



# CHEMISTRY

## BOOKS - NIKITA CHEMISTRY (HINGLISH)

### CO-ORDINATION COMPOUNDS

#### Mcqs

1. Which of the following ligands is a bidentate?

A. EDTA

B. Ethylenediamine

C. Acetate ion

D. Pyridine

**Answer: B**



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2. Which of the following ligands is a bidentate?

A. Pyridine

B. Ethylenediamine

C. Sulphate ion

D. Both (b) and (c.)

**Answer: D**



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3. The oxidation state of platinum in

$Na[PtBrCl(NO_2)(NH_3)]$  is

A. +2

B. +4

C. +6

D. 0

**Answer: A**



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4. The oxidation state of oxygen in  $O_2[PtF_6]$  is

A. Zero

B.  $+1/2$

C.  $+1$

D.  $-1/2$

**Answer: B**



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5. Which response state gives the correct coordination number (C.N.) and oxidation number (O.N.) of the

transition metal atom in  $[Co(NH_3)_2(H_2O)_2Cl_2]^+$  ?

A. C.N.=3, O.N. = + 1

B. C.N.=4, O.N. = + 2

C. C.N.=6, O.N. = + 1

D. C.N.=6, O.N. = + 3

**Answer: D**



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6. In  $K_4Fe(CN)_6$

A. (CN) are linked with primary valency

B. (CN) are linked with secondary valency

C. K are linked with secondary valency

D. K are linked with non-ionic valency

**Answer: B**



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7. In  $K_4[Fe(CN)_6]$ , the number of 3d-electrons in the iron atom is

A. 3

B. 4

C. 5

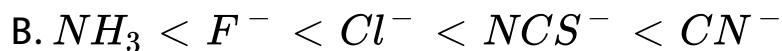
D. 6

Answer: D



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8. Which one of the following is the correct arrangement of the ligands in terms of the  $Dq$  values of their complexes with any particular "hard" metal ion ?



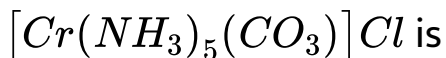


Answer: A



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9. The IUPAC name of the complex compounds,



- A. carbonatopentaamminechromium (III)chloride
- B. pentaamminecarbonatochromium (III)chloride
- C. pentaamminecarbonatochromate (III)chloride
- D. pentaamminetricarbonylchromium (III) chloride



**Answer: B**



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**10.** The correct IUPAC name of the complex compound,

$K_3[Cr(CN)_6]$  is

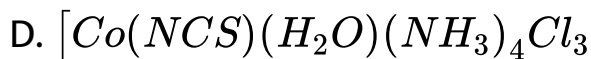
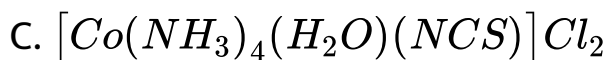
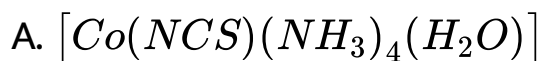
- A. potassium hexacyanochromate (III)
- B. potassum hexacyanchromium (III)
- C. potassium chromimum (III) hexacyanide
- D. potassium chromine (III)hexacyanide.

**Answer: A**



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11. The correct formula of the complex, tetraaminequathiocyanato-N-cobalt (III)chloride is



**Answer: C**



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12.  $NH_3$  group in a coordination compound is named as \_\_\_\_\_.

A. Ammonium

B. Ammine

C. Amine

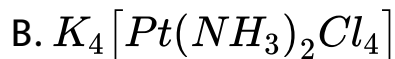
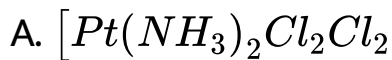
D. Ammonia

**Answer: B**



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13. The formula of tetrachlorodiamine platinum (IV) is



**Answer: D**



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**14.** Match list I with list II and select the correct answer using the codes given below the lines.



A.	Codes	(a)	(b)	(c)	(d)
	a	4	1	5	2

B.	Codes	(a)	(b)	(c)	(d)
	<i>b</i>	1	3	2	5
C.	Codes	(a)	(b)	(c)	(d)
	<i>c</i>	3	1	5	2
D.	Codes	(a)	(b)	(c)	(d)
	<i>d</i>	1	3	5	2

**Answer: C**



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15. The complex ion  $[Co(en)_2Cl_2]^+$  exhibits

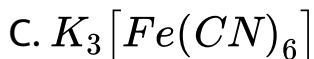
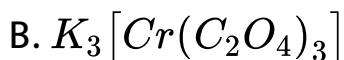
- A. cis-trans isomerism only
- B. cis-trans isomerism and linkage isomerism
- C. cis-trans isomerism and optical isomerism
- D. optical isomerism and linkage isomerism.

**Answer: C**



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**16.** Which one of the following can show optical isomerism ?

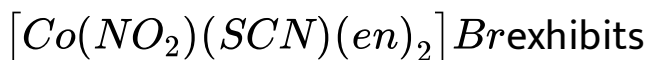


**Answer: B**



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17. The complex salt having the molecular composition,



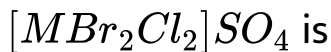
- A. cis-trans isomerism only
- B. linkage isomerism only
- C. ionization isomerism only
- D. all the above.

**Answer: D**



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18. The possible number of isomers for the complex



A. 2

B. 4

C. 5

D. 7

**Answer: C**



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19. The complexes of nickel (II) can be



A. square planar, tetrahedral and octahedral

B. square planar and tetrahedral

C. tetrahedral and octahedral

D. square planar only.

**Answer: A**



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**20.** The ion  $[Co(NH_3)_6]^+$  is octahedral and high spin.

This complex is

A. paramagnetic, with 1 unpaired electrons

B. paramagnetic, with 3 unpaired electrons

C. paramagnetic, with 4 unpaired electrons

D. paramagnetic, with 5 unpaired electrons

**Answer: B**



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21. The hybridization scheme involved on

$[Cu(NH_3)_4]^{2+}$  is

A.  $sp^3$

B.  $dsp^2$

C.  $d^3s$

D. none of the above.

**Answer: B**



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22. In  $K_4[Fe(CN)_6]$ ,  $Fe$  is in the form of

- A. An atom
- B. An ion
- C. Cationic complex
- D. Anionic complex

**Answer: B**



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23. The number of neutral molecules or negative groups attached to be central metal atom in a complex ion is called

- A. Atomic number
- B. Effective atomic number
- C. Coordination number
- D. Primary valency

**Answer: C**



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24. Match list I with list II and select the correct answer using the codes given below the lists.



A. Codes (a) (b) (c) (d)  
*a* 1 2 3 4

B. Codes (a) (b) (c) (d)  
*b* 3 1 5 2

C. Codes (a) (b) (c) (d)  
*c* 2 3 4 5

D. Codes (a) (b) (c) (d)  
*d* 1 3 5 4

**Answer: B**



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25. The ligand  $N(CH_2CH_2NH_2)_3$  is

A. Tridentate

B. Pentadentate

C. Tetradentate

D. Bidentate

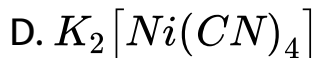
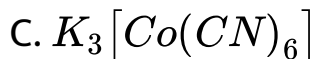
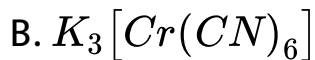
**Answer: C**



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26. Which of the following are diamagnetic ?

A.  $K_4[Fe(CN)_6]$

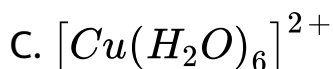
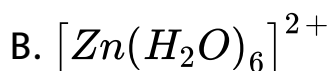
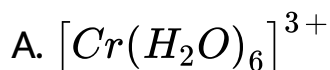


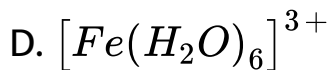
**Answer: B**



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27. Among the following ions, which one has the highest paramagnetism ?





Answer: D

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28. Amongst  $Ni(CO)_4$ ,  $[Ni(CN)_4]^{2-}$  and  $NiCl_4^{2-}$ :

A.  $Ni(CO)_4$  and  $NiCl_4^{2-}$  are diamagnetic and

$[Ni(CN)_4]^{2-}$  is paramagnetic.

B.  $NiCl_4^{2-}$  and  $[Ni(CN)_4]^{2-}$  are diamagnetic and

$Ni(CO)_4$  is paramagnetic.

C.  $Ni(CO)_4$  and  $[Ni(CN)_4]^{2-}$  are diamagnetic

and  $NiCl_4^{2-}$  is paramagnetic.



D.  $Ni(CO)_4$  is diamagnetic and  $NiCl_4^{2-}$  and

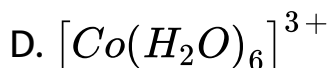
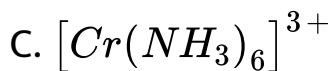
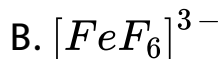
$[Ni(CN)_4]^{2-}$  are paramagnetic.

**Answer: C**



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**29.** Which of the following complexes is an inner orbital complex ?



**Answer: C**



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**30.** Coordination compounds are mainly formed by

A. s-block elements

B. p-block elements

C. d-block elements

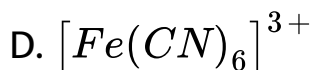
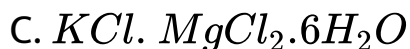
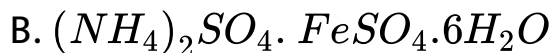
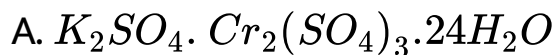
D. f-block elements.

**Answer: C**



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31. Which of following is not a double 'salt' ?



Answer: D



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32. The solution of  $K_4[Fe(CN)_6]$  in water will

A. give a test of  $K^+$

B. give a test of  $Fe^{2+}$

C. give a test of  $CN^-$

D. give a test of  $[Fe(CN)_6]^{4-}$

**Answer: A**



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**33.** Which is the correct statement about Ligands are ?

A. nrgative ions only

B. neutral molecules only capable of donating the  
electron pairs(s)

C. negative or very rarely positive ions or neutral molecules

D. never positive ions .

**Answer: C**



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**34.** EDTA is a/an

A. monodentate

B. bidentate

C. Hexadentate

D. tetradentate.

**Answer: C**



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**35. The donor atoms in EDTA are**

- A. two N and two O
- B. two N and four O
- C. four N and two O
- D. three N and three O.

**Answer: B**



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36. The coordination number of Pt in  $K_2[PtCl_6]$  is

A. 2

B. 4

C. 6

D. 0

**Answer: C**



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37. The oxidation state of Co in  $[Co(CO)_4]$  is

A. +1

B. 0

C. +2

D. +4

**Answer: B**



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**38.** The oxidation state of Co in  $[Co(NH_3)_5Cl]Cl_2$ .

A. +2

B. -2

C. +5

D. +3



**Answer: D**



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39.  $C_2O_4^{2-}$  is a ..... ligand.

A. monodentate

B. didentate

C. tridentate

D. polydentate.

**Answer: B**



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40. The brown ring complex compound is formulated as  $[Fe(H_2O)_5NO]SO_4$ . The oxidation state of  $Fe$  is

A. +1

B. +2

C. +3

D. 0

**Answer: A**



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41. The oxidation state of platinum in  $K[PtF_6]$  is

A. +8

B. +5

C. +6

D. +7

**Answer: B**



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**42.** Which of the following does not form a chelate ?

A. EDTA

B. Oxalate

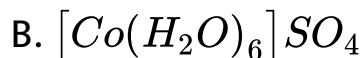
C.  $NH_3$

## D. Ethylenediamine

Answer: C

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43. If solutions equal concentration are prepared, the one with the highest electrical conductivity will be



**Answer: C**



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**44.** Which one of the following is a bidentate ligand ?

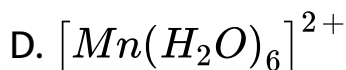
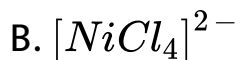
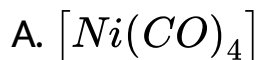


**Answer: D**



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45. In which compound synergic effect is present ?



**Answer: A**



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46. In the complex ion,  $[Fe(CN)_6]^{4-}$ , the oxidation number of Fe is

A. +1

B. +2

C. +3

D. -4

**Answer: B**



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**47.** In the complex ion,  $[Co(en)_2Br_2]^+$ , the oxidation number of Co is

A. +1

B. +2

C. +3

D. -2

**Answer: C**



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**48.** In the complex ion,  $[Cr(C_2O_4)_2(H_2O)_2]^-$  the oxidation number of Cr is

A. +1

B. +2

C. +3

D. -2



**Answer: C**



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**49.** The number of primary and secondary valencies (or linkages) in the complex ion  $[Cr(C_2O_4)_2(H_2O)_2]^-$  are

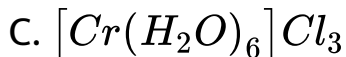
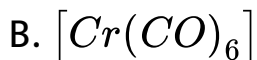
- A. Primary linkages=2, secondary linkages=2
- B. Primary linkages=1, secondary linkages=4
- C. Primary linkages=3, secondary linkages=6
- D. Primary linkages=2, secondary linkages=6

**Answer: C**



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50. In which of the following complexes oxidation state of metal is zero

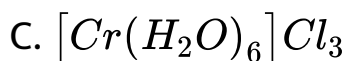
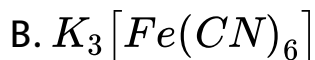
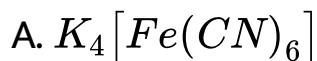


**Answer: B**



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51. Pick out the complex compound in which the central metal atom obeys EAN rule strictly



**Answer: A**



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52. Which of the following is wrong statement

- A.  $Ni(CO)_4$  has oxidation number +1 for Ni
- B.  $Ni(CO)_4$  has zero oxidation number for Ni
- C. Ni is cationic metal
- D. CO is neutral ligand

**Answer: A**



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53.  $Ti^{3+}$  is purple, while  $Ti^{4+}$  is colourless, because

- A. there is no crystal field effect in  $Ti^{4+}$
- B. The energy difference between eg and  $t_{2g}$  orbitals of  $Ti^{4+}$  is quite high and hence, does

not fall within the visible region

C.  $Ti^{4+}$  had  $3d^0$  configuration

D.  $Ti^{4+}$  is a very small cation when compared to

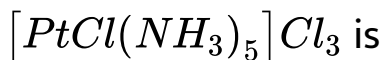
$Ti^{3+}$  and hence, does not absorb any radiation.

**Answer: C**



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54. The oxidation state of platinum in



A. +2

B. +3

C. +4

D. +6

**Answer: C**



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**55.** An ambidentate ligand in one which

A. is linked to the metal atom through two donor atoms

B. has two donor atoms, but only one of them has the capacity to form a coordinate bond [or a sigma ( $\sigma$ ) bond]

C. has two donor atoms, but either of two can form a coordinate bond

D. form chelate rings.

**Answer: C**



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**56.** Which of the following is not an ambident ligand ?

A.  $SCN^-$

B.  $NO_2^-$

C.  $CN^-$

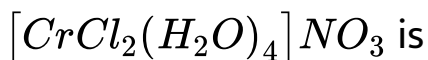
D. ethylenediamine.

**Answer: D**



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**57.** The correct name for the coordination compound



- A. dichlorotetraqueuschromiun (III)nitrate
- B. tetraaquadichlorochromate (III)nitrate
- C. tetraaquadichlorochromium (III)nitrate
- D. tetraaquodichlorochromium (II)nitrate.

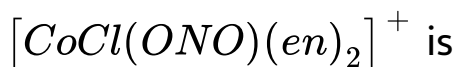
**Answer: C**



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58. The correct IUPAC name for the complex ion



A. chlorodiethyldiaminenitrocobalt (III)

B. chlorodiethyldiaminenitri-O-cobalt (III)

C. bis(ethylenediamine) chloronitrito-O-cobaltate  
(III)

D. bis(ethylenediamine) chlorinitro-O-cobalt (III)

**Answer: D**



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59. In the following coordination compound,  $[Cr(NH_3)_2(en)Cl_2]Br$ , where en=ethylenediamine, the coordination number (C.N.) and oxidation number (O.N.) of the metal atom, respectively are

A. C.N.=6, O.N.=4

B. C.N.=6, O.N.=3

C. C.N.=5, O.N.=2

D. C.N.=5, O.N.=4.

**Answer: B**



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60. In the coordination compound  $[Co(en)_2Cl_2]Cl$  (en=ethylenediamine), the coordination number and oxidation number of the central atom are, respectively

A. 4, + 3

B. 6, + 2

C. 4, + 2

D. 6, + 3.

**Answer: D**



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61. In the coordination compound  $[Pt(NH_3)_2Cl_2]$  the coordination number and oxidation number of the central atom are, respectively.

A. 2,0

B. 4, + 4

C. 6,0

D. 4, + 3

**Answer: D**



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62. A bidentate ligand always

A. has bonds formed to two metal ions

B. has a charge of  $+2$  or  $-2$

C. forms complex ions with a charge of  $+2$  or  $-2$

D. has two donor atoms forming simultaneously two sigma ( $\sigma$ ) bonds.

**Answer: D**

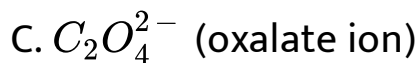


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63. Which one of the following is a monodentate ligand ?



B. EDTA



**Answer: A**



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64. The IUPAC name for  $K_4[FeCl_2(CN)_4]$  is

- A. tetrapotassiumdichloridotetracyanoiron (II)
- B. potassiumdichloridotetracyanoiron (II)
- C. potassiumdichloridotetracyanidoferrate (III)
- D. potassiumdichloridotetracyanidoferrate (II)

**Answer: D**



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65. The IUPAC name for  $[Ru(NH_3)_2(en)](NO_3)_2$  is

- A. (ethane-1,2-diamine)                      diammineruthenium  
(III)nitrate

B. diamminebis(ethane-1,2-diamine) ruthenium

(III)nitrate

C. diamminebis(ethine-1,2-diamine) ruthenium

(II)nitrate

D. diammine (ethane-1,2-diamine) nitrato ruthenium

(III).

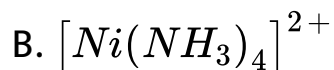
**Answer: C**



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**66.** Which of the following aquare planar complex ions can have cis-trans isomers ?





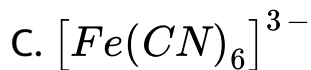
**Answer: C**



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**67.** Cis-trans isomerism is exhibited by which which one of the following ?





D. None of these.

**Answer: D**



**View Text Solution**

**68.** The numbers of geometrical and optical isomers of the complex ion,

$[Co(En)_3]^{3+}$  (en=ethylenediamine) are respectively

A. 2 and 2

B. 1 and 1

C. 3 and 2

D. 1 and 2.

**Answer: D**



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69.  $K_3[A](C_2O_4)_3$  is called

A. potassiumaluminumoxalate

B. potassiumtrioxalatoaluminate (III)

C. potassiumaluminium (III) oxalate

D. potassiumtrioxalatoaluminate (III).

**Answer: B**



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70. The complex  $[Co(OCN)(NH_3)_5Cl_2]$  and  $[Co(NCO)(NH_3)_5Cl_3]$  are the examples of

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

**Answer: B**



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71. The number of ions per mole of the complex  $CoCl_3 \cdot 5NH_3$  in aqueous solution will be

A. 9

B. 4

C. 3

D. 2

**Answer: C**



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72. The complex  $CoCl_3 \cdot 5NH_3$  is treated with silver nitrate solution. Maximum number of chloride ions that can be precipitated is

A. 9

B. 4

C. 3

D. 2

**Answer: D**



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73. The number of chloride ions which would be precipitated when one mole of the complex  $PtCl_4 \cdot 4NH_3$  is treated with silver nitrate is : (here coordination number of platinum is 6).

A. 2

B. 3

C. 4

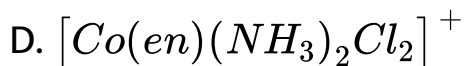
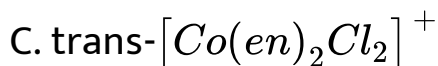
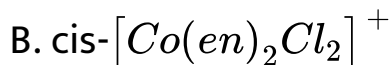
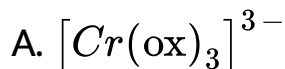
D. 1

**Answer: A**



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74. Optical isomerism is not shown by the complex



Answer: C



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75. In  $[Ag(CN)_2]^-$ , the number of  $\pi$  bonds is

A. 2



B. 3

C. 4

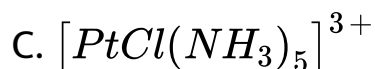
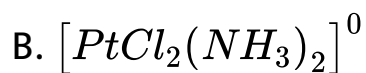
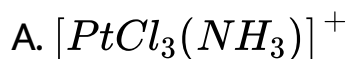
D. 6

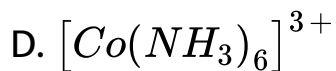
**Answer: C**



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**76.** Which of the following coordination entities will show geometrical isomerism ?





**Answer: B**



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77. The complex  $CoCl_3 \cdot 3NH_3$  ionizes to give

A.  $2Cl^-$  ions

B.  $1Cl^-$  ions

C.  $3Cl^-$  ions

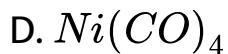
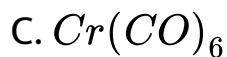
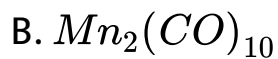
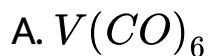
D. no  $Cl^-$  ion.

**Answer: D**



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78. Which of the following is polymeric metal carbonyl.



**Answer: B**



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79. Zeigler-Natta catalyst ( $R_3Al/TiCl_4$ ) is used as a heterogeneous catalyst for

- A. the synthesis of ethanol
- B. polymerization of alkenes
- C. the hydrogenation of alkenes
- D. cracking of hydrocarbons.

**Answer: B**



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80. Which one of following type of isomerism is shown by  $pCoCl_2(en)(NH_3)_2Cl$  ?

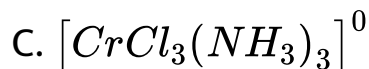
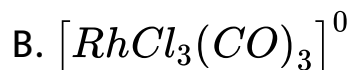
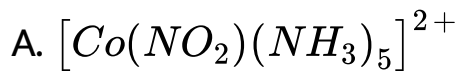
- A. Geometrical isomerism
- B. Optical isomerism
- C. Linkage isomerism
- D. Coordination isomerism.

**Answer: B**



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81. Geometrical isomerism is shown by



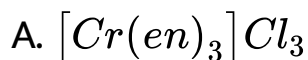
D. both b and c.

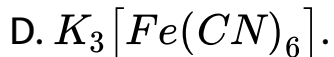
**Answer: D**



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**82.** Which one of the following can show optical isomerism ?



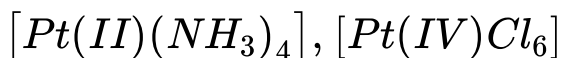


**Answer: A**

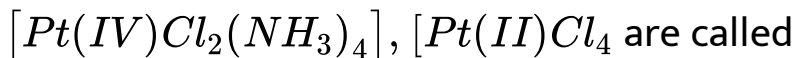


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**83.** The complex compounds,



and



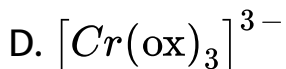
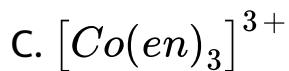
- A. linkage isomers
- B. ionization isomers
- C. coordination isomers

D. optical isomers.

**Answer: C**

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**84.** Which of the following is not optically active?



**Answer: A**





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85. Number of geometrical isomers shown by the octahedral complex of the type  $[MX_3Y_3]$  is

A. 2

B. 4

C. 6

D. 8

**Answer: A**



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86. Number of geometrical isomers shown by the octahedral complex of the type  $[MX_2Y_4]$  is

A. 4

B. 6

C. 8

D. 2

**Answer: D**



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87. The oxidation number of Pt in  $[Pt(H_2O)Cl_3]^-$  is

A. +1

B. +2

C. +3

D. +4

**Answer: B**



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**88.** Which of the following statement is true ?

A. The oxidation number of iron in  $[Fe(CN)_6]^{4-}$  is

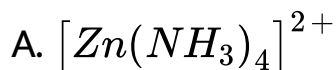
+6

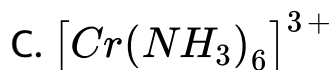
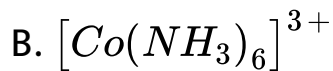
- B. In transition metal complexes, the ligands act as Lewis acid
- C. The charge on the complex ion in  $K_2[PtCl_4]$  is +2
- D. The coordination number of Hg in  $[Hg(en)_2]$  is '4' (where en ethylenediamine).

**Answer: D**

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**89.** Outer orbital complex is





**Answer: D**



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**90.** The number of d-electrons in  $[Cr(H_2O)_6]^{3+}$  [At.

No. of Cr = 24 ] is

A. 2

B. 3

C. 4

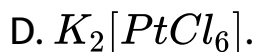
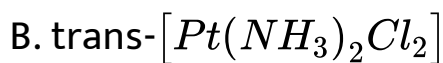
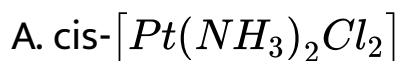
D. 5

**Answer: B**



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**91.** Cis-platin used in the treatment of cancer is



**Answer: A**



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92. The geometry of  $[Ag(NH_3)_2]^+$  ion is

A. trigonal planar

B. tetrahedral

C. linear

D. square planar.

**Answer: C**



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93. The theory of coordination compounds was put forth by

A. Pauling

B. Werner

C. Bronsted and Lowry

D. Lewis.

**Answer: B**



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94. The structure of complex cation  $[Pt(NH_3)_4]^{2+}$  is



- A. pyramidal
- B. tetrahedral
- C. square planar
- D. none of these.

**Answer: C**



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**95.** The number of unpaired electrons in  $[Ni(CO)_4]^0$  is

- A. 2
- B. 4
- C. 0

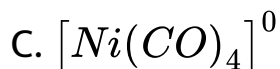
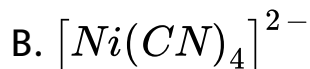
D. 3

**Answer: C**



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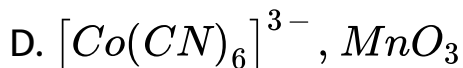
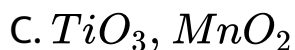
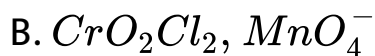
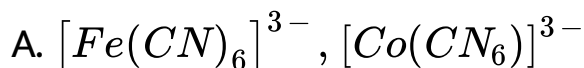
**96.** Which of the following does not have tetrahedral structure ?



**Answer: B**

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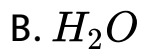
97. The pair of the compounds in which both the metals are in the highest possible oxidation state is



**Answer: B**

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98. In the spectrochemical series which ligand produces strongest field ?



**Answer: D**



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99. IUPAC name of  $K_4[Fe(CN)_6]$  is

- A. potassiumhexacyanoferrate (III)
- B. potassiumhexacyanoferrate (II)
- C. potassiumferrcyanide
- D. potassiumferricyanide

**Answer: B**

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100. Which of the following has highest molar conductivity

A. Diamminedichloroplatinum (II)

B. Tetraamminedichlorocobalt (III)chloride

C. Potassiumhexacyanoferrate (II)

D. Hexaaquochromiun (III)bromide

**Answer: C**

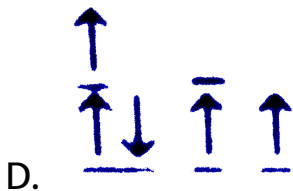
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**101.** Which of the following energy diagrams shows the electron distribution according to the crystal field model of the 3d-electrons in  $Mn(H_2O)_6^{2+}$  ?

A. 

B. 

C. 



Answer: C

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102. Which of the following energy diagrams for 3d-electrons corresponds to the low-spin  $Fe(CN)_6^{4-}$  species ?

A. 

B. 

C. 

D.  $\begin{array}{ccc} \bar{\quad} & \bar{\quad} & \\ \uparrow\downarrow & \uparrow\downarrow & \uparrow \\ \underline{\quad} & \underline{\quad} & \underline{\quad} \end{array}$

**Answer: A**

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**103.** A complex with the composition  $[Ma_2b_2]x_2$  is found to have no geometrical isomers. Both A and B are monodentate ligands. The structure of the complex is

A. linear



B. square pyramidal

C. tetrahedral

D. octahedral.

**Answer: C**



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**104.** In the complex ion  $ML_6^{n+}$ ,  $M^{n+}$  has five d-electrons and L is a strong field ligand. According to crystal field theory, the magnetic properties of the complex ion correspond to how many unpaired electrons ?

A. 0

B. 1

C. 2

D. 3

**Answer: B**



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**105.** In the complex ion  $ML_6^{n+}$ ,  $M^{n+}$  has five d-electrons and L is a weak field ligand. According to crystal field theory, the magnetic properties of the complex ion correspond to how many unpaired electrons?

A. 0

B. 5

C. 2

D. 3

**Answer: B**



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**106.** In the complex ion  $ML_6^{n+}$ ,  $M^{n+}$  has four d-electrons and L is a strong field ligand. According to crystal field theory, the magnetic properties of the complex ion correspond to how many unpaired electrons ?

A. 4

B. 1

C. 2

D. 3

**Answer: C**



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**107.** In the complex ion  $ML_6^{n+}$ ,  $M^{n+}$  has four d-electrons and L is a Weak field ligand. According to crystal field theory, the magnetic properties of the complex ion correspond to how many unpaired electrons ?

A. 0

B. 1

C. 2

D. 4

**Answer: D**



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**108.** For ethylenediaminetetraacetic acid (EDTA) correct statement is

A. not useful as a chelating agent

B. an effective antidote for heavy metal poisoning

(e.g.,  $Pb^{2+}$  and  $Hg^{2+}$ )

C. a monodentate ligand

D. form unstable complex ions with  $Fe^{3+}$

**Answer: B**



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**109.** Cis-platinum complexes are

A. used in the extraction of silver and gold

B. effective antidotes for heavy metal poisoning

(e.g.,  $Pb^{2+}$  and  $Hg^{2+}$ )

C. used to provide nutrients for plants

D. effective antitumor agents.

**Answer: D**



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**110.** How many unpaired electrons does the manganese ion have in  $[Mn(CN)_6]^{4-}$  ?

A. 1 unpaired electron

B. 2 unpaired electrons

C. 3 unpaired electrons

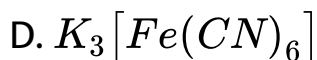
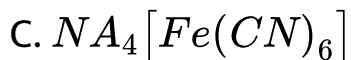
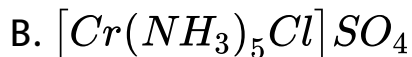
D. 5 unpaired electrons

**Answer: A**



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**111.** The metal ion in complex A has EAN identical to the atomic number of krypton. A is (At No. of Cr=24, Fe=26, Pd=46)



**Answer: C**





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112. Which of the following energy shows the electron distribution according to the crystal field model of the 3d-electrons in  $CoCl_4^{2-}$

A. 

B. 

C. 

D. 

**Answer: D**



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113. Back bonding is possible in

A.  $NH_3$

B. en

C. CN

D. CO

Answer: D



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114. The number of chloride ion that can be precipitated when the complex  $CoCl_3 \cdot 4NH_3$  is treated

with  $AgNO_3$

A. 0

B. 1

C. 2

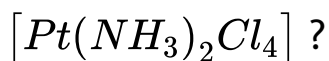
D. 3

**Answer: B**



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**115.** How many ions for moles are present in



A. 0

B. 1

C. 2

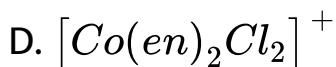
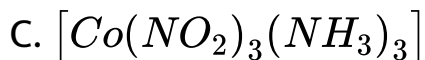
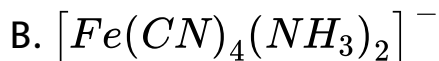
D. 4

**Answer: A**



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**116.** Fac-mer isomerism is possible in



**Answer: C**

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117.  $[Fe(H_2O)_6]^{2+}$  is

A. octahedral outer orbital complex

B. octahedral inner orbital complex

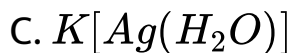
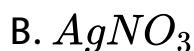
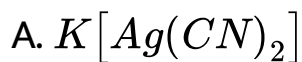
C. It is diamagnetic

D. It has hybridization  $d^2 sp^3$

**Answer: A**

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118. Which of the following complex is used in silver plating ?



D. EDTA

**Answer: A**



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**119.** Which of the following diapositive cation produces more stable complex ?



**Answer: C**



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

A. 3,4

B. 4,3

C. 3,6

D. 6,3

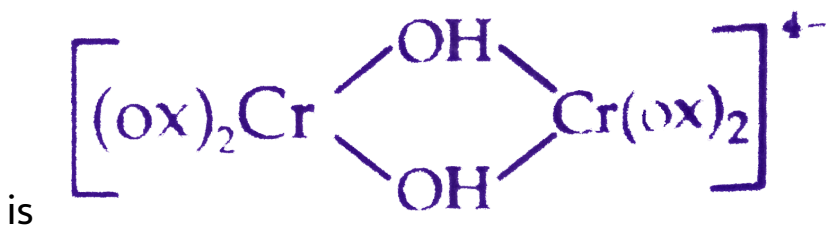
**Answer: C**



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121. Oxidation state of chromium in following complex



A. +2

B. +3

C. +4

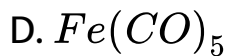
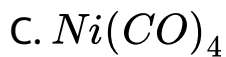
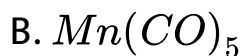
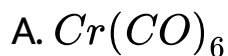
D. +5

**Answer: B**



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122. The non-existent metal carbonyl among the following is



**Answer: B**



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123. The pair  $[Co(NH_3)_5NO_3]SO_4$  and  $[Co(NH_3)_5SO_4]NO_3$  will show

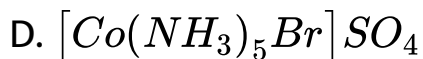
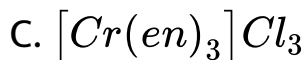
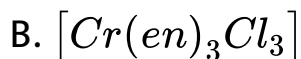
- A. hydrate isomerism
- B. linkage isomerism
- C. ionization isomerism only
- D. co-ordinate isomerism

**Answer: C**



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124. Which one of the following co-ordination compounds exhibit ionization isomerism ?



**Answer: D**



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125. If the Effective Atomic Number (EAN) of  $[A(NH_3)_6]Cl_3$  is 33, is the atomic number of the element (A) will be

A. 23

B. 27

C. 24

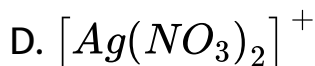
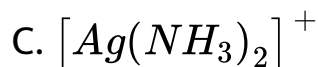
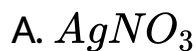
D. 29

**Answer: C**



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126. Tollen's reagent is

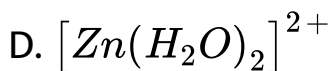
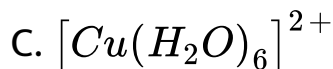
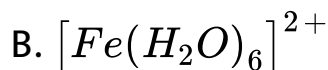
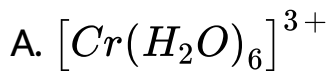


**Answer: C**



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127. Which of the following aquated metal ions has the highest paramagnetism ?



**Answer: B**



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**128.** The hybridization states of the central atom in the complex ions  $[FeF_6]^{3-}$ ,  $[Fe(H_2O)_6]^{3+}$  and  $[Ni(NH_3)_6]^{2+}$  are

A.  $sp^3d^2$  and  $sp^3$  respectively

B. all are  $dsp^3$

C. all are  $sp^3d^2$

D.  $sp^3d^2$ ,  $dsp^3$  and  $d^2sp^3$  respectively

**Answer: C**



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**129.** The complex ion  $[Co(NH_3)_6]^{3+}$  is formed by  $sp^3d^2$  hybridization. Hence, the ion should possess

A. octahedral geometry

B. tetrahedral geometry

C. square planar geometry



D. tetragonal geometry

**Answer: A**



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**130.** Which of the following is strong ligand ?

A. OH

B. F

C. Cl

D.  $NH_3$

**Answer: D**



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131. Formula of hexa-aquamanganese (II)phosphate is

- A.  $[Mn(H_2O)_6](PO_4)$
- B.  $[Mn(H_2O)_6]_3(PO_4)$
- C.  $[Mn(H_2O)_6]_3(PO_4)_2$
- D.  $[Mn(H_2O)_6](PO_4)_3$

**Answer: C**



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132. How many hydrate isomers are possible with the formula  $CrCl_3 \cdot 6H_2O$ ?

- A. six
- B. four
- C. three
- D. two

**Answer: C**



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**133.** The neutral molecules or ions which co-ordinate with the central atom or ion in a complex ion are called,

A. combinants

B. cryptands

C. spherands

D. ligands

**Answer: D**



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134. IUPAC name of  $[Pt(NH_3)_3(Br)(NO_2)Cl]Cl$  is

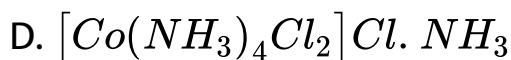
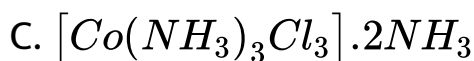
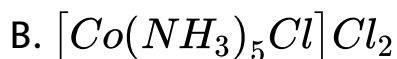
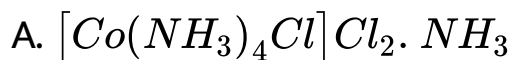
- A. triamminechlorobromonitroplatinum (IV) chloride
- B. triamminebromochloronitroplatinum (IV)chloride
- C. triamminetrochlorobromoplatinum (IV)chloride
- D. trimminechloronitrobromoplatinum (IV)chloride

**Answer: B**



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135. One mole of complex compound  $Co(NH_3)_5Cl_3$  gives 3 moles of ions on dissolution in water. One mole of same complex reacts with two moles of  $AgNO_3$  to yield two moles of  $AgCl(s)$ . The complex is:

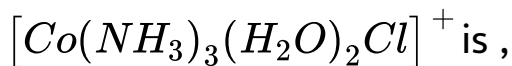


**Answer: B**



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136. Oxidation number of Co in



A. 1

B. 2

C. 3

D. 4

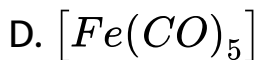
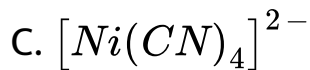
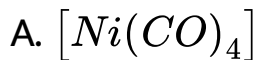
**Answer: B**



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137. Which of the following has square planar structure

?



**Answer: C**

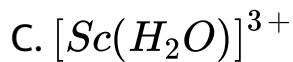


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**138.** Which of the following complex will not show colour ?







**Answer: C**



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**139.** Coordination compounds are the compound in which the central metal atom is linked to atoms ions or molecules by

A. Covalent bonds

B. Coordinate bonds

C. Ionic and covalent bonds

D. Both ionic and coordinate bonds

**Answer: B**



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**140.** Complex compounds are mainly formed by

A. p-block elements

B. f-block elements

C. d-block elements

D. s-block elements

**Answer: C**



141. Which of the following statements is incorrect about coordination compounds?

- A. All molecular compounds are not coordination compounds
- B. Complexes always give ions in the solution
- C. Complexes may or may not give ions in the solution
- D. Complex ion does not dissociate into its component parts even in the solution

**Answer: B**

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**142.** According to Werner's theory, the secondary valencies of the central metal atom correspond to its

- A. Oxidation state
- B. Coordination number
- C. Any of the two a and b
- D. Neither of the two

**Answer: B**

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**143.** Mohr's salt is a

A. Simple's salt

B. Alum

C. Double salt

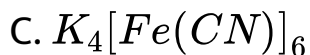
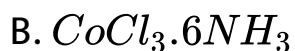
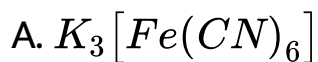
D. Coordinate compound

**Answer: C**



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144. Which of the following is not a coordination compound ?



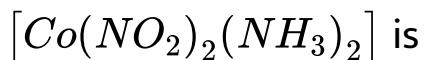
D. Carnallite

**Answer: D**



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**145.** The number of geometrical isomers of the complex



A. 2

B. 3

C. 4

D. 0

**Answer: A**



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**146.** Ligands are

A. neutral molecules only

B. negative ions only

C. never positive ions

D. negative or positive ions or neutral molecules

**Answer: D**



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**147.** The number of chlorine atoms acting as ligands in the complex  $[Co(en)_2(H_2O)Cl]Cl_2$  is

A. 0

B. 1



C. 2

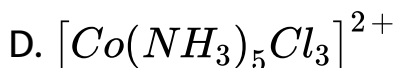
D. 3

**Answer: B**



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**148.** In the complex  $[Co(NH_3)_5Cl]Cl_2$ , the coordination sphere is



**Answer: D**



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**149.** Ethylenediamine is

A. Monodentate

B. Bidentate

C. Tridentate

D. Tetradentate.

**Answer: B**



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150.  $O^-$  is an

- A. Monodentate
- B. Bidentate ligand
- C. Tridentate ligand
- D. Tetridentate.

**Answer: B**



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151.  $SCN^-$  is a/an

- A. Monodentate ligand

B. Bidentate ligand

C. Tridentate ligand

D. Tetradentate ligand

**Answer: A**



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**152.** Chelating ligand is one which donates to the metal ion

A. two lone pair

B. three lone pairs

C. four lone pairs

D. all are correct

**Answer:**

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**153.** Which of the following is a chelate complex ?

A. Potassium ferrocyanide

B. Potassium tetracyanonickelate (II)

C.  $[Co(en)_3]^{3+}$

D.  $[Co(NH_3)_4Cl_2]Cl$

**Answer: C**



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154. Which one of the following ligands can act as Hexadentate ligand ?

A. Ethylenediamine

B. EDTA

C.  $CN^-$

D. CO

**Answer: B**



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**155.** Which one of the following acts as a neutral ligand

- A. amine
- B. Oxalato
- C. flurido
- D. Cyano

**Answer: A**



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**156.** The number of anionic coordinating sites of EDTA are

A. 2

B. 4

C. 6

D. 8

**Answer: B**



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**157.** The most strongest ligand is

A.  $Cl^-$

B.  $F^-$

C.  $I^-$



D.  $CN^-$

**Answer: D**



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**158.** An example of non ambidentate ligand is

A.  $NH_3$

B. SCN

C. CN

D.  $NO_2$

**Answer: A**



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159. Chelating ligand among the following is

A. CO

B.  $CN^-$

C.  $OH^-$

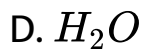
D. en

**Answer: D**



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160. The strongest ligand is



**Answer: C**



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**161.** An example of bidentate ligand is



D.  $Cl^-$

**Answer: C**



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**162.** Consider

EDTA-Hexadentate ligand

Ethylene diamine-Bidentate ligand

Diethylene triamine-Tridentate ligand

Chloride-Tridentate ligand

A. 1 and 2

B. 3 and 4

C. Only 4

D. 1,2 and 3

**Answer: C**



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**163.** Which one of the following ligands form a chelate complex ?

A. Water

B. Oxalate

C. Ammonia

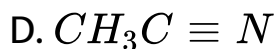
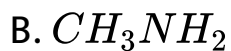
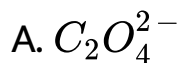
D. Cyanide

**Answer: B**



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**164.** Which ligand is expected to be bidentate ?

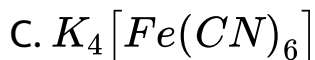
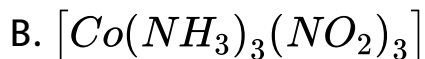
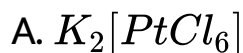


**Answer: A**



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165. Pick out from the following complex compounds, a poor electrolytic conductor in solution



**Answer: B**



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166. Magnetic moment of  $[Cu(NH_3)_4]^{2+}$  ion is

A. 0

B. 1.73

C. 1.44

D. 2.99

**Answer: B**



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**167.** In the compound lithium tetrahydridoaluminate, the ligand is

A. H

B.  $H^+$



C.  $H^-$

D. Al

**Answer: C**



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**168.** Which one of the following is NOT a ligand ?

A.  $PH_3$

B.  $NO^+$

C.  $Na^+$

D.  $F^-$

**Answer: C**



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**169.** In a coordination complex the negative groups or neutral molecules attached to the central atoms are termed as \_\_\_\_\_ .

- A. charge of metal ion
- B. ligands
- C. coordination number
- D. EAN

**Answer: B**



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**170.** The coordination number of a central ion may be obtained from

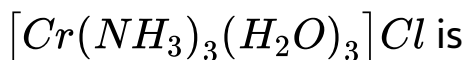
- A. the number of coordinate bonds formed with surrounding atoms
- B. the number of ionic bonds formed with the surrounding ions
- C. the number of ions of opposite charge immediately surrounding the specific ion
- D. none of the above.

**Answer: A**



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**171.** The coordination number of Cr in



A. 2

B. 3

C. 4

D. 6

**Answer: D**



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172. The oxidation number of Fe in  $K_4[Fe(ox)_3]$  is

A. 1

B. 2

C. 3

D. 4

**Answer: C**



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173. The oxidation number of manganese in  $[Mn_2(CO)_{10}]$  is

A. 0

B. +1

C. +2

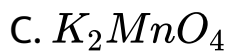
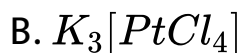
D. +5

**Answer: A**



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174. Which one of the following has oxidation number of transition metal atom four ?

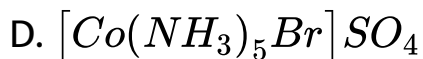
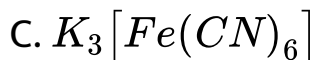
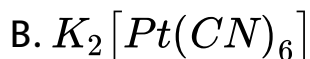
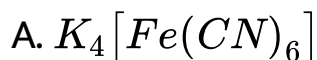


**Answer: D**



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175. Out of the following which one has transition metal atom in the oxidation state + 2?



**Answer: A**



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176. The coordination number of Al in potassium trioxalato aluminate (III) is

A. 3

B. 4

C. 5

D. 6

**Answer: D**



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177. The oxidation state of Al in  $LiAlH_4$  is

A. 0

B. 1

C. 2

D. 3

**Answer: D**



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**178.** The oxidation state of Co in  $[Co(en)]^{3+}$  is

A. +3

B. -3

C. +1

D. + 2

**Answer: A**



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**179.** The donor site of CN can be

A. C

B. S

C. N

D. Both a and c

**Answer: D**



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**180.** The oxidation state of iron in haemoglobin is

A. 0

B. +1

C. +2

D. +3

**Answer: C**



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**181.** The coordination number of Ni in the complex  $[Ni(CO)_4]$  is

A. 1

B. 2

C. 3

D. 4

**Answer: D**



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**182.** The oxidation state of Zn in  $K_2[Zn(CNS)_4]$  is

A. 0

B. +1

C. +2

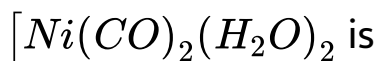
D. +3

**Answer: C**



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**183.** The oxidation state of nickel in the complex



A. 0

B. +1

C. +2

D. +4

**Answer: A**



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**184.** What is true for  $[Fe(CN)_6]^{3-}$  and  $[FeF_6]^{3-}$

A. Both are paramagnetic

B. Only  $[Fe(CN)_6]^{3-}$  is paramagnetic

C. Only  $[FeF_6]^{3-}$  is paramagnetic

D. Both are diamagnetic

**Answer: A**



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**185.** Choose the correct statement.

A. Coordination number has nothing to do with the number of groups or molecules attached to the central atom

B. Coordination number is the number of coordination sites of all the ligands connected to the central atom or the number of coordinate bonds formed by the metal atom with ligands



C. Werner's coordination theory postulates only one type of valency

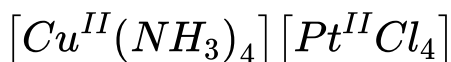
D. All are correct

**Answer: B**



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**186.** Following compound shows .... Type of isomerism



A. solvate

B. linkage

C. ionisation

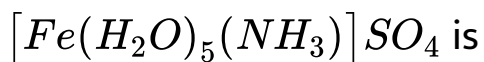
D. coordinate

**Answer: D**



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**187.** The oxidation state of Fe in



A. +1

B. +2

C. +4

D. +3

**Answer: B**



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**188.** Coordination number of cobalt in  $[Co(ox)_3]^{3-}$  is

A. 2

B. 6

C. 5

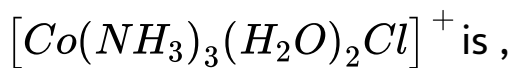
D. 4

**Answer: B**



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189. Oxidation number of CO in



A. 1

B. 2

C. 3

D. 4

**Answer: B**



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

- A. give the test  $SO_4^{2-}$  ions
- B. give the test  $Cu^{2+}$  ions
- C. give the test of  $NH_3$
- D. not give the test of any of the above

**Answer: A**



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**191.** Metal ions which form the most stable complexes have each of the following properties except

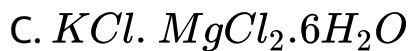
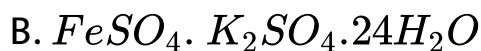
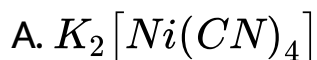
- A. empty orbitals
- B. at least one lone pair of electrons
- C. high nuclear charge
- D. small size

**Answer: B**



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192. Which of the following will not give tests for free transition metal ion in solution ?



Answer: A



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193. The complex  $CoCl_3 \cdot 4NH_3$  ionizes to give

A. one  $Cl^-$  ion

B. two  $Cl^-$  ions

C. three  $Cl^-$  ions

D. no  $Cl^-$  ion.

**Answer: A**



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**194.** The number of ions produced from one molecule of  $[Pt(NH_3)_5Cl_3]$  in the aqueous solution will be

A. 3

B. 5



C. 4

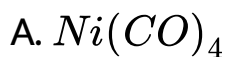
D. 6

**Answer: C**



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**195.** Which one has the highest paramagnetism ?



**Answer: C**



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**196.** The number of ions furnished by

$[Co(NH_3)_5Cl]Cl_2$  in solution are,

A. zero

B. 1

C. 2

D. 3

**Answer: D**



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197. Complex forming tendency is more for the metal ion

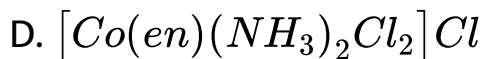
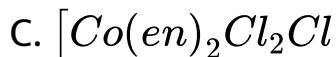
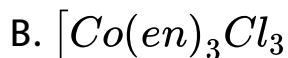


**Answer: B**



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198. Which of the following does not have optical isomer?



**Answer: A**



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**199.** Change in composition of coordination sphere yields which types of isomers

A. Optical

B. Geometrical

C. Ionisation

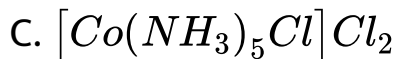
D. None of the these.

**Answer: C**



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200. Which of the following will not give a precipitate with  $AgNO_3$  ?



**Answer: A**



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201. The number of ions formed when  $[Cu(NH_3)_4SO_4]$  is dissolved in water is

A. 0

B. 2

C. 4

D. 3

**Answer: A**



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202. The total number of ions furnished by  $K_4[Fe(CN)_6]$  in solution is

A. 3

B. 4

C. 5

D. 6

**Answer: C**



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203. The number of groups acting only as secondary valences in the complex  $[CoCl_2(NH_3)_4]Cl$  are

A. 4

B. 2

C. 6

D. 1

**Answer: C**



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**204.** Primary and secondary valency of platinum in the complex  $[Pt(en)_2Cl_2]$  are

A. 6,6

B. 2,6

C. 4,4

D. 6,2

**Answer: B**



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**205.** EAN of Ni in  $[Ni(CO)_4]$  is

A. 35

B. 36

C. 38

D. 40

**Answer: B**



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206. EAN of Pt in  $[Pt(NH_3)_4]^{2+}$

A. 35

B. 40

C. 80

D. 84

**Answer: D**



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207. The EAN of Pt in  $[Pt(NH_3)_4]^{2+}$

A. 33

B. 34

C. 35

D. 36

**Answer: C**

208. Consider (At.No. Cr=24, Ni=28, Pt=78, Pd=46). Which of the following has correct EAN ?

- Complex                      *EAN*
- A.  $[Cr(CN)_6]^{3-}$                       52
- Complex                      *EAN*
- B.  $[Ni(CO)_4]$                       86
- Complex                      *EAN*
- C.  $[Pt(NH_3)_6]^{4+}$                       86
- Complex                      *EAN*
- D.  $[PdCl_4]^{2-}$                       33

**Answer: C**

**209.** Suffix-o or ido is added to the name of a ligand when the ligand is

- A. positively charged
- B. neutral (except water)
- C. negatively charged
- D. all of the above

**Answer: C**



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**210.** The IUPAC name of  $K_3[Fe(\text{O})_3]$  is

- A. Potassiumferroxalate
- B. Potassiumferrioxalate
- C. Potassiumtrioxateferrate (II)
- D. Potassiumtrioxalatoferrate (III)

**Answer: D**



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**211.** Diammine silver (I)ion is

- A.  $[Ag(NH_3)_2]^+$
- B.  $[Ag(NH_3)]^{3+} NH_3$
- C.  $[Ag(NH_3)_2]^{3+} NH_3$

D. None of these.

**Answer: A**

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**212.** The correct name of the compound

$[Cu(NH_3)_4](NO_3)_2$ , according to IUPAC system is

- A. Cuprammoniumnitrate
- B. Tetraamminecopper (I)nitrate
- C. Tetraamminecopper (III)nitrate
- D. Tetraamminecopper (III)nitrate



Answer: C



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213. The IUPAC name of  $[CoCl(NH_3)(en)_2]Cl$  is

A. Chloroammine bis (ethylenediamine) cobalt

(II)chloride

B. Amminechlorobis(ethylenediamine) cobalt

(II)chloride

C. Amminechlorobis (ethylenediamine) cobalt

(III)chloride

D. Amminechlorobis(ethylenediamine)

cobalt

(IV)chloride

**Answer: C**



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**214.** The complex ions  $[Co(NH_3)_5(NO_2)]^{2+}$  and  $[Co(NH_3)_5(ONO)]^{2+}$  are called

- A. Geometrical isomers
- B. Linkage isomers
- C. Ionization isomers
- D. Coordination isomers.

**Answer: B**



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**215.** Geometrical isomerism in complex compounds is exhibited by

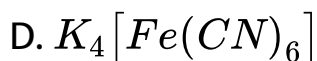
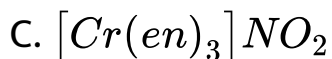
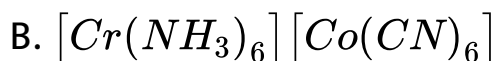
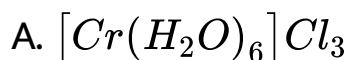
- A. square planar, tetrahedral and complexes
- B. square planar and octahedral complexes
- C. tetrahedral and octahedral complexes
- D. square planar, tetrahedral and octahedral complexes

**Answer: B**



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216. Which of the following compound would exhibit co-ordination isomerism?



**Answer: B**



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217.

The

complexes

$[Pt(NH_3)_4][PtCl_6]$  and  $[Pt(NH_3)_4Cl_2][PtCl_4]$  are

:

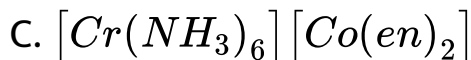
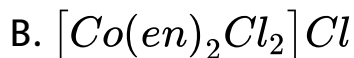
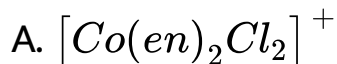
- A. Linkage isomerism
- B. Ionisation isomerism
- C. Coordination isomerism
- D. Hydrate isomerism

**Answer: C**



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218. OF the following complexes which one will show coordination isomerism ?



Answer: C



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219. The octehedral complex  $[M(aa)x_2y_2]Cl_2$  gives

- A. two geometrical isomers
- B. two optical isomers
- C. three optical isomers
- D. three geometrical isomers

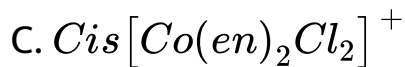
**Answer: D**



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**220.** Which of the following complexes can form d and L isomers ?



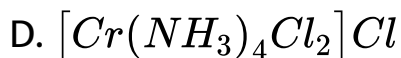
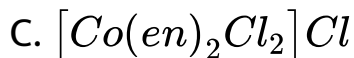
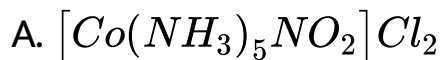


**Answer: C**



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**221.** Out of the following which will not show geometrical isomerism ?





**Answer: A**



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222.  $K_3 [Fe(C_2O_4)_3]$  exhibits

- A. Ionization isomerism
- B. Geometrical isomerism
- C. Optical isomerism
- D. Coordination isomerism.

**Answer: C**



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223.  $[Co(NH_3)_4Cl_2]Cl$  exhibits

- A. Ionization isomerism
- B. Linkage isomerism
- C. Geometrical isomerism
- D. Optical isomerism

Answer: C



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224. The number of hydrate isomers of  $CrCl_3 \cdot 6H_2O$  are

A. 1

B. 2

C. 3

D. 4

**Answer: D**



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**225.** Geometrical isomerism is shown by

A. Tetrahedral

B. Octahedral

C. Square planer

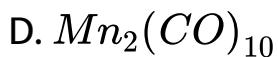
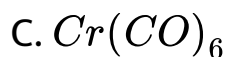
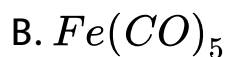
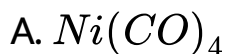
D. Both b and C.

**Answer: D**



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**226.** Which of the following has metal-metal bond ?

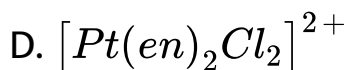
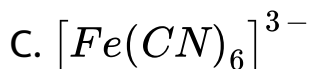


**Answer: D**



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227. Cis-trans isomerism is exhibited by which one of the following ?

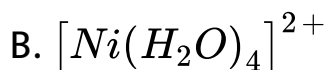
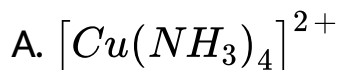


**Answer: D**



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**228.** Optical isomerism can be shown by the complex



C. Both (a) and (b)

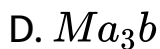
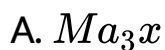
D. Neither (a) or (b)

**Answer: D**



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**229.** Square planar complex which shows geometrical isomerism is

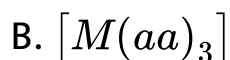
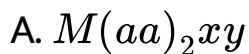


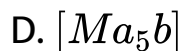
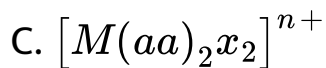
**Answer: C**



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**230.** Which of the following types of octahedral complexes does not show optical isomerism ?





**Answer: D**



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**231.** A complex with the composition  $[Ma_2b_2]X_2$  is found to have no geometrical isomers. Both A and B are monodentate weak ligands. The structure of the complex is

A. Linear

B. Tetrahedral



C. Square planar

D. Octahedral.

**Answer: B**



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**232.** The complex ion  $[Co(en)_2Cl_2]^+$  exhibits

A. cis-trans isomerism only

B. cis-trans isomerism and optical isomerism

C. cis-trans isomerism and linkage isomerism

D. optical isomerism and linkage isomerism.

**Answer: B**



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**233.** The complex ion  $[Cu(NH_3)_4]^{2+}$  is

- A. Tetrahedral
- B. Square planar
- C. Both
- D. None of these.

**Answer: B**



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**234.** The number of precipitable halide ions in the sample  $[Pt(NH_3)Cl_2Br]Cl$  will be

A. 2

B. 3

C. 4

D. 1

**Answer: D**



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**235.** Back bonding involves the formation of

A.  $\sigma$  bond

B. Coordinate bond

C.  $\pi$  bond

D. None of these.

**Answer: C**



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**236.** Hexafluoroferrate (III)ion is an outer orbital complex. The number of unpaired electrons present in it

A. 1

B. 4

C. 5

D. 0

**Answer: C**



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**237.** A complex involving  $dsp^2$  hybridization has

A. Square planar geometry

B. A tetrahedral geometry

C. An octahedral geometry

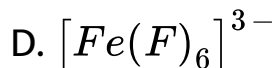
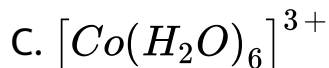
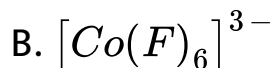
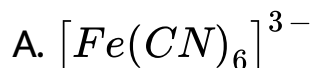
D. Trigonal planar geometry

**Answer: A**



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**238.** Which of the following complex species involves  $d^2 sp^3$  hybridisation?

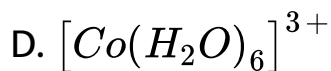
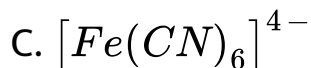
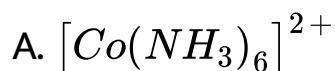


**Answer: A**



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239. The ion which has a high spin  $d^6$  configuration is



**Answer: D**



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240. Which among the following complex has square pyramidal geometry ?

- A. Tetracarbonylnickel (0)
- B. Pentacarbonyliron (0)
- C. Hexamminecobalt (II)nitrate
- D. Tetraaminecopper (II)sulphate

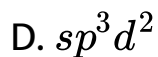
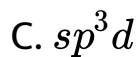
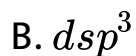
**Answer: D**



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



**Answer: D**



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**242.** Compare

A.  $[Ag(NH_3)_2]^+$  Diagonal

B.  $[Cr(CO)_6]^0$  Tetrahedral

C.  $[Fe(CN)_6]^{3-}$  Square planar

D.  $[Ni(CN)_4]^{2-}$  Octahedral

**Answer: C**



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**243.** In coordination compound  $[Co(en)_2Cl_2]Cl$  which is false

A. Show geometrical Isomerism

B. Show optical Isomerism

C. Show ionic Isomerism

D. A octahedral complex

**Answer: C**



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**244.**  $K_3CoF_6$  is high spin complex. What is the hybrid state of Co atom in the complex?

A.  $d^2 sp^3$

B.  $dsp^2$

C.  $sp^3 d$

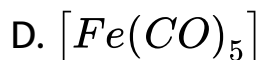
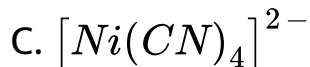
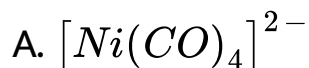
D.  $sp^3 d^2$

**Answer: D**



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**245.** Which of the following has square planar structure ?

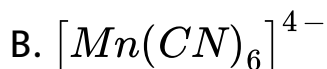
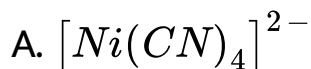


**Answer: C**



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246. The paramagnetic ion among the following is



D. All the above.

Answer: B



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247. The complex ion  $[Cu(NH_3)_4]^{2+}$  is

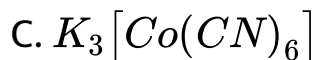
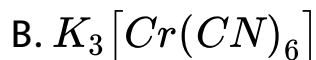
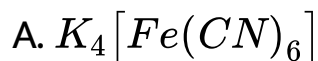
- A. Square planar and diamagnetic
- B. Square planar and paramagnetic
- C. Tetrahedral and diamagnetic
- D. Tetrahedral and paramagnetic

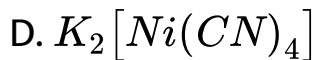
**Answer: B**



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**248.** Which of the following are diamagnetic ?





**Answer: B**



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**249.** Select the correct answer using the codes given below :

A. 1,2 and 4

B. 1,3 and 4

C. 2 and 3

D. 1 and 4.

**Answer: A**



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**250.**  $t_{2g}$  orbitals are proposed in

A. Crystal field theory

B. Pauling theory

C. Lewis theory

D. Sidwick theory

**Answer: A**



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251.  $e_g$  orbitals consist of

A.  $dx^2y^2, dz^2$

B.  $dxy, dxz, dyz$

C.  $dxy, dxz, dz^2$

D.  $dz^2$

Answer: C



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252. Which of the following atomic orbital of the metal cation are considered in CFT ?

A. s

B. p

C. d

D. f

**Answer: B**



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**253.** Which of the following cannot be explained by CFT?

A. Electrovalency

B. Covalency

C. Secondary valency

D. Oxidation number

**Answer: B**



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**254.** Which is colourless of the following ?

A. Anhydrous  $CuSO_4$

B.  $CuSO_4 \cdot 5H_2O$

C.  $Cu_2(CH_3COO)_4 \cdot H_2O$

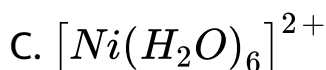
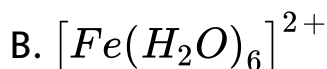
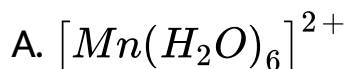
D.  $[Cu(NH_3)_4]SO_4 \cdot 4H_2O$

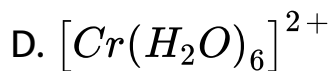
Answer: A

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**255.** The d electron configuration of  $Cr^{2+}$ ,  $Mn^{2+}$ ,  $Fe^{2+}$  and  $Ni^{2+}$  are  $3d^4$ ,  $3d^5$ ,  $3d^6$  and  $3d^8$  respectively. Which one of the following aqua complexes will exhibit the minimum paramagnetic behaviour?

(At. No.  $Cr = 24$ ,  $Mn = 25$ ,  $Fe = 26$ ,  $Ni = 28$ )

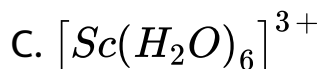
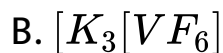




**Answer: C**

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**256.** Which of the following complex will not show colour ?



**Answer: C**



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**257.** Ligand(s) with lone pair of electron(s) with vacant orbital to receive back the electrons donated to the metal is/are

A. CO

B.  $H_2O$

C.  $NH_3$

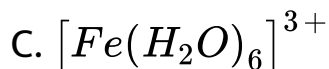
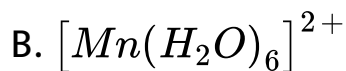
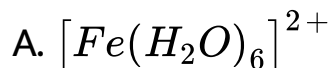
D.  $F^-$

**Answer: A**



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**258.** The more stable complex among the following is



D. None of these.

**Answer: C**



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**259.** The value of stability constant depends upon

- A. the charge on the central metal ion
- B. nature of the ligand
- C. chelation
- D. all of the above

**Answer: D**



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**260.** Which one of the following statements is incorrect

?



- A. Greater the stability constant of a complex ion, greater is its stability
- B. Greater the charge on the central metal ion, greater is the stability of the complex
- C. Greater the basic character of the ligand, the greater is the stability of the complex
- D. Complexes have low stability constants

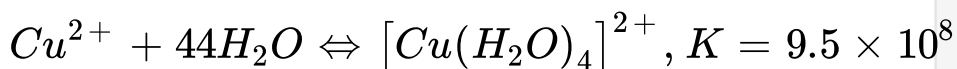
**Answer: D**



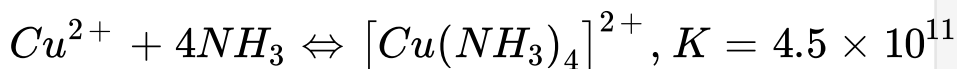
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**261.** From the stability constants (hypothetical values), given below, predict which one is the strongest ligand ?

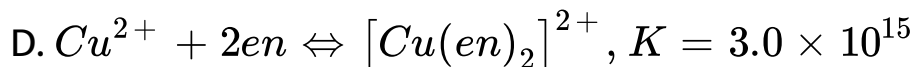
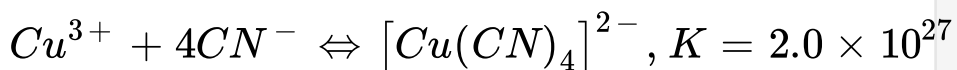
A.



B.



C.



**Answer: C**

**262.** The stability constants of the complexes formed by a metal ion  $M^{2+}$  with  $NH_3$ ,  $CN^-$ ,  $H_2O$  and en are of the order of  $10^{11}$ ,  $10^{27}$ ,  $10^{15}$  and  $10^{18}$  respectively. Then,

A.  $CN^-$  is the strongest ligand

B. en is the strongest ligand

C. these values cannot predict the strength of the ligand

D. all the ligands are equally strong

**Answer: A**

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**263.** Cyanide process is used for the extraction of

A. Sodium

B. Copper

C. Gold

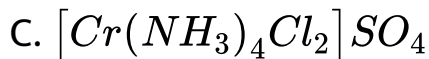
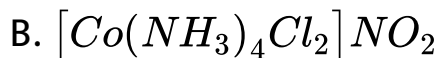
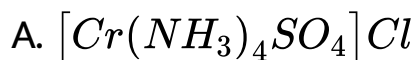
D. Calcium

**Answer: C**



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264. Which of the following complex will give a white precipitate on treatment with  $BaCl_2$  solution ?



D. Both a and b

Answer: C



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265. Complexometric titrations involve use of

A. EDTA

B.  $K_2Cr_2O_7$

C.  $KMnO_4$

D. NaCl

**Answer: A**



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**266.**  $[Fe(NO_2)_3Cl_3]$  and  $[Fe(O - NO)_3Cl_3]$  show

A. Linkage isomerism

B. Geometrical isomerism

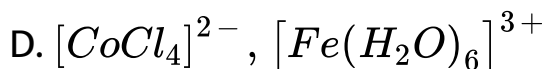
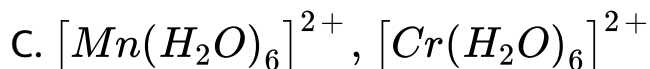
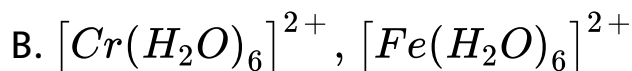
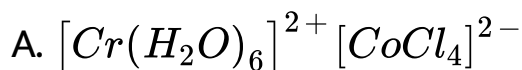
C. Optical isomerism

D. None of the above.

**Answer: A**

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**267.** The pair in which both species have same magnetic moment (spin only value) is .

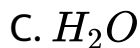
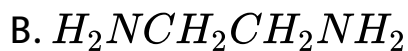


**Answer: B**



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**268.** Which of the following can participate in linkage isomerism ?



**Answer: A**



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**269.** The hardness of water is measured by

- A. Titration method
- B. Conductivity method
- C. EDTA method
- D. Distillation method

**Answer: C**



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**270.** When ammonia is added to AgCl, the following is /are correct observations / statements ?

A. AgCl dissolves

B. AgCl becomes black

C. A complex  $[Ag(NH_3)_2]Cl$  is formed

D. Both a and c

**Answer: D**



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271. What will be the theoretical value of magnetic moment ( $\mu$ ) when  $CN^-$  ligands join  $Fe^{3+}$  ion to yield complex

A. 2.83 BM

B. 3.87 BM

C. 5.92 BM

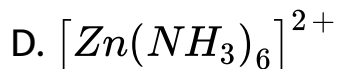
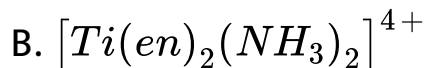
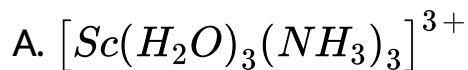
D. 1.73 BM

**Answer: D**



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272. Which of the following complex ions is expected to absorb visible light?



**Answer: C**



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**273.** The reaction  $[Fe(CNS)_6]^{3-} \rightarrow [FeF_6]^{3-}$  takes place with:

- A. Decrease in magnetic moment
- B. Increase in magnetic moment
- C. Decrease in co-ordination number
- D. Increase in co-ordination number

**Answer: B**



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**274.** An example for a double salt is

- A. Mohr's salt
- B. Potassium ferricyanide
- C. Cuprammonium sulphate
- D. Cobalthexammine chloride

**Answer: A**



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**275.** Which of the following facts about the complex  $[Cr(NH_3)_6]Cl_3$  is wrong ?

A. The complex involves  $d^2sp^3$  hybridisation and is octahedral in shape

B. The complex is paramagnetic

C. The complex is an outer orbital complex

D. The complex gives white precipitate with silver nitrate

**Answer: C**



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

A. Complex compound

B. Double salt

C. Neutral molecule

D. None of these.

**Answer: A**



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**277.** Some salts although containing two different metallic elements give test for one of them in solution.

Such salts are:

A. Normal salts

B. Complex

C. Double salt

D. None of these.



**Answer: B**



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**278.** The EAN of iron in  $[Fe(CN)_6]^{3-}$  is

A. 34

B. 35

C. 36

D. 37

**Answer: B**



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279. Coordination number of  $Ni$  in  $[Ni(C_2O_4)_3]^{4-}$  is:

A. 3

B. 5

C. 4

D. 6

Answer: D



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280. According to Lewis, the ligands are

A. Acidic in nature

B. Basic nature

C. Neither acidic nor basic

D. Some are acidic and others are basic

**Answer: B**



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**281.** According to the postulates of Werner for cooedination compounds

A. Primary valency is ionizable

B. Secondary valency is ionzable

C. Primary and secondary valency are nonionizable

D. Only primary is non-ionizable

**Answer: A**



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**282.** In  $[Co(NH_3)_6]Cl_3$ , the number of covalent bonds is

A. 18

B. 6

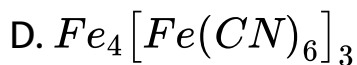
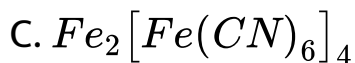
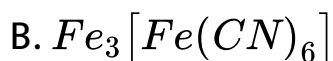
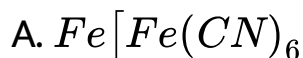
C. 9

D. 3

**Answer: B**

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**283.** Chemical formula for iron (III) hexacyanoferrate (II) is



**Answer: D**

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

- A. Sodiumcobaltinitrate
- B. Sodiumhexanitritocobaltate (III)
- C. Sodiumhexanitrocobalt (III)
- D. Hexanitrosodium cobaltate (III)

**Answer: B**



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285. Ligand in a complex salt are

A. anions linked by coordinate bonds to a central metal atom or ion

B. cations linked by co-ordinate bonds to a central or ion

C. ions or molecules linked by coordinate bonds to a central atom or ion

D. only neutral molecules linked by coordinate bonds to a central metal or iron

**Answer: C**



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286. The IUPAC name of  $K_3 [Ir(C_2O_4)_3]$  is

- A. Potassiumtrioxalatoiridium (III)
- B. Postassiumtrioxalatoiridate (II)
- C. Potassiumtris (oxalato) iridium (III)
- D. Potassiumtris (oxalato) iridate (III)

Answer: D

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287. In  $[Cr(C_2O_4)_3]^{3-}$  the isomerism shown is

- A. Optical



B. Geometrical

C. Linkage

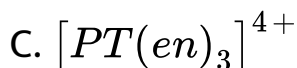
D. Ionization

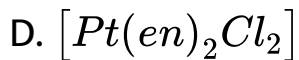
**Answer: A**



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**288.** Which of the following complex will show geometrical as well as optical isomerism ?



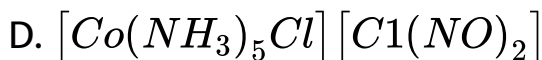
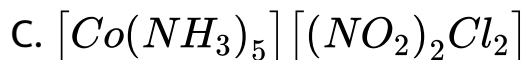
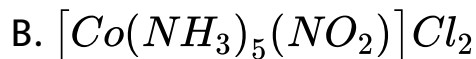


**Answer: D**



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**289.** A coordination compound of cobalt has the molecular formula containing five ammonia molecules, one nitro group and two chlorine atoms for one cobalt atom. One mole of this compound gives three ions in an aqueous solution. On reacting this solution with excess of  $AgNO_3$  solution, we get two moles of  $AgCl$  precipitate. The ionic formula for this complex would be

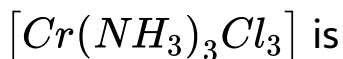


**Answer: B**



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**290.** The number of isomers exhibited by



A. 5

B. 4

C. 3

D. 2

**Answer: D**



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

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

**Answer: B**



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**292.** A similarity between optical and geometrical isomerism is that

- A. each gives equal number of isomers for a given compound
- B. if one is present in a compound then so is the other
- C. both are included in stereoisomerism
- D. they have no similarity

**Answer: C**



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**293.** The type of isomerism present in  $\text{[Cr(NH}_3\text{)}_5\text{Cl]}^{2+}$  is:

- A. Ionization
- B. Optical
- C. Linkage
- D. Polymerization

**Answer: C**



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294. The unpaired electrons in  $Ni(CO)_4$  are

A. Zero

B. One

C. Three

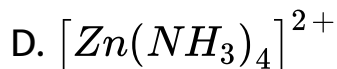
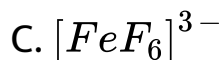
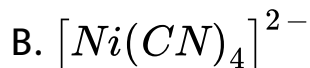
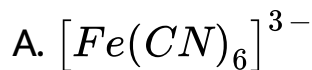
D. Four

**Answer: A**



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295. Which of the following species represent the example of  $d^2 sp^3$  hybridisation ?



**Answer: A**



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296. The correct structure of  $Ni(CN)_5$  is



A. Square pyramidal

B. Square planer

C. Octahedral

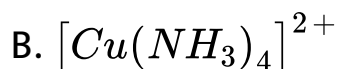
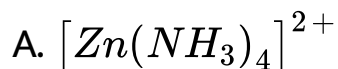
D. Tetrahedral

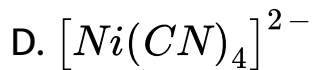
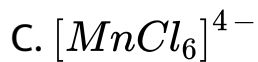
**Answer: A**



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**297.** Which one of the following is an example of octahedral complex ?



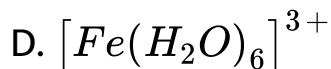
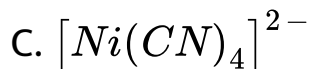
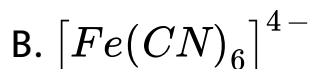
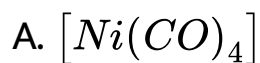


**Answer: C**



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**298.** Which of the following is paramagnetic ?



**Answer: D**

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**299.** Which statement is incorrect ?

- A.  $[Zn(NH_3)_4]^{3+}$  Tetradral, paramagnetic
- B.  $[Ni(CN)_4]^{2-}$  Square planar, diamagnetic
- C.  $[Ni(CO)_4]$  Tetrahedral, diamagnetic
- D.  $[FeCl_4]^{2-}$  Tetrahedral, paramagnetic

**Answer: A**

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300. Consider the following complex  $[Cu(CN)_4]^{3-}$ . The co-ordination number and oxidation number of metal are respectively

A. 4,1

B. 1,4

C. 4,2

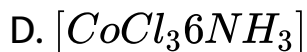
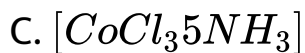
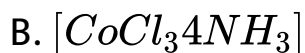
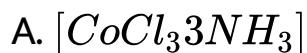
D. 4,4

**Answer: A**



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301. Which of the following will exhibit maximum ionic conductivity ?

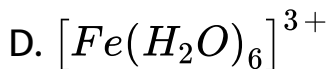
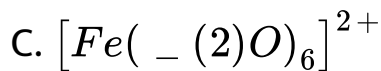
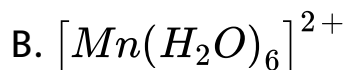
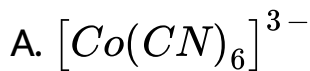


Answer: D



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302. Which of the following complex is diamagnetic ?



**Answer: A**



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**303.** In the silver plating of copper,  $K[Ag(CN)_2]$  is used instead of  $AgNO_3$ . The reason is

A. More voltage is required

B.  $Ag^+$  ions are completely removed from solution

C. A thin layer of Ag is formed on Cu

D. Less availability of  $Ag^+$  ions, as Cu cannot displace from  $[Ag(CN)_2]^-$  ion

**Answer: D**



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**304.**  $Cu^{2+}$  and  $Cd^{2+}$  are separated by

A.  $NH_3$  ligand

B. CN ligand

C.  $H_2O$  ligand

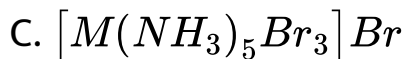
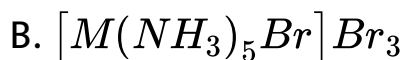
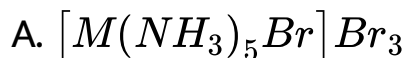
D. Cl ligand

**Answer: B**



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**305.** Molar conductance of complex  $M(NH_3)_5Br_4$  is  $390 \text{ ohm}^{-1} \text{ mol}^{-1}$ . What is the structure of complex ?



**Answer: A**



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**306.** Molar conductance of complex  $Pt6NH_3Cl_4$  is zero ohm  $mol^{-1}$ . How many total ions are present in solution ?

A. 0

B. 2

C. 4

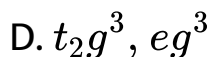
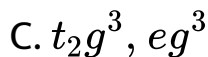
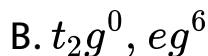
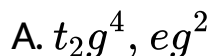
D. 5

**Answer: A**



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307. Electronic configuration of Co in  $[Co(ox)_3]^{3-}$  is



Answer: A



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308. How many unpaired electrons are present in octahedral complexes of  $d^9$  ion when  $\Delta_0 > P$ .

A. 0

B. 1

C. 2

D. 3

**Answer: B**



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**309.** How many unpaired electrons are present in tetrahedral complexes of  $d^5$  ion when  $\Delta t < P$

A. 1

B. 3

C. 4

D. 5

**Answer: D**



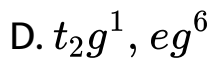
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**310.** On the basis of CFT, what is the electronic configuration of  $Co^{3+}$  ion in an octahedral complex for which  $\Delta_0 > P$ ?

A.  $t_{2g}^4, e_g^1$

B.  $t_{2g}^6, e_g^0$

C.  $t_{2g}^5 e_g^2$

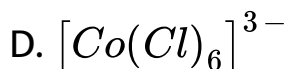
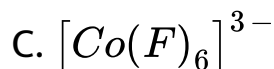
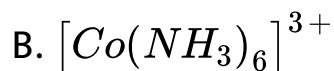
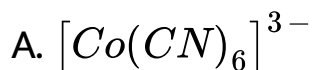


Answer: B



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311. Which of the following complex has large value of

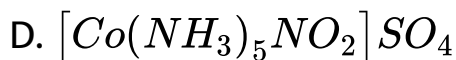
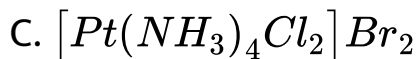
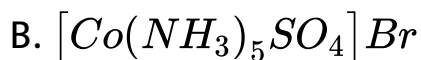
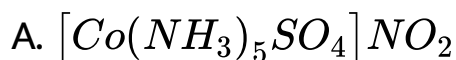


**Answer: A**



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**312.** Which of the following complex give precipitate with barium nitrate ?



**Answer: D**



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313. Complex of formula  $CrCl_3 \cdot 6H_2O$  when heated with conc.  $H_2SO_4$  three moles of water are lost. The structure of the complex is

- A.  $[Cr(H_2O)_6]Cl_3$
- B.  $[Cr(H_2O)_5Cl]Cl_2 \cdot H_2O$
- C.  $[Cr(H_2O)_4Cl_2]Cl_2 \cdot 2H_2O$
- D.  $[Cr(H_2O)_3]Cl_3 \cdot 3H_2O$

**Answer: D**



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314. How many geometrical isomers of the compound  $[Pt(NH_3)(Br)(Cl)(Py)]$  will show optical isomerism?

A. 1

B. 2

C. 3

D. 4

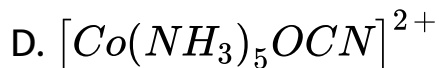
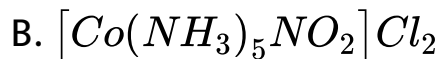
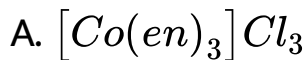
**Answer: C**



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315. Which of the following complex does not show linkage isomerism ?



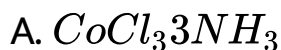


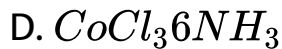
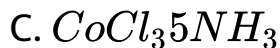
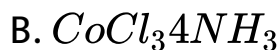
**Answer: A**



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





**Answer: A**



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

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

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

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

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

**Answer: A**

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