



# CHEMISTRY

## BOOKS - R G PUBLICATION

### COORDINATION COMPOUNDS

#### Exercise

1. Write the IUPAC name of  $[PtCl_2(NH_3)_2]$ .



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2. Give one example of a co-ordination compound which is used in medicine.

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3. Give reasons:  $[Ti(H_2O)_6]^{3+}$  is coloured while  $[Sc(H_2O)_6]^{3+}$  is colourless.

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4. Give reasons:  $[CoF_6]^{3-}$  is a high spin complex ion.

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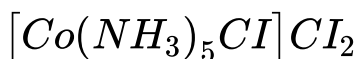
5. Draw the two geometrical isomers of the complex compound  $[Pt(NH_3)_2Cl_2]$

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6. Write the formula of lithium tetrahydridoaluminate

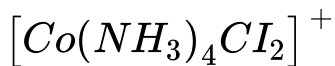
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7. Write the IUPAC name of the following:



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8. Draw the geometrical isomers of the complex ion



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9. Find the secondary valency of Ni in  $[Ni(CO)_4]$ .



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10. What is the basic difference between a double salt and a co-ordination complex?



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11. Give chemical test to show that  $[Co(NH_3)_5Cl]SO_4$  and  $[Co(NH_3)_5SO_4]Cl$  are ionisation isomers.

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12. Mention one analytical application of co-ordination compound.

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13. Define the following terms with one example each:  
Coordination sphere

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14. Define the following terms with one example each:

Coordination number

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15. Define the following terms with one example each:

Ligands

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16. Write the IUPAC name of-  $Fe_4[Fe(CN)_6]_3$

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17. Draw figure to show splitting of d-orbitals in a octahedral crystal field.

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18. Draw the two geometrical isomers of the complex compound  $[Pt(NH_3)_2Cl_2]$

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19. Give one example of the following: Ionisation isomerism.

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20. Give one example each of the following: Geometrical isomerism.

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21. Using valence bond theory, show that  $[Ni(CN)_4]^{2-}$  complex is diamagnetic in nature. [Atomic number of Ni is 28].

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22. What are the ambidentate ligands? Give one suitable example of ambidentate ligand.







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23. Vitamin  $B_{12}$  is a complex of

A. Cobalt

B. Cobalt (III)ion

C. Chromium (II) ion

D. Chromium (III) ion

**Answer:**



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24. The Geometry of complex is due to

A. Primary valency of the metal

B. Hybridization

C. Co-ordination sphere

D. Secondary valency

**Answer:**



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**25.** EDTA is a

A. Mono dentate ligand

B. Bidentate ligand

C. Poly dentate ligand

## D. Chelating ligand

**Answer:**



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26. Which of the following facts about the complex

$[Cr(NH_3)_6]Cl_3$  is wrong?

A. The complex involves  $d^2sp^3$  hybridization and is

octahedral in shape

B. The complex is paramagnetic

C. The complex is diamagnetic

D. The complex gives white ppt with  $AgNO_3$

**Answer:**



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27. The geometric isomerism in a complex is arisen due to presence of

- A. Double bond between the metal atoms
- B. Different types of linkage
- C. More than one kind of donor groups whose arrangement is different with respect to central metal ion
- D. None of the above

**Answer:**



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28. The spin only magnetic moment of  $[MnBr_4]^{2-}$  is 5.9 BM. The geometry of the complex ion is.

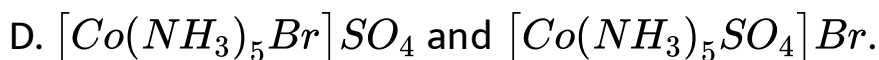
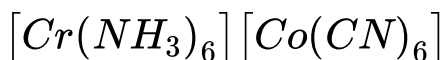
- A. Octahedral
- B. Tetra hedral
- C. Square planer
- D. Can't be predicted

**Answer:**



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29. Which of the following isomeric pairs shows ionisation isomerism?



**Answer:**



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30.  $[Cu(H_2O)_4]^{2+}$  ion absorbs red colour during excitation. The emitted colour is

- A. Violet
- B. Yellow orange
- C. Blue green
- D. Blue

**Answer:**



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31. One of the limitation of crystal field theory is that

- A. It can not explain ionic character of bond

- B. It can not explain magnetic property
- C. It can not explain covalent character of bond
- D. It can not explain the colour of complex

**Answer:**



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**32. Wilkinson Catalyst is used for**

- A. Hydrogenation of alkenes
- B. Oxidation of alcohol
- C. As a Chelating agent
- D. Conversion of alkyne to alkene



**Answer:**

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**33.** How  $CoCl_3 \cdot 5NH_3$  is different from  $CoCl_3 \cdot 4NH_3$ .

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**34.** What are primary valency and secondary valency of metal?

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**35.** Give an example of unidentate and one poly dentate ligand with formula.

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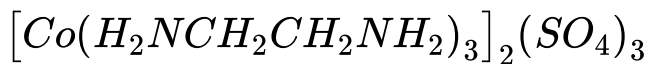
**36.** What is co-ordination number of square pyramidal and trigonal bipyramidal complex?

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**37.** Give one example of homoleptic & heteroleptic complex.

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38. Write the IUPAC name of following complex



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39. Give an example of ambidentate ligand and mention the points of linkage with star marks.



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40. Draw the isomer facial  $[Co(NH_3)_3Cl_3]$

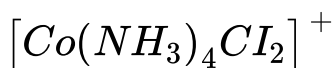


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41. Why is geometrical isomerism not possible in tetrahedral complexes having two different types of unidentate ligands coordinated with the central metal ion?

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42. Draw the geometrical isomers of the complex ion



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43. Give chemical test to show that  $[Co(NH_3)_5Cl]SO_4$  and  $[Co(NH_3)_5SO_4]Cl$  are ionisation isomers.

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44. What is outer orbital complex? Why it is called spin free complex?

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45. Predict the number of unpaired electrons in the square planer  $[Pt(CN)_4]^{2-}$  ion.

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**46.** What is spectrochemical series?

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**47.** Define crystal field stabilization energy? What is bary centre?

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**48.** Depending upon the repulsive force between the ligands & the central metal ion. d-orbital of the metal ion is further divided into two groups. What are they/ Which group has higher energy in tetrahedral complex.



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49. Why some crystals are coloured?



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50. Predict the number of unpaired electrons in the square planer  $[Pt(CN)_4]^{2-}$  ion.



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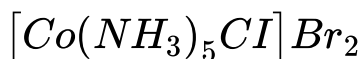
51. Give an example of a complex which is used as anti cancer drug.

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52. Write IUPAC name of the following:  $[Co(NH_3)_6]Br_2$

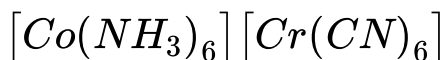
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53. Write IUPAC name of the following:



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54. Write IUPAC name of the following:







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55. Write IUPAC name of the following:  $[Cu(gly)_2]$



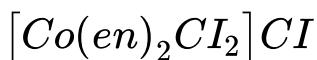
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56. Write IUPAC name of the following:  $K_3[Fe(OX)_3]$



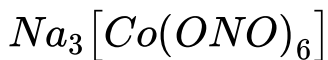
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57. Write IUPAC name of the following:



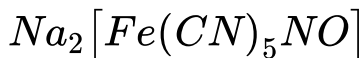
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58. Write IUPAC name of the following:



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59. Write IUPAC name of the following:



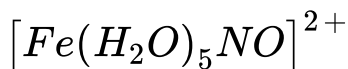
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60. Write IUPAC name of the following:



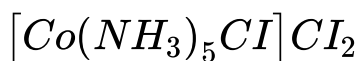
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61. Write IUPAC name of the following:



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62. Write the IUPAC name of the following:



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63. Write IUPAC name of the following:  $Hg[Co(NCS)_4]$

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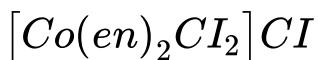
64. Write IUPAC name of the following:  $Fe_4[Fe(CN)_6]_3$

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65. Write IUPAC name of the following:  $Na_3[CrF_4O]$

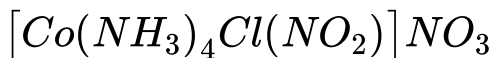
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66. Write IUPAC name of the following:



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67. Write IUPAC name of the following:



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68. Write the formula of the following: Tetra hydroxo zincate (II)



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69. Write the formula of the following: Potassium tetrachlorido palladate (II)



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70. Write the formula of the following: Potassium trioxalato Chromate (III)



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71. Write the formula of the following: Hexa ammine cobalt (III) sulphate.



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72. Write the formula of the following: Di ammine dichlorido platinum (II)



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73. Write the formula of the following: Hexa ammine platinum (IV)

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74. Write the formula of the following: Potassium tetracyano nickelate (II)

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75. Write the formula of the following: Tetrabromidocuprate (II)



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76. Write the formula of the following: Penta ammine nitrito-O-Cobalt (III)



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77. Write the formula of the following: Penta ammine nitrito-N-Cobalt (III)



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78. Write the formula of the following: Ammine chlorobis (ethylenediamine) Cobalt (iii)

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79. Write the formula of the following: Diammine tetra chloro platinum (iv)

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80. Write the formula of the following: Nitrosopentaqua iron (ii) sulphate

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**81.** Write the formula of the following: Dichlorobis (ethylene diamine) chromium (iii)

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**82.** Write the formula of the following: Potassium trichloro ethylene platinate (ii)

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**83.** Write the formula of the following: Potassium pentacyano nitrosyl cobaltate (iii)

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**84.** Why CO is stronger ligand than  $NH_3$  for many metals.

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**85.** Mention one application of co-ordination compound in plant.

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**86.** Explain the bonding in coordination compounds in terms of Werner's postulates.



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87. Draw the optical isomers of  $[Cr(C_2O_4)_3]^{3-}$



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88. Draw the optical isomers of  $[PtCl_2(en)_2]^{2+}$



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89. What is the basic difference between a double salt and a co-ordination complex?

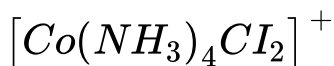


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90. What is chelate ligand? Give one example.

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91. Draw the geometrical isomers of the complex ion



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92. Draw the isomers of the following  $[CoCl_2(en)_2]^+$

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93. On the basis of valence bond theory explain the structure of  $[Co(NH_3)_6]^{3+}$  ion

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94. Aqueous copper sulphate solution gives: a green precipitate with aqueous potassium fluoride.

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95. Aqueous copper sulphate solution gives: a bright green solution with aqueous KCl Explain there experimental result.

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**96.** Discuss the nature of bonding in metal carbonyls.

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**97.** What is meant by stability of a coordination compound in solution? State the factors which govern stability of complexes.

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**98.** What will be the correct order for the wave lengths of absorption in the visible region for the following.

Explain the fact.  $[Ni(NO_2)_6]^+$ ,  $[Ni(H_2O)_6]^{2+}$

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**99.** Explain the following: Co (II) is stable in aqueous solution but in the presence of the complexing agents, it is easily oxidised.

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**100.** Which of the following is a more stable complex and why?  $[Co(NH_3)_6]^{3+}$  and  $[Co(en)_3]^{3+}$

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**101.** How is the stability of a co-ordination compound in solution decided? How is the dissociation constant of a complex defined?

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**102.** Calculate the overall complex dissociation equilibrium constant for the  $[Cu(NH_3)_4]^{2+}$  ion, give that  $\beta_4$  for this Complex is  $2.1 \times 10^{12}$ .

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**103.** Square planer complex (of  $MX_2L_2$  type) with Coordination number of 4 exhibit geometrical isomerism where as tetrahedral complexes with similar composition do not why?



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**104.** What are the factors that affect Crystal field Spilitting Energy?



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**105.** Explain the following:- Ferri cyanide complex  $[Fe(CN)_6]^{3-}$  is weakly paramagnetic whereas Ferrocyanide complex  $[Fe(CN)_6]^{4-}$  is diamagnetic.

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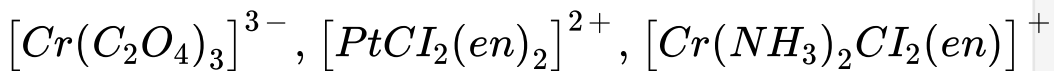
**106.** Draw the geometrical isomers of Complex  $[Pt(NH_3)_2Cl_2]$ : on the basis of crystal field theory write the electronic configuration of  $d^4$  if  $\Delta_o < p$ .

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**107.** Draw the geometrical isomers of Complex  $[Pt(NH_3)_2Cl_2]$ : Write the hybridization and magnetic behaviours of the complex  $[Ni(CO)_4]$

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**108.** Draw the structures of optical isomers of each of the following complex ion.



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**109.** Explain the following term giving a suitable example in the case: Ambident ligand

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**110.** Explain the following terms giving a suitable example in each case: Denticity of a ligand

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**111.** Explain the following terms giving a suitable example in each case: Crystal field splitting in an octahedral field.





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**112.** What do you understand by the term "synergic bonding"? Show diagrammatically synergic bonding in a metal carbonyl.



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