



CHEMISTRY

BOOKS - ACCURATE PUBLICATION

COORDINATION COMPOUNDS

Multiple Choice Questions

1. The IUPAC name of $Fe(CO)_5$ is :

A. Pentacarbonyl ferrate(0)

B. Pentacarbonyl ferrate(III)

C. Pentacarbonyliron(0)

D. Pentacarbonyl iron(II)

Answer: C



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2. $K_4[Fe(CN)_6]$ is a

A. Sodium pentacyanonitrosonium ferrate(II)

B. Sodiium pentacyanonitro ferrate(II)

C. Sodium nitrosoferro cyanide

D. (a) and (b) both

Answer: A



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3. 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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4. Which of the following represents chelating ligand?



Answer: B



5. Name the type of isomerism exhibited by the following pair of isomers. $[Cr(H_2O)_6]Cl_3$ and $[Cr(H_2O)_5Cl]Cl_2 \cdot H_2O$

A. linkage isomerism

B. hydrate isomerism

C. Ligand isomerism

D. none of these

Answer: B



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6. The IUPAC name of $[Co(NH_3)_6][Cr(CN)_6]$ is :

- A. Hexamminecobalt (III) hexacyanochromate (III)
- B. Hexacyanochromium cobalt hexamine (VI)
- C. Hexamminecobalt (III) hexacyanochromium (VI)
- D. Hexacyanochromium (III) hexamine cobalt (III)

Answer: A

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7. The number of ions formed on dissolving one molecule of $FeSO_4(NH_4)_2SO_4 \cdot 6H_2O$ in water is:

A. 4

B. 5

C. 3

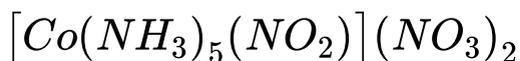
D. 6

Answer: B



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8. Write down the IUPAC name of the following complex.



A. Nitrito-N-pentaamminecobalt (III) chloride

B. Nitrito-N-pentaamminecobalt (II) chloride

C. Pentaamminenitrito-N-cobalt (II) chloride

D. Pentaamminenitrito-N-cobalt (III)

Answer: D

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9. Violet colour is obtained when dilute CuSO_4 is added in alkaline solution of protein. This test is known as

A. NH_4OH is added to CuSO_4

B. CuSO_4 solution reacts with $\text{K}_4[\text{Fe}(\text{CN})_6]$

C. FeCl_3 reacts with $\text{K}_4[\text{Fe}(\text{CN})_6]$

D. Anhydrous $CuSO_4$ is dissolved in water.

Answer: B



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10. A reagent used for identifying nickel ion is :

A. Potassiumferrocyanide

B. Phenolphthalin

C. Dimethylglyoxime

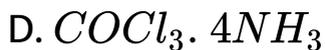
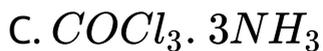
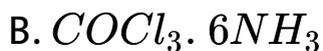
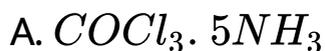
D. EDTA

Answer: C



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11. Which of the following is not true for species?



Answer: C



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12. The name of complex $[Fe(CN)_6]^{3-}$ is

- A. It has 4 unpaired electron, high spin
- B. No unpaired electron, high spin
- C. No unpaired electron, low spin
- D. 4 unpaired electron, low spin

Answer: C



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13. Correct order of the stoichiometries of AgCl formed when $AgNO_3$ in excess is treated with

complexes

:

$CoCl_3 \cdot 6NH_3$, $CoCl_3 \cdot 5NH_3$, $CoCl_3 \cdot 4NH_3$

respectively is

A. 3AgCl, 1 AgCl, 2AgCl

B. 3AgCl, 2 AgCl, 1 AgCl

C. 2AgCl, 3AgCl, 2AgCl

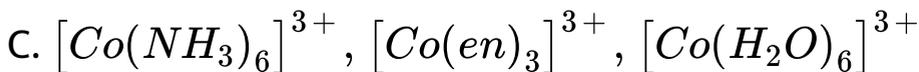
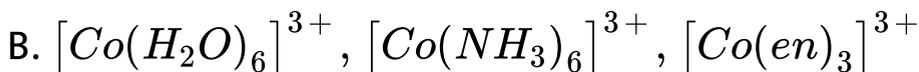
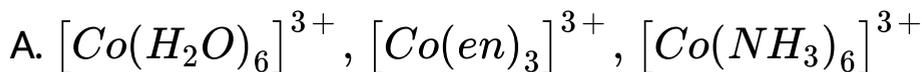
D. 1 AgCl, 3 AgCl, 2 AgCl

Answer: B



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14. Correct increasing order of wavelength of absorption in visible region for complex of CO^{3+} is :



Answer: D



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15. Pick out the correct statement with respect to



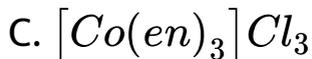
- A. It is sp^2d^2 hybridised tetrahedral
- B. It is d^2sp^3 hybridised octahedral
- C. It is d^2sp^3 hybridised octahedral
- D. It is sp^3d^2 hybridised octahedral

Answer: B



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16. Facial and meridional isomerism will be shown by



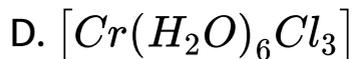
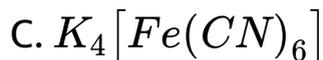
Answer: A



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17. What is molar conductivity?



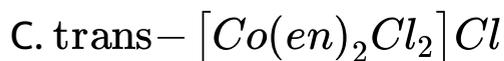
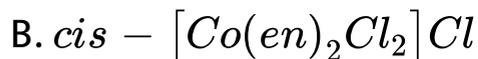


Answer: C



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18. Which of the following acids does not exhibit optical isomerism ?



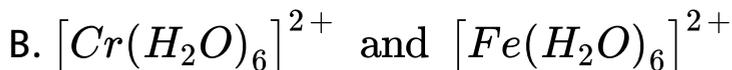
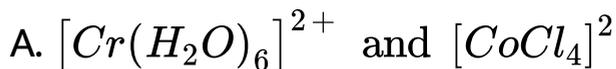


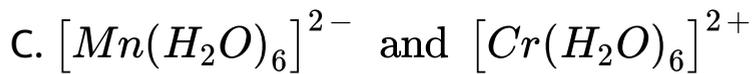
Answer: B



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19. 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 ? (At. nos. Cr = 24, Mn = 25, Fe = 26, Co = 27)



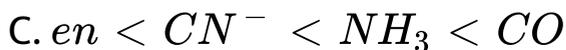


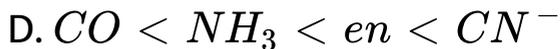
Answer: B



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20. Which of the following ligands is expected to be bidentate?





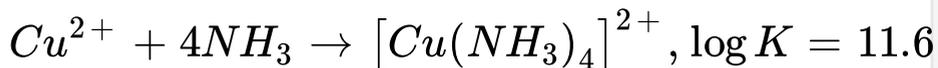
Answer: A



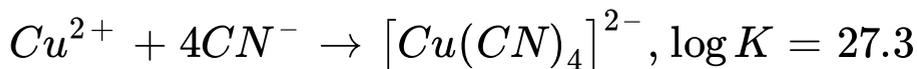
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21. Which of the following complexes formed by Cu^{2+} ions is most stable ?

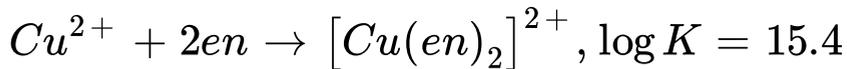
A. (i)



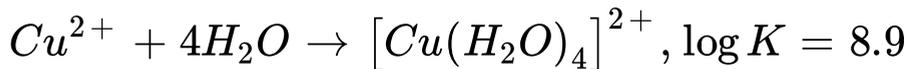
B. (ii)



C. (iii)



D. (iv)



Answer: B



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22. Explain any two properties of a magnet?



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23. How can you determine the poles of a magnet which has no markings on it?

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24. What happens when a south pole of a magnet is brought near the south pole a suspended bar magnet?

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25. Which complex has square planar structure?

A. 2 geometrical isomers

B. 2 optical isomers

C. 3 optical isomers

D. 3 geometrical isomers

Answer: C



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

A. thiosulphato

B. oxala to

C. glycina to

D. ethane-1,2-diamine

Answer: A



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27. The solution of the complex $[Cu(NH_3)_4]SO_4$ in water will

A. give the tests of Cu^{2+} ion

B. give the tests of NH_3

C. 1 give the test SO_4^{2-} ions

D. not give the tests of any of the above

Answer: C



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28. The correct IUPAC name of $[Pt(NH_3)_2Cl_2]$ is:

A. Triamminechlorodibromidoplatinum

(IV)chloride

B. Triamminechloridobromidonitrochlorideplatinum

(IV) chloride

C. Triamminebromidochloridonitroplatinum

(IV)chloride

D. Triamminebromidochloridonitroplatinum(IV)

chloride

Answer: C



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29. Turnbull's blue is

A. Ferricyanide

B. Ferrousferricyanide

C. Ferrous cyanide

D. none of these

Answer: B



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30. Primary and secondary valency of Pt in $[\text{Pt}(\text{en})_2\text{Cl}_2]$ are

A. 4,4

B. 4,6

C. 6,4

D. 2,6

Answer: D



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31. Name the type of isomerism exhibited by the following pair of isomers. $[Co(NH_3)_5(NO_2)]Cl_2$ and $[Co(NH_3)_5(ONO)]Cl_2$

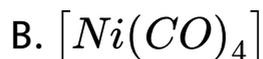
- A. Ionization isomers
- B. Linkage isomers
- C. Co-ordination isomers
- D. Geometrical isomers

Answer: B



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32. Which of the following has square planar structure ?



D. none of these

Answer: C



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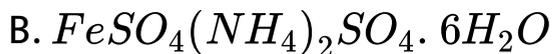
33. Which of the following has magnesium?

- A. Chlorophyll
- B. Haemocyanin
- C. Carbonic anhydride
- D. Vitamin B_{12}

Answer: A

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34. Mohr's salt is



Answer: B



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35. The complex $[Co(NH_3)_5Br]SO_4$ will give white precipitates with



B. $AgNO_3$

C. KI

D. none of these

Answer: A



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36. EDTA is used for the estimation of

A. Na^+ and K^+ ions

B. Cl^- and Br^- ions

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

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

Answer: D



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37. The name of complex $[Fe(CN)_6]^{3-}$ is

- A. Tricyanidoferrate (III) ion
- B. Hexacyanidoferrate (III) ion
- C. Hexacyanidoiron(III)
- D. Hexacyanidoferrate (II) ion

Answer: B



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38. A complex involving dsp^2 hybridization has

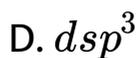
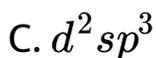
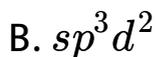
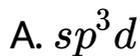
- A. square planar geometry
- B. tetrahedral geometry
- C. octahedral geometry
- D. trigonal planar geometry

Answer: B



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39. $K_3[CoF_6]$ is high spin complex. What is the hybrid state of Co atom in this complex ?



Answer: B



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40. The compounds



are examples of

A. geometrical isomers

B. linkage isomers

C. Ligand isomers

D. ionization isomers

Answer: B



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41. $[Co(NH_3)_5Br]SO_4$ and $[Co(NH_3)_5SO_4]Br$

are examples of which type of isomers ?

A. linkage

B. geometrical

C. ionisation

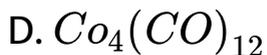
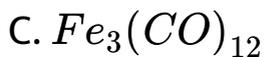
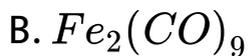
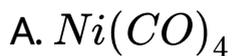
D. optical

Answer: C



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42. Choose the binuclear carbonyl



Answer: B



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43. Which of the following compound is paramagnetic

A. Tetracyanonickelate (II)ion

B. Tetraamminezinc (II)ion

C. Hexamminechromium (III)ion

D. Diamminesilver (I)ion

Answer: C



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44. Compounds which contain one or more metal carbon bonds are called

A. organic compounds

B. complex compounds

C. metal carbides

D. organometallic compounds

Answer: D

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45. Coordination compounds have great importance in biological systems in this context which of the following statements is incorrect?

A. cyanocobalamin is vitamin B_{12} and contains

cobalt

B. haemoglobin is the red pigment in blood and

contains iron

C. chlorophylls are green pigments in plants and contain calcium

D. carboxypeptidase -A is an enzyme and contains zinc

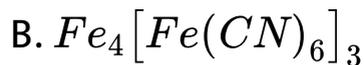
Answer: C



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46. Which of the following compounds is not coloured?





Answer: C



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47. The π bonded organometallic compound which has ethene as one of its component is

A. Zeise's salt

B. Ferrocene

C. Dibenzene chromium

D. Tertaethyltin

Answer: A



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48. Hypo is used in photography because it is :

A. a strong reducing agent

B. a strong oxidizing agent

C. a strong complexing agent

D. photo sensitive compound

Answer: C



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49. The crystal field splitting energy for octahedral (Δ_0) and tetrahedral (Δ_t) complexes is related as

A. Nature of ligands

B. The ease with which the ligand can approach the metal ion

C. The ease with which the ligand)move away from the metal ion

D. Both (a) and (b)

Answer: D



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50. Fill in the blanks:

The most acceptable theory of ascent of sap is

.

A. cobalt

B. copper

C. silver

D. zinc

Answer: A



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51. Primary valency expresses ?

A. co-ordination number

B. oxidation state

C. counter ions

D. geometry

Answer: B



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52. An example of double salt is

- A. Mohr's salt
- B. sodium chloride
- C. magnesium chloride
- D. sodiumdicynoaurate

Answer: A



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53. How photosynthesis is done in cactus plant?



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54. The number of unpaired electrons in the complexes $[NiCl_4]^{-2}$ and $[Ni(CO)_4]$ are

A. 0

B. 4

C. 3

D. 2

Answer: A



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55. What is the coordination number of Fe in $[Fe(EDTA)]^-$?

A. 4

B. 5

C. 6

D. 7

Answer: C



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56. Write the IUPAC name of $K_3[Fe(C_2O_4)_3]$.

- A. Potassiumtrioxalate iron(II)
- B. Potassium trioxaltoiron (III)
- C. Potassiumtrioxalatoferrate (II)
- D. Potassiumtrioxalatoferrate (III)

Answer: D



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57. The relationship between tetrahedral and octahedral complexes is

A. $D\eta_t = 4/9\Delta_0$

B. $\Delta_0 = 4/9\Delta_r$

C. $\Delta_r = 9/4\Delta_0$

D. none of these

Answer: A



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58. Write IUPAC name of $[Pt(NH_3)_2Cl_4]$.

A. Tetraamedichloridoplatinum(IV)chloride

B. Tetraamedichloridoplatinate(VI)chloride

C. Dichloridotetraamineplatinum(IV)chloride

D. Dichloridotetraamihexachloroplatinum(VI)chloride

Answer: A



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59. In tetrahedral complex five d-orbitals split up into

A. d_{xy} , d_{yz} , d_{zx} higher energy

B. d_{xy} , d_{yz} , d_{zx} of lower energy

C. $d_{x^2 - y^2}$ and d_{z^2} higher energy

D. none of these

Answer: A



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60. In octahedral crystal field splitting, the three orbitals are called and two orbitals are called

A. $dx^2 - y^2$ and dz^2 of higher energy

B. $dxy - dyz$ and dzx of lower energy

C. both (a) and (b)

D. $dxy - dyz$ and dzx of higher energy

Answer: C



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61. Write the IUPAC name of



A. diamminechloridomethanamineplatinum(II)chloride

B. diamminemethanaminechloridoplatinilm(II)chloride

C. chloridodiamminemethanamineplatinum(II)chloride

D. amminechloridomethanamineplatinum(II)chloride

Answer: A



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62. The degenerate orbitals have

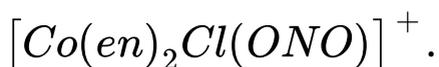
- A. Different energy
- B. Same energy
- C. Both (a) and (b)
- D. None of the above

Answer: B



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63. Write name of central atom in complex ion



A. chloride

B. nitosyl

C. ethylenediamine

D. cobalt

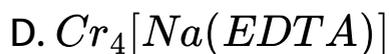
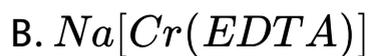
Answer: D



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64. Write the chemical formula for the complex compound : Sodium (ethylene diammine tetra acetate) chromate(II).

A. $Na_2[Cr(EDTA)]$

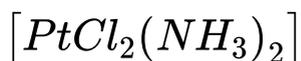


Answer: A



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65. Which type of isomerism is shown by



A. optical isomerism

B. Linkage isomerism

C. geometrical isomerism

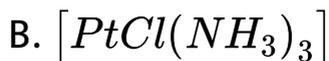
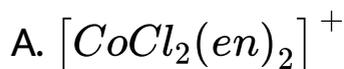
D. none of these

Answer: C



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66. Write a note on geometrical isomerism.



D. all of these

Answer: A



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67. What type of isomerism is shown by the following complex, $[Co(NH_3)_6][Cr(CN)_6]$?

- A. linkage isomerism
- B. co-ordination isomerism
- C. ionisation isomerism
- D. none of these

Answer: B



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68. Study of coordination compounds is called Chemistry ?

A. Coordination

B. Biological

C. Complex

D. Metallurgical

Answer: A



69. Name the type of isomerism exhibited by the following pair of isomers. $[Co(NH_3)_5(NO_2)]Cl_2$ and $[Co(NH_3)_5(ONO)]Cl_2$

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

Answer: B



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70. How many heme molecules are present in one molecule of haemoglobin?

A. Two

B. Three

C. six

D. one

Answer: D



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

A. +3

B. +2

C. +1

D. 0

Answer: A



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72. According to Werner's theory , the stereo chemistry of a complex is determined by

A. Only primary Valencies

B. Only secondary valencies

C. Both

D. None of these

Answer: B



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73. Which has strong field strength SCN^- , F^- or CN^- ?

A. SCN^-

B. F^-

C. CN^-

D. none of these

Answer: C

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74. Why removal of water from $[Ti(H_2O)_6]Cl_3$ on heating renders it colour less but originally it is of purple colour ?

A. due to presence of three Cl

B. due to presence of metal Ti

C. due to absence of ligands on heating

D. none of these

Answer: C



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75. Which is an example of homoleptic carbonyl ?

A. Tetracarbonyl nickel (0)

B. Tetraaminedicyano cobalt (III)chloride

C. Cis-platin

D. Ferri-ferrocyanide

Answer: A



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76. Amongst the following ions which one has the highest magnetic moment value: $[Fe(H_2O)_6]^{2+}$

A. d^3

B. d^6

C. d^{10}

D. d^0

Answer: B



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77. Which coordination compound is used in the treatment of lead poisoning.

- A. Cis is platinum
- B. haemoglobin
- C. carbonic dehydratase
- D. EDTA

Answer: D



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78. Write IUPAC name of the complex: $[CoCl_2(en)_2]^+$

A. Dichlorido (ethane,2-diamine) cobalt (III) ion

B. Dichloridobis (ethane, 2-diamine) cobalt (II)

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

ion

D. Dichloridobis (methyl-1,2-diamine) cobalt (III)

ion

Answer:



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79. Define ligand.

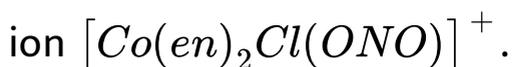


Answer: D



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80. Write oxidation state of central atom in complex



A. 2

B. 3

C. 1

D. 0

Answer: B



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81. Why $Cu(OH)_2$ is soluble in NH_4OH but not in NaOH solution ?

A. due to hydrogen bonding

B. due to formation of soluble coordination complex

C. due to nature of Cu

D. due to nature of NH_4OH

Answer: B



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82. Which type of complexes do not show geometrical isomerism ?

A. tetrahedral complexes

B. square planar

C. octahedral complexes

D. all of the above

Answer: A



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83. Ethylenediamine is an example of:

A. monodentate ligand

B. bidentate ligand

C. tridentate ligand

D. polydentate ligand

Answer: B



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

A. the number of ligands around a metal ion

bonded by sigma and pi bonds both

B. the number of ligands around a metal ion

bonded by pi bonds

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

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

Answer: A



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85. Low spin complexes are :

A. paramagnetic

B. diamagnetic

C. ferromagnetic

D. homoleptic

Answer: B



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86. Greater the charge on the central atom is the stability of its complexes.

A. 1. smaller

B. 2. greater

C. 3. equal

D. 4. no effect

Answer: B



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87. Energy gap between t_{2g} and e_g level of d orbitals after splitting increases in :

A. strong field of ligands

B. weak field of ligands

C. in both cases

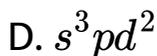
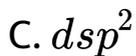
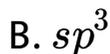
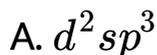
D. none of these

Answer: A



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88. In $[MnBr_4]^{2-}$ there is d^5 system. What could be its hybridisation ?



Answer: B



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89. An ambident ligand is the one which

A. Is linked to the metal atom at two points.

B. Has 2 donor atoms but only 1 of them has the capacity to form the coordinate bond.

C. Has 2 donor atoms but any of the 2 can form coordinate bond

D. Forms chelate rings.

Answer: B



90. The complex in which the metal is bounded to more than one kind of donor groups are called

- A. homoleptic complexes
- B. heteroleptic complexes
- C. coordination complexes
- D. chelate complexes

Answer: B



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1 Mark Questions

1. Define co-ordination compound.



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2. Define co-ordination number.



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3. Define Counter ions?



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4. Define Co-ordination sphere ?

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5. Explain the following terms with suitable examples.

Cationic detergents

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6. Which one of the following is a anionic detergent ?

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

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8. Define Chelation ?

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9. Define Denticity of the ligand ?

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10. Define Ambident ligands ?

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11. Find Oxidation state on a complex $[Ni(NH_3)_6]^{2+}$.

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12. Define Homoleptic complexes ?

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13. Define Hetroleptic complexes ?

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14. How many ions are produced from the complex



in solution ?

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15. Why are low spin tetrahedral complexes not formed ?

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16. Why does NH_3 readily form complexes but NH_4^+ does not ?

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17. Name central metal atom present in haemoglobin and Vitamin B_{12} .

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2 Marks Questions

1. What is the difference between a complex salt and a double salt?

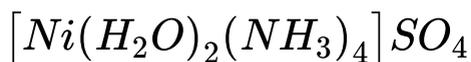
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2. Write the IUPAC name of following :



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3. Write the IUPAC name of the following:



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4. Draw the geometrical isomers of the following complexes : $[CoCl_2(NH_3)_4]^+$ and find its optical activity.



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5. Discuss structure of $[Co(NH_3)_6]^{3+}$ ion the basis of V.B.T.



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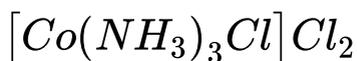
6. Write the factors affecting the stability of Complex Ion.

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7. Explain the difference between a weak field ligand and a strong field ligand.

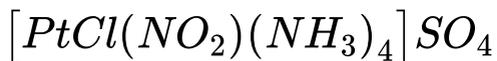
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8. Write IUPAC name of the following



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9. Write IUPAC name of the following:



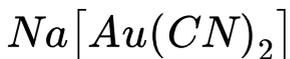
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10. Write the IUPAC name of the $[K_4[Ni(CN)_4]]$



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11. Write IUPAC name of the following



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12. Write the IUPAC name of the $K[Ag(CN)_2]$

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13. Write IUPAC Name of Complexe : $Na[Co(CO)_4]$

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14. Write the IUPAC name of $K_2[PtF_6]$.

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15. Write IUPAC Name of Complex :



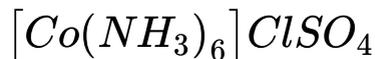
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16. Write IUPAC Name of Complex :



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17. Write IUPAC Name of Complex :

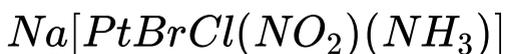


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18. Write IUPAC Name of Complex : $Na[Co(CO)_4]$

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19. Write IUPAC Name of Complex :



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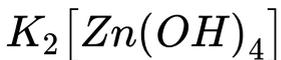
20. Write IUPAC Name of Complex :



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21. Write IUPAC name of the following



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22. Write IUPAC name of the following



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23. Define Isomerisation with their types ?





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