, K_2\left[Pt(CN)_4\right.$

Watch Video Solution

7. Consider the following complex entities.

$\left[FeF_6\right]^{3-}, \left[Fe\left(H_2O\right)_6\right]^{2+}, \left[Mn(CN)_6\right]^{4-}, \left[Co(gly)_3\right], [Co(EDTA)]^-, \left[Pt\left(NH_3\right.\right.$

If W, X, Y and Z are the total number of diamagnetic, paramagnetic, capable of exhibiting stereoisomerism and coloured complex entities respectively, find WXYZ. If W,X,Y and Z are 2, 4, 3, 6 respectively, write your answer as 2436.

View Text Solution

8. Which of the following is tetrahedral and paramagnetic ?

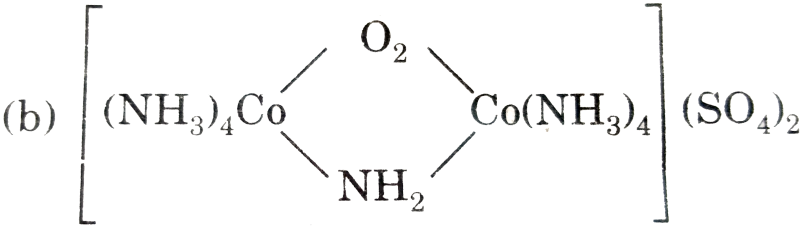
$MnO_4^-, CrO_4^{--}, Cr_2O_7^{2-}, MnO_4^{--}, CIO_4^-, CIO_3^-, NO_2, N_2O_4$

[If your answer is 5 so write 0005.]

Watch Video Solution

9. Find the number of paramagnetic species each central metal ion having $t_{2g}^6 e_g^0$ configuration.

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



(b)

(c) $K_4\left[Fe(CN)_5O_2\right]$

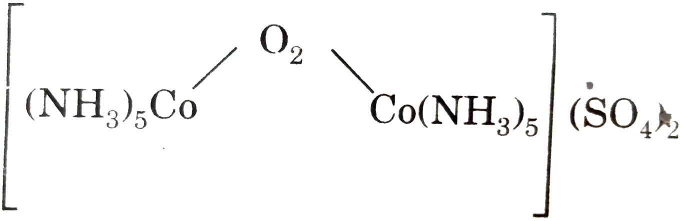
(d) $K_3\left[Co(CN)_5O_2\right]$

$\left[Fe(CN)_5O_2\right]^{-5}$

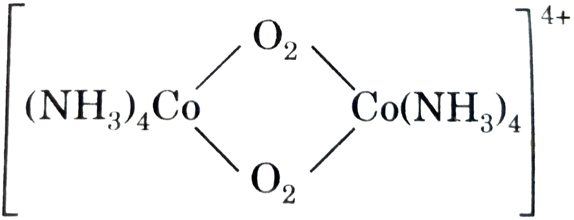
(f) $Na_2[Fe(CN))_5NO^+]$

(g) $K_4\left[Co(CN)_5O_2\right]$

(h)



(i)



(h)

(i)

View Text Solution

10. Which of the following compounds are coloured due to charge transfer ?

$(a)KMnO_4 \quad (b)K_2Cr_2O_7$

$(c)K_2CrO_4 \quad (d)Na_2\left[Fe(CN)_5NO\right]$

$(e)CrO_2Cl_2 \quad (f)K_3\left[VO_4\right]$

$(g)\left[Fe\left(H_2O\right)_5NO\right]SO_4$

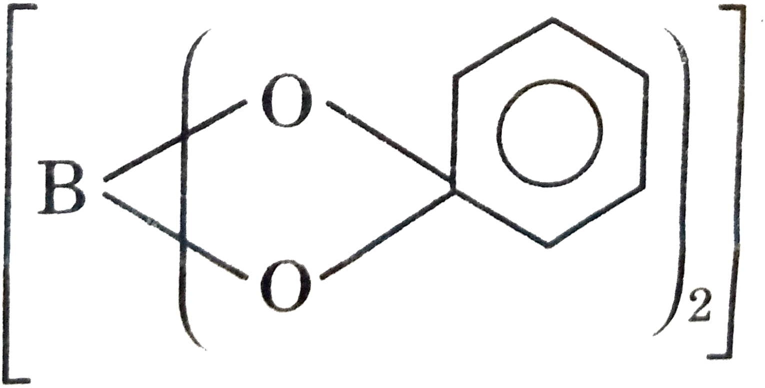
View Text Solution

11. How many compounds are tetrahedral in shape ?

$(a) KMnO_4 \quad (b) K_2Cr_2O_7$

$(c) K_2CrO_4 \quad (d) K_4[Ni(CN)_4]$

$(e) Be(acac)_2$

(f) 

$(g) [Pd(NH_3)(H_2O)(Br)(Cl)]$

$(h) [Pt(acac)_2]$

$(i) [Ni(CO)_4]$

Watch Video Solution

12. $\left[\left(H_2O\right)_8Fe_2(OH)_2\right].\left(SO_4\right)_2$

Calculate the coordination number of central metal, E.A.N., Primary valencies.

[If the coordination number is 4, EAN is 18, Primary valency = 2 than answer is 4182.]

Watch Video Solution

13. Find the number of compound which has four orbitals participating in hybridisation in central atom.

$(a)K_2CrO_4$ $(b)K_2Cr_2O_7$

$(c)KMnO_4$ $(d)K_2MnO_4$

$(e)\left[Ni(CN)_4\right]^{2-}$ $(f)\left[NiCl_4\right]^{2-}$

$(g)\left[PtCl_4\right]^{2-}$ $(h)Na_4P_2O_7$

$(i)H_2S_2O_8$

Watch Video Solution

14. How many of the following has 2.8 B.M. magnetic moment ?

$(a)\left[Ni\left(NH_3\right)_6\right]Cl_2$ $(b)K_4\left[NiCl_6\right]$

$(c)K_3\left[Mn(CN)_6\right]$ $(d)\left[NI(CO)_4\right]$

$(e)\left[Ni(CN)_4\right]^{2-}$ $(f)Hg\left[Co(SCN)_4\right]$

$(g)K_3\left[Fr(CN)_6\right]$

Watch Video Solution

15. Calculate the coordination number and number of stereo isomers of

$\left[Co(gly)NH_3(CO)\left(H_2O\right)Cl\right]Cl_2$

If your answer is 4 and 20 then write 0420.

Watch Video Solution

16. Find the value of $m + n$ in the anionic species $\left[Ti(CO)mp^{n-}\right.$, if it follows E.A.N. rule and complex is octahedral ?

Watch Video Solution

17. Find the number of species having C-O bond length grater than that in free CO molecule.

$Fe(CO)_5, \big(CO_3^{2-}, CO_2, Ni(CO)_4, \big[Cr(dien)(CO)_3\big], \big[Co(CO)_4\big]^-, C_3O_2, H\big[Mn(C$

View Text Solution

18. Consider the complex $\left[Co\left(NH_3\right)_4CO_3\right]ClO_4$, in which coordination number, oxidation number and number of d-electrons on the metal are respectively

Watch Video Solution

19. Select the total number of properties which are correct with respect to

$K_4\left[Fe(CN)_5O_2\right]$ or any of its isomers (d^6 configuration of central metal ion).

(a) Paramagnetic

(b) Inner orbital complex

(c) Low spin complex

(d)$\Delta_0 > P$

(e) Shows optical isomerism

(f) Shows linkage isomerism

Watch Video Solution

20. How many of the following obey's Sidgwick EAN rule ?

$(a)K_4\left[Fe(CN)_6\right], \quad (b)K_3\left[Fe(CN)_6\right],$

$(c)Mn_2(CO)_{10}, \quad (d)\left[Fe\left(H_2O\right)_5NO\right]SO_4,$

$(e)Na_2\left[Fe(CN)_5NO\right], \quad (f)\left[Co_2(CO)_8\right],$

$(g)\left[Fe\left(\pi\text{ - }C_5H_5\right)_2\right]$

Watch Video Solution

21. How many of the following compounds splitting energy (Δ) is greater than pairing energy (P) ?

$(a) Fe(Co)_5$, $(b)\left[Co\left(H_2O\right)_6\right]^{3+}$

$(c)\left[Mn\left(NH_3\right)_6\right]^{2+}$, $(d)\left[Ir\left(H_2O\right)_6\right]^{3+}$

$(e) Na_2\left[Fe(CN)_5NO\right]$, $(f)\left[Ni(CO)_4\right]$,

$(g)\left[PtCl_4\right]^{2-}$ $(h)\left[Co\left(H_2O\right)_3F_3\right]$

Watch Video Solution

22. For what minimum value of n, polymerisation isomers of $\left[Fe\left(NH_3\right)_3\left(NO_2\right)_3\right]_n$ would not exist ?

View Text Solution

23. If the complex $\left[Mo(CO)_4Br\left(CPh_3\right)\right]$ follow 18 electron rule or EAN rule, find the bond order of Mo-C bond .

Watch Video Solution

24. Find the total number of compounds/ions having linear shape.

$\left[Ag(CN)_2\right]^-, HgCl_2, SnCl_2, NO_2^{+1}, ClO_2^+, AuCl_2^-, Hg_2Cl_2$

Watch Video Solution

25. Find the total number of diastereomers of the complex $M_{a_2b_2c_2}$ where M is the central metal atom/ion and a, b, c are monodentate achiral ligands.

View Text Solution

26. Find the number of complexes involving d^2sp^3 hybridisation of the cental metla atom/ion.

$(a)\left[Co(Ox)_3\right]^{3-}, \quad (b)\left[Mn(CN)_6\right]^{4-},$

$(c)\left[Mn\left(NH_3\right)_6\right]^{2+}, \quad (d)\left[CoF_6\right]^{3-},$

$(e)\left[Co(gly)_3\right], \quad (f)\left[Pt\left(NH_3\right)_6\right]^{4+},$

$(g)\left[Ni\left(H_2O\right)_6\right]^{2+}, \quad (h)\left[Co\left(H_2O\right)_6\right]^{3+},$

$(i)\left[IrCl_6\right]^{3-}$

Watch Video Solution

27. Find the total number of compounds or ions having O-O bond longer than that in free O_2 molecule.

$(a)Na_2O_2, \quad (b)KO_2,$

$(c)\left[\overset{v}{Cr}\left(O_2\right)_4\right]^{3-}, \quad (d)\left[\overset{VI}{Cr}O\left(O_2\right)_2\left(H_2O\right)\right],$

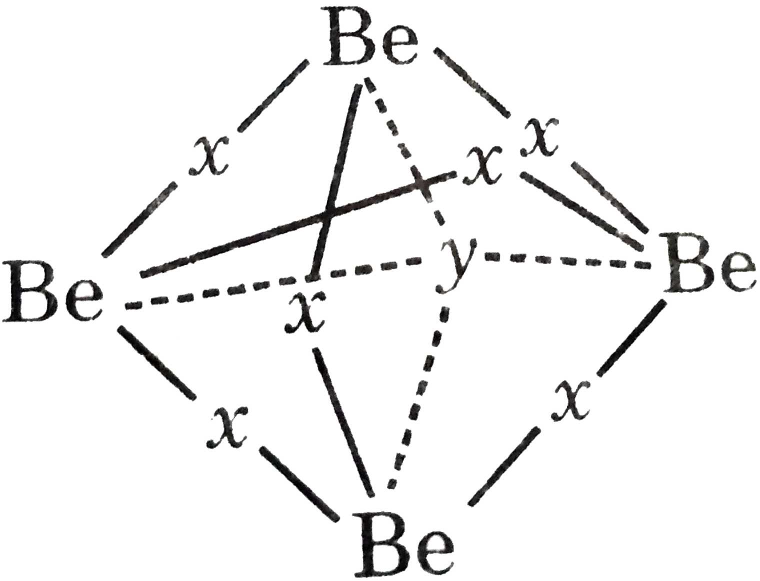
$(e)\left[CrO_5(Py)\right], \quad (f)\left[\overset{III}{Cr}\left(O_2\right)(CN)_5\right]^{3-},$

$(g)Na_2ZnO_2$

View Text Solution

28. Find the total number of Fe-Fe bonds in $Fe_3(CO)_{12}$ if it follows EAN rule.

Watch Video Solution



29.

Find the number of$Be - \vec{y} - Be$ bond angles(s) in above structure.

Watch Video Solution

30. How many of the following are square palanar?

(a) $Ni(dmg)_2$ (b)$\left[Ni(CN)_4\right]^{2-}$

(c)$\left[Ni(CN)_4\right]^{4-}$ (d)$\left[Ni(CO)_4\right]$

(e) $\left[Ni(Cl)_4\right]^{2-}$ (f)$K_2Cr_2O_7$

(g) K_2CrO_4 (h)$KMnO_4$

(i)K_2MnO_4 (j)CrO_2Cl_2

Watch Video Solution

31. Consider the complex $\left[Pt\left(S_5\right)_3\right]^{2-}$. If x, y and z are the number of chelates, number of optically active isomers and number of geometrical iosmers respectively, find the value of $(x+y+z)$:

Watch Video Solution

32. Find the total number of complexes / species which are paramagnetic.

(a)$\left[Co\left(NH_3\right)_6\right]^{3+}$, (b)$\left[Co\left(H_2O\right)_6\right]^{3+}$,

(c)$\left[Cr\left(NH_3\right)_6\right]^{2+}$, (d)$\left[CoF_6\right]^{3-}$,

(e)$K_3\left[PtCl_3\left(C_2H_4\right)\right]$, (f)$\left[Mn\left(NH_3\right)_6\right]^{2+}$,

(g)$\left[Fe\left(NH_3\right)_6\right]^{2+}$, (h)$NO_2$,

(i)ClO_2, (j)$\left[Pt\left(NH_3\right)_2Cl_2\right.$

Watch Video Solution

33. A symmetricla bridged complex cation made of $Co(III), NH_3$ molecules and oxygen (in the proper ligands form) is found to contain the following mass composition [Atomic mass of Co=59]

Co=36.875%, $NH_3 = 53.125\%$, O=10%

The complex cation exists in three ionic forms with cationic charges A : $(n+), B(n-1)^+$ and $C:(n-2)^+$ such that O-O bond length in all of them is found to be more than that in $O_2[Ptf_6]$. Calculate the value of $n, (n-1)$ and $(n-2)$.

View Text Solution

34. In sodium nitroprusside the oxidation number, coordination number and EAN of iron are respectively.

[If your answer is 1, 2, 24 then write the answer as 1224]

Watch Video Solution

35. Give the co-ordination number of La in the compound $Na\left[LaEDTA\left(H_2O\right)_4\right].3H_2O$ (Here $EDTA^{4-}$ shows it's maximum denticity.)

Watch Video Solution

36. Find the number of molecules in which π - *donation* is present between metal and any ligand $Cr\left(C_6H_6\right)_2$, $K\left[PtCl_3\left(C_2H_4\right)\right]$, RMgX, R_2Zn, cis-platin.

View Text Solution

37. Oxidation number of the central iron atom in the complex $Fe_4\left[Fe(CN)_6\right]_3$ is.

Watch Video Solution

38. Find the EAN value of cetral atom of ferrocene $\left[Fe\left(\pi - C_5H_5\right)_2\right]$

Watch Video Solution

39. If EAN of central metal ion X^{2+} in a non-chelating complex is 34 and atomic number of X is 28. Find out the number of monodentate ligands in compelx.

Watch Video Solution

40. Find the change of EAN values when the complex (A) is changing into (B)

$$\underset{(A)}{Na_2\left[Fe(CN)_5NO\right]} + Na_2S \rightarrow \underset{(B)}{Na_4\left[Fe(CN)_5NOS\right]}$$

Watch Video Solution

41. Calculate the value of E.A.N of metal cation in $\left[Cu\left(NH_3\right)_4\right]SO_4$ complex

Watch Video Solution

42. What is the difference between the EAN value of $\left[Fe(CO)_5\right]$ and $\left[Fe(CO)_2(NO)_2\right]$

Watch Video Solution

43. What is the difference between the EAN value of central metla ion in $Na_2\left[Fe(CN)_5NO\right]$ and $\left[Fe\left(H_2O\right)_5NO\right]SO_4$

Watch Video Solution

44. Find the difference in the EAN value, if the NO ligand is considered as netural and if NO ligand is considered as positive ligand in $\left[Fe\left(H_2O\right)_5NO\right]SO_4$ complex

Watch Video Solution

45. Find the number of complexes following sidgwick EAN rule :

$\left[Ag(CN)_2^-,\quad \left[HgI_4\right]^{2-},$

$\left[Ti(CO)_6\right]^{2-},\quad \left[Ti\left(\sigma - C_5H_5\right)_2\left(\pi - C_5H_5\right)_2\right]^{\circ},$

$\left[Fe(CN)_6NO\right]^{2-}$

Watch Video Solution

46. If EAN of metal is 36 in

$\left[M(CO)_2\left(\sigma - C_5H_5\right)\left(\pi - C_5H_5\right)\right]$

Find the atomic number of metal M

Watch Video Solution

47. Find number of Co-N linkage in pentaammine cobalt(III)-mu-amidodiamminetriaquacobalt(III) chloride.

Watch Video Solution

48. Write simplest ratio of $Co^{3+} : NH_3 : NO_2^-$ in : tetraamminedintrito

N-cobalt(III)diamminetrtranitrito-N-cobaltate(III)

Watch Video Solution

49. How many moles of ions (cation and anion) are present in 1 mole of

Diamminediaquadipyridineiron(II)sulphate

Watch Video Solution

50. Find the total number of stereoisomers of $\left[M(gly)_3\right]$

[Where M is any metal capable of forming such complexes.]`

Watch Video Solution

51. Find the number of diamagnetic complexes which show geometrical

isomerism :

$(a)\left[NiF_6\right]^{2-}$, $(b)\left[Pt\left(NH_3\right)_2Cl_2\right]$,

$(c)\left[CoF_3\left(H_2O\right)\right]$, $(d)\left[Fe(en)_2Cl_2\right]Cl$,

$(e)\left[Ni\left(NH_3\right)_2Cl_2\right]$, $(f)\left[Ni\left(PPh_3\right)_2Cl_2\right]$

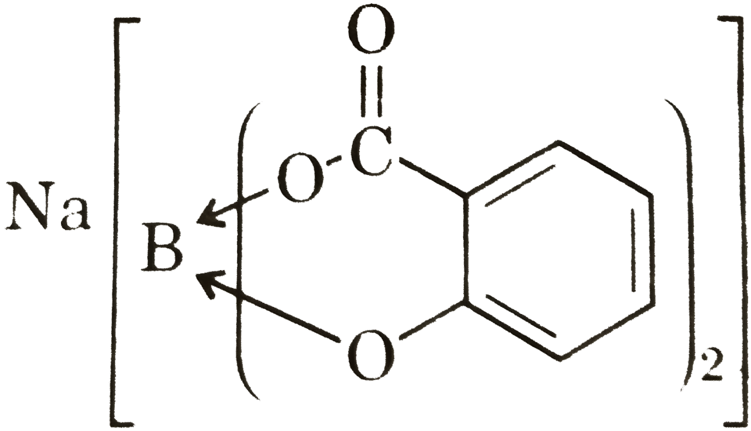
Watch Video Solution

52. Among the following, total number of species is/are existing as optically inactive form :

$(a)\left[Fe(en)_3\right]Cl_3$,

$(b)\left[RhCl\left(PPh_3\right)(CO)\left(H_2O\right)\right]$,

$(c)\left[Pd(en)Cl_2\right]$,



(d)

Watch Video Solution

53. Consider the complexes

$(P)\left[Fe(Cl)(F)(CN)\left(H_2O\right)(en)\right]$

$(Q)\left[MoCl_2F_2(gly)\right]^{2-}$

these are having number for optically active isomers a and b respectively then a-b is :

Watch Video Solution

54. In the given following complex compound / ions, how many exist in enantiomeric form ?

$\left[Pt\left(NH_3\right)_3Cl_3\right]^{+}$ $\left[Co\left(NH_3\right)_2\left(H_2O\right)_2Cl_2\right]^{+}$

$\left[Cr\left(H_2O\right)_3BrClI\right]$, $\left[Pt(en)_2Cl_2\right]^{2+}$,

$\left[Cr(bipy)_2BrCl\right]^{+}$, $[Fe(edta)]^{-}$

View Text Solution

55. $\frac{1}{4}\left[Li_{CH_3} - (4)\right] + \left[Mo(CO)_6\right] \rightarrow [X]$

Here X is Lithium acetylpentacarbonyllmolybdate(1-), then find the total number of Mo-C linkages in the complex X

Watch Video Solution

56. Find the total number of geometrical iosmers of $[M(AB)(CD)(EF)]^{n+}$

Watch Video Solution

57. Find the number of geometrical isomer of Ma_2bcde which have identical ligands at maximum distance. (a, b, c, d and e are monodentate ligand)

Watch Video Solution

58. Find the maximum number of atoms in one plane in $\left[Fe(CN)_6\right]^{3-}$

Watch Video Solution

59. Find the number of unpaired electrons in e_g orbital of Fe in $K_4\left[Fe(CN)_6\right]$

Watch Video Solution

60. Find the number of unpaired electrons in Pentaaquanitrosyliumiron(I) sulphate.

Watch Video Solution

61. Find the change in magnetic moment when $\left[Ni\left(H_2O\right)_6\right]^{2+}$ is converted into $\left[Ni\left(NH_3\right)_6\right]^{2+}$

Watch Video Solution

62. How many non-axial d-orbitals are involved in hybridisation of CrO_2Cl_2?

Watch Video Solution

63. On the basis of the following observations made with aqueous solutions, how many of them have 6 secondary valencies ?

Formula	Moles of AgCl precipitated per mole of the compounds with exce
$(a) PdCl_2.4NH_3$	2
$(b) NiCl_2.6H_2O$	2
$(c) PtCl_4.2HCl$	0
$(d) CoCl_3.4NH_3$	1
$(e) PtCl_2.2NH_3$	0

Watch Video Solution

64. On 100% dissociation of the compound $K_4Fe(CN)_6$, the total number of ions produced will be

Watch Video Solution

65. Amongst the following complexes, (mentioned without any charge) how many of them are expected to have a $+vely$ charged counter ion ?

$(a)[PtCl_6]$ $(b)[Ni(NH_3)_4]$

$(c)[Fe(C_2O_4)_3]$ $(d)[Co(en)_3]$

$(e)[Fe(CN)_6]$ $(f)[PtCl_4]$

$(g)[Ni(CO)_4]$ $(h)[Co(NH_3)_6]$

$(i)[Cu(CN)_4]$

Watch Video Solution

66. Amongst the following complexes, find the number of complexes having oxidation number of central atom as $+3$. Let's say it is equal to x. Similarly find the number of complexes having oxidation number of central atom as $+2$. Let's say it is equal to y. All other complexes number equal to z :

$[Co(NH_3)_{94})(H_2O)Cl]Cl_2,$ $K_2[Zn(OH)_4],$

$K_3\left[Al\left(C_2O_4\right)_3\right]$ $\left[CoCl_2(en)_2\right]^+$,

$\left[Ni(CO)_4\right]$, $\left[Pt\left(NH_3\right)_2Cl\left(NO_2\right)\right]$,

$K_3\left[Cr\left(C_2O_4\right)_3\right]$, $\left[CoCl_2(en)_2\right]Cl$,

$\left[Co\left(NH_3\right)_5\left(CO_3\right)\right]Cl$, $Hg\left[Co(SCN)_4\right.$,

$\left[Cr\left(NH_3\right)_3\left(H_2O\right)_3\right]Cl_3$,

$\left[Co\left(NH_2CH_2CH_2NH_2\right)_3\right]_2\left(SO_4\right)_3$,

$\left[Ag\left(NH_3\right)_2\right]\left[Ag(CN)_2\right]$, $K_3\left[Fe(CN)_6\right]$,

$K_2\left[PdCl_4\right]$, $\left[Pt\left(NH_3\right)_2Cl\left(NH_2CH_3\right)\right]Cl$,

$K_2\left[Ni(CN)_4\right]$, $\left[Cr(en)_3\right]Cl_3$,

$Fe_4\left[Fe(CN)_6\right]_3$

Hence, find the value of $x - y + z$

View Text Solution

67. How many of the following complexes are expected to have d^2sp^3 hybridisation ?

$\left[Mn(CN)_6\right]^{3-}$, $\left[MnCl_6\right]^{3-}$,

$\left[Fe(CN)_6\right]^{3-}$, $\left[FeF_6\right]^{3-}$, $\left[CoF_6\right]^{3-}$,

$\left[Co\left(C_2O_4\right)_3\right]^{3-}$, $\left[MnBr_4\right]^{2-}$

Watch Video Solution

68. Write all the geometrical isomers of $\left[Pt\left(NH_3\right)(Br)(Cl)(py)\right]$ and how many of these will exhibit optical isomers?

Watch Video Solution

69. Estimate the numbers for the central metal ion :

(a) Oxidation state in $\left[Mn\left(H_2O\right)_6\right]SO_4 = x$

(b) d-orbitals occupation in *cis* - $\left[Cr(en)_2Cl_2\right]Cl = y$(if d^8 then y=8)

(c) Co-ordination number in $K_3\left[Co\left(C_2O_4\right)_3\right] = z$

(d) Spin multiplicity in $Cs\left[FeCl_4\right] = t$

Hence, find the value of z - $(x \times y) + t$

Watch Video Solution

70. Find the total stereoisomes for :

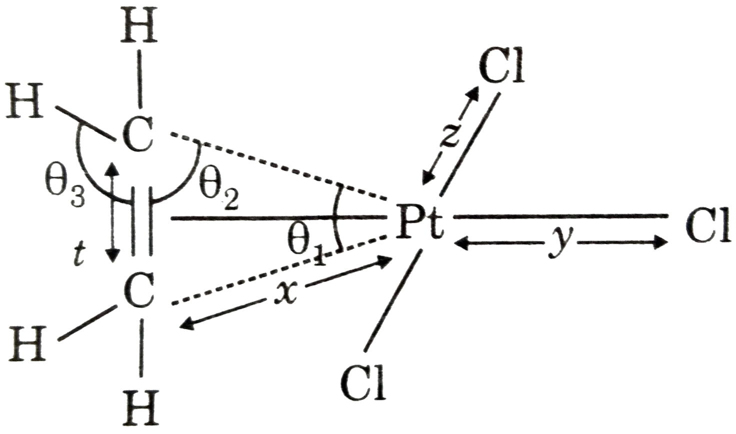
(a) $\left[Cr\left(C_2O_4\right)_3\right]^{3-} = x$

(b) $\left[PtCl_2(en)_2\right]^{2+} = y$

(c) $\left[Cr\left(NH_3\right)_2Cl_2(en)\right]^{+} = z$

Hence write the value of $x + y + z$

Watch Video Solution



71.

Here, θ_1, θ_2 and θ_3 are bond angles, x, y, z, t are bond lengths in ZEISE'S Salt.

Write the number of correct relationships

$(a) y < z \quad (b) x > z$

$(c) x > y \quad (d) t < y$

$(e) \theta_1 < \theta_2 \quad (f) \theta_3 > \theta_2$

$(g) x = y = z \quad (h) \theta_1 = \theta_2$

View Text Solution

72. Find the number of complexes which satisfy at least three of the following four conditions :

(a) Primary valence=3

Secondary valence=6

Oxidation number of central atom $< +3$

Number of ions per molecule > 3

$I. \left[Pt\left(NH_3\right)_4\right]\left[PtCl_6\right], \quad II. \left[Co\left(NH_3\right)_6\right]Cl_3,$

$III. \left[Co\left(NH_3\right)_5\left(OH_2\right)\right]Cl_3, \quad IV. \left[Pt\left(NH_3\right)_6\right]Cl_4,$

$V. K\left[PtCl_5\left(NH_3\right)\right], \quad VI. \left[CoCl_2, (en)_2\right]^+,$

$VII. \left[Ni(CO)_4\right], \quad VII. [Co(EDTA)]^-$

Watch Video Solution

73. Choose the number of correct statements.

(a) Measurement of molar conductivity was utilized by Werner to characteris the cobalt (III)-ammine compounds.

(b) The neutral ligands can only satisfy the secondary valence but the anions may satisfy both the primary and secondary valencies.

(c) The secondary valencies are directional to provide the specific geometry of a complex but the primary valencies have nothing to do with the goemetry of coordination compounds.

(d) The oxyanions, aminopoly carboxylates, cysteine, histidine etc. can show the flexidentate character.

(e) The concept of co-ordination number in co-ordination compounds is different from that in the ionic solids .

(f) In determining the co-ordination number in co-ordination compounds, the number of π - $bondsf$ or $medbylig$ and $swithm\eta lcentrehasnoro \le . (g)O \le f \in scanact \perp ha$

mu-$bondisaspecialtypeof$sigma-bond`

View Text Solution

View Text Solution

74. Choose the number of correct statements.

(a) The π - acid ligands can stabilize the low oxidation states of metals.

(b) In the chelating ring produced by acac ligand, pseudo-aromaticity is maintained.

The Flexidentate character of EDTA largely depends on pH.

(d) M-SCN linkage is bent while M-NCS linkage is linear.

(e) Ambidentate character of a peptide linkage mainly depends on pH.

(f) Dioxygen $\left(O_2\right.$, dinitrogen $\left(N_2\right)$ can act as π - acid ligands.

(g) Ag(SCN) (solid) form a polymeric zig-zag chain.

(h) Dithiooxalate and thiosulphate can produce the linkage isomers.

(i) For $\left[PtCl_2\left(PR_3\right)_2\right]$, the trans-isomer shows 0 (zero) dipole moment but for $\left[PtCl_2\left(Et_2S\right)_2\right.$, the trans isomer shows a non-zero dipole moment.

View Text Solution

75. Find the difference in the EAN of the complexes $\left[Fe(CN)_6\right]^{3-}$ and $\left[CuCl_2\right]^{-}$

Watch Video Solution

76. Among the ligands :

$\eta^2 - C_2H_4, \eta^5 - C_5H_5^-, \eta^1 - C_5H_5^-, \eta^3 - C_5H_5^-, \eta^3 - C_3H_5^-, \eta^1 - C_4H_6, \eta^7 - C_7H_7^+,$

The number of species which are :

$2e^-$ donors=x

$4e^-$ donors=y

$6e^-$ donors=z

Find the value of $2x - y + z$.

View Text Solution

77. Total stereoisomers of $\left[Cu(gly)_2\left(OH_2\right)_2\right]$ are :

Watch Video Solution

78. Total stereoisomers of $\left[Co\left(N_2O_4\right)\right]^-$ are :

Watch Video Solution

79. Number of optically active isomers of compound $\left[M(AB)b_2c_2\right]^{\pm n}$

Watch Video Solution

80. From given compounds how many have tetrahedral shape, not sp^(3) hybridised and coloured W.r.t. underline atoms.

$MnO_4^-, Cr_2O_7^{2-}, VO_4^{3-}, \left[Fe\left(H_2O\right)_5NO\right]^{+2}, CrO_2Cl_2$

Watch Video Solution

81. Consider the diamagnetic complex $\left[M(en)_3\right]\left(ClO_4\right)_{30}$, Where M is a first row transition metal except Sc. Find the value of $x + y$ of M in above complex.

If

x=oxidation state

y= number of d electrons present

Watch Video Solution

82. Find the total number of ions which form paramagnetic complex irrespective of nature of ligand in octahedral geometry. (C.N. = 6)

$Sc^{+3}, Ti^{3=}, Cr^{+3}, Pt^{+4}, Ni^{+2}, Co^{+3}, Fe^{+3}$

Watch Video Solution

83. In how many of the following compounds 'd' orbital (which contains no nodal plane) is used in hybridisation of central atom/ion ?

$Fe(CO)_5, \quad MnO_4^-, \quad Co\left(C_2O_4\right)_3^{-3},$

$NiCl_2\left(PPh_3\right)_2, \quad PtCl_4^{2-}, \quad Ni(CN)_4^{-2},$

$Ni(CN)_4^{-4}$

Watch Video Solution

84. In octahedral complex Ma_2b_2cd, total number of steroisomers is

Watch Video Solution

85. Total number of optically active isomers in $\left[Pt\left(NH_3\right)\left(H_2O\right)BrClIPy\right]^+$ when NH_3 and H_2O are in trans position (opposite to each other)

Watch Video Solution

86. Determine the difference between exhangeable pair for high spin and low spin d^6 ions in an octahedral complex.

Watch Video Solution

87. Total number of ligand(s) which forms five membered ring and also contains chiral centre(s).

$pn, en, tn, bn, DMG^{-1}, acac^{-1}, nta^{-3}$

Watch Video Solution

88. Find the number of ions which have higher splitting energy value than the Mn^{+2} in octahedral complex considering same ligands for all ions.

$Cr^{+2}, V^{+2}, Fe^{+2}, Co^{+2}, Ni^{+2}, Cu^{+2}$

Watch Video Solution

89. Find the number of correct statements ?

(a) Pd(II) and Pt(II) form mostly the 4-coordination, square planar, diamagnetic co-ordination entities.

(b) The free ions Pd^{+2}, Pt^{+2} and Ni^{+2} are paramagnetic in ground states.

(c) Octahedral $\left[Co\left(H_2O\right)_6\right]^{+2}$ is pink, that of tetrahedral $\left[CoCl_4\right]^{2-}$ is blue

(d) $\Delta_0 = \frac{4}{9}\Delta_t$

(e) If a multidentate ligand happens to be cyclic and there are no unfavourable steric effects a further increase in stability occurs. This is termed as macrocyclic effect.

View Text Solution

90. Find the number of complexes which follow sidgwick rule of EAN

$\left[Fe(CO)_5\right]$, $\left[Mn(CO)_5\right]$, $\left[NiCl_4\right]^{2-}$,

$\left[Pt\left(NH_3\right)_4Cl_2\right]^{2+}$, $\left[HgI_4\right]^{2-}$, $H\left[AuCl_4\right]$

Atomic number : Fe = 26, Mn = 25, Ni = 28, Pt = 78, Hg = 80, Au = 79

Watch Video Solution

91. The maximum number of N-Co-O bond angle in $\left[Co\left(gly_3\right)\right]^{\circ}$ is :

Watch Video Solution

Watch Video Solution

92. Find the number of ligands which behave prediminantly as π - donor ligand (as wel as non-classical ligand)

$C_2H_4, C_6H_6, NO^+, NO, CO, NH_3, NH_2^-, H_2O, OH^-$

View Text Solution

93. Find the number of complexes in which stability constant value is greater than the stability constant value of $\left[FeF_6\right]^{3-}$

$\left[Fe(CN)_6\right]^{3-}, \quad \left[Fe(\mathrm{ox})_3\right]^{3-},$

$\left[Fe\left(NH_3\right)_6\right]^{3+}, \quad \left[Fe\left(H_2O\right)_6\right]^{3+},$

$\left[Fe(en)_3\right]^{3+}$

Watch Video Solution

94. If we replace all the fuoride and water ligands from $\left[CoF_3\left(H_2O\right)_3\right]$ by oxalate ligand without changing the oxidation state and co-ordination number of central metal atom or ion, then, predict which of the following value increases in the newly formed complex.

(a) Δ_0

(b) Number of t_{2g} electrons

(c) Number of e_g electrons

(d) Number of stereo isomers

(e) Number of geometrical isomers,

(f) EAN value

View Text Solution

95. Find the number of compounds where $d_{x^2-y^2}$ orbitals will not take part in hybridisation.

$(a)\left[Pt\left(NH_3\right)Cl\left(H_2O\right)Br\right]$ $(b)\left[XeO_3F_2\right]$

$(c)\left[Cu\left(NH_3\right)_4\right]^{2+}$ $(d)\left[\mathrm{XeO}_3F_2\right]$

$(e)\left[\mathrm{XeO}_2F_2\right]$ $(f)\left[Co(en)_3\right]^{3+}$

$(g)\left[Fe(CO)_5\right]$ $(h)POCl_3$

$(i)XeF_4$ $(j)XeO_6^{4-}$

Watch Video Solution

96. Find the number of complex(es) which have at least one five member chelate ring formed by two carbon atoms, two nitrogen atoms and one central metal.

$(a)[Co(EDTA)]^{-}$ $(b)\left[Co(en)_3\right]^{3+}$

$(c)\left[Co(Gly)_3\right]^{0}$ $(d)\left[Co(bipy)_3\right]^{+3}$

$(e)\left[Co(oxalate)_3\right]^{-3}$ $(f)\left[Co(dien)\left(NH_3\right)_3\right]^{+3}$

Watch Video Solution

97. Among the following, total number of planar molecule(s)/ions are :

$\left[PtCl_4\right]^{2-}$, $\left[Ni\left(NH_3\right)_6\right]^{2+}$, ICI_4^{-},

$\left[NiCl_4\right]^{2-}$, $\left[AgF_4\right]^{-}$,

SF_4

Watch Video Solution

98. Find the total number of compounds having equal all bond lengths equal :

$PCl_5, PF_5, SF_4, XeF_2, XeF_4, XeF_6, SF_6, ClF_3, BrF_5, Ni(CO)_4, IF_7$

Watch Video Solution