



# CHEMISTRY

## BOOKS - MTG GUIDE

### COORDINATION COMPOUNDS

#### Illustration

1. When a coordination compound  $CrCl_3 \cdot 6H_2O$  is mixed with  $AgNO_3$ , 2 moles of  $AgCl$  are

precipitated per mole of the compound. Write structural formula of the complex.



[View Text Solution](#)

2. Write the coordination number and oxidation state of platinum in the complex  $[Pt(en)_2Cl_2]$ .



[View Text Solution](#)

3. Write the IUPAC name of  $PtCl(NH_2CH_3)(NH_3)_2]Cl$ .



[View Text Solution](#)

 [View Text Solution](#)

4. Using IUPAC norms write the formulae for the Pentaamminenitrito-Ocobalt(III) chloride

 [View Text Solution](#)

5. Using IUPAC norms write the formulae for the Potassium tetracyanonickelate(II)

 [View Text Solution](#)

6. Using IUPAC norms write the formulae for Tris(ethane-1,2,diamine)chromium(III) chloride



[View Text Solution](#)

7. Using IUPAC norms write the formulae for Potassium tetrahydroxozincate(II)



[View Text Solution](#)

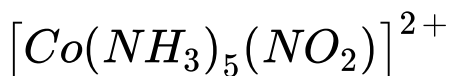
8. Draw one of the geometrical isomers of the complex  $[Pt(en)_2Cl_2]^{2+}$  which is optically

active.



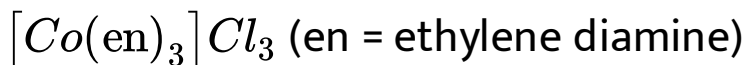
[View Text Solution](#)

9. Indicate the types of isomerism exhibited by the following complexes :



[View Text Solution](#)

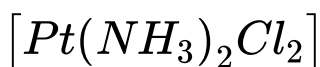
10. Indicate the types of isomerism exhibited by the following complexes :





[View Text Solution](#)

11. Indicate the types of isomerism exhibited by the following complexes :



[View Text Solution](#)

**Neet Cafe Werner S Theory Some Important Terms  
And Nomenclature Of Coordination Compounds**

1. The fraction of chlorine precipitated by  $AgNO_3$  solution from  $[Co(NH_3)_5Cl]Cl_2$  is

A.  $1/2$

B.  $2/3$

C.  $1/3$

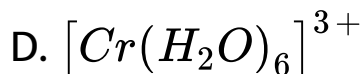
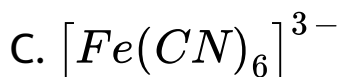
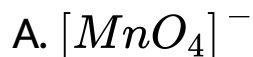
D.  $1/4$

**Answer: B**



**View Text Solution**

2. The complex ion which has no 'd' electrons in the central metal atom is



**Answer: A**



**View Text Solution**



3. The EAN of nickel in  $Ni(CO)_4$  is

A. 36

B. 38

C. 28

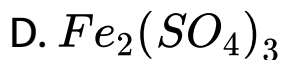
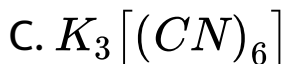
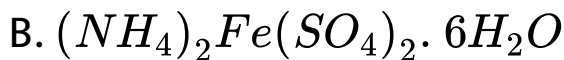
D. 54

**Answer: A**



**View Text Solution**

4. Which will not give the usual test for iron?



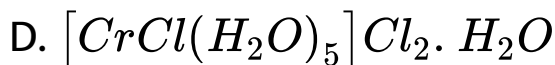
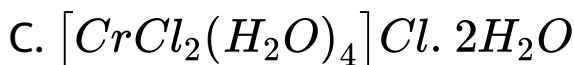
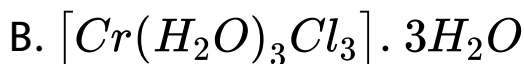
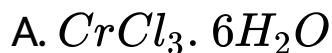
**Answer: C**



**View Text Solution**

5. Which one is the most likely structure of  $CrCl_3 \cdot 6H_2O$ , if  $1/3$  of total chlorine of the

compound is precipitated by adding  $AgNO_3$  to its aqueous solution?



**Answer: C**



**View Text Solution**

6. The spin magnetic moment of cobalt in  $Hg[Co(SCN)_4]$  is

A.  $\sqrt{3}BM$

B.  $\sqrt{8}BM$

C.  $\sqrt{15}BM$

D.  $\sqrt{24}BM$

**Answer: C**



**View Text Solution**

7. Which of the following statements is incorrect?

A. In  $K_3[Fe(CN)_6]$ , the ligand has satisfied

only the secondary valency of ferric ion

B. In  $K_3[Fe(CN)_6]$ , the ligand has satisfied

both primary and secondary valencies of ferric ion.

C. In  $K_4[Fe(CN)_6]$ , the ligand has satisfied

both primary and secondary valencies of ferrous ion.

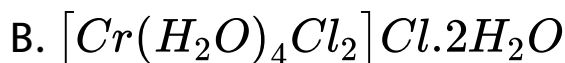
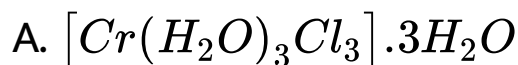
D. In  $Cu(NH_3)_4SO_4$ , the ligand has satisfied only the secondary valency of copper.

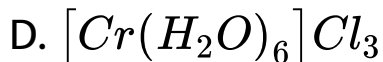
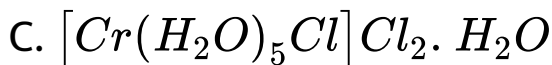
**Answer: A**



[View Text Solution](#)

8. On treatment of 100 mL of 0.1 M solution of the complex  $CrCl_3 \cdot 6H_2O$  with excess of  $AgNO_3$ , 4.305 g of  $AgCl$  was obtained. The complex is





**Answer: D**



**View Text Solution**

9. The IUPAC name for  $[Pt(py)_4][PtCl_4]$  is

A. tetrakis (pyridine) platinum(II)

tetrachloridoplatinate(II)

B. tetrapyridine tetrachloridodiplatinum(IV)

C. tetrachloridotetrapyridine diplatinum(II)

D. tetrakis (pyridine) platinum(IV)

tetrachloridoplatinum

**Answer: A**



[View Text Solution](#)

10. Given the molecular formula of the hexacoordinate complexes (A)

$CoCl_3 \cdot 6NH_3$  (B)  $CoCl_3 \cdot 5NH_3$  (C)  $CoCl_3 \cdot 4NH_3$

. If the number of coordinated  $NH_3$  molecules in



A, B and C respectively are 6, 5 and 4, the primary valency in (A), (B) and (C) are

A. 3, 3, 3

B. 0, 1, 2

C. 3, 2, 1

D. 6, 5, 4

**Answer: A**



**View Text Solution**

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

A. 6 and 3

B. 6 and 2

C. 4 and 2

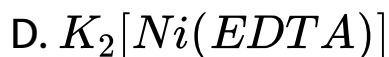
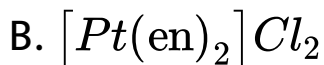
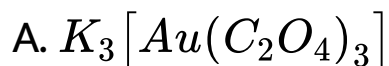
D. 4 and 3

**Answer: A**



**View Text Solution**

12. The most stable complex among the following is

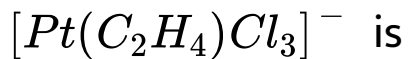


**Answer: D**



**View Text Solution**

13. The oxidation number of Pt in



A. +1

B. +2

C. +3

D. +4

**Answer: B**



**View Text Solution**

14. How many EDTA (ethylenediaminetetraacetic acid) molecules are required to make an octahedral complex with a  $Ca^{2+}$  ion?

A. Six

B. Three

C. One

D. Two

**Answer: C**



**View Text Solution**

15. A complex of a certain metal ion has a magnetic moment of 4.90 BM, another complex of the same metal in the same oxidation state has a zero magnetic moment. The central metal ion could be

A. Cr(III)

B. Mn(II)

C. Fe(III)

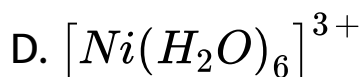
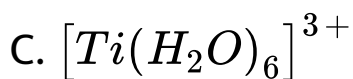
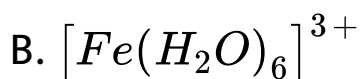
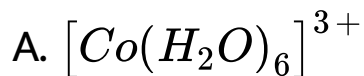
D. Fe(II)

**Answer: D**



**View Text Solution**

16. The most acidic aqua ion is



**Answer: C**



**View Text Solution**

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

A.  $-1$

B.  $0$

C.  $+1$

D.  $+2$

**Answer: B**



**View Text Solution**



18. A solution containing 2.675 g of  $CoCl_3 \cdot 6NH_3$  (molar mass =  $267.5 \text{ g mol}^{-1}$ ) is passed through a cation exchanger. The chloride ions obtained in solution were treated with excess of  $AgNO_3$  to give 4.78 g of  $AgCl$  (molar mass =  $143.5 \text{ g mol}^{-1}$ ). The formula of the complex is (At. Mass of  $Ag = 108\text{u}$ )

- A.  $[CoCl(NH_3)_5]Cl_2$
- B.  $[Co(NH_3)_6]Cl_3$
- C.  $[CoCl_2(NH_3)_4]Cl$
- D.  $[CoCl_3(NH_3)_3]$

**Answer: B**



**View Text Solution**

## Neet Cafe Importance And Applications Of Coordination Compounds

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

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

B. Haemoglobin is the red pigment of blood and contains iron.

C. Cyanocobalamin is  $B_{12}$  and contains cobalt.

D. Carboxypeptidase-A is an enzyme and contains zinc.

**Answer: A**



**View Text Solution**

2. A reagent used for identifying nickel ion is

A. potassium ferrocyanide

B. phenolphthalein

C. dimethyl glyoxime

D. EDTA

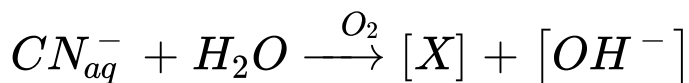
**Answer: C**

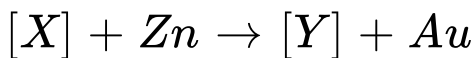


[View Text Solution](#)

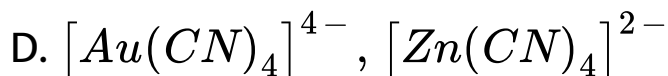
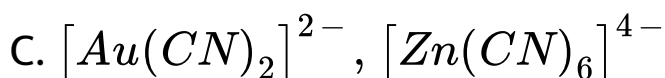
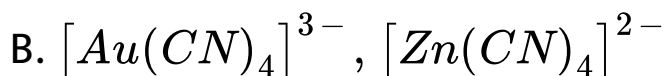
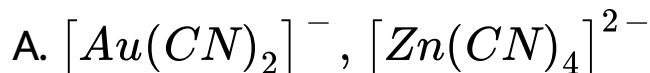
**3.** In the process of extraction of gold,

Roasted gold ore +





Identify the complexes [X] and [Y].



**Answer: A**



**View Text Solution**

4. Chlorophyll is a coordination compound of

A. iron

B. magnesium

C. manganese

D. chromium

**Answer: B**



**View Text Solution**

5. The chelating ligand used to remove excess of copper and iron in chelate therapy is

A. D-penicillamine

B. oxalate ion

C. EDTA

D. ethylenediamine

**Answer: A**



**View Text Solution**

**6. Wilkinson's catalyst is used for**

A. epoxidation

B. hydrogenation

C. polymerisation

D. substitution

**Answer: B**



**View Text Solution**

7. Excess of copper in toxic proportions in plants/animals can be removed by chelating with

A. EDTA

B. ethane-1,2-diamine

C. oxalate ion



D. D-penicillamine.

**Answer: D**



[View Text Solution](#)

**Check Your Neet Vitals**

1. According to Werner's theory, the primary valencies of the central metal atom

A. are satisfied by negative ions or neutral molecules

B. are satisfied by negative ions

C. are equal to its coordination number

D. decide the geometry of the complex

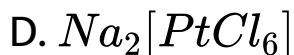
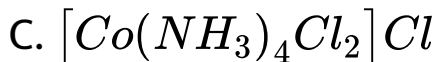
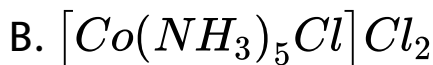
**Answer: A**



[View Text Solution](#)

2. When one mole of each of the following complex salts is treated with excess of  $AgNO_3$ , which of them gives maximum amount of  $AgCl$ ?



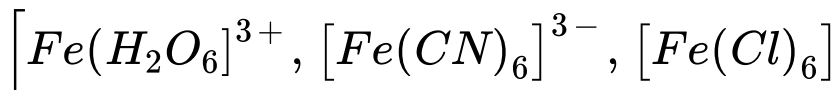


**Answer: D**

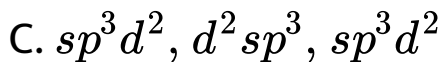
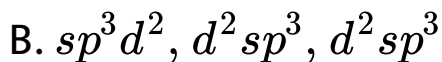
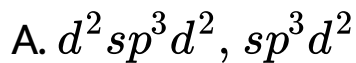


**View Text Solution**

3. Among



species, the hybridisation state of the Fe atom are, respectively



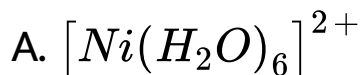
D. none of these

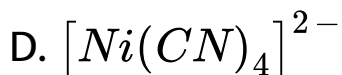
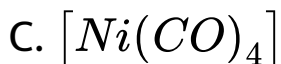
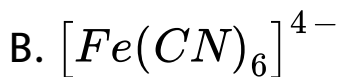
**Answer: B**



**View Text Solution**

**4. Which of the following ions is paramagnetic?**





**Answer: C**



**View Text Solution**

5.  $[Cr(H_2O)_6]Cl_3$ , (At. no. of Cr=24) has a magnetic moment of 3.83 B.M. The correct distribution of 3d electrons in the central metal of the complex is

A.  $3d_{xy}^1, 3d_{yz}^1, 3d_{xz}^1$

B.  $3d_{xy}^1, 3d_{yz}^1, 3d_{z^2}^1$

C.  $3d_{(x^2 - y^2)}^1, 3d_{z^2}^1, 3d_{xz}^1$

D.  $3d_{xy}^1, 3d_{(x^2 - y^2)}^1, 3d_{yz}^1$

**Answer: B**



**View Text Solution**

6. The geometry of  $[Ni(CO)_4]$  and  $[Ni(PPh_3)_2Cl_2]$  are

A. both square planar

B. tetrahedral and square planar respectively

C. both tetrahedral

D. square planar and tetrahedral respectively.

**Answer: C**



**View Text Solution**

7. IUPAC name of  $[Pt(NH_3)_2Cl(NO_2)]$  is

A. platinum diamminechloronitrite

B. chloronitrito-N-ammineplatinum (II)

C. diamminechloridonitrito-N-platinate (II)

D. diamminechloronitrito-N-platinate (II)

**Answer: A**



**View Text Solution**

8. Which of the following will form an inner octahedral complex?

A.  $d^4$  low spin

B.  $d^8$  high spin

C.  $d^6$  low spin



D. all of these

**Answer: C**



**View Text Solution**

9. Which is not true about the coordination compound  $[Co(en)_2Cl_2]Cl$ ?

- A. It exhibits geometrical isomerism.
- B. It exhibits optical isomerism.
- C. It exhibits ionization isomerism.
- D. It is an octahedral complex.

**Answer: B**



**View Text Solution**

**10.** A complex compound of  $Co^{3+}$  with molecular formula  $CoCl_{x.y}NH_3$  gives a total of 3 ions on dissolving it in water. To satisfy both primary and secondary valencies in this complex, the number of  $Cl^-$  ions required is

A. one

B. four

C. three

D. zero

**Answer: B**



[View Text Solution](#)

11. Match the entries of Column I with appropriate entries of Column II and select the correct option

**Column I**

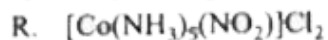
**Column II**



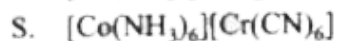
1. Optical isomerism



2. Ionisation isomerism



3. Coordination isomerism

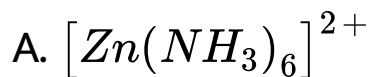


4. Geometrical isomerism



[View Text Solution](#)

12. The complex which involves outer orbital hybridisation of central metal ion is



**Answer: C**



**View Text Solution**

13. Effective atomic number (EAN) of Fe in brown ring complex  $[Fe(H_2O)_5NO]^{2+}$  is

A. 36

B. 37

C. 38

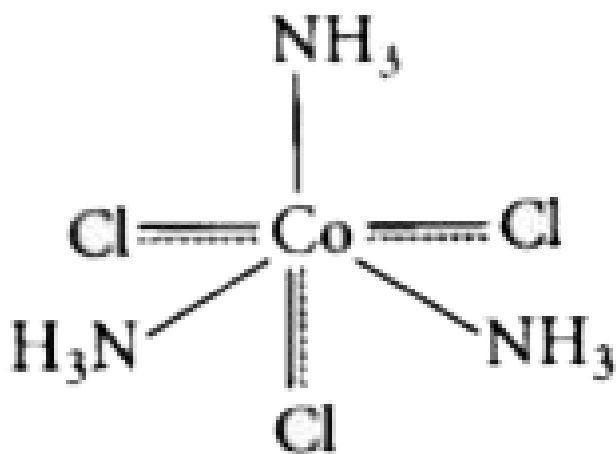
D. 39

**Answer: B**



**View Text Solution**

14. Which of the following statements is correct about the given complex?



- A. It is a molecular complex
- B. It gives four ions in the aqueous solution
- C. Primary valency of cobalt is six.
- D. All are correct.

**Answer: C**



**View Text Solution**

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

A.  $[Co(CN)_6]^{3-}$  has four unpaired electrons and will be in a high-spin configuration.

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

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

D.  $[Co(CN)_6]^{3-}$  has four unpaired electrons and will be in a low -spin configuration.

**Answer: C**



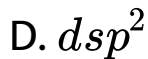
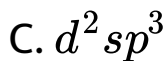
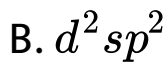
**View Text Solution**

**16.** The hybridisation involved in complex

$[Ni(CN)_4]^{2-}$  is (At. No. Ni = 28)

A.  $sp^3$





**Answer: D**



**View Text Solution**

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

A. hexacyanoferrate(III) ion

B. tricyanoferrate(III) ion

C. hexacyanidoferrate(III) ion

D. hexacyanoiron(III). ion.

**Answer: C**



[View Text Solution](#)

**18.** The sum of coordination number and oxidation number of the metal M in the complex  $[M(en)_2(C_2O_4)]Cl$  (where en is ethylenediamine) is

A. 6

B. 7

C. 8

D. 9

**Answer: D**



**View Text Solution**

**19.** Number of possible isomers for the complex

$[Co(en)_2Cl_2]Cl$  will be (en = ethylenediamine)

A. 1

B. 3

C. 4

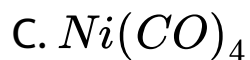
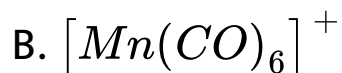
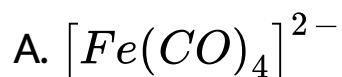
D. 2

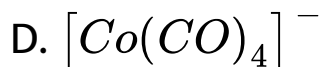
**Answer: B**



[View Text Solution](#)

**20.** Which of the following has longest C-O bond length? (Free C - O bond length in CO is 1.128 Å.)



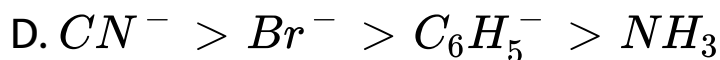
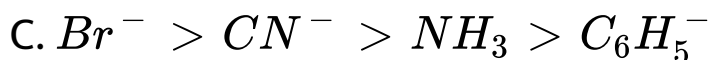
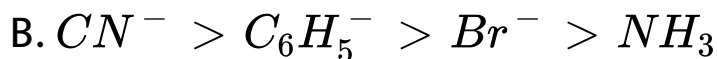
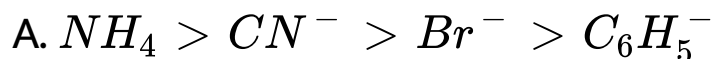


Answer: A



View Text Solution

21. The correct increasing order of trans-effect of the following species is

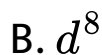


**Answer: B**



**View Text Solution**

22. Jahn-Teller effect is not observed in high spin complexes of



**Answer: B**



[View Text Solution](#)

23. An example of a sigma bonded organometallic compound is

A. Grignard reagent

B. ferrocene

C. cobaltocene

D. ruthenocene

**Answer: A**



[View Text Solution](#)

24. The correct order of the stoichiometries of AgCl formed when  $AgNO_3$  in excess is treated with the complexes  $CoCl_3 \cdot 6NH_3$ ,  $CoCl_3 \cdot 5NH_3$ ,  $CoCl_3 \cdot 4NH_3$  respectively is

- A. 3AgCl, 1AgCl, 2AgCl
- B. 3AgCl, 2AgCl, 1AgCl
- C. 2AgCl, 3AgCl, 2AgCl
- D. 1AgCl, 3AgCl, 2AgCl

**Answer: B**

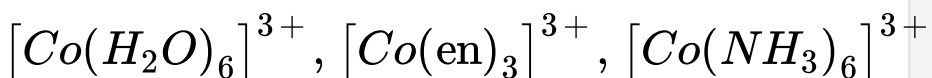




View Text Solution

25. Correct increasing order for the wavelengths of absorption in the visible region for the complexes of  $Co^{3+}$  is

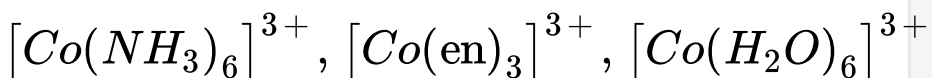
A.



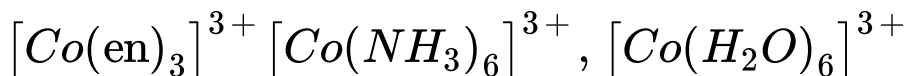
B.



C.



D.



**Answer: D**



**View Text Solution**

**26.** Pick out the correct statement with respect to



- A. It is  $sp^3d^2$  hybridised and tetrahedral.
- B. It is  $d^2sp^3$  hybridised and octahedral.
- C. It is  $dsp^2$  hybridised and square planar.

D. It is  $sp^3d^2$  hybridised and octahedral.

**Answer: B**



**View Text Solution**

27. The type of isomerism shown by the complex

$[CoCl(en)_2]$  is

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

**Answer: A**



**View Text Solution**

**28.** The geometry and magnetic behaviour of the complex  $[Ni(CO)_4]$  are

- A. square planar geometry and diamagnetic
- B. tetrahedral geometry and diamagnetic
- C. square planar geometry and paramagnetic
- D. tetrahedral geometry and paramagnetic.

**Answer: B**



[View Text Solution](#)

29. Iron carbonyl,  $Fe(CO)_5$  is

- A. tetranuclear
- B. mononuclear
- C. trinuclear
- D. dinuclear

**Answer: B**



[View Text Solution](#)

30. What is the correct electronic configuration of the central atom in  $K_4[Fe(CN)_6]$  based on crystal field theory?

A.  $e^4 t_2^2$

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

C.  $t_{2g}^6 e_g^0$

D.  $e^3 t_2^3$

**Answer: C**



**View Text Solution**