CHEMISTRY

BOOKS - FULL MARKS CHEMISTRY (TAMIL ENGLISH)

COORDINATION CHEMISTRY

Evaluate Yourself

1. When a coordination compound $CrCl_3$, $4H_2O$ is mixed with silver nitrate solution, one

mole of silver chloride is precipitated per mole of the compound. There are no free solvent molecules in that compound. Assign the secondary valence to the metal and write the structural formula of the compound.

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2. In the complex $\left[Pt(NO)_2(H_2O)(NH_3)_2\right]Br$, identify the followin

(i) Central metal atom/ion (ii) Ligand(s) and their types

(iii) Coordinates entity (iv) Oxidation number

of the central metal ion (v) Coordination number

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3. Write the IUPAC name for the following compound .

$(i) K_2\left[Fe(CN)_3(Cl)_2(NH)_3\right]$

$(ii)\left[Cr(CN)_2(H_2O)_4\right]\left[Co(\mathrm{ox})_2(en)\right]$

$(iii)\left[Cu(NH_3)_2Cl_2\right]$

$(iv)\left[Cr(NH_3)_3(NC)_2(H_2O)^+\right]$

$(v)\left[Fe(CN)_4\right]^{4-}$

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4. Give the structure for the following compound .

(i) diamminesilver (I) dicyanidoargentater (I)

(ii) Pentaammine nitrito-kN cobalt (III) ion

(iii) hexafluorido cobaltate (III) ion

(iv) dichloridobis (ethylenediamine) cobalt (III) sulphate

(v) Tetracarbonylnickel (0)

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5. A solution of $\left[Co(NH_3)_4I_4\right]Cl$ when treated with $AgNO_3$ gives a white precipitate.What should be the formula of isomer of the dissolved complex that gives yellow precipitate with $AgNO_3$. What are the above isomers called ?

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6. Three compounds A, B and C have empirical formula $CrCl_3.6H_2O$.they are kept in a container with a dehydrating agent and they

lost water and attaining constant weight as shown below.

Compound	Initial weight of the compound (in g)	Constant weight after dehydration (in g)
A	4	3.46
B	0.5	0.466
C	3	3

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7. Indicate the possible type of isomerism for the following complexex and draw their isomers

$(i)\left[Co(en)_3\right]\left[Cr(CN)_6\right]$

$(ii)\left[Co(NH_3)_5(NO_2)\right]^{2+}$

$(iii)\left[Pt(NH_3)_3(NO_2)\right]Cl$

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8. Draw all possible stereo isomers of a complex

$Ca\left[Co(NH)_3Cl(Ox)_2\right]$

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9. The spin only magnetic moment of Tetrachloridomaganate (II) ion is $5.9BM$. On

the basis of VBT, predict the type of hybridisation and geometry of the compound.

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10. Predict the number of unpaired electrons in $[CoCl_4]^{2-}$ ion on the basis of VBT.

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11. A metal complex having composition $Co(en)_2Cl_2Br$ has been isolated in two forms

A and B. (B) reacted with silver nitrate to give a white precipitate readily soluble in ammonium hydroxide . Whereas A gives a pale yellow precipitate. Write the formula of A and B, state the hybridization of Co in each and calculate their spin only magnetic moment.

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12. The mean pairing energy and octahedral field splitting energy of $\left[Mn(CN)_6\right]^{3-}$ are $28,800 cm^{-1}$ and $38500 cm^{-1}$ respectively.

Whether this complex is stable in low spin or high spin?

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13. Draw energy level diagram and indicate the number of electrons in each level for the complex $\left[Cu(H_2O)_6\right]^{2+}$. Whether the complex is paramagnetic or diamagnetic ?

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14. For the $[CoF_6]^{3-}$ ion the mean pairing energy is found to be $21000cm^{-1}$. The magnitude of Δ_0 is $13000cm^{-1}$. Calculate the crystal field stabilization energy for this complex ion corresponding to low spin and high spin states.

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Textbook Evaluation

1. The sum of primary valance and secondary valance of the metal M in the complex $\left[M(en)_2(Ox)\right]Cl$ is ..... .

A. 3

B. 6

C. -3

D. 9

Answer: D

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2. An excess of silver nitrate is added to $100ml$ of a $0.01M$ solution of penta aquachlorido chromium (III) chloride . The number of moles of $AgCl$ precipitated would be ..... .

A. 0.02

B. 0.002

C. 0.01

D. 0.2

Answer: B

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3. A complex has a molecular formula $MSO_4Cl.6H_2O$. The aqueous solution of it gives white precipitate with Barium chloride solution and no precipitate is obtained when it is treated with silver nitrate solution. If the secondary valence of the metal is six, which one of the following correctly represents the complex ?

A. $\left[M(H_2O)_4Cl\right]SO_4.2H_2O$

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

C. $\left[M(H_2O)_5Cl\right]SO_4.H_2O$

D. $\left[M(H_2O)_3Cl\right]SO_4.3H_2O$

Answer: B::C::D

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4. Oxidation state of Iron and the charge on the ligand NO in $\left[Fe(H_2O)_5NO\right]SO_4$ are ..... .

A. $+2$ and 0 respectively

B. $+3$ and 0 respectively

C. $+3$ and -1 respectively

D. $+1$ and $+1$ respectively

Answer: A::C::D

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5. As per IUPAC guidelines, the name of the complex $\left[Co(en)_2(ONO)Cl\right]Cl$is..... .

A. chlorobisethylenediaminenitritocobalt (III) chloride

B. chloridobis(ethane-1, $2-$ diamine)nitro k-Ocobaltate(III)chloride

C. chloridobis(ethane-1, $2-$ diammine)nitrito k-Ocobalt(II)chloride

D. chloridobis(ethane-1, $2-$ diamine)nitro k-Ocobalt(III)chloride

Answer: A::B::C::D

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

A. potassiumtrioxalatoaluminium(III)

B. potassiumtrioxalatoaluminate (II)

C. potassiumtrisoxalatoaluminate (III)

D. potassiumtrioxalatoaluminate(III)

Answer: A::D

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7. A magnetic moment of 1.73BM will be shown by one among the following

A. $TiCl_4$

B. $[CoCl_6]^{4-}$

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

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

Answer: B::C::D

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8. crystal field stabilization energy for high spin d^5 octahedral complex is..... .

A. $-0 \cdot 6\Delta_0$

B. 0

C. $2(P - \Delta_0)$

D. $2(P + \Delta_0)$

Answer: A

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9. In which of the following coordination entities the magnitude of Δ_0 will be maximum?

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

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

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

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

Answer: A::C

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10. Which one of the following will give a pair of enantiomorphs?

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

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

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

D. $\left[Co(NH_3)_4Cl_2\right]NO_2$

Answer: B::C

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11. Which type of isomerism is exhibited by $\left[Pt(NH_3)_2Cl_2\right]$?

A. Coordination isomerism

B. Linkage isomerism

C. Optical isomerism

D. Geometrical isomerism

Answer: A::C::D

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12. How many geometrical isomers are possible for $[Pt(Py)(NH_3)(Br)(Cl)]$?

A. 3

B. 4

C. 0

D. 15

Answer: A::C

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13. Which one of the following pairs represents linkage isomers?

A. $\left[Cu(NH_3)_4\right][PtCl_4]$ and $\left[Pt(NH_3)_4[CuCl_4\right]$

B. $\left[Co(NH_3)_5(NO_3]SO_4\right.$ and $\left[Co(NH_3)_5(ONO)\right]$

C. $\left[Co(NH_3)_4\right][NCS_2]Cl$ and $\left[Co(NH_3)_4(SCN)_2\right]Cl$

D. both (b) and (c)

Answer: A::B::C::D

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14. Which kind of isomerism is possible for a complex $\left[Co(NH_3)_4Br_2\right]Cl$?

A. geometrical and ionization

B. geometrical and optical

C. optical and ionization

D. geometrical only

Answer: A::C::D

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15. Which one of the following complexes is not expected to exhibit isomerism?

A. $\left[Ni(NH_3)_4(H_2O)_2\right]^{2+}$

B. $\left[Pt(NH_3)_2cl_2\right]$

C. $\left[Co(NH_3)_5SO_4\right]Cl$

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

Answer: C::D

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16. A complex in which the oxidation number of the metal is zero is..... .

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

B. $\left[Fe(CN)_3(NH_3)_3\right]$

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

D. both (b) and (c)

Answer: C

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17. Formula of tris(ethane-1, 2-diamine)iron(II)phosphate

A. $\left[Fe\left(CH_3-CH(NH_2)_2\right)_3\right](PO_4)_3$

B. $\left[Fe(H_2N-CH_2-CH_2-NH_2)_3\right](PO_4)$

C. $\left[Fe(H_2N-CH_2-CH_2-NH_2)_3\right](PO_4)_2$

D.

$$\left[Fe(H_2N-CH_2-CH_2-NH_2)_3\right](PO_4)_2$$

Answer: B::C::D

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18. Which of the following is paramagnetic in nature?

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

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

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

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

Answer: B::C

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19. Fac-mer isomerism is shown by..... .

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

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

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

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

Answer: C

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20. Choose the correct statement

A. Square planar complexes are more stable than octahedral complexes

B. The spin only magnetic moment of $\left[Cu(Cl)_4\right]^{2-}$ is 1.732BM and it has

square planar structure.

C. Crystal field splitting energy (Δ_0) of $[FeF_6]^{4-}$ is higher than the (Δ_0) of $[Fe(CN)_6]^{4-}$

D. crystal field stabilization energy of $[V(H_2O)_6]^{2+}$ is higher than the crystal field stablization of $[Ti(H_2O)_6]^{2+}$

Answer: A::B::C::D

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21. Write the IUPAC names for the following complexes.

$(i) Na_2[Ni(EDTA)]$

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

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

$(iv) \left[Co(ONO)(NH_3)_5\right]^{2+}$

$(v) \left[Pt(NH_3)_2Cl(NO_2)\right]$

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22. Write the formula for the following coordination compounds.

(a) potasiumhexacyanidoferrate (II)

(b) petacarbonyliron (0)

(c) pentaamminenitrito - k -N-cobalt (III) ion

(d) hexaamminecobalt (III) sulphate

(e) sodiumtetrafluoridhydroxidochromate (III)

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23. Arrange the following in order of increasing molar conductivity.

$(i) Mg[Cr(NH_3)(Cl)_5]$

$(ii) [Cr(NH_3)_5Cl]_3[CoF_6]_2$

$(iii) [Cr(NH_3)_3Cl_3]$

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24. Ni^{2+} is identified using alcoholic solution of dimethyl glyoxime. Write the structural formula for the rosy and precipitate of a complex formed in the reaction.

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25. $[CuCl_4]^{2-}$ exists while $[CyI_4]^{2-}$ does not exist why ?

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26. Calculate the ratio of $\frac{[Ag^+]}{[Ag(NH_3)_2]^+}$ in $0.2M$ solution of NH_3. If the stability constant for the complex $[Ag(NH_3)_2]^+$ is 1.7×10^7

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27. Give an example of coordination compound used in medicine and two examples of biologically important coordination compounds.

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28. Based on VB theory explain why $\left[Cr(NH_3)_6\right]^{3+}$ is paramagnetic, while $\left[Ni(CN)_4\right]^{2-}$ is diamagnetic.

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29. Draw all possible geometrical isomers of the complex $\left[Co(en)_2Cl_2\right]^{+}$ and identify the optically active isomer.

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30. $\left[Ti(H_2O)^6\right]^{3+}$ is coloured, while $\left[Sc(H_2O)_6\right]^{3+}$ is colourless- explain.

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31. Given an example for complex of the type $[Ma_2b_2c_2]$ where a, b, c are monodentate ligands and give the possible isomers.

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32. Given one test of differentiate $\left[Co(NH_3)_5Cl\right]SO_4$ and $\left[Co(NH_3)_5SO_4\right]Cl$.

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33. Is an octahedral crystal field, draw the figure to show splitting of d orbitals .

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34. What is linkage isomerism ? Explain with an example .

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35. Write briefly about the applications of coordination compounds in volumetric analysis.

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36. Classify the following ligand based on the number of donor atoms.

$(a) NH_3$ $(b) en$ $(c) \mathrm{ox}^{2-}$ (d) triaminotriethylamine (e) pyridine

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37. Give the difference between double salts and coordination compounds.

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38. Write the postulates of Werner's theory.

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39. $[Ni(CN)_4]^{2-}$ is diamagnetic , while $[NiCl_4]^{2-}$ is paramagentic, explain using crystal field theory.

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40. Why tetrahedral complexes do not exhibit geometrical isomerism.

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41. Explain optical isomerism in coordination comounds with an example.

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42. What are hydrate isomers ? Explain with an example.

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43. What is crystal field solitting energy?

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44. What is crystal field stabilization energy (CFSE) ?

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45. A solution of $\left[Ni(H_2O_6\right]^{2+}$ is green, whereas a solution of $\left[Ni(CN)_4\right]^{2-}$ is colourless-Explain.

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46. Discuss briefly the nature in metal carbonyls.

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47. What is the coordination entity formed when excess of liquid ammonia is added to an aqueous solution copper sulphate ?

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48. On the basis of VB theory explain the nature of bonding in $\left[Co(C_2O_4)_3\right]^{3-}$.

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49. What are the limitation of VB theory ?

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50. Write the oxidation state, coordination number , nature of ligand, magnetic property

and electronic configuration in octahedral crystal field for the complex $K_4\left[Mn(CN)_4\right]$.

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Additional Question Choose The Correct Answer

1. Which one of the following is an example of coordination compound ?

A. Common salt

B. Mohr'salt

C. Haemoglobin

D. Potash alum

Answer: A::B::C

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2. Which one of the following is not an example of complex salt ?

A. Haemoglobin

B. Chlorophy II

C. Cobalamine

D. Ferrous ammonium sulphate

Answer: A::D

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3. Which one of the complex salt is acting as a photo sensitiser in photosynthesis process ?

A. Wilkinson's compound

B. Cobalamine

C. Chlorophy II

D. Haemoglobin

Answer: C

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4. The complex compound act as oxygen transporter of human is .....

A. Haemoglobin

B. Chlorophy II

C. Cyano cobalamine

D. Wilkinson compound

Answer: A::B

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5. Which metal is present in vitamin B_{12} ?

A. Iron

B. Cobalt

C. Manganese

D. Copper

Answer: A::B::C

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6. Which one of the following metal ion is present in Haemoglobin ?

A. Fe^{2+}

B. CO^{3+}

C. Mn^{2+}

D. Cu^{2+}

Answer: A::B

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7. Consider the following statements,

(i) Mohr's salt answers the presence of Fe^{2+}, NH_4^+ ans SO_4^{2-} ions.

(ii) Potassium Ferri thio cyanate answers the presence of K^+, Fe^{3+}, SCN^- ions

(iii) In coordination compound, the complex ion does not loose its identity and never

dissociate to give simple ions.

Which of the above statements is/are correct?

A. ii only

B. i and iii

C. ii and iii

D. iii only

Answer: A::B::D

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8. How many moles of $AgCl$ are precipiated on the reaction of one mole of $CoCl_3.5NH_3$ with $AgNO_3$?

A. 3

B. 1

C. 2

D. 5

Answer: B::C

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9. What are primary and secondary valency of cobalt in $CoCl_3.6NH_3$?

A. $3, 3$

B. $6, 3$

C. $3, 6$

D. $6, 6$

Answer: C

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10. Consider the following statements

(i) The outer sphere in coordination compound is called ionisation sphere.

(ii) The primary valences are non directional while secondary valences are directional.

(iii) The primary valances of a metal ion is negative and it is satisfied by positive ions .

Which of the above statements is/are not correct ?

A. i and ii

B. ii and iii

C. iii only

D. ii only

Answer: C

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11. Which one of the following is the coordination centity in $k_4\left[Fe(CN)_6\right]^{4-}$?

A. $4K^+$

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

C. Fe^{2+}

D. CN^{-}

Answer: B::C::D

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12. Which of the following is called Lewis acid in $\left[Ni(Co)_4\right]$?

A. Ni^{2+}

B. Co

C. Ni^{4+}

D. Co^{-}

Answer: A::B

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13. Identify the lewis acid in $K_4\left[Fe(CN)_6\right]$?

A. Fe^{3+}

B. Fe^{2+}

C. K^{+}

D. CN^-

Answer: B

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14. The coordination polyhedra of $K_3[Fe(CN)_6]$ is .....

A. Square planar

B. Tetrahedral

C. Linear

D. Octahedral

Answer: A::C::D

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15. The coordination polyhedra of $\left[Ni(CO)_4\right]$ is .....

A. Octahedral

B. Tetrahedral

C. Square planar

D. Pyramidal

Answer: A::B::D

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16. What is the coordination number of Fe^{2+} in $K_4\left[Fe(CN)_6\right]$?

A. 4

B. 6

C. 3

D. 2

Answer: B

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17. Identify the coordination number of Ni^{2+} in $\left[Ni(en)_3\right]Cl_2$

A. 3

B. 2

C. 6

D. 5

Answer: C

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18. The oxidation state of Fe in $\left[Fe(CN)_6\right]^{4+}$ is.....

A. II

B. III

C. VI

D. IV

Answer: A

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19. Identify the oxidation state of cobalt in $\left[Co(NH_3)_5Cl\right]^{2+}$?

A. $+2$

B. $+3$

C. $+4$

D. $+5$

Answer: B::C

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20. What is the coordination number of Pt in $\left[Pt(NO_2)(H_2O)(NH_3)_2\right]Br$?

A. 3

B. 4

C. 2

D. 5

Answer: B::D

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21. Which one of the following is an example of cationic complex ?

A. $Na\left[Ag(CN)_2\right]$

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

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

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

Answer: A::B::C

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22. Which of the following is an example of anionic complex ?

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

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

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

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

Answer: C::D

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23. Which one of the following is a neutral complex ?

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

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

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

D. $Na\left[Ag(CN)_2\right]$

Answer: A::C

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24. Which one of the following is a homoleptic complex ?

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

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

C. $\left[Pt(NO_2)(H_2O)(NH_3)_2\right]Br$

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

Answer: C::D

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25. Which one of the following is a hetroleptic complex ?

A. $\left[Pt(NO_2)(H_2O)(NH_3)_2\right]Br$

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

C. $[Co(NH_3\ \_\ (6)]Cl_3$

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

Answer: A::B::C

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26. Which one of the following is called as Zeise's salt ?

A. $\left[Pt(NH_3)_4\right]\left[PtCl_4\right]$

B. $K[PtCl_3(C_2H_4)]$

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

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

Answer: B::C::D

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27. $\left[Pt(NH_3)_4\right]\left[PtCl_4\right]$ is called as .....

A. Zeigler Natta Catalyst

B. Zeises' salt

C. Magnus's green salt

D. Mohr's salt

Answer: A::C

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28. The IUPAC name of $K_4\left[Fe(CN)_6\right]$ is .....

A. Potassium hexacyanido Ferrate (III)

B. Potassium hexacyanidoferrate (II)

C. Potassium ferrocyanide

D. Potassium ferricyanide

Answer: A::B::C::D

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29. Which of the following is the IUPAC name of $\left[Co(NH_3)_6\right]Cl_3$?

A. Hexamminecobalt (III) chloride

B. Hexammine cobalt (II) chloride

C. Hexamminechloro cobaltate (III)

D. Trichlorohexammine cobalt (III)

Answer: A::B::C::D

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30. The IUPAC name of $\left[Co(NH_3)_4Cl_2\right]Cl$ is .....

A. Tetrammine dichlorido cobalt (III) chloride

B. Dichlorido tetrammine cobalt (III) chloride

C. Tetrammine cobalt (III) trichloride

D. Tetrammine dichlorido cobaltate (III).

Answer: A::B::C::D

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31. Which one of the following is the IUPAC name of $\left[Cr(en)_3\right]\left[CrF_6\right]$

A. Triethylamine chormium (III) hexa fluriod chromium (III)

B. Tris (ethane-$1, 2$ diamine) chromium (III) hexa flurido chromate (III)

C. Hexa fluoro chromium (III) tris (ethane-$1, 2$-diamined) chromium (III)

D. Hexa fluoro chromate (III) triethyl amine chromium (III)

Answer: A::B::C::D

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32. The IUPAC name of $Na_2[Ni(EDTA)]$ is .....

A. Disodium tetra acetato nickalate (II)

B. Sodium $2, 2', 2'', 2''' -$ (ethane $1, 2$-diyldinitrilo) tetra acetato nickelate (II)

C. Ethylene tetra acetato nickalate (II)

D. Sodium tetraacetato nickel (II)

Answer: A::B::C::D

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33. The formula of Hexafluorido ferrate (II) ion is .....

A. $[FeF_6]^{4-}$

B. $[FeF_6]^{3-}$

C. $[FeF_6]^{2-}$

D. $[FeF_6]^{3+}$

Answer: A::D

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34. What is the IUPAC name of $\left[Co(CO_3)(NH_3)_4\right]Cl$?

A. Carbonato tetraammine cobalt (III) chloride

B. Tetraamminecarbantaocbalt (III) chloride

C. Carbonato tetra ammonium cobaltate (III)

D. Carbonato tetraammine cobaltate (II)

Answer: A::B::C::D

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35. What is the formula of Diaquadiododinitrito $-kO$ palladium (IV) ?

A. $\left[PdI_2(ONO)_2(H_2O)_2\right]$

B. $\left[PdI_2(NO_2)_2(H_2O)_2\right]$

C. $\left[PdI_2(NO_3)_2H_2O\right]$

D. $\left[PdI_2(NO_3)(H_2O)\right]$

Answer: A::B::D

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36. What is the formula of Triammine triaquachrmium (III) chloride ?

A. $[CrCl_3]\left[Cr(H_2O)_3\right]Cl_3$

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

C. $\left[Cr(H_2O)_6\right][CrCl_3]$

D. $\left[Cr(NH_3)_2(H_2O)_4\right]Cl_3$

Answer: B::C

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37. Which type of isomerism is possible in $\left[Co(NH_3)_5(No_2)\right]^{2+}$?

A. Ligand isomerism

B. Coordination isomerism

C. Ionisation isomerism

D. Linkage isomerism

Answer: A::D

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38. $\left[Cr(NH_3)_4ClBr\right]NO_2$ and $\left[Cr(NH_3)_4ClNO_2\right]Br$ are examples of .....

A. Linkage isomerism

B. Ionisation isomerism

C. Coordination isomerism

D. Hydrate isomerism

Answer: A::B

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39. The type of isomerism present in $\left[Pt(NH_3)_4\right]\left[Pd(Cl)_4\right]$ and $\left[Pd(NH_3)_4\right]\left[Pt(Cl)_4\right]$ is .....

A. Solvate isomerism

B. Ionisation isomerism

C. Coordination isomerism

D. Linkage isomerism

Answer: A::C::D

View Text Solution

40. Isomerisom present in $CrCl_36H_2O$ is.....

A. Solvate isomerism

B. Ligand isomerism

C. Linkage isomerism

D. Ionisation isomerism

Answer: A

View Text Solution

41. Geometrical isomerism is exhibited by .....

A. Tetrahedral complex

B. Linear complex

C. Square planar complex

D. All of the above

Answer: A::C

View Text Solution

42. The type of isomerism possessed by $\left[CO(en)_3\right]^{3+}$ is .....

A. Cis-trans isomerism

B. Optical isomerism

C. Ionisation isomerism

D. Linkage isomerism

Answer: A::B::C

View Text Solution

43. VB theory was proposed by .....

A. Alfred Werner

B. Bethe and Van vleck

C. Linus Pauling

D. Louis de Bronglie

Answer: A::C

View Text Solution

44. Bethe and Van vleck proposed a coordination theory named as .....

A. Werner's theory

B. Valence bond theory

C. Molecular orbital theory

D. Crystal field theory

Answer: A::C::D

View Text Solution

45. Which one of the following geometry is possessed by $[CuCl_2]^-$ and $\left[Ag(CN)_2\right]$?

A. Trigonal planar

B. Linear

C. Tetrahedral

D. Square planar

Answer: A::B

View Text Solution

46. The type of hybridisation take place in $\left[HgI_3^-\right]$ is .....

A. sp

B. sp^3

C. sp^2

D. dsp^2

Answer: B::C

View Text Solution

47. Square planar complexes have..... type of hybridisation.

A. sp^3

B. dsp^2

C. sp^3d

D. sp^3d^2

Answer: B::D

View Text Solution

48. Which type of hybridisation take place in $\left[Fe(CO)_5\right]$?

A. dsp^2

B. d^2sp^3

C. sp^3d^2

D. dsp^3

Answer: C::D

View Text Solution

49. The d orbital involved in $dSP3$ hybridisation of $\left[Fe(CO)_5\right]$ is.....

A. d_{xy}

B. d_{yz}

C. d_{xz}

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

Answer: B::D

View Text Solution

50. In a octahedral geometry the type of hybridisation involved is.....

A. sp^3d^2

B. d^2sp^3

C. dsp^3

D. a or b

Answer: A::B::D

View Text Solution

51. The d orbitals involved in d^2sp^3 hybridization are .....

A. d_{xy}, d_{yz}

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

C. d_{zy}, d_{xz}

D. d_{xy}, d_{z^2}

Answer: B::D

View Text Solution

52. Which type of hybridisation is possible in $\left[Ni(CN)_4\right]^{2-}$ and $\left[Pt(NH_3)_4\right]^{2+}$?

A. dsp^2

B. dsp^3

C. sp^3d

D. sp^3d^2

Answer: A::B::D

View Text Solution

53. The geometry possible in $[FeF_6]^{4-}$ and $[CoF_6]^{4-}$ is .....

A. Trigonal bipyramidal

B. Square planar

C. Octahedral

D. Tetrahedral

Answer: A::C::D

View Text Solution

54. The geometry of $\left]Fe(CN)_5\right)^-$ is .....

A. Tetrahedral

B. Octahedral

C. Square planar

D. Trigonamal bipyramidal

Answer: A::B::C::D

View Text Solution

55. Which one of the following complex is paramagnetic in nature ?

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

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

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

D. $\left[Ag(CN)_2\right]^{-}$

Answer: C::D

View Text Solution

56. Which one of the following complex has magnetic moment a $4.899B_M$?

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

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

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

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

Answer: C

View Text Solution

57. Consider the following statements

(i) VB theory does not explain the colour of the complex

(ii) VB theory does not explain the magneitc properties

(iii) Vb theory does not provide a quantative explanation about inner orbital complexes.

Which of the above statements is/are not correct ?

A. i only

B. i and ii

C. iii only

D. ii only

Answer: C

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58. Consider the following statements

(i) Complexes of central metal atom such as of Cu^+, Zn^{2+} are coloured

(ii) Most of the transition metal complexes are colourless

(iii) Negative CFSE value indicates that low spin complex is favoured

Which of the above statements is/are correct ?

A. i and ii

B. iii only

C. ii only

D. i, ii only iii

Answer: B

View Text Solution

59. Which is used for the separation of landimides in softening of hard water and also in removing lead poisoning ?

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

B. EDTA

C. $\left[Ni(DMG)_2\right]$

D. $TiCl_4 + Al(C_2H_5)_3$

Answer: A::B::D

View Text Solution

60. Which complex is used as an antiumor drug in cancer treatment ?

A. Ca-EDTA chelate

B. EDTA

C. $TiCl_4 + Al(C_2H_5)_3$

D. Cis-Platin

Answer: A::C::D

View Text Solution

61. What is the name of $Na_3\left[Ag(S_2O_3)_2\right]$.

A. Sodiumargentothisuplhate

B. Sodium dithio sulphato angentate (I)

C. $HyPO$

D. Sodium thiosulphate

Answer: A::B::D

View Text Solution

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

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

B. $\left[CO(en)_2Cl_2\right]Cl$

C. $\left[Pt(NH_3)_4\right][PtCl_6]$

D. $\left[CO(NH_3)_4Cl_2\right]NO_2$

Answer: B::C

View Text Solution

63. In which of the following coordination enitities, the magnitude of Δ_0 (CFSE in octahedral field) will be maximum ?

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

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

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

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

Answer: A::C

View Text Solution

64. Which of the following complex ion is expected to absorb visile light ?

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

B. $\left[Sc(H_2O)_3(NH_3)_3\right]^{3+}$

C. $\left[Ti(en)_2(NH_3)_2\right]^{4+}$

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

Answer: C::D

View Text Solution

65. Which of the following complex ion is not expected to absorv visible light ?

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

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

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

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

Answer: B::C::D

View Text Solution

66. The IUPAC name of Zeise's salt is

A. Tetramminecopper (II) sulphate

B. Ferrous Ammoniumsulphate

C. Tetracyanocopper (II) sulphate

D. Potassiumtrichloro(ethene) platinate (II)

Answer: A::C::D

View Text Solution

67. The CFSE is the highest for

A. $[CoF_4]^{2-}$

B. $[Co(NCS)_4]^{2-}$

C. $[Co(NH_3)]^{3+}$

D. $[CoCl_4]^{2-}$

Answer: B::C::D

View Text Solution

68. Zero magnetic moment will be shown by the compound

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

B. $\left[Ag(CN)_2\right]^{-1}$

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

D. $[CoF_6]^{3-}$

Answer: A::B::C

View Text Solution

69. The change of Fe in $\left(Fe(CN)_6\right]^{3-}$ is

.....

A. -6

B. $+3$

C. -3

D. $+6$

Answer: B::C

View Text Solution

70. Coordination number of Co in $\left[Co(F)_6\right]^{3-}$

A. 3

B. 6

C. 8

D. 9

Answer: B

View Text Solution

71. $AgCl$ precipitate dissolves in ammonium hydroxide due to the formation of .....

A. $\left[Ag(NH_4)_2\right]OH$

B. $\left[Ag(NH_4)_2\right]Cl$

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

D. $\left[Ag(NH_3)_2\right]^{+1}$

Answer: A::B::C

View Text Solution

72. The complexes $\left[Co(NH_3)_6\right]\left]Cr(CN)_6\right]$ and $\left[Cr(NH_3)_6\right]\left[Co(CN)_6\right]$ are the example of which type of isomerism ?

A. Linkage isomerism

B. Ionisation isomerism

C. Optical isomerism

D. Coordination isomerism

Answer: A::C::D

View Text Solution

73. A magnetic moment of 1.73BM will be shown by one among the following

A. $TiCl_4$

B. $[CoCl_6]^{4-}$

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

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

Answer: B::C::D

View Text Solution

74. Among the following complexes which one shows zero CFSE ?

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

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

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

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

Answer: B::C

View Text Solution

75. Number of possible isomers for the complex

$\left[Co(en)_2Cl_2\right]Cl$ will be

A. 1

B. 4

C. 3

D. 2

Answer: C

View Text Solution

76. The hybridization involved in the complex $[Ni(CN)_4]^{2-}$ is.....

A. sp^3

B. d^2sp^3

C. dsp^2

D. sp^3d^2

Answer: B::C::D

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Additional Question Fill In The Blanks

1. The reaction between Ferric chloride and potassium thio cyanate solution gives a blood red coloured coordination compound as .....

View Text Solution

2. .....is a pigment present in plants acting as a photosensitiser in the photosynthesis.

View Text Solution

3. In a coordination compound, if the metal ion has a secondary valence of six, it has an..... Geometry.

View Text Solution

4. The coordination polyhedral of $\left[Ni(CO)_4\right]$ is ..... .

View Text Solution

5. In $\left[Ni(en)_3\right]Cl_2$,the coordination number of Fe^{2+} is..... .

View Text Solution

6. In the coordination entity $\left[Fe(CN)_6\right]^{4-}$ the oxidation state of iron is represented as..... .

View Text Solution

7. The oxidation state of cobalt in $\left[Co(NH_3)_5Cl\right]^{2+}$ is..... .

View Text Solution

8. The coordination number of Pt in $\left[Pt(NO_2)(H_2O)(NH_3)_2\right]Br$ is..... .

View Text Solution

9. Ethylene diamine tetraacetate has the structure as..... .

View Text Solution

10. The IUPAC name of $k_4\left[Fe(CN)_6\right]$ is..... .

View Text Solution

11. The complex ion in $k_4\left[Fe(CN)_6\right]$ is ..... .

View Text Solution

12. The oxidtion state of Fe in `k_(4)[Fe(CN)_(6)] is..... .

View Text Solution

13. The coordination number of cobalt in $\left[CO(NH_3)_4Cl_2\right]Cl$ is..... .

View Text Solution

14. The IUPAC name of $\left[CO(NH_3)_4Cl_2\right]Cl$ is..... .

View Text Solution

15. The IUPAC name of $\left[Cr(en)_3\right]\left[CrF_6\right]$ is..... .

View Text Solution

16. The coordination number of $\left[Cr(en)_3\right]\left[CrF_6\right]$ and oxidation state of Cr

are..... .

View Text Solution

17. The IUPAC name of $\left[Cr(NH_3)_3\right](H_2O)_3]Cl_3$ is..... .

View Text Solution

18. The coordination number of Fe in $K_3\left[Fe(CN)_5NO\right]$ is..... .

View Text Solution

19. The IUPAC name of $[FeF_6]^{4-}$ is..... .

View Text Solution

20. The coordination number of cobalt in $[CO(NO_2)_3(NH_3)_3$ is..... .

View Text Solution

21. The IUPAC name of coordination compound $\left[CO(NO_2)_3(NH_3)_3\right]$ is..... .

View Text Solution

22. The isomerism possible in $\left[CO(NH_3)_5(NO_2)\right]^{2+}$ is..... .

View Text Solution

23. The isomerism possible in $\left[Pt(en)_2Br_2\right]Cl_2$ is..... .

View Text Solution

24. The type of isomerism possible in $CrCl_36H_2O$ is..... .

View Text Solution

25. Geometric isomerism exists in ..... Complexes due to different possible three dimensional spatial arrangement of ligands around the central metal atom.

View Text Solution

26. In..... of the form $[MA_2B_2]^{n\pm}$, cis-trans isomerism exists.

View Text Solution

27. The square planar complex of the type $\left[M(xy)_2^{n\pm}\right.$ shows..... Isomerism

View Text Solution

28. $\left[Pt(NH_3)_2Cl_2\right]^{2+}$ shows..... isomerism.

View Text Solution

29. $\left[COCl_2(en)_3\right]^{3+}$ exhibits.....isomerism.

View Text Solution

30. The hybridised orbitals are..... And their orientation in space gives a definite..... to the complex ion.

View Text Solution

31. The shape of $\left[Fe(CO)_5\right]$ is.....

View Text Solution

32. The shape of $\left[Ni(CO)_4\right]$ is..... Whereas the shape of $\left[Ni(CN)_4\right)]^{2-}$ is..... .

View Text Solution

33. The shape of $[HgI_3]^-$ is..... and the type of hybridisation is..... .

View Text Solution

34. The geometry and hybridisation involved in $[CuCl_2]^-$ are.....respectively.

View Text Solution

35. The hybridisation and geometry of $[Fe(CN)_6]^{2-}$ and $[Fe(CN)_6]^{3-}$ are .....and .....respectively.

View Text Solution

36. The shape of $\left[Fe(H_2O)_6\right]^{2+}$ and $[COF_6]^{4-}$ is .....

View Text Solution

37. The hybridisation take place in $[FeF_6]^{4-}$ and $\left[Fe(H_2O)_6\right]^{2+}$ is .....

View Text Solution

38. The d orbital involved in the dsp^3 hybridisation of $Fe(CO)_5]$ is .....

View Text Solution

39. In the octahedral complexes, if the $(n-1)d$ orbitals are involved in hybridisation, they are called.....and.....complexes.

View Text Solution

40. CO, CN^-, en and NH_3 are called.....ligands.

View Text Solution

41. The magnetic character of $\left[Ni(CO)_4\right]$ is.....

View Text Solution

42. The hybridisation and geometru of $[Ni(CO)_4]$ are.....and .....respectively.

View Text Solution

43. The hybridisation and magnetic nature of $[Ni(CN)_4]^{2-}$ are.....and.....respectively.

View Text Solution

44. The hybridisation and magnetic nature of $\left[Fe(CN)_6\right]^{3-}$ are.....and.....respectively.

View Text Solution

45. The number of unpaired electrons in $\left[Fe(CN)_6\right]^{3-}$ is.....and the magnetic moment value is

View Text Solution

46. The hybridisation and geometry of $[CoF_6]^{3-}$ are.....and.....respectively.

View Text Solution

47. The number of unpaired electrons and magnetic moment value of $[CoF_6]^{3-}$ are .....and.....respectively.

View Text Solution

48. The spin only magnetic moment of tetrachlorido manganate (II) iron is .....

View Text Solution

49. $\left[Co(en)_2Cl_2\right]Br$ react with silver nitrate to form.....coloured precipitate.

View Text Solution

50. The crystal field splitting energy of Ti^{3+} ion complexes such as $[TiBr_6]^{3-}$, $[TiF_6]^{3-}$, $\left[Ti(H_2O)_6\right]^{3+}$ the ligands are in the order.....

View Text Solution

51. .....is defined as the energy difference of electronic configuration in the ligand field and the istropic field.

View Text Solution

52. The hydrated copper (II) ion is.....in colour as it absorbs.....light and transmit its complementary colour.

View Text Solution

53. The colour of $\left[Ti(H_2O)_6\right]^{3+}$ is.....

View Text Solution

54. Purification of Nickel by ..... Process involves formation ..... Which yields $99.5\,\%$ pure Nickel on decomposition.

View Text Solution

55. .....is used as a chelating ligand for the separation of lanthanides, in sofetning of hard water and also in removing.....poisoning.

View Text Solution

56. .....process is used in the extraction of sliver and gold from their ores.

View Text Solution

57. Wilkinson's catalyst.....is used for hydrogenation of alkenes.

View Text Solution

58. .....is used in the polymerisation of ethane as a complex catalyst

View Text Solution

59. .....is used as antitumor drug in cancer treatment

View Text Solution

60. In photography, undecomposed $AgBr$ forms a soluble complex called.....

View Text Solution

61. A red blood corpuscles (RBC) is composed of heme group which..... Complex play an important role in carrying oxygen from lungs to tissues.

View Text Solution

62. The green pigment chlorophyll contains ..... Ion surrounded by a modified porphyrin ligand called .....

View Text Solution

63. Co^{3+} is present in vitamin B_{12} otherwise chemically called.....

View Text Solution

64. The enzyme important in digestion is .....contains.....coordinated to protein

View Text Solution

Additional Question Match The Following

1.

LIST I	LIST II
A. Chlorophyll	1. Zn^{2+}
B. Haemoglobin	2. Co^{3+}
C. Carboxy peptidase	3. Mg^{2+}
D. Cyanocobalamine	4. Fe^{2+}

Code:	A	B	C	D
(*a*)	3	4	1	2
(*b*)	4	3	2	1
(*c*)	2	1	4	3
(*d*)	1	2	3	4

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2. LIST I LIST II

A.	$K_4 [Fe (CN)_6]$	1. 4
B.	$[Cu (NH_3)_4] SO_4$	2. 3
C.	$Na [Ag (CN)_2]$	3. 6
D.	$[Hg I_3]^-$	4. 2

Code:	A	B	C	D
(*a*)	1	2	3	4
(*b*)	3	1	4	2
(*c*)	2	4	1	3
(*d*)	4	3	2	1

2.

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3. LIST I LIST II

A. $[Hg\ I_3]^-$		1.	dsp^3
B. $[Fe\ (CO)_5]$		2.	sp^2
C. $[Ag\ (CN)_2]^-$		3.	sp^3d^2
D. $[Fe\ F6]^{4-}$		4.	sp

Code:	A	B	C	D
(*a*)	2	1	4	3
(*b*)	3	2	1	4
(*c*)	4	3	2	1
(*d*)	1	4	3	2

3.

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4. LIST I LIST II

A. $[Fe(CN)_6]^{3-}$		1. sp^3	
B. $[Ni(CN)_4]^{2-}$		2. sp	
C. $[Ag(CN)_2]^-$		3. d^2sp^3	
D. $[NiCl_4]^{2-}$		4. dsp^2	

Code:	A	B	C	D
(*a*)	1	2	3	4
(*b*)	4	3	1	2
(*c*)	3	4	2	1
(*d*)	2	1	4	3

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LIST I	LIST II
A. Linear	1. $[Pt(NH_3)_4]^{2+}$
B. Trigonal planar	2. $[Ni Cl_4]^{2-}$
C. Sqare Planar	3. $[Cu Cl_2]^-$
D. Tetrahedral	4. $[Hg I_3]^-$

5.

Code:	A	B	C	D
(*a*)	3	4	1	2
(*b*)	2	3	4	1
(*c*)	4	1	2	3
(*d*)	1	2	3	4

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6. LIST I LIST II

A. Octahedral	1. $[Ni(CO)_4]$
B. Trigonal bipyramidal	2. $[Co F_6]^{3-}$
C. Trigonal Planar	3. $[Fe(CO)_5]$
D. Tetrahedral	4. $[Hg I_3]^-$

Code:	A	B	C	D
(a)	1	2	3	4
(b)	2	3	4	1
(c)	3	4	1	2
(d)	4	1	2	3

6.

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LIST I	LIST II
A. Unpaired electrons 0	1. $[Mn\ Cl_4]^{2+}$
B. Unpaired electrons 1	2. $[Co\ F_6]^{3-}$
C. Unpaired electrons 4	3. $[Fe\ (CN_6)]^3$
D. Unpaired electrons 5	4. $[Ni\ (CN)_4]^{2-}$

7.

Code:	A	B	C	D
(*a*)	4	3	2	1
(*b*)	3	2	1	4
(*c*)	1	4	3	2
(*d*)	2	1	4	3

View Text Solution

8.

LIST I	LIST II
A. Phthalo blue pigment	1. antitumor drug
B. EDTA	2. Printing ink
C. $Ni(DMG)_2$	3. Softening of hard water
D. Cis-platin	4. Metal ion estimation

Code:	A	B	C	D
(*a*)	2	3	4	1
(*b*)	3	4	1	2
(*c*)	4	1	2	3
(*d*)	1	2	3	4

View Text Solution

9. LIST I LIST II

A. $[(PPh_3)_3 Rh Cl]$	1. Ziegler Natta catalyst
B. $Ti Cl_4 + Al (C_2H_5)_3$	2. Cis-Platin
C. $Na_3 [Ag (S_2O_3)_2]$	3. Wilkinson's catalyst
D. $[Pt (NH_3)_2 Cl_2]$	4. Sodium dithiosulphato Argentato (I)

Code:	A	B	C	D
(*a*)	2	4	3	1
(*b*)	4	2	1	3
(*c*)	3	1	4	2
(*d*)	1	3	2	4

9.

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10. LIST I LIST II

A.	$[Cr(H_2O)_6]Cl_3$	1.	Ionisation isomerism
B.	$[Cr(NH_3)_4ClBr]NO_2$	2.	Optical isomerism
C.	$[Cr(NH_3)_6][CO(CN)_6]$	3.	Solvate isomerism
D.	$[CO(en)_3Cl_2]^{3+}$	4.	Coordination isomerism

10.

Code:	A	B	C	D
(*a*)	3	1	4	2
(*b*)	4	2	3	1
(*c*)	2	4	1	3
(*d*)	1	3	2	4

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Additional Question Assertion And Reason

1. Assertion (A) : Mohr's Salt answers the presence of Fe^{2+} , NH_4^+ and SO_4^{2-} ions.

Reason (R) : The double salt, Mohr's salt loose their identity and dissociates into their constituent simple ions in solution.

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

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

C. Both A and R are wrong

D. A is wrong but R is correct

Answer: A

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2. Assertion (A) : Potassium ferro thiocyanate answers the presences of Fe^{3+}, K^{+} and SCN^{-} ions.

Reason (R) : The complex ion in coordination compound does not loose its identify and never dissociate to give simple ions.

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

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

C. A is wrong but R is correct

D. Both A and R are wrong

Answer: C

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3. Assertion (A) : The outer sphere in the complex compound is called ionisation sphere.

Reason (R) : The groups present in outer sphere are loosely bound to the central metal ion and hence can be separated into ions upon dissolving the complex in the suitable solvent.

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

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

C. A is correct but R is wrong

D. A is wrong but R is correct

Answer: A

View Text Solution

4. Assertion (A) : In $K_4\left[Fe(CN)_6\right]$, the coordination number is six.

Reason (R) : The number of σ bonds between ligands and the central metal atom is known as coordination number.

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

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

C. A is correct but R is wrong

D. A is wrong but R is correct

Answer: A

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5. Assertion (A) : $\left[Co(NH_3)_6\right]^{3+}$ and $\left[Fe(H_2O)_6\right]^{2+}$ are homoleptic complexes

Reason (R) : The central metal ion/atom is coordinated to only one kind of ligands is called a homoleptic complex.

A. Both A and R are wrong

B. A is correct but R wrong

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

D. Both A and R are correct but R is not the correct explanation of A.

Answer: A

View Text Solution

6. Assertion (A) : $\left[Co(NH_3)_6\right]\left[Cr(CN)_6\right]$ can exist in coordination isomerism.

Reason (R) : In a bimetallic complex, the interchange of one or more ligands between

the cationic and the anionic coordination entities result in coordination isomerism

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

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

C. A is correct but R is wrong

D. A is wrong but R is correct

Answer: A

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7. Assertion (A) : $\left[Co(NH_3)_4Br_2\right]Cl$ and $\left[Co(NH_3)_4ClBr\right]Br$ are examples of ionisation isomers.

Reason (R) : The exchange of counter ions with one or more ligands in the coordination entity will result in ionisation isomers

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

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

C. A and R are wrong

D. A is wrong but R is correct

Answer: B

View Text Solution

8. Assertion (A) : Geometrical isomerism exists in homoleptic complexes.

Reason (R) : In homoleptic complexes due to different possible three dimensional spatial

arrangements of ligands around the central metal atoms.

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

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

C. A and R are wrong

D. A is wrong but R is correct

Answer: C

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9. Assertion (A) :Geometrical isomerism exists in heteropleptic complexes.

Reason (R): In heteroleptic complexes due to different possible three dimensional spatial arrangement of ligands around the central metal atom results in geometrical isomers.

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

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

C. Both A and R are wrong

D. A is wrong but R is correct

Answer: A

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10. Assertion (A) : $\left[Ni(CO)_4\right]$ is diamagnetic

Reason (R) : In $\left[Ni(CO)_4\right]$, there is no unpaired electrons and so it is dimagnetic.

A. Both A and R are wrong

B. A is wrong but R is correct

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

D. Both A and R are correct but R is not the correct explanation of A.

Answer: C

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11. Assertion (A) : $\left[Fe(CN)_6\right]^{3-}$ is paramagnetic

Reason (R) : In $\left[Fe(CN)_6\right]^{3-}$, there is one unpaired electron and so it is paramagnetic

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

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

C. Both A and R are wrong

D. A is correct but R is wrong

Answer: A

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12. Assertion (A) : Most of the transition complexes are coloured.

Reason (R): Transition complexes absorbs the light of particular wavelength in the visible light. The transmitted light gives the complementary colour.

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

B. A is correct but R is wrong

C. A and R are wrong

D. A is wrong but R is correct

Answer: A

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13. Assertion (A) : Complexes of central metal atom such as of Cu^+, Zn^{2+}, SC^{3+}, Ti^{4+} are colourless.

Reason (R) : Cu^+, Zn^{2+}, SC^{3+}, Ti^{4+} are having d^0 or d^{10} configuration and because of it, $d-d$ transition is not possible and so they are colourless.

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

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

C. Both A and R are wrong

D. A is correct but R is wrong

Answer: A

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Additional Question Find The Odd One Out

1. Find the Odd net out.

A. Vitamin-B_(12)`

B. Haemoglobin

C. Chlorophy II

D. Glycine

Answer: D

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2. Find the Odd net out.

A. Mohar's salt

B. Potassium Ferrocyanide

C. Potassium ferrithio cyanate

D. Wilkinson's compound

Answer: A

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3. Find the Odd net out.

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

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

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

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

Answer: C

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4. Find the Odd net out.

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

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

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

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

Answer: C

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5. Find the Odd net out.

A. NH_3

B. CN^-

C. H_2O

D. PPh_3

Answer: B

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6. Find the Odd net out.

A. CN^-

B. Cl^-

C. SO_4^{2-}

D. NH_3

Answer: D

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7. Find the Odd net out.

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

B. $Na\left[Ag(CN)_2\right]$

C. $K_2\left[Zn(CN)_4\right]$

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

Answer: D

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8. Find the Odd net out.

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

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

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

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

Answer: A

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9. Find the Odd net out.

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

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

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

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

Answer: B

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10. Find the Odd net out.

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

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

C. $[FeF_6]^{4-}$

D. $[CoF_6]^{4-}$

Answer: A

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Additional Question Find Out The Correct Pair

1. Find out the correct pair

A. $\left[Ni(CO)_4\right], \left[NiCl_4\right]^{2-}$

B. $\left[CuCl_2\right]^{-}, \left[Fe(CO)_5\right]$

C. $\left[FeF_6\right]^{4-}, \left[Fe(CN)_6\right]^{2-}$

D. $\left[Ni(CO)_4\right], \left[HgI_3\right]^{-}$

Answer: A

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2. Find out the correct pair

A. $\left[Fe(CN)_6\right]^{3-}, \left[CoF_6\right]^{3-}$

B. $\left[Ni(CN)_4\right]^{2-}, \left[Ni(Co)_5\right]$

C. $\left[FeF_6\right]^{4-}, \left[CoF_6\right]^{3-}$

D. $\left[CuCl_2\right]^{-}, \left[HgI_3\right]^{-}$

Answer: A

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3. Find out the correct pair

A. $\left[Cr(H_2O)_6\right]Cl_3$ and $\left[Cr(H_2O)_4Cl_2\right].2H_2O$

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

C. $\left[Cr(H_2O)_4Cl_2\right]Cl.2H_2O$ and $\left[Cr(H_2O)_5Cl\right]Cl_2.\ H_2O$

D. $\left[Fe(CO)_5\right]$ and $\left[Ni(CN)_4\right]^{2-}$

Answer: D

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Additional Question Find Out The Incorrect Pair

1. Find out the Incorrect pair

A. $[Fe(F_6)]^{4-}, [CoF_6]^{4-}$

B. $[CuCl_2]^{-}, [Ag(CN)_2]^{-}$

C. $[Ni(CN)_4]^{2-}, [Pt(NH_3)_4]^{2-}$

D. $[HgI_3]^{-}, [Fe(CO)_5]$

Answer: D

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2. Find out the Incorrect pair

A. CN^- and NO_2^-

B. CO and NO

C. F^- and Br^-

D. en and $\left(COO^-\right)_2$

Answer: A

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Additional Question 2 Marks Question

1. What is the limitations of werner's theory?

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2. Differentiate primary valency and secondary valency.

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3. What is coordination entity? Give example.

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4. What is meant by central action in complex salt?

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5. What are ligands? Give example.

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6. What is meant by coordination sphere? Give example.

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7. What is meant by coordination polyhedron?

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8. Define coordination number? Give example

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9. What is the coordination number in $[Nl(en)_3]Cl_2$? Explain it.

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10. Calculate the oxidation number of $Coln[Co(NH_3)_5Cl]^{2+}$.

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11. Explain about the types of coordination compound based on kind of ligands?

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12. Write the IUPAC names of the following complex salts.

$(i)\ \left[Co(NH_3)_6\right]Cl_3\ (ii)\ K_4\left[Fe(CN)_6\right]$

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13. Give the formula and IUPAC name of the following ligands.

(i) OX (ii)en

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14. Give the formula of

(i) EDTA `(ii) Triphenyl phosphine

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15. Give the IUPAC names of the following compounds.

(i) $\left[PdI_2(ONO)_2(H_2O)_2\right]$ (ii) $\left[Cr(PPh_3)(CO)_5\right]$

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16. Give the IUPAC names of the following compounds. (i) $\left[CO(NO_2)_3(NH_3)_3\right]$ (ii) $K_3\left[Fe(CN)_5NO\right]$

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17. Give the IUPAC names of the following compounds.

$(i) Na_2[Ni(EDTA)$ $(ii)\left[Co(NH_3)_5Cl\right]^{2+}$

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18. Give the IUPAC names of the following compounds.

$(i)\left[Ag(NH_3)_2\right]^{+}$ $(ii)[FeF_6]^{4-}$

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19. Define isomerism in coordination compounds.

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20. What are the different types of isomerism in coordination compounds ?

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21. Define stereo isomerism in coordination compound . Given its type.

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22. Define crystal field stabillisation energy . (CFSE).

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23. What are metallic carbonyl ? Give example.

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Additional Question 3 Marks Question

1. Explain Werner's postulate using $COCl_3.6NH_3$.

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2. What is the oxidation state in coordination compound ?

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3. Explain the types of complexes based on the charge on the complex.

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4. What is meant by ligand ? Explain their types with examples.

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5. Identify the following terms in the complex $K_4[Fe(CN)_6]$

(i) Cation (ii) Anion (iii) ligand (iv) central metal ion

(v) Oxidation state of metal (vi) IUPAC name

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6. Identify and write the following in the complex $[CO(NH_3)_4Cl_2]Cl$

(i) Cation (ii) Ligands (iii) Name of the ligand

(iv) central metal

(v) Oxidation state of central metal (vi) Anion

(vii) IUPAC name

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7. Write the following in the complex $[Cr(en)_3][CrF_6]$

(i) Types of complex (ii) Ligands (iii) central metal

(iv) Oxidation state of central metal (v) IUPAC name

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8. Write the IUPAC names of the following complexes

$(i)\left[Co(NH_3)_5CN\right]\left[Co(NH_3)(CN)_5\right]$

$(ii)\left[Pt(Py)_4\right]\left[PtCl_4\right]$

$(iii)\left[Co(NH_3)_4Cl_2\right]_3\left[Cr(CN)_6\right]$

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9. Explain coordination isomerism with suitable example.

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10. Explain ionisation isomerism with suitable example.

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11. Explain the type of isomers possible for the formula $[Cr(H_2O_6]Cl_3$ with their colour.

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12. Mention the coordination number, hybridisation and geometry of the following compounds. $(i)[CuCl_2]^-$ $(ii)[HgI_3]^-$ $(iii)Ni(CO)_4$

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13. Mention the coordination number, hybridisation and geometry of the following compounds.

$(i)\left[Ni(CN)_4\right]^{2-}$ $(ii)\left[Fe(CO)_5\right]$

$(iii)\left[CO(NH_3)_6\right]^{3+}$

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14. How is spectrochemical series is used to identify the type of ligands ?

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15. Most of the transition metal complexes are coloured . Justify this statement.

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16. Using crystal field theory, explain the colour of the coordination compound.

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17. $\left[Ti(H_2O)_6\right]^{2+}$ is purple in colour. Prove this statement

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18. Cu^+, Zn^{2+}, Sc^{3+}, Ti^{4+} are colourless. Prove this statement.

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19. Explain about the bonding in metal carbonyls.

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20. Explain the medicinal application of coordination compounds ?

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Additional Question 5 Marks Question

1. Write the IUPAC name of the following complexes.

$(i)\left[Ag(NH_3)_2\right]Cl$ $(ii)\left[Co(en)_2Cl_2\right]Cl$

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

$(iv)\left[Co(CO_3)(NH_3)_4\right]Cl$

$(v)\left[Cr(NH_3)_3(H_2O)_3\right]Cl_3$

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2. Explain about the geometrical isomerism in complexes having coordination number 4.

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3. Explain about the geometrical isomerism of octahedral complexes with suitable example.

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4. Describe about the postulate of VB theory (or) Valence bond theory.

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5. Explain the hybridisation, mgnetic property, geometry, magnetic moment of $\left[Ni(CO)_4\right]$ using valence bondy theory.

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6. Explain the hybridisation, geometry, magentic property and magnetic moment of $\left[Ni(CN)_4\right]^{2-}$ using valence bondy theory.

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7. Using VB theory, explain the type of hybridisation , geometry , magnetic property and magnetic moment of $\left[Fe(CN)_6\right]^{3-}$

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8. Explain the hybridisation, geometry, magentic property and magnetic moment of $[COF_6]^{3-}$

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9. Explain about crystal field theory.

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10. Describe about the crystal field splitting in tetrahedral complex.

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11. How would you calculate crystal field stabilization energy (CBSE) for $\left[Fe(H_2O_6\right]^{3+}$.

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12. How would you measure CBSE for $\left[Fe(CN)_6\right]^{3-}$.

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13. Explain about the classification of metal carbonyls with suitable examples.

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14. Explain about the importance and application of coordination complexes.

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15. Write the formulae for the following coordination compounds :

(i) Tetraamminediaquacobalt (III) chloride.

(ii) Ptassium tetracyanonickelate (II).

(iii) Tris (ethane-1,2-diamine) chromium (III) chloride.

(iv) Amminebromidochloridonitrito-N-platinate (II).

(v) Dichlorobis (ethane-1,2-diamine)platinum (IV) nitrate.

(vi) Iron (III) hexacyanoferrate(II)

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16. Write the IUPAC names of the following

$(i)\left[Co(NH_3)_6Cl_3\right]$ $(ii)\left[Co(NH_3)_5Cl\right]Cl_2$

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

$(iv)K_3\left[Fe(C_2O_4)_3\right]$ $(v)K_2[PdCl_4]$

$(vi)\left[Pt(NH_3)_2Cl(NH_2CH_3)\right]Cl$

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17. Indicate the types of isomerism exhibited by the following complexes and draw the structures for these isomers :

$(i)K\left[Cr(H_2O)_2(C_2O_4)_2\right]$ $(ii)\left[CO(en)_3\right]Cl_3$

(iii) $\left[CO(NH_3)_5(NO_2)\right](NO_3)_2$

(iv) $[Pt(NH_3)(H_2O)Cl_2]$

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18. Give evidence that $\left[Co(NH_3)_5Cl\right]SO_4$ and $\left[CO(NH_3)_5SO_4\right]Cl$ are ionisation isomers.

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19. Explain on the basis of valence bondy theory that $\left[Ni(CN)_4\right]^{2-}$ ion with square planar

structure is diamagnetic and the $[NiCl_4]^{2-}$ ion with tetrahedral geometry is paramagnetic.

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

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21. $\left[Fe(H_2O)_6\right]^{3+}$ is strongly paramagnetic whereas $\left[Fe(CN)_6\right]^{3-}$ is weakly paramagnetic . Explain.

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22. Explain $\left[Co(NH_3)_6\right]^{3+}$ is an inner orbital complex whereas $\left[Ni(NH_3)_6\right]^{2+}$ is an outer orbital complex.

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23. Predict the number of unpaired electrons in the square planar $\left[Pt(CN)_4\right]^{2-}$ ion.

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24. $\left[Cr(NH_3)_6\right]^{3+}$ is paramagnetic while $\left[Ni(CN)_4\right]^{2-}$ is diamagnetic . Explain why?

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25. Write down the IUPAC name for each of the followin complexes and indicate the oxidation

state, electronic configuration and coordination number. Also give stereochemistry and magnetic moment of the complex.

$(i) K\left[Cr(H_2O)_2(C_2O_4)_2\right].3H_2O$

$(ii)\left[CO(NH_3)_5Cl\right]Cl_2$

$(iii) CrCl_3(py)_3$ $(iv) Cs[FeCl_4]$

$(v) K_4\left[M \in (CN)_6\right]$

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26. How to find out stability constant by stepwise method ?

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