



CHEMISTRY

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

COORDINATION COMPOUNDS

Example

1. 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

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

A. 4

B. 5

C. 6

D. 8

Answer: C

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3. The magnetic moment of $[CoF_6]^{3-}$ by using CFT is

A. 0

B. 4.9

C. 5.9

D. 1.73

Answer: B



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

A. $-1.8\Delta_0$

B. $-1.2\Delta_0$

C. $-1.6\Delta_0$

D. $-0.8\Delta_0$

Answer: D

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Exercise 1

1. The coordination number of $\text{Co in } [\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$ is

A. 2

B. 5

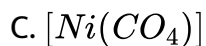
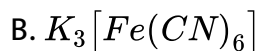
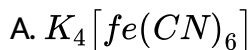
C. 6

D. 1

Answer: C

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2. A complex compound in which the oxidation number of a metal is zero , is



Answer: C

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3. The oxidation state of Cr in $[Cr(NH_3)_4Cl_2]^+$ is:

A. 0

B. +1

C. +2

D. +3

Answer: D

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4. In the complex ion $[Co(NH_3)_6]^{3+}$, the NH_3 molecules are linked to the central metal ion by

- A. ionic bonds
- B. covalent bonds
- C. coordinate bonds
- D. hydrogen bonds

Answer: C

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5. The oxidation state of Fe in brown complex $[Fe(H_2O)_5NO]SO_4$ is

A. +3

B. 0

C. +2

D. +1

Answer: D

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6. The number of unidentate ligands in the complex ion is called

A. oxidation number

B. primary valency

C. coordination number

D. EAN

Answer: C

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7. The denticity of the ligand $N(CH_2CH_2NH_2)_3$ is

- A. tridentate
- B. pentadentate
- C. tetradentate
- D. bidentate

Answer: C

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8. How many ions are produced from $[Co(NH_3)_6]Cl_3$ in solution ?

A. 6

B. 4

C. 3

D. 2

Answer: B

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9. The name of the ring structure complex compound formed between metal ion and polydentate ligand is

A. simple complex

B. chelate complex

C. polynuclear complex

D. none of these

Answer: B



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10. The primary and secondary valencies of chromium in the complex ion, dichlorodioxalatochromium (III), are respectively

A. 3,4

B. 4,3

C. 3,6

D. 6,3

Answer: C



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11. Potassium ferrocyanide is a

A. complex salt

B. double salt

C. normal salt

D. mixed salt

Answer: A

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12. EDTA has coordination number

A. 3

B. 4

C. 5

D. 6

Answer: D

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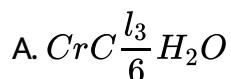
13. Ligands are

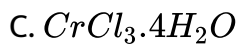
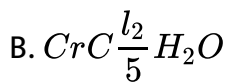
- A. the ions bound to the central atom/ion the coordination entity
- B. the molecules bound to the central atom/ion in the coordination entity
- C. Lewis acids
- D. both (a) and (b)

Answer: D

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14. Which complex gives three chloride ions per formula unit ?



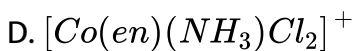
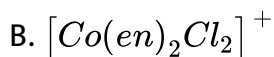
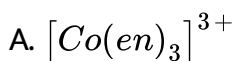


D. All of these

Answer: A

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



Answer: C

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16. The ionisation isomer of $[Cr(H_2O)_4Cl(NO_2)]Cl$

- A. $[Cr(H_2O)_4(O_2N)]Cl_2$
- B. $Cr(H_2O)_4Cl_2]NO_2$
- C. $[Cr(H_2O)_4Cl(ONO)]Cl$
- D. $[Cr(H_2O)_4Cl_2(NO_2)] \cdot H_2O$

Answer: B

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17. The IUPAC name of $[Co(NH_3)_5ONO]^{2+}$ ion is

- A. pentamminenitrito cobalt (IV) ion
- B. pentamminenitro cobalt (III) ion

C. pentamminenitrito cobalt (III) ion

D. pentamminenitro cobalt (IV) ion

Answer: C

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18. The possible number of the stereo isomers in $[Cr(en)_2Cl_2]^{\oplus}$ is .

A. 2

B. 3

C. 4

D. 6

Answer: A

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19. The complexes $[Co(NH_3)_6][Cr(CN)_6]$ and $[Cr(NH_3)_6][Co(CN)_6]$ are the examples of which type of isomerism ?

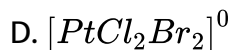
- A. linkage isomerism
- B. coordination isomerism
- C. ionisation isomerism
- D. geometrical isomerism

Answer: B

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20. Which can exist both as diastereoisomer and enantiomer ?

- A. $[Pt(en)_3]^{4+}$
- B. $[Pt(en)_2ClBr]^{2+}$



Answer: B

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21. Due to the presence of ambidentate ligands coordination compounds show isomerism. Palladium complexes of the type $[Pd(C_6H_5)_2(SCN)_2]$ & $[Pd(C_6H_5)_2(NCS)_2]$ are

- A. linkage isomerism
- B. coordination isomerism
- C. ionisation isomerism
- D. geometrical isomerism

Answer: A

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22. EAN of Fe in $[Fe(C_2O_4)_3]^{3-}$ is .

A. 27

B. 24

C. 35

D. 29

Answer: C

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23. The correct IUPAC name of $K_2[Zn(OH)_4]$ is

A. potassium tetrahydroxyzinc (II)

B. dipotassium tetrahydroxyzinc (II)

C. potassium tetrahydroxyzincate (II)

D. potassium tetrahydroxy zincate (III)

Answer: C

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24. Match the Column and choose the correct option from the codes given below.



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

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

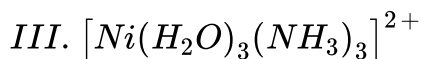
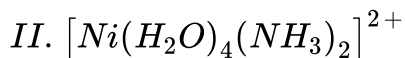
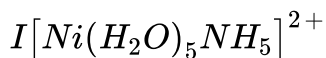
C. $\begin{matrix} A & B & C \\ 1 & 2 & 3 \end{matrix}$

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

Answer: A

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25. The correct statement on the isomerism associated with the following complex ions.



- A. (I) and (II) show geometrical and optical isomerism
- B. (I) and (II) show only optical isomerism
- C. (II) and (III) show only geometrical isomerism
- D. (II) and (III) show geometrical and optical isomerism

Answer: C



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26. The compounds $[PtCl_2(CH_3)_4]Br_2$ and $[PtBr_2(NH_3)_4]Cl_2$ constitutes a pair of

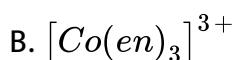
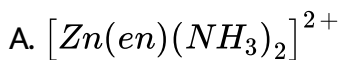
- A. coordination isomers
- B. linkage isomers
- C. ionisation isomers
- D. hydrate isomers

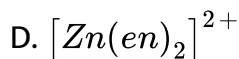
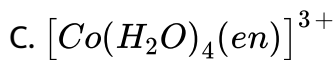
Answer: C

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27. Which of the following has an optical isomer?

(en=ethylenediamine) ?



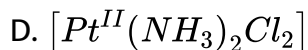
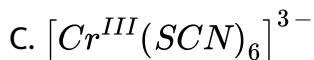


Answer: B

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28. Which one amongst the following , exhibit geometrical isomerism

?



Answer: D

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29. The correct name of the compound $[Cu(NH_3)_4](NO_3)_2$, according to IUPAC system is

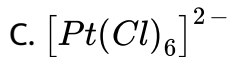
- A. Cuprammonium nitrate
- B. Tetramminecopper (II) dinitrate
- C. Tetramminecoper (II) nitrate
- D. Tetramminecoper (II) dinitrite

Answer: C

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30. Which of the following ion does not follow EAN rule ?

- A. $[Fe(CH)_6]^{4-}$
- B. $[Ag(CN)_2]^-$



D. None of these

Answer: B

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31. A complex of the type $[M(AA)_2X_2]$ is known to be optically active. What does this indicate about the structure of the complex?

Give one example of such complex .

A. It has an octahedral geometry

B. It is tetrahedral complex

C. It is trans complex

D. none of the above

Answer: A

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32. Optical isomerism is shown by octahedral complexes

- A. having all monodentate ligands
- B. having all the three bidentate ligands
- C. having two trans bidentate ligands
- D. having two trans monodentate ligands

Answer: B

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33. The IUPAC name of $[Ni(PPh_3)_2Cl_2]^{2+}$ is

- A. bis- dichlorido (triphenylphosphine) nikel (II)
- B. dichloride bis (triphenylphoshine) nikel (IV)

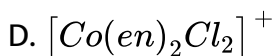
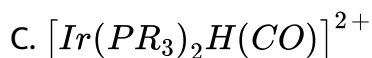
C. dischlorido triphenylphosphine nickel (II)

D. triphenylphosphine nickel (II) dichloride

Answer: B

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



Answer: D

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35. IUPAC name of $K_3[Fe(CN)_6]$ is

- A. Potassium ferricyanide
- B. hexayano ferrate (III)
- C. potassium hexacyano ferrate (III)
- D. Potassium hexacyano ferrate (II)

Answer: C

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36. The number of water molecule(s) directly bonded to the metal centre in $CuSO_4 \cdot 5H_2O$ is-

- A. 1
- B. 2
- C. 3

D. 4

Answer: D

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37. IUPAC name of $Na_3[Co(NO_2)_6]$ is

- A. sodium hexanitrito cobaltate (II)
- B. sodium hexanitro cobaltate (III)
- C. sodium hexanitritro cabaltate (III)
- D. sodium cobaltinitrite

Answer: B

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38. Which kind of isomerism is exhibited by octahedral $[Co(NH_3)_4Br_2]Cl$?

- A. Geometrical and ionisation
- B. Geometrical and optical
- C. optical ionisation
- D. Geometrical only

Answer: A

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39. The complex, $[Pt(py)(NH_3)BrCl]$ will have how many geometrical isomers?

- A. 2
- B. 3

C. 4

D. 0

Answer: B



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40. The effective atomic is shown by

A. 35

B. 27

C. 33

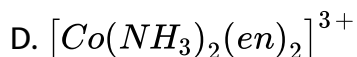
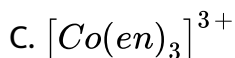
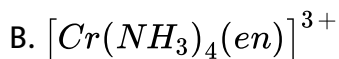
D. 36

Answer: C



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41. Geometrical isomerism is shown by

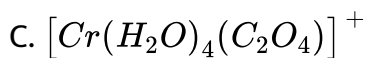
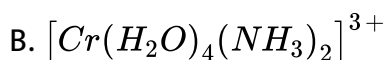
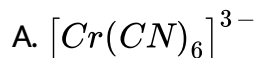


Answer: D



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42. In which case EAN of Cr is maximum ?



D. EAN is equal in all of the above

Answer: D

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43. Write IUPAC names of (i) $K_3 [Fe(CN)_5NO]$ (ii) $K_3 [Al(C_2O_4)_3]$.

- A. Pentacyano nitrosyl potassium ferrate (II)
- B. Potassium cyano pentanitrosyl ferrate (II)
- C. potassium pentacyanonitrosyl ferrate (III)
- D. Potassium pentacyanonitrosonium ferrate (I)

Answer: D

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44. The complex $Na_2 [Fe(CN)_5NO]$ is called :

- A. pentacyanonitroso sodium ferrate
- B. pentacyanonitroso sodium ferrate (II)
- C. Sodium pentacyanonitrosonium ferrate (II)
- D. Sodium pentacyanonitroso ferrate

Answer: C

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45. Which of the following complexes show linkage isomerism ?

- A. $[Co(NH_3)_6]Cl_3$
- B. $[Co(H_2O)_5Co]^{3+}$
- C. $[Cr(NH_3)_5SCN]^{2+}$
- D. $[Fe(en)_2Cl_2]^+$

Answer: C

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46. According to IUPAC nomenclature sodium nitroprusside is named as

- A. sodium nitroferricyanide
- B. sodium nitroferrocyanide
- C. Sodium nitroferrocyanonitrosyl ferrate (II)
- D. Sodium pentacyanonitrosonium ferrate (III)

Answer: D

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47. The magnetic moment (spin only) of $[NiCl_4]^{2-}$ is

- A. 1.82BM

B. 5.46BM

C. 2.2BM

D. 1.41 BM

Answer: C

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48. In Spectrochemical series , chlorine is above than water . I .e

$Cl > H_2O$ this is due to

A. Good π – acceptor properties of Cl

B. Strong σ – donor and good π – acceptor [properties of Cl]

C. good π – donor properties of Cl

D. none of the above

Answer: B

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49. What is the magnetic moment of $K_3[FeF_6]$?

A. $5.91BM$

B. $4.89BM$

C. $3.87BM$

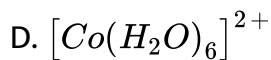
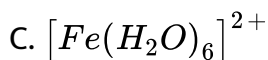
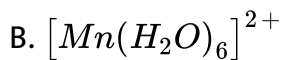
D. $6.92BM$

Answer: A

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50. The d-electron configurations of Cr^{2+} , Mn^{2+} , Fe^{2+} and Co^{2+} are d^4 , d^5 , d^6 and d^7 respectively. Which one of the following will exhibit minimum paramagnetic behaviour?

A. $[Cr(H_2O)_6]^{2+}$

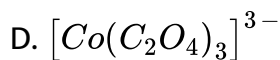
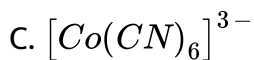
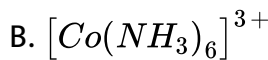
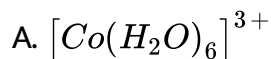


Answer: D

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51. In which of the following coordination entites the magnitude of Δ_0 (CFSE in octehedral field) will be maximum.

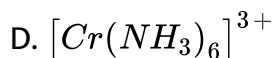
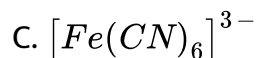
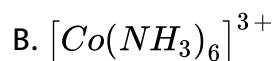
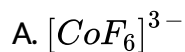
(*At. No. Co = 27*)



Answer: C

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52. Which of the following complex species does not involve inner orbital hybridisation ?



Answer: A

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

A. 18000cm^{-1}

B. 16000cm^{-1}

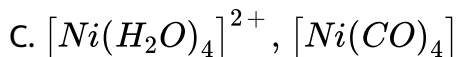
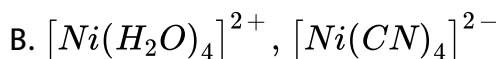
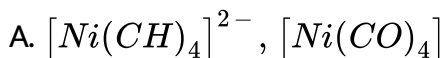
C. 8000cm^{-1}

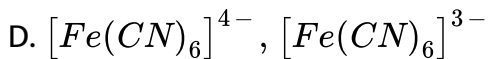
D. 2000cm^{-1}

Answer: C

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54. Magnetic moment of the complexes is zero in





Answer: A

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55. For d^4 ions the fourth electron enters one of the e_g orbitals giving rise to the configuration $t_{2g}^3 e_g^1$, when

A. $\Delta_0 > P$

B. $\Delta_0 < P$

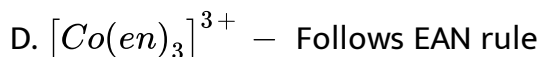
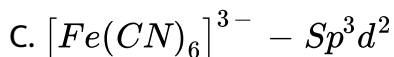
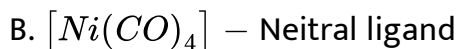
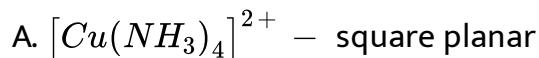
C. $\Delta_0 = P$

D. $\Delta_0 > P$

Answer: B

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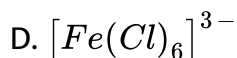
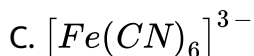
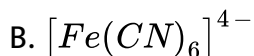
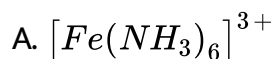
56. Which one of the following is wrongly matched ?



Answer: C

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57. Which complex compound possesses sp^3d^2 hybridization



Answer: D

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58. The number of unpaired electrons in $Ni(CO)_4$ is

A. 0

B. 1

C. 3

D. 4

Answer: A

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59. how many uppaired electrons are present in the central metal ion of $[CoCl_4]^{2-}$?

A. 3

B. 4

C. 5

D. 2

Answer: A

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

A. $-0.6\Delta_0$

B. $-1.8\Delta_0$

C. $-1.6\Delta_0 + P$

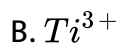
D. $-1.2\Delta_0$

Answer: A

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61. Magnetic moments $2.84B$. M is given by :

(At. nos. ni = 28, Ti = 22, Cr = 24, Co = 27).



Answer: A

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62. $[NiCl_4]^{2-}$ is paramagnetic while $[Ni(CO)_4]$ is diamagnetic though both are tetrahedral. Why?

A. former is in +2 oxidation state while the latter is in zero oxidation state

B. former has two unpaired electrons while the latter has no unpaired electron

C. former has three unpaired electrons while the latter has four unpaired electrons

D. Both (a) and (b)

Answer: D



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63. The correct relationship between Δ_t and Δ_0 is expressed as

A. $\Delta_t = (9/4)\Delta_0$

B. $\Delta_t = (5/7)\Delta_0$

C. $\Delta_t = (7/5)\Delta_0$

D. $\Delta_t = (4/9)\Delta_0$

Answer: D

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64. $[Sc(H_2O)_6]^{3+}$ ion is

A. Colourless and diamagnetic

B. Coloured and octahedral

C. Colourless and paramagnetic

D. coloured and paramagnetic

Answer: A

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65. Excited state configuration of Mn^{2+} is

A. t_{2g}^4

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

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

D. $t_{2g}^5 e_g^0$

Answer: B

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66. Considering H_2O as a weak field ligand, the number of unpaired electrons in $[Mn(H_2O)_6]^{2+}$ will be (At. no. of $Mn = 25$)

A. three

B. five

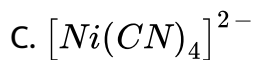
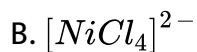
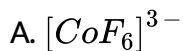
C. two

D. four

Answer: B

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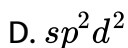
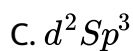
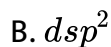
67. Of the following complex ions, which is diamagnetic in nature?



Answer: C

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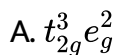
68. An octahedral complex is formed when hybrid orbitals of the following type are involved

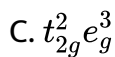


Answer: C

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69. High spin complex $[FeCl_6]^{3-}$ has the d-configuration





Answer: A



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70. The correct statement with respect to the complexes $Ni(CO)_4$ and $[Ni(CN)_4]^{2-}$ is

- A. Contains Ni atom in same oxidation state in both the complexes
- B. Possess square planar geometry
- C. Possess tetrahedral geometry
- D. Have square planar and tetrahedral geometry respectively

Answer: D

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71. $[Fe(H_2O)_6]^{2+}$ and $[Fe(CN)_6]^{4-}$ differ in :

- A. Geometry magnetic moment
- B. magnetic moment and colour
- C. Geometry and hybridisation
- D. none of the above

Answer: D

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72. What is true about $[MnCl_6]^{3-}$, $[FeF_6]^{3-}$ and $[CoF_6]^{3-}$?

each of these are outer orbital complexes .

II. Each of these have SP^3d^2 hybridisation .

III . Each of these are paramagnetic .

IV . $[MnCl_6]^{3-}$, $[FeF_6]^{3-}$ and $[CoF_6]^{3-}$ have four ,five and four unpaired electrons respectively .

Choose the correct statements .

- A. I,II and III
- B. II,III and IV
- C. I,III and IV
- D. I,II ,III and IV

Answer: D

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73. Which of these statements about $[Co(CN)_6]^{3-}$ is true?

- A. $[Co(CN)_6]^{3-}$ has no unpaired electrons and will be in a low - spin complex

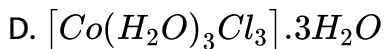
- B. $[Co(CN)_6]^{3-}$ has four unpaired electrons and will be in a low - spin complex
- C. $[Co(CN)_6]^{3-}$ has four unpaired electrons and will be in a high - spin complex
- D. $[Co(CN)_6]^{3-}$ has no unpaired electrons and will be in a high - spin complex

Answer: A

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74. One mole of the complex $CoCl_3 \cdot 6H_2O$ on reaction with excess of $AgNO_3$ gives two moles of white precipitate thus , complex is

- A. $[Co(H_2O)_6]Cl_3$
- B. $[Co(H_2O)_5Cl]Cl_2 \cdot H_2O$
- C. $[Co(H_2O)_4Cl_2]Cl \cdot 2H_2O$



Answer: B

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75. Paramagnetic octahedral complex, $[CoF_6]^{3-}$ uses outer orbital (4d) in hybridisation (sp^3d^2). it is thus called

- A. outer orbital complex
- B. high spin complex
- C. spin free complex
- D. all of the above

Answer: D

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76. Cobalt (III) chloride forms several octahedral complexes with ammonia. Which of the following will not give test for chloride ions with silver nitrate at $25^{\circ}C$?

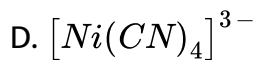
- A. $[Co(NH_3)_3]Cl_3$
- B. $[Co(NH_3)_6]Cl_3$
- C. $[Co(NH_3)_4Cl_2]Cl$
- D. $[Co(NH_3)_5Cl]Cl_2$

Answer: A

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77. The most stable complex among the following is

- A. $[Pd(CN)_4]^{4-}$
- B. $[Pd(CN)_4]^{3-}$
- C. $[Ni(CN)_4]^{4-}$



Answer: b

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78. Which of the following is an organometallic compound ?

- A. Lithium methoxide
- B. Lithium acetate
- C. Lithium dimethylamine
- D. Methyl lithium

Answer: D

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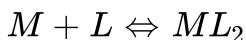
79. In metal carbonyl (organometallic) complexes , the M -C bond is

- A. ionic
- B. covalent with character
- C. Covalent
- D. coordinate covalent

Answer: D

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80. For the complex ML_2 stepwise formation constants for



are 4 and 3 . Hence overcell stability constant for $M + 2L \rightleftharpoons ML_2$ is

- A. 12

B. 7

C. 1.33

D. 0.75

Answer: A



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81. The M-C π bond is formed by the

A. donation of a pair of electrons by metal ion

B. sharing of a pair of electrons

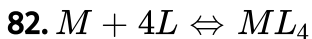
C. receiving of a pair of electrons by metal ion

D. none of the above

Answer: A



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For this reaction overall stability constant (β_4) is expressed as

A. $\beta_4 = [ML] / [ML_3][L]$

B. $\beta_4 = [ML_4] / [ML_3][L]$

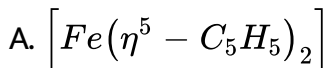
C. $\beta_4 = [ML_4] / [M][L]^4$

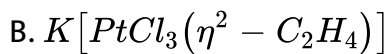
D. $\beta_4 = [ML] / [M][L]$

Answer: C

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83. which of the following organometallic compound has σ and π – bonds ?





C. Both (a) and (b)

D. None of the above

Answer: D

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84. which of the following fields involve the use of coordination compounds ?

I. Electroplating

II. Medicinal chemistry

III. Textile dyeing

IV. Metallurgical processes

V. Analytical reagents

Chosse the correct option

A. I,II ,III and IV

B. II,III ,IV, and V

C. I,III and V

D. I ,II ,III , IV and V

Answer: D



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85. Match the column and choose the correct option from the codes given below .



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

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

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

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

Answer: B

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Exercise 2 Miscellaneous Problems

1. The IUPAC name of the complex ion formed when gold dissolves in aqua-regia is

- A. tetrachloridoaurate (III)
- B. tetrachloridoaurate (II)
- C. tetrachlorideoaurate (I)
- D. dichloridoaurate (III)

Answer: A

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2. The oxidation state of Fe in brown complex $[Fe(H_2O)_5NO]SO_4$ is

A. 0

B. 1

C. 2

D. 3

Answer: B



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3. What is the spin only magnetic moment when HCl is added to an aqueous solution of $CoCl_2$. Its colour changes from reddish pink to deep blue. Colour .

A. 3.88BM

B. 5.9BM

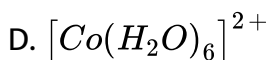
C. 7 BM

D. 35BM

Answer: B

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4. When concentrated HCl is added to an aqueous solution of $CoCl_2$. Its colour changes from reddish pink to deep blue. Which complex ion gives blue colour in this reaction ?



Answer: A

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5. Red precipitate is obtained when ethanol solution of dimethylglyoxime is added to ammoniacal $Ni(II)$. Which of the following statement is not true?

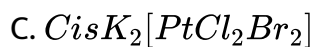
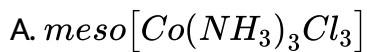
- A. Red complex has a square planar geometry
- B. Complex has symmetric H-bonding
- C. Red complex has a tetrahedral geometry
- D. Dimethylglyoxime functions as bidentate ligand



Answer: C

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6. The complex used as an anticancer agent is



Answer: B

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7. The oxidation number of *Co* in $[Co(NH_3)_3(NO_2)_3]$ is

A. +3

B. 0

C. -3

D. 6

Answer: A

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

- A. $[Ag(NH_3)_2]^{2+}$, $[Ag(CN)_2]^+$ and $[Ag(S_2O_3)_2]^{3-}$
- B. $[Ag(NH_3)_2]^{2+}$, $[Ag(CN)_2]^{3-}$ and $[Ag(S_2O_3)_2]^{2-}$
- C. $[Ag(NH_4)_2]^{2+}$, $[Ag(CN)_2]^{3-}$ and $[Ag(S_2O_3)_2]^{2-}$
- D. $[Ag(NH_3)_2]^+$, $[Ag(CN)_2]^-$ and $[Ag(S_2O_3)_2]^{3-}$

Answer: A

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

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

A. 40mL

B. 20mL

C. 60mL

D. 80mL

Answer: B

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11. The number of ions formed when hexammine copper (II) sulphate is dissolved in water is

A. 1

B. 2

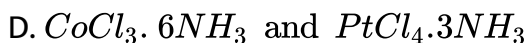
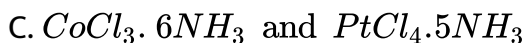
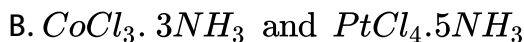
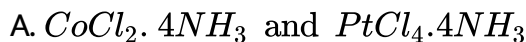
C. 4

D. 6

Answer: B

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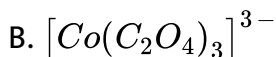
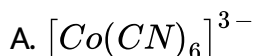
12. Both Co^{3+} and Pt^{4+} have a coordination number of six. Which of the following pair of complexes will show approximately the same electrical conductance for their 0.001 M aqueous solution ?

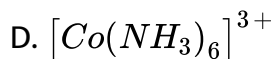
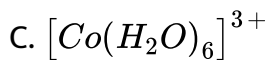


Answer: C

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





Answer: A

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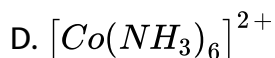
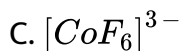
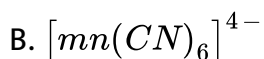
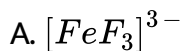
14. Coordination compounds have great importance in biological systems. In this context which of the following statements is incorrect:

- A. chlorophyll is green pigment in plants and contain calcium
- B. haemoglobin is the red pigment of blood and contains iron
- C. Cyanocobalamin is vitamin B_{12} and contains cobalt
- D. Carboxypeptidase -A is an enzyme and contains zinc

Answer: A

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



Answer: A

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16. According to Postulates of wener's theory for coordination compounds , which of the following is true

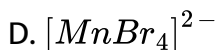
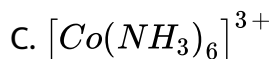
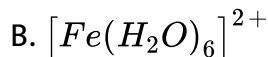
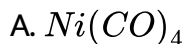
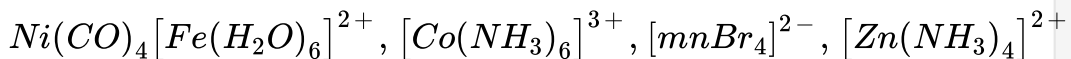
A. Primary valencies are ionisable

- B. Secondary valencies are ionisable
- C. Only primary valencies are non- ionisable
- D. Primary and secondary are non -ionisable

Answer: A

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17. Among the following complexes , which has a magnetic moment of 5.9 BM



Answer: D

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18. Match the Column (formulation of cobalt (III) chloride ammonia complexes) and choose the correct option from the codes given below .



A. $(A, B, C)(2(I), 1(II), 3(III))$

B. $(A, B, C)(3(II), 2(III), 1(I))$

C. $(A, B, C)(1(III), 3(II), 2(I))$

D. $(A, B, C)(2(II), 3(I), 1(II))$

Answer: C

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19. In the complex ions, $[Fe(C_2O_4)_3]^{3+}$ the coordination number of Fe and Co is 6 because

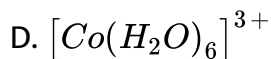
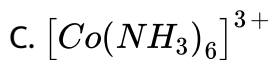
- A. $C_2O_4^{2-}$ and ethane -1,2 dimaine are bidentate ligands
- B. $C_2O_4^{2-}$ and ethane -1,2,- dimamine are ambidentate ligands
- C. $C_2O_4^{2-}$ and ethane -1,2 - dimamine are monodentate ligands
- D. None of the these

Answer: A

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20. Which of the following complexes does not have d^2Sp^3 hybridisation ?

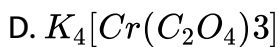
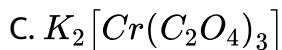
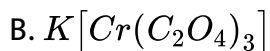
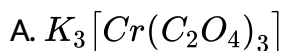
- A. $[Cr(NH_3)_6]^{3+}$
- B. $[Fe(CN)_6]^{3-}$



Answer: D

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21. Potassium trioxalatochromate (III) is



Answer: A

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22. EAN of mg is in $[Mg(EDTA)]^{2-}$

A. 16

B. 20

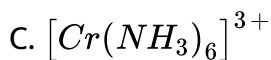
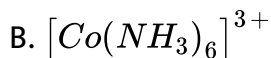
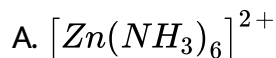
C. 22

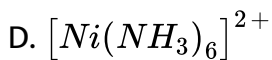
D. 18

Answer: C

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23. Which one of the following is an inner orbital complex as well as diamagnetic in nature?





Answer: B

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24. When EDTA solution is added to Mg^{2+} ion solution then the incorrect statement regarding the reaction will be

- A. Four coordination sites of Mg^{2+} are occupied by EDTA and remaining two sites are occupied by water molecules
- B. all six coordination sites of Mg^{2+} are occupied
- C. pH of the solution decreases
- D. Colourless $[Mg - EDTA]^{2-}$ chelate is formed

Answer: A

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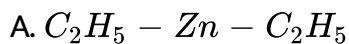
25. Which statement is incorrect for metal - ligand complex ?

- A. Larger the value of ionisation potential of central metal , stronger is the bond
- B. Greater the dipole moment of ligand , more stable is metal ligand bond
- C. Greater the charge on ligand , more stronger is the bond
- D. Larger the ligand , less stable is the metal -ligand complex .

Answer: D

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26. Which of the following is an organometallic compound ?

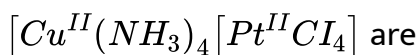


D. None of the above

Answer: A

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27. The total number possible isomers for the complex compound



A. 3

B. 6

C. 5

D. 4

Answer: A



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28. 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

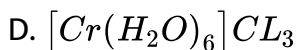
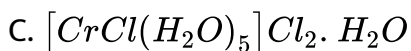
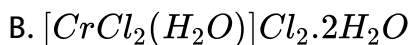
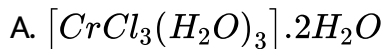
D. 0.0048

Answer: C



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29. When 1 mol $CrCl_3 \cdot 6H_2O$ is treated with excess of $AgNO_3$, 3 mol of $AgCl$ are obtained. The formula of the complex is



Answer: D

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30. The octahedral complex of a metal ion M^{3+} with four monodentate ligands L_1, L_2, L_3 and L_4 absorb wavelengths in the region of red, green, yellow and blue, respectively. The increasing order of ligand strength of the four ligands is

A. $L_4 < L_3, L_2 < L_1$

B. $L_1 < L_3 < L_2 < L_4$

C. $L_3 < L_2 < L_4 < L_1$

D. $L_1 < L_2 < L_4 < L_3$

Answer: B

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31. $[NiCl_2\{P(C_2H_5)_2(C_6H_5)\}_2]$ exhibits temperature dependent magnetic behaviour. The coordination geometries of Ni^{2+} in the paramagnetic and diamagnetic states are:

A. Tetrahedral and tetrahedral

B. Square planar and square planar

C. tetrahedral and square planar

D. Square planar and tetrahedral

Answer: C

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32. The atomic number of cobalt is 27 .The EAN of cobalt in $Na_3[Co(NO_2 - (4)Cl_2]$ is

A. 24

B. 36

C. 34

D. 35

Answer: B

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33. Amongst the following cis - trans isomerism is shown by

A. Ma_4

B. $M(aa')_2$ [where aa' are unsymmetrical ligands]

C. Ma_3b

D. $M(aa)_2$

Answer: B

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34. The existence of two different coloured complexes with the composition $[Co(NH_3)_2Cl_2]^+$ is due to

A. ionisation isomerism

B. coordination isomerism

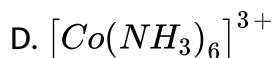
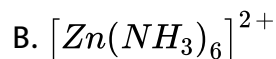
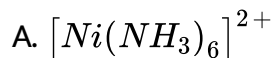
C. linkage isomerism

D. geometrical isomerism

Answer: D

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35. Which one of the following is an outer orbital complex and exhibits paramagnetic behaviour ?



Answer: A

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36. The IUPAC name of $Ni(CO)_4$ is

- A. tetracarbonylnickelate (0)
- B. tetracarbonyl nikel (II)
- C. tetracarbonyl nickel (0)
- D. tetracarbonyl nickelate (II)

Answer: C

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37. From four transition metal octahedral complexes , (the choice given below) low spin electronic configuration arises only for

- A. d^1 to d^3 complexes
- B. d^4 , d^7 complexes
- C. d^7 to d^9 complexes
- D. d^1 , d^2 and d^8 complexes

Answer: B

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38. Calculate the coordination number of the metal ion, its oxidation state, number of electrons and number of unpaired electrons in d-orbitals respectively in complex $[Co(H_2O)_4SO_4]Cl$

A. 6,3,6,4

B. 6,3,6,0

C. 5,3,6,4

D. 5,3,6,0

Answer: A

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39. The correct structure of ethylenediaminetetraacetic acid (*EDTA*) is .

A. 

B. 

C. 

D. 

Answer: C

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40. Which of the following 0.1 M complex compound solutions will have the minimum electrical conductivity ?

A. Hexammine platinum (IV) chloride

B. Terammine chlorido platinum (IV) chloride

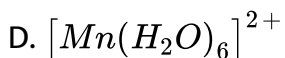
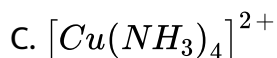
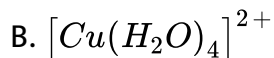
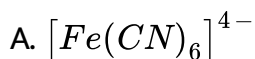
C. Pentamine chlorido platinum (IV) chloride

D. Tromminetrchlorido platinum (IV) chloride

Answer: D

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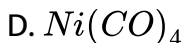
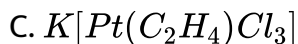
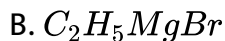
41. Which has maximum paramagnetic character ?



Answer: D

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42. Which of the following does not have a metal carbon bond?



Answer: A



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

A. 6 and 2

B. 4 and 3

C. 4 and 3

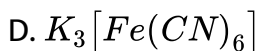
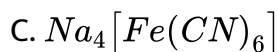
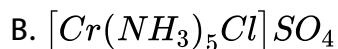
D. 6 and 3

Answer: D

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44. The metal ion in complex A has EAN identical to the atomic number of krypton. A is

(Atomic no. Of $Cr = 24$, $Fe = 26$, $pd = 46$)



Answer: C

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45. $[CoCl_2(NH_3)_4]^+ Cl^-$ (green) and $[CoCl_2(NH_3)_4]^+ Cl^-$ (violet) have identical formula $CoCl_3.4NH_3$, but distinct properties .Such compounds are called ...A ... here ,A refers to

- A. isomers
- B. coordination compounds
- C. Either (a) or (b)
- D. None of these

Answer: A

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46. Classify the following structures into nitro -N A nitrito -O-B thiocyanato C, Isothiocyanato D.



choose the correct option.

A. I -A,II-B,III-C,IV -D

B. I -B,II-C,III-D,IV -A

C. I -D,II-C,III-B,IV -A

D. I -C,II-A,III-D,IV -B

Answer: B



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47. Which isomerism is repeated by the following square planar complex ?



A. Optical isomerism

B. Linkage isomerism

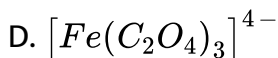
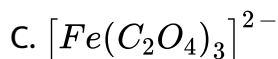
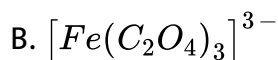
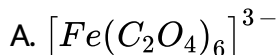
C. Geometrical isomerism

D. None of these

Answer: D

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48. Ink contains Fe^{3+} . Spot of ink can be removed by addition of $C_2O_4^{2-}$ complex formed is



Answer: B

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49. Hexaammineplatinum (IV) tetrachloridoplatinate (II) is

- A. $[Pt(NH_3)_6][PtCl_4]$
- B. $[Pt(NH_3)_6]_2[PtCl_4]$
- C. $[Pt(NH_3)_6][PtCl_4]_2$
- D. $[Pt(NH_3)_6]_3[PtCl_4]_2$

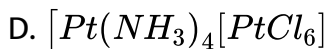
Answer: C



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50. Which of the following will give a pair of enantiomorphs? .

- A. $[Co(NH_3)_4Cl_2]NO_2$
- B. $[Cr(NH_3)_6][Co(CN)_6]$
- C. $[Co(en)_2Cl_2]Cl$



Answer: C

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51. Coordination number of Cr is three. A complex ion of Cr with $C_2O_4^{2-}$ end and superoxide ion, O_2^- has the formula ,

$[Cr(CO_2O_4)_x(en)_y(O_2)_z]^-$ The ratio $x : y : z$ will be

A. 1 : 1 : 1

B. 1 : 1 : 2

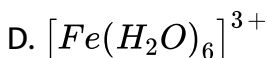
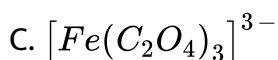
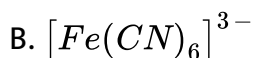
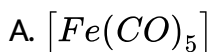
C. 1 : 2 : 2

D. 2 : 1 : 1

Answer: B

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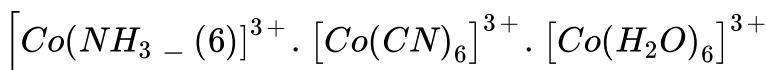
52. The stabilization of coordination compound due to chelation is called the chelate effect. Which of the following is the most stable complex species?

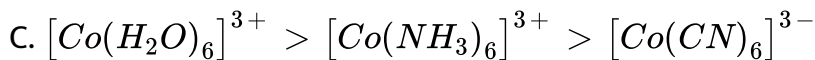
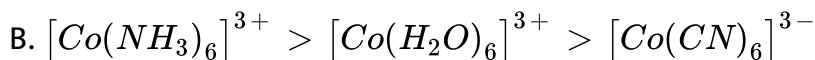
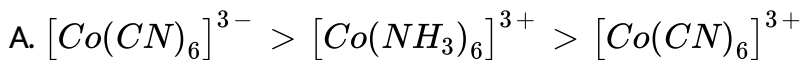


Answer: C

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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,

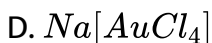
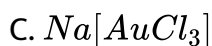
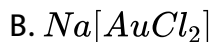
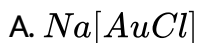




Answer: C

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54. Which of the following is obtained when auric chloride reacts with sodium chloride ?

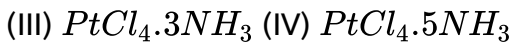
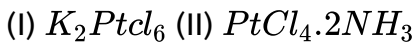


Answer: D



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55. Consider the following complexes:



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



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56. EAN of cobalt is 36 in $[Co(NH_3)_2O_2(en)Cl]$ thus, O_2 is

- A. Dioxide
- B. Superoxide ion
- C. Peroxide ion
- D. oxide

Answer: C

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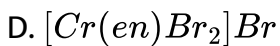
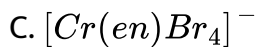
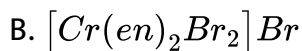
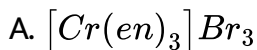
57. A correct statement is

- A. $[Co(NH_3)_6]^{2+}$ is paramagnetic
- B. $[MnBr_6]$ is tetrahedral
- C. $[CoBr_2(en)_2]^-$ exhibit linkage isomerism
- D. $[Ni(NH_3)_6]^{2+}$ is an inner orbital complex

Answer: A

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58. Which among the following will be named as dibromidobis (ethylene



Answer: B

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59. Which of the following is a negatively charged bidentate ligand ?

A. Cyano

B. Ethylene diamine

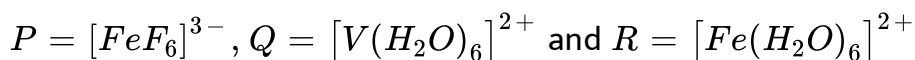
C. Acetato

D. DMG

Answer: D

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60. Consider the following complexes ion P , Q and R



The correct order of the complex ions, according to their spin only magnetic moment values (in BM) is .

A. $R < Q < P$

B. $Q < R < P$

C. $R < P < Q$

$$D. Q < P < R$$

Answer: B

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61. 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. $[Co(NH_3)_4Cl]Cl_2$
- B. $[Co(NH_3)_4Cl_2] \cdot Cl \cdot NH_3$
- C. $[Co(NH_3)_3] \cdot 2NH_2$
- D. $[Co(NH_3)_5Cl]Cl_2$

Answer: D

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

A. 2

B. 4

C. 6

D. 8

Answer: C



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63. Ammonia gas does not evolve from the complex $FeCl_2 \cdot 4NH_3$ But it gives white precipitate with aqueous solution of $AgNO_3$.

Coordination number of central name of the complex will be .

A. Ammonium trichloro triamine iron (III)

B. Tetraamine iron (III) chloride

C. Dichlorido tetraamine iron (II) chloride

D. Dichlorido tetraamine iron (III) chloride

Answer: D



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64. How many electrons are present in 3d - orbital of tetrahedral

$K_2[NiCl_4]$ complex ?

A. 8 electrons

B. 10 electrons

C. 7 electrons

D. 6 electrons

Answer: A



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65. The two isomers X and Y with the formula $Cr(H_2O)_5ClBr$ were taken for experiment on depression in freezing point. It was found that one mole of X gave depression corresponding to 2 moles of particles and one mole of Y gave depression to 3 moles of particles.

The structural formulae of X and Y respectively are

- A. $[Cr(H_2O)_5Cl]Br_2$, $[Cr(H_2O)_3ClBr_2 \cdot 2H_2O]$
- B. $[Cr(H_2O)_5]BrCl$, $[Cr(H_2O)ClBr]Br \cdot H_2O$
- C. $[Cr(H_2O)_5Br]BrCl$, $[Cr(H_2O)_4ClBr]Br \cdot H_2O$
- D. $[Cr(H_2O)_4Br_2]ClH_2O$, $[Cr(H_2O)_5Cl]Br_2$

Answer: D



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66. Geometrical shapes of the complexes formed by the reaction of Ni^{2+} with CO , CN^- and H_2O , respectively, are :

- A. Octahedral , tetrahedral and square planar
- B. Tetrahedral , square planar and octahedral
- C. square planar , tetrahedral and octahedral
- D. Octahedral , square planar and octahedral

Answer: B

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67. Which of the following shell , form only outer orbital octahedral complex ?

A. d^4

B. d^8

C. d^6

D. None of these

Answer: B



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

A. π - character only

B. both σ and π characters

C. ionic character

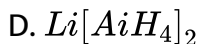
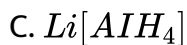
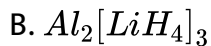
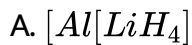
D. σ - character only

Answer: B



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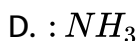
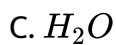
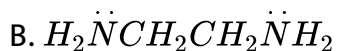
69. What is the structural formula of lithium tetrahydrido aluminate



Answer: C

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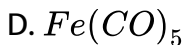
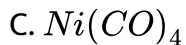
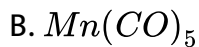
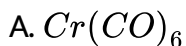
70. Which of the following can participate in linkage isomerism ?



Answer: A

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71. The non-existent metal carbonyl among the following is `



Answer: B

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72. Consider the following statements ,

I. In coordination compounds , metals show two types of linkage (

valencies) .

II. The primary valencies are normally ionisable and are satisfied by negative ions.

the correct statement(s) is / are

A. only I

B. only II

C. both I and II

D. neither I nor II

Answer: C

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73. The name of  is

A. Tetraamine aquacobalt chloride

B. Tetraamminediaquacobalt (III) chloride

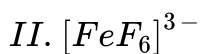
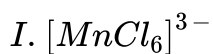
C. Tetraaminediaquacobalt (IV) chloride

D. None of the above

Answer: B

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74. Atomic number of Mn , $FeCO$ and Ni are 25,26,27 and 28 respectively. Which of the following outer orbital octahedral complexes have same number of unpaired electrons?



code .

A. I and II

B. II and IV

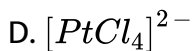
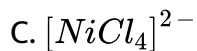
C. I, III and IV

D. *I* and *III*

Answer: D

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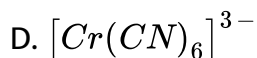
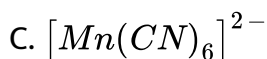
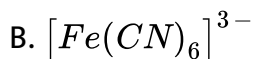
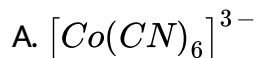
75. Which one of the following has a square planar geometry ?



Answer: D

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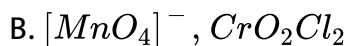
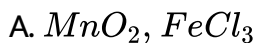
76. Which one of the cyano complexes would exhibit the lowest value of paramagnetic behaviour ?

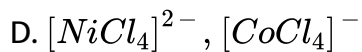
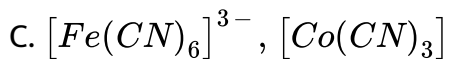


Answer: A

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77. The pair of compounds having metals in their highest oxidation state is





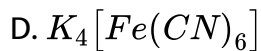
Answer: B



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Mht Cet Corner

1. Which of the following is a neutral complex ?



Answer: A



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2. The correct IUPAC name $[Co(NH_3)_3(NO_2)_3]$ is

- A. tetrammine trinitro -N- cobalt (III)
- B. Triammine trinitro -N-cobalt (II)
- C. Triammine cobalt (III) nitrite
- D. Triammine trinitro -N - cobaltate (III)

Answer: A

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3. $[Cr(NH_3)_6]Cr(SCN)_6$ and $[Cr(NH_3)_2(SCN)_4][Cr(NH_3)_4(SCN)_2]$ are the examples of what type of isomerism ?

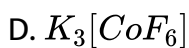
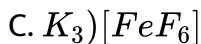
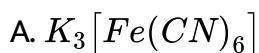
- A. Ionisation isomerism

- B. Linkage isomerism
- C. Coordination isomerism
- D. Solvate isomerism

Answer: C

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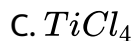
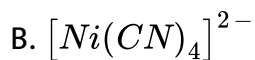
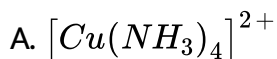
4. Select the diamagnetic complex ion amongst the following complexes (At no. : Fe= 26,Co=27)



Answer: B

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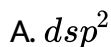
5. A magnetic moment of 1.73 B.M. will be shown by one among the following:

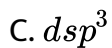
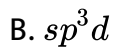


Answer: A

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6. $[Cu(NH_3)_4]^{2+}$ shows the following hybridisation .

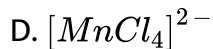
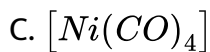
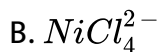
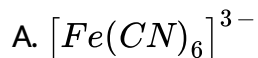




Answer: A

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7. Which of the following is diamagnetic in nature ?



Answer: C

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