



## **CHEMISTRY**

## **BOOKS - MARVEL CHEMISTRY (HINGLISH)**

## **CO-ORDINATION COMPOUNDS**

**Multiple Choice Questions** 

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

A. Covalent bonds

- B. Co-ordinate bonds
- C. Ionic and covalent bonds
- D. Both ionic and co-ordinate bonds

Answer: B



- 2. Complex compounds are mainly formed by
  - A. p-block elements
  - B. f-block elements
  - C. d-block elements
  - D. s-block elements



coordination compounds?

A. Co-ordination compounds and complexes are

synonym terms

- B. Complexes always give ions in the solution
- C. Complexes may or may not give ions in the solution



#### Answer: B



5. Carnallite is an ore of

A. Simple salt

B. Alum

C. Double salt

D. Co-ordinate compound

Answer: C



6. Copper sulphate dissolved in excess of KCN to give:-

## A. $Cu(CN)_2$

- $\mathsf{B.}\left[Cu(CN)_4\right]^{3-}$
- $\mathsf{C.}\left[Cu(CN)_4\right]^{2-}$
- D. CuCN

#### Answer: B



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

A. 1

B. 3

C. 2

D. None of these

#### Answer: A

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## **8.** In the complex $\left[ Co(NH_3)_5 Cl \right] Cl_2$ , the co-ordination

sphere is

A.  $2Cl^{-}$ 

 $\mathsf{B.}\, Co^{3\,+}$ 

 $C. (NH_3)_5 Cl$ 

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

#### Answer: D



9. Ethylenediamine is

A. Monodentate

B. Bidentate

C. Tridentate

D. Tetradentate

#### Answer: B



### **10.** EDTA is a/an

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

#### Answer: D



**11.**  $SCN^{-}$  is a/an

A. Monodentate ligand

B. Bidentate ligand

C. Tridentate ligand

D. Tetradentate ligand

#### Answer: A



**12.** Which of the following ligands can act as hexadentate ligand ?

A. Ethylenediamine

B. EDTA

C. Acetylacetoriato

D. 1, 10-Phenanthroline

#### Answer: B

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13. Which one of the following acts as a neutral ligand ?

A. Carbonyl

B. Oxalato

C. Hydroxo

#### D. Cyano

#### Answer: A



14. The number of anionic co-ordinating sites of EDTA

are

A. 2

B.4

C. 6

D. None of these

| Answer: B                            |
|--------------------------------------|
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|                                      |
|                                      |
| <b>15.</b> The more strong ligand is |
|                                      |
| A. $Cl^-$                            |
|                                      |
| B. <i>F</i>                          |
| C. $I^{-}$                           |
|                                      |
| D. $CN$                              |
|                                      |
| Answer: D                            |
|                                      |
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|                                      |

16. Ligands are :

A. Lewis acids

B. Lewis bases

C. Both

D. None of these

Answer: B

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17. An example of non ambident ligand is

A.  $-OCH_3$ 

B. NCS

C. CN

D. None of these

Answer: A



18. Chelating ligand among the following is

A. EDTA

B. Phen

C. Dipy

D. All the above

# Answer: D Watch Video Solution 19. The strongest ligand is A. $Cl^-$ B. $F^{-}$ C. NO D. $H_2O$ Answer: C

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20. An example of bidentate ligand is

- A. Ethylene triamine
- B. Cyanide ion
- C. Ethylene diamine
- D. EDTA

Answer: C



21. Which one of the following ligands form a chelate ?

A. Acetate

B. Oxalate

C. Ammonia

D. Cyanide

Answer: B



22. An ambidentate ligand is 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 co-ordinate bond [or a

 $sigma(\sigma) bond$ ]

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

a co-ordinate bond

D. forms chelate rings

#### Answer: C



### **23.** $NH_2 \cdot NH_2$ serves as

A. Monodentate ligand

B. Chelating ligand

C. Bridging ligand

D. Both (a) and (c)

#### Answer: D



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

A.  $PH_3$ 

B.  $NO^+$ 

C.  $Br^{-}$ 

D.  $BF_3$ 

#### Answer: D



**25.** 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. co-ordination number

D. EAN

Answer: B



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

A. the number of co-ordinate 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 these

Answer: A

# 27. The co-ordination number of Cr in $\left[Cr(NH_3)_3(H_2O)_3\right]Cl_3$ is

A. 2

B. 3

C. 4

D. 6

Answer: D



28. What is the oxidation number of Fe in  $K_3 [Fe(C_2O_4)_3]$ ?

A. 1

B. 2

C. 3

D. 4

#### Answer: C



**29.** Which one of following hads oxidation number of metal ion as 4 ?

A.  $KMnO_4$ 

 $\mathsf{B.}\,K_3[PtCl_4]$ 

 $\mathsf{C.}\,K_2MnO_4$ 

D.  $K_2[PtCl_6]$ 

Answer: D



30. Out of the following which one has transition metal

atom in the oxidation state +2 ?

A. 
$$K_4ig[Fe(CN)_6ig]$$

 $\mathsf{B}.\,K_2\big[Pt(CN)_6\big]$ 

 $\mathsf{C}.\,K_3\big[Fe(CN)_6\big]$ 

D. 
$$\left[ Co(NH_3)_5 Br 
ight] SO_4$$

#### Answer: A



**31.** The co-ordination number of Al is potassium trioxalato aluminate (III) is

A. 3

B. 6

C. 8

D. None of these

Answer: B



**32.** The oxidation state of Al in  $LiAlH_4$  is

#### A. zero

B. 1

C. 2

D. 3

#### Answer: D



## **33.** Th oxidation state of Co in $[Co(EDTA)]^{-1}$ is

- $\mathsf{A.}+3$
- $\mathsf{B.}-3$
- C. + 1

 $\mathsf{D.}+2$ 

#### Answer: A



**34.** The donor site of  $SCN^{\,-}$  can be

A. C

B. S

C. NO

D. Both (b) and (c)

#### Answer: D





### 35. What is the oxidation state of iron in haemoglobin

?

- $\mathsf{A.}+2$
- B. + 1
- C. zero
- D. None of these

#### Answer: A



**36.** The co-ordination number of Ni in the complex  $[Ni(EDTA)]^{-2}$  is

A. 1

B. 2

C. 3

D. 6

#### Answer: D



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

A. Zero

 $\mathsf{B.}+1$ 

 $\mathsf{C}.+2$ 

D. None of these

#### Answer: C

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**38.** The oxidation state of nickel in the complex  $Ni(CO)_2(PPh_3)$  is

 $\mathsf{A.}+1$ 

B. Zero

 $\mathsf{C.}+2$ 

D. None of these

#### Answer: B

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**39.** The oxidation state of Fe in brown complex  $[Fe(H_2O)_5NO]SO_4$  is

 $\mathsf{A.}+1$ 

 $\mathsf{B.}+2$ 

C.+4

D.+3

| Answer: B  |
|--|
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|  |
|  |
| <b>40.</b> Co-ordination number of cobalt in $ig[Co(C_2O_4)_3ig]^{3-}$ |
| is   |
| A. 2   |
| B. 6   |
| C. 5   |
| D. 4   |
| Answer: B  |

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# **41.** Oxidation number of Co in $\left[Co(NH_3)_3(H_2O)_2Cl\right]^+$ is

#### A. 1

B. 2

- C. 3
- D. 4

**Answer: B** 



**42.** 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. large nuclear charge

D. small size

Answer: B


**43.** The number of ions produced from one molecule of  $\left[Pt(NH_3)_3Cl\right]Cl_3$  in the aqueous solution will be

A. 3

B. 5

C. 4

D. 6

## Answer: C



**44.** The compound which is not an organometallic compound is

A.  $C_6H_5MgBr$ 

B.  $C_{6}H_{5}Ti(OC_{3}H_{7})_{2}$ 

C.  $C_2H_5MgBr$ 

D.  $C_2H_5ONa$ 

Answer: D



45. Complex forming tendency is more for the metal

ion

A.  $Ca^{2+}$ B.  $Co^{2+}$ C.  $Ce^{2+}$ 

D.  $Li^+$ 

Answer: B



46. An example of organometallic compound is

## A. $CH_3ONa$

## $\mathsf{B.}\, CH_3 CH_2 Li$

## C. $CH_3COONa$

D.  $NaNH_2$ 

## Answer: B



## **47.** Which one of the following is likely to give a precipitate with $AgNO_3$ solution ?

A. 
$$K_4ig[Fe(CN)_6ig]$$

 $\mathsf{B}.\,K_2\big[Pt(CN)_5\big]$ 

C.  $K_2[Pt(CN)_5Cl]$ 

D.  $K_3Fe(CN)_6$ ]

## Answer: B

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**48.** Which one of the following cation does not form an ammine complex with excess of ammonia ?

A.  $Ag^+$ 

- B.  $Na^+$
- $\mathsf{C.}\, Cu^{2\,+}$

D.  $Cd^{2+}$ 

# Answer: B View Text Solution

**49.** Addition of KI to  $HgI_4$  having

A. Blue colour

B. Violet colour

C. Red colour

D. Colourless nature

Answer: D



50. The water-soluble complex is

## A. $Ni(CO)_4$

- B.  $Fe(CO)_5$
- $\operatorname{C.} Cr(CO)_6$
- D.  $K_4 ig(Fe(CN)_6ig]$

### Answer: D



**51.** The number of ions formed when  $[Cu(NH_3)_4]SO_4$ 

is dissolved in water is

A. 1

B. 2

C. 4

D. zero

Answer: B

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

## A. 5

B. 4

C. 3

D. 6

**Answer: A** 

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**53.** Which one of following hads oxidation number of metal ion as 4 ?

A.  $KMnO_4$ 

 $\mathsf{B.}\,K_3[PtCl_4]$ 

 $\mathsf{C.}\,K_2MnO_4$ 

D.  $K_2[PtCl_6]$ 

## Answer: D Watch Video Solution

- 54. Primary and secondary valency of platinum in the complex  $\left[Pt(en)_2 Cl_2\right]$  are
  - A. 4, 6
  - B. 2, 6
  - C. 4, 4
  - D. 6, 4

Answer: B



## **55.** The EAN of $\left[ Mn(Cl)_6 ight]^{4-}$ is

A. 33

B. 34

C. 35

D. 36

Answer: C



**56.** If Z is atomic number of a metal, X is number of electrons lost during the formation of the metal ion from its atom, and Y is the number of electrons donated by the ligands, then effective atomic number (EAN) is

A. EAN = Z + X + Y

B. EAN = Z - X + Y

C. EAN = Z - X - Y

D. EAN = Z + X - Y

Answer: B

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**57.** A metal ion continues to accept electron pairs from the ligands till the total number of electrons present around the metal ion in the complex becomes becomes equal to the atomic number of

A. next hlogen

B. next element

C. next transition metal

D. next insert gas atom

## Answer: D

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**58.** Ferrous ion have EAN equals to 36. How many monodentate ligand can combine with it ?

A. 6

B. 4

C. 2

D. 1

## Answer: A



59. Which of the following complex does not obey EAN

rule ?

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

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

 $\operatorname{C.}Ni(CO)_4$ 

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

## Answer: A



60. Which of the following complex obeys EAN rule ?

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

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

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

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

## Answer: D



61. What is the effective atomic number of Zn (30) in

 $Zn(NH_3)_4Cl_2$  ?

A. 36

B. 54

C. 86

D. 118

## Answer: A



**62.** Effective atomic number of the central metal ion, Pt, in the complex  $[Pt(NH_3)_6]^{4+}$  is , ( the atomic no. of Pt is 78)

A. 36

B. 54

C. 86

D. 118

Answer: C



## **63.** EAN of which complex match with atomic number of Redon ?

A. 
$$\left[ Pt(NH_3)_6 
ight]^{4+}$$

B. 
$$\left[Zn(NH_3)_4
ight]^{4-2}$$

C. 
$$\left[ Co(NH_3)_6 
ight]^{3+2}$$

D. 
$$\left[Fe(CN)_6
ight]^{4-2}$$

## Answer: A



64. Suffix -O is added to the name of ligand when the

liuid is

A. positively charged

B. neutral (except water)

C. negatively chared

D. all of the above

## Answer: C



**65.** IUPAC name of  $K_3 [Fe(C_2O_4)_3]$  is

A. Potassium ferroxalate

B. Potassium ferroxalate

C. Potassium trioxalate ferrate (II)

D. Potassium trisoxalato ferrate (III)

## Answer: D



66. Diamine silver (I) ion is

A.  $\left[Ag(NH_3)_2
ight]^+$ 

 $\mathsf{B.}\left[Ag(NH_3)\right]^{3\,+}NH_3$ 

C.  $\left[Ag(NH_3)_2\right]^{3+}NH_3$ 

## D. None of these

## Answer: A



**67.** The correct name of the compound  $[Cu(NH_3)_4](NO_3)_2$ , according to IUPAC system is

A. Cuprammonium nitrate

B. Tetraammine copper (I) nitrate

C. Tetraammine copper (II) nitrate

D. Tetraammine copper (III) nitrate

## Answer: C



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

A. Gemetrical isomers

B. Linkage isomers

C. Ionization isomers

D. Co-ordination isomers

Answer: B



**69.** Geometrical isomerism in coordination compounds is exhibited by

A. square planar and tetrahedral 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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**70.** IUPAC name of  $K_3 \big[ Fe(CN)_6 \big]$  is

A. Potassium ferrocyanide (II)

B. Potassium hexaferrocyanate (III)

C. Potassium ferrohexacyanate (II)

D. Potassium hexacyanoferrate (III)

### Answer: D

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**71.** IUPAC name of  $\left| Co(ONO)(NH_3)_5 Cl_2 \right|$  is

A. Pentaammine nitroto cobalt (III) chloride

- B. Pentaammine nitro cobalt (III) chloride
- C. Pentaammine nitroso cobalt (III) chloride
- D. Pentaammine oxo-nitro cobalt (III) chloride

Answer: A



72. The correct IUPAC name of potassium cuprochloride

is

A. Potassium copper (I) tetrachloride

B. Potassium tetrachloro cuprate (I)

C. Tetrachloro potassium cuprate (I)

D. Tetrachloro copper (I) potassiate

## Answer: B



73. The IUPAC name of the compound  $\begin{bmatrix} CuCl_2(CH_3NH_2)_2 \end{bmatrix}$  is

A. Dichloro bis (dimethyl amine) copper (II)

B. Dichloro bis (mthyl amine) cupper (II)

C. Dimethyl amine copper (II) chloride

D. bis (dimethyl amine) copper (II) chloride



**74.** According to IUPAC nomenclature sodium nitroprusside is named as

A. Sodium pentacyanonitrosyl ferrate (III)

B. Sodium nitroferricyanide

C. Sodium nitroferrocyanide

D. Sodium petacyano nitrosyl ferrate (II)

Answer: A



**75.** The correct name of  $\left| Pt(NH_3)_4 Cl_2 \right| \left| PtCl_4 \right|$  is

A. Tetraammine dichloro platinum (IV) tetrachloro platinate (II)

B. Dichloro tetra ammine platinum (IV) tetrachloro platinate (II)

C. Tetrachloro platinum (II) tetraammine platinate

(IV)

D. Tetrachloro platinum (II) dichloro tetraammine platinate (IV)

Answer: A



**76.** The hypothetical complex chloro diaquatriammine cobalt (II) chloride can be represented as

A. 
$$\left[Co(NH_3)_3(H_2O)_3
ight]Cl_2$$

$$\mathsf{B}.\left[Co(NH_3)_3(H_2O)_2\right]Cl_2$$

C. 
$$\left[ CoCl(NH_3)_3(H_2O)_2 \right] Cl_3$$

D.  $CoCl(NH_3)_3(H_2O)_2]Cl_2$ 

## Answer: D



77. Formula of hexa-aquamangnnese (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



78. Optical isomers have

A. same physical properties

B. same molecular formula

C. difference in action towards plane polarized light

D. all of the above

Answer: D



**79.** Which one of the following compounds would exhibit co-ordination isomerism ?

- A.  $\left[ Cr(H_2O)_6 
  ight] Cl_3$
- $\mathsf{B.}\left[Cr(NH_3)_6\right]\left[Co(CN)_6\right]$
- $\mathsf{C.}\left[Cr(en)_3\right]NO_2$

## D. none of these

## Answer: B



**80.** Of the following complexes which one will show coordination isomerism?

- A.  $\left[Cu(en)_2 Cl_2
  ight]^+$
- $\mathbf{B.}\left[Co(en)_2Cl_2\right]Cl$
- $\mathsf{C}.\left[ C(NH_3)_6 \right] \left[ Co(en)_3 \right]$
- D.  $\left[ Cr(NH_3)_6 
  ight] Cl_2$



Answer: D



82. Which of the following complexes can form d and l

isomers ?

- A.  $\left[Co(NH_3)_3Cl_3\right]$
- $\mathsf{B.}\left[ Co(NH_3)_4 \right]^{+2}$
- $\mathsf{C.}\,Cis\big[Co(en)_2Cl_2\big]^+$
- D.  $Trans[Co(en)Cl_2]$

Answer: C



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

- A.  $\left[ Co(NH_3)_5 NO_2 \right] Cl_2$
- $\mathsf{B.}\left[Pt(NH_3)_2Cl_2\right]$
- $\mathsf{C.}\left[ Co(en)_2 Cl_2 \right] Cl$
- D.  $\left[ Cr(NH_3)_4 Cl_2 \right] Cl$

## Answer: A



**84.** 
$$K_3ig[Fe(C_2O_4)_3ig]$$
 exhibits

- A. Ionisation isomerism
- B. Geometrical isomerism
- C. Optical isomerism
- D. Co-ordination isomerism

## Answer: C



**85.** 
$$ig[Co(NH_3)_4Cl_2ig]Cl$$
 exhibits

A. Ionisation isomerism

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

#### Answer: C



# **86.** The compounds $[Cr(H_2O)_6]Cl_3$ and

# $[Cr(H_2O)5C_1]Cl_2\cdot H_2O$ are examples of

A. Linkage isomerism

- B. Hydrate isomerism
- C. Ionisation isomerism
- D. Co-ordination isomerism

# Answer: B



87. Cis platin is chemically

- A.  $\left[ Pt(NH_3)_4 Cl_2 \right]$
- $\mathsf{B.}\left[Pt(NH_3)_2Cl_2\right]$
- $\mathsf{C}.\left[Pt(NH_3)_4\right]Cl_2$
- D. none of these

#### Answer: B



**88.** The compound  $Co \cdot Cr \cdot (CN)_6 (H_2O)_6$  can exhibit

A. Linkage isomerism

B. Co-ordination isomerism

C. Both (a) and (b)

D. none of these

#### Answer: C



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

A. 1

B. 2

C. 3

D. 4

## Answer: C



90. Geometrical isomerism is shown by

A. Tetrahedral

B. Octahedral

C. Square planer

D. Both (b) and (c)

#### Answer: D



91. Which of the following has metal-metal bond?

A.  $Ni(CO)_4$ 

- B.  $Fe(CO)_5$
- $\operatorname{C.} Cr(CO)_6$
- D.  $Mn_2(CO)_{10}$

#### Answer: D





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

A. 
$$\left[ Pd(NH_3)_3 Cl 
ight]^+$$

 $\mathsf{B.}\left[ Co(NH_3)_5 Cl \right]^{2+}$ 

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

D. None of them

# Answer: D



93. Optical isomerism can be shown by the complex

A. 
$$\left[ Cu(NH_3)_4 
ight]^{2\,+}$$

$$\mathsf{B.}\left[Ni(H_2O)_4\right]^{2\,+}$$

C. Both (a) and (b)

D. Neither (a) or (b)

#### Answer: D



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

A.  $MAB_3$ 

B.  $MA_4$ 

C. MABCD

D.  $MA_3B$ 

Answer: C



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

A.  $MA_2X_2Y_2$ 

 $\mathsf{B.}\left[M(AA)_3\right]^{n+}$ 

C. 
$$\left[M(AA)_2 X_2\right]^{n+}$$
  
D.  $\left[Pt(NH)_3\right)_4 
ight]^{2+}$ 

#### Answer: D



96. The complex shown below can exhibit



A. Optical isomerism only

B. Geometrical isomerism only

C. Both optical and geometrical isomerism

D. None of the above

# Answer: C



**97.** The complex ion  $\left[Co(en)_2 Cl_2\right]^+$  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



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

A.  $Na_3ig[Cr(C_2O_4)_3ig]$ 

 $\mathsf{B.}\, Cr\big[(NH_3)_6\big]Cl_3$ 

 $\mathsf{C}.\,Na_3\big[Fe(CN)_6\big]$ 

D.  $FeSO_4 \cdot 7H_2O$ 

# Answer: A



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

A. Linkage isomers

B. Ionisation isomers

C. Co-ordination isomers

D. Geometrical isomers

Answer: A



**100.** The complex ion  $\left[Cu(NH_3)_4\right]^{2+}$  has

A. Tetrahedral

B. Square planar

C. Both

D. None of these

Answer: B



101. Hydrated copper sulphate is

A. Square planer

B. Tetrahedral

C. Octahedral

D. None of these

#### Answer: A



# 102. Backbonding involes the fomation of

A.  $\sigma$  bond

B. Co-ordinate bond

C.  $\pi$  bond

D. None of these

# Answer: B

**103.** A complex involving  $dsp^2$  hybridisation has

A. Square planar geometry

B. A tetrahedral geometry

C. An octahedral geometry

D. Trigonal planar geometry

#### Answer: A





 $d^2sp^3$  hybridisation?

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

- $\mathsf{B.}\left[ Co(NH_3)_6 \right]^{3\,+}$
- $\mathsf{C}.\left[ Co(H_2O)_6 \right]^{3+}$
- D. All of these

## Answer: A



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

A. 
$$\left[ Co(NH_3)_6 
ight]^{2\,+}$$

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

C. 
$$\left[Fe(CN)_6\right]^4$$

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

#### Answer: D



**106.** An octahedral complex is formed when hybridisation is

A.  $sp^3$ 

 $\mathsf{B.}\,dsp^3$ 

 $\mathsf{C.}\, sp^3d$ 

D.  $sp^3d^2$ 

## Answer: D



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

A. 
$$sp^3$$

 $\mathsf{B.}\,dsp^3$ 

C.  $sp^3d$ 

D.  $sp^3d^2$ 

# Answer: D



# 108. Compare

- (1)  $\left[Ag(NH_3)_2\right]^+$  Diagonal
- $(2) \quad \left[ Zn(BH_3)_4 \right]^{2+} \quad ext{Tetrahedral}$
- (3)  $\left[Fe(CN)_{6}\right]^{3-}$  Square planar

- (4)  $\left[Ni(CN)_{A}\right]^{2-}$  Octahedral

Which is/are correctly shaped?

# A. 1 and 2

B. 2 and 3

C.1 only

D. 3 and 4

Answer: C



109. Match List I with List II. Select the correct answer

using the codes given below the lists.

List I List II Molecules/Ions Molecular Shape  $(1) [Ag(NH_3)_2]^+$  (a) Trigonal prymidal  $(2) [In(CH_3)_3]_3$  (b) Trigonal bipyramidal  $(3) PF_3$  (c) Triangular planer  $(4) [Sb(CH_3)_3Cl_2]$  (d) Octahedral (e) Linear A. (1) - (e), (2) - (c), (3) - (a), (4) - (b)

- B. (1) (a), (2) (e), (3) (b), (4) (c)
- C. (1) (d), (2) (b), (3) (a), (4) (c)
- D. (1) (d), (2) (e), (3) (c), (4) (b)

#### Answer: A

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110.  $K_3CoF_6$  is high spin complex. What is the hybrid

state of Co atom in the complex?

A.  $d^2 sp^3$ B.  $dsp^2$ C.  $sp^3d$ D.  $sp^3d^2$ 

Answer: D



111. Which complex has square planar structure ?

- A.  $\left[Ni(CO)_4\right]$
- $\mathsf{B.}\left[NiCl_4\right]^{2\,-}$
- $\mathsf{C}.\left[Ni(CN_4]^{2\,-}\right.$
- D.  $\left[Fe(CO)_5\right]$

# Answer: C



# **112.** A complex involving $dsp^2$ hybridisation has

A. a square planar complex

B. a tetrahedral geometry

C. an octahedral geometry

D. trigonal planar geometry

#### Answer: A



**113.** The paramagnetic ion among the following is

A. 
$$ig[Ni(CN)_4ig]^{2\,-}$$

- $\mathsf{B.}\left[Mn(CN)_6\right]^4-$
- C.  $\left[Zn(NH_3)_4
  ight]^{2+}$

D. All the above

#### Answer: B





**114.** The complex ion  $\left[Cu(NH_3)_4
ight]^{2+}$  has

A. Square planar and diamagnetic

B. Square planar and parmagnetic

C. Tetrahedral and diamagnetic

D. Tetrahedral and parmagnetic

**Answer: B** 

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115. Which of the following are diamagnetic?

```
(I) K_4 ig[Fe(CN)_6ig]
```

```
(II) K_3 ig[ Cr(CN)_6 ig]
```

```
(III) K_3 [Co(CN)_6]
```

(IV)  $K_2 ig[Ni(CN)_4ig]$ 

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: B** 



**116.**  $e_g$  orbitals are proposed in

A. Crystal field theory

B. Pauling theory

C. Lewis theory

D. Sidwick theory

Answer: A



117. Which of the following atomic orbital of the metal

cation are considered in CFT ?

A. s

B.p

C. d

D. f

#### Answer: C



118. which of the following cannot be explained by CFT

A. Electrovalency

B. Covalency

?

C. Secondary valency

D. Oxidation number

#### Answer: B



119. 
$$[CoCl(NH_3)_5]^{2+}$$
 is

A. Violet

B. Yellow

C. Blue

D. Red

Answer: A

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120. Which of the following is purple in colour ?

A. 
$$\left[Cu(H_2O)_4
ight]^{2+}$$

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

 $\mathsf{C.}\left[\mathit{Co(NH_3)}_6\right]^{2+}$ 

# $\operatorname{D.}Ni(CO)_4$

## Answer: C

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**121.** Yellow coloured complex formed with  $Co^{3+}$  is treated with  $KNO_2$  and acetic acid is

A.  $Coig[K_2(NO_2)_6ig]$ 

 $\mathsf{B.} \operatorname{Co} \bigl[ K_2 \bigl( NO_2 \bigr)_2 \bigr]$ 

 $\mathsf{C}.\,K_2\big[Co(NO_2)_4\big]$ 

D.  $K_3 ig[ Co(NO_2)_6 ig]$ 



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

A. 
$$ig[Cr(NH_3)_6ig]Cl_3$$

 $\mathsf{B.}\,K_3[VF_6]$ 

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

D. 
$$\left[NiCl_4
ight]^{2-}$$

## Answer: C



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

A. CO

 $\mathsf{B.}\,H_2O$ 

 $\mathsf{C}.NH_3$ 

D.  $F^{\,-}$ 

**Answer: A** 



125. When dimethylglyoxime is added to  $Ni^{2+}$ , which of the following statements or observations is wrong? A. Red, insoluble precipitate results B. The above precipitate is ionic in character C. The above precipitate is a chelate complex D.  $Co^{2+}$  ions do not behave as  $Ni^{2+}$  do with dimethylglyxime

Answer: B

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**126.** For the same metal ion stability constant is more for the ligand

A.  $I^{\,-}$ 

B.  $Cl^{-}$ 

C.  $F^{\,-}$ 

D. None of these

Answer: C



**127.** The more stable complex among the following is
- A.  $\left[Fe(H_2O)_6
  ight]^{2+}$
- $\mathsf{B.}\left[Mn(H_2O)_6\right]^{2\,+}$
- $\mathsf{C.}\left[Fe(H_2O)_6\right]^{3+}$
- D. None of these

## Answer: C



128. 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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129. 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



130. Which metal ion forms the most stable metal -

EDTA chelate out of the following?

A.  $Ba^{2+}$ 

B.  $Zn^{2+}$ 

C.  $Sr^{2+}$ 

# D. $Ca^{2+}$

#### Answer: B

|  | C | View Text Solution |  |
|--|---|--------------------|--|
|--|---|--------------------|--|

**131.** The forces stabilizing the alkali metal -cyclic polyether complexes are

A. Covalent

B. Co-ordinate

C. Electrostatic

D. Vanderwaal's forces

# Answer: C View Text Solution 132. Stability constant is more for the complex: $A. \left[ Co(NH_3)_6 \right]^{3+}$

- $\mathsf{B.}\left[Ag(NH_3)_2\right]^+$
- $\mathsf{C.}\left[Cu(NH_3)_4\right]^{2\,+}$

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

## Answer: A

**133.** The stability constants of the complexes formed by a metal ion  $M^{2+}$  with  $NH_3$ ,  $CN^{-1}$ ,  $H_2O$  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



134. Cyanide process is used for the extraction of :

A. Sodium

B. Copper

C. Gold

D. Calcium

Answer: C

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135. Complexometric titrations involve use of

A. EDTA

 $\mathsf{B.}\, K_2 Cr_2 O_7$ 

 $\mathsf{C}.KMnO_4$ 

D. All of these

Answer: A



**136.** The ion which is not tested by complexometric titration is

A.  $Na^+$ 

B.  $Ba^{2+}$ 

 $\mathsf{C.}\, Cu^{2\,+}$ 

# D. $Mg^{2\,+}$

#### Answer: A



# 137. Chlorophyll contains

- A.  $Co^{2+}$
- B.  $Mg^{2\,+}$
- C.  $Fe^{2+}$

## D. All the above

#### Answer: B





**138.** The complex formed during the fuxing of negative in photography is

A. 
$$\left[Ag(S_2O_3]^{-1}
ight.$$

B. 
$$\left[Ag(S_2O_3)_2
ight]^{2-2}$$

C. 
$$\left[Ag(S_2O_3)_2
ight]^{3-}$$

D. None of these



139. Nessler's reagent is

- A.  $\left[HgI_4
  ight]^{-1}$
- B.  $[HgI_2]^{-2}$
- C.  $[HgI_4]^{-4}$
- D.  $\left[HgI_4
  ight]^{2\,-}$

#### Answer: D



140. lodide of Million's base is

A.  $H_2N\cdot Hg_2O\cdot HgI$ 

 $\mathsf{B}.\,H_2HgO\cdot HgI_2C$ 

C. Both (a) and (b)

D.  $H_2N \cdot HgO \cdot HgI$ 

Answer: D



**141.** The formula of sodium nitroprusside is

A. 
$$Naig[Fe(CN)_4(NO)_2ig]$$

 $\mathsf{B.} \, Na_2 \big[ Fe(CN)_5 NO \big]$ 

 $\mathsf{C.}\,Na\big[Fe(CN)_5NO\big]$ 

D.  $Na_3[Fe(CN)_5NO]$ 



**142.** Solution of  $TiCl_2$  and trialkyaluminium used as a catalyst in polymerisation of olefins is called

A. Wilkinson's catalyst

B. Grignard rcagent

C. Ziegler Natta catalyst

D. Homogeneous catalyst



143. The hardness of water is estimated by

A. Titrimetric method

B. Conductivity method

C. EDTA method

D. Distillation method



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

A. AgCl dissolves

B. AgCl becomes back

C. A complex  $ig[Ag(NH_3)_2ig]Cl$  is formed

D. Both (a) and (c)

Answer: D



**145.** Composition of complex formed when the ore agentite is treated with NaCN is

```
A. Na_3 ig[ Ag(CN)_6 ig]
```

```
\mathsf{B}.\, Na \big[Au(CN)_2\big]
```

```
\mathsf{C.}\, Na \big[ Ag(CN)_2 \big]
```

```
D. Na ig[Au(CN)_6ig]
```

Answer: C



146.  $Cu^{2+}$  and  $Cd^{2+}$  ions can be separated by their

A. Chelates

- B. Oxalate complexes
- C. Cyano complexes
- D. Formation of sulphides

## Answer: C



# 147. Formation of complex compound can be detected

by

A. Change in solubility

B. Change in colour

C. Change in pH

D. All the above

#### Answer: D

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**148.** Vitamin  $B_{12}$  is a red coloured compound . It is a complex of

A. Cobalt

B. Zinc

C. Vanadium

D. Nickel



D. Yellow fever

Answer: B

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**150.** Which of the following is not co-ordination compound ?

A. 
$$K_3ig[Fe(CN)_6ig]$$

 $\mathsf{B.} \operatorname{CoCl}_3 \cdot 6 NH_3$ 

 $\mathsf{C}.\,K_4[Fe(CN)]_6$ 

D. Potash alum

Answer: D



**151.** 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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152. What is chelating ligand ?

A. one lone pair

B. two lone pairs

C. three lone pairs

D. both (b) and (c)

#### Answer: D



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

- A. Potassium ferrocyanide
- B. Potassium tetracyanonickelate (II)
- $\mathsf{C.}\left[ Co(en)_3 \right] Cl$
- D.  $\left[ Co(NH_3)_4 Cl_2 \right] Cl$



# 154. Consider

- (1) EDTA Hexadentate ligand
- (2) Ethylene diamine Bidentate ligand
- (3) Diethylene triamine Tridentate ligand
- (4) Phen- Tridentate ligand

Which is / are not correctly paired ?

A. 1 and 2

B. 3 and 4

C. Only 4

D. 1, 2 and 3



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

A. H

 $\mathsf{B.}\,H^{\,+}$ 

C.  $H^{\,-}$ 

D. None of these



157. What is the coordination number of Mn in  $\left[ Mn_2(CO)_{10} \right]$  ?

A. 0

B. + 1

 $\mathsf{C.}+2$ 

D.+5

#### Answer: A



**158.** 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. 4

#### Answer: B



159. Choose the correct statement.

A. Co-ordination number has nothing to do with the

number of groups or molecules attached to the central atom

B. Co-ordination number is the number of co-ordinating sites of all the ligands connected to the central atom or the number of co-ordinate bonds formed by the metal atom with ligands
C. Werner's co-ordination theory postulates only one type of valency

D. All are correct.

#### Answer: B



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

## A. Zero

- B. + 1/2
- C. + 1
- D. -1/2



**161.** The solution of the complex  $\left[Cu(NH_3)_4
ight]SO_4$  in water will

A. give the tests of  $SO_4^{2-}$  ions

B. give the tests of  $Cu^{2+}$  ions

C. give the tests of  $NH_3$ 

D. not give the tests of any of the above

**Answer: A** 



162. Which of the following will not give tests for free

transition metal ion is solution ?

A.  $K_2 ig[Ni(CN)_4ig]$ 

 $\texttt{B.} \ FeSO_4 \cdot K_2SO_4 \cdot 24H_2O$ 

C. Both of the above

D. None of the above

**Answer: A** 



163. The complex  $CoCl_3$ ,  $3NH_3$  ionizes to give

A. one  $Cl^-$  ion

B. two  $Cl^-$  ion

C. three  $Cl^-$  ions

D. no  $Cl^-$  ion

#### Answer: D

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**164.** The number of ions furnished by  $K_2 \cdot PtCl_6$  in solution are

A. zero

B. 1

C. 2

D. 3

#### Answer: D

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**165.** Which of the following is not an organo-metallic compound ?

A.  $Ti(OC_3H_7)_4$ 

B.  $Sn(CH_3)_4$ 

 $\mathsf{C.}\,Ru(C_5H_5)_2$ 

D.  $(C_2H_5)_2Zn$ 



A. 1

B. 2

C. 4

D. zero

Answer: B



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

A. 4

B. 2

C. 6

D. None of these

**Answer: A** 



168. Consider (At. No. Cr=24, Ni=28, Pt=78, Pd=46)

|     | Complex                       | $\mathbf{EAN}$ |    |
|-----|-------------------------------|----------------|----|
| (1) | $ig[ {\it Cr(CN)}_6 ig]^{3-}$ | (a)            | 52 |
| (2) | $Ni(CO)_4$                    | (b)            | 86 |
| (3) | $\left[PtCl_6 ight]^{2-}$     | (c)            | 36 |
| (4) | $\left[PdCl_4 ight]^2{}^-$    | (d)            | 33 |

The correct pairing is


**169.** The IUPAC name of  $\left[CoCl(NH_3)(en)_2\right]Cl_2$  is

A. Chloro ammine bis (ethylenediamine) cobalt (II)

chloride

B. Ammine chlorobis (ethylenediamine) cobalt (II)

chloride

C. Ammine chlorobis (ethylenediamine) cobalt (III)

chloride

D. None of the above



170.

:

The

complexes

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

A. Linkage isomerism

B. Ligand isomerism

C. Co-ordination isomerism

D. Hydrate isomerism



**171.** 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. Tetrahedral

C. Square planer

D. Octahedral

Answer: B

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

A. 1

B.4

C. 5

D. Unpredictable



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

A. 0

B. + 1

C. + 2

D.+3

Answer: B



**174.** From the stability constant (hypothetical vlues ) , given below, predict which is the most stable complex ?

A.

$$Cu^{2+}+4H_2O \Leftrightarrow \left[Cu(H_2O)_4
ight]^{2+}, K=9.5 imes 10^8$$

Β.

$$Cu^{2\,+} + 4NH_3 \Leftrightarrow ig[Cu(NH_3)_4ig]^{2\,+}, K = 4.5 imes 10^{11}$$

C.

$$Cu^{2+} + 4CN^- \Leftrightarrow ig[Cu(CN)_4ig]^{2-}, K = 2.0 imes 10^{27}$$

D.  $Cu^{2\,+} + 2en \Leftrightarrow \left[Cu(en)_2
ight]^{2\,+}, K = 3.0 imes 10^{15}$ 

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

- A.  $\left[ Cr(NH_3)_4 SO_4 \right] Cl$
- $\mathsf{B.}\left[Co(NH_3)_4Cl_2\right]NO_2$
- C.  $\left[Cr(NH_3)_4Cl_2\right]SO_4$
- D. Both (a) and (b)



176. The complex  $\left[ Co(NH_3)_5 Br 
ight] SO_4$  will give white ppt with

A.  $PbCl_2$ 

B.  $AgNO_3$ 

C. KI

D. None of these

Answer: A



**177.** Which of the following is most likely structure of  $CrO_3.6H_2O$  if 1/3 of total chlorine of the compound is precipitated by adding  $AgNO_3$  to its aqueous solution ?

A.  $CrCl_3 \cdot 6H_2O$ 

- $\mathsf{B.}\left[Cr(H_2O)_3Cl_3\right](H_2O)_3$
- C.  $\left[ CrCl_2(H_2O)_4 \right] Cl \cdot 2H_2O$
- D.  $[CrCl_2(H_2O)_5]Cl_2 \cdot H_2O$

#### Answer: C

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178. A ligand may be regarded as

A. Lewis acid

B. Bronsted base

C. Lewis base

D. Bronsted acid

#### Answer: C

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179. The number of unidentate ligands in the complex

ion is called

A. Oxidation number

- B. Primary valency
- C. Coordination number

D. EAN

Answer: C

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180. The IUPAC name of  $ig[Ni(NH_3)_4ig][NiCl_4]$  is

A. Tetrachloronickel (II) - Tetraamminenickel (II)

B. Tetraamminenickel (II) - Tetrachloronickel(II)

C. Tetraamminenickel (II) - Tetrachloronickelate (II)

D. Tetrachloronickel (II) - Tetraamminenickelate (II)

#### Answer: C



# **181.** The coordination compounds, $[Co(NH_3)_6]^{3+}, [Cr(CN)_6]^{3-}$ and $[Cr(NH_3)_6]^{3+} [Co(CN)_6]^{3-}$ are examples of

A. Linkage isomerism

- B. Coordination isomerism
- C. Ionisation isomerism
- D. Geometrical isomerism

Answer: B



182. Among the following , the coloured compound is

A. CuCl

- $\mathsf{B}.\,K_3\big[Cu(CN)_4\big]$
- $\mathsf{C}.\,CuF_2$
- D.  $\left[ Cu(CH_3CN)_4 
  ight] BF_4$

#### Answer: C

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**183.** The  $\pi$ -bonded organometallic compound which

has ethane as one of its component is

A. Zeise's salt

B. Ferrocene

C. Dibenzene chromium

D. Tetraethyl tin

**Answer: A** 



184. Potassium ferrocyanide is a

A. Normal salt

B. Mixed salt

C. Double salt

D. Complex salt

#### Answer: D

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### 185. Zeigler-Natta catalyst is used for which type of

reaction ?

A. Hydrogenation

**B.** Polymerisation

C. Oxidation

D. Rdeuction

#### Answer: B

**D** Watch Video Solution

**186.** In a complex, the highest possible co-ordination number is

A. 6

B. 12

C. 4

D. 8



## 187. The oxidation numbers of chromium in $Na_2[CrF_4O]$ complex is

A. II

B. IV

C. VI

D. III

Answer: B



188. Which would exhibit co-ordination isomerism?

- A.  $[Cr(NH_3)_6]Co(CN)_6]$
- $\mathsf{B}.\left[Co(en)_2 Cl_2\right]$
- C.  $[Cr(NH_3)_6]Cl_3$
- D.  $\left[ Cr(en)_2 Cl_2 \right]$

#### Answer: A



**189.** 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:

A. 
$$\left[ Co(NH_3)_5 Cl 
ight] Cl_2$$

B. 
$$\left[ Co(NH_3)_3 \cdot ZNH_3 
ight.$$

C. 
$$ig[Co(NH_3)_4Cl_2ig]Cl\cdot NH_3$$

D. 
$$\left[ Co(NH_3)_4 Cl 
ight] Cl_2 \cdot NH_3$$

#### Answer: A

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**190.** A square planar complex is formed by hybridisation of which atomic orbitals?

A. 
$$s, p_x, p_y, d_{yz}$$
  
B.  $s, p_x, p_y, d_{x^2-y^2}$   
C.  $s, p_x, p_y, d_{z^2}$ 

D. 
$$s, p_y, p_z, d_{xy}$$

#### Answer: C



**191.** The type of isomerism present in intro pentaamine-

chromium(III) chloride is:

A. optical

B. linkage

C. ionization

D. polymerisation

#### Answer: B



**192.** Ammonia forms the complex  $[Cu(NH_3)_4]^{2+}$  with copper ions in alkaline solution but not in acid solution. The reasons for it is:

- A. In acidic solutions protons coordinate with ammonia molecules forming  $NH_4^+$  ions and  $NH_3$  molecules are not available B. In alkaline solutions  $Cu(OH)_2$  is precipitated which is soluble in excess of any alkali C. Copper hydroxide is an amphoteric substance
- D. In acidic solutions hydration protects copper ions

Answer: A



**193.** 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:

A. 
$$ig[Co(NH_3)_3Cl_3ig]2NH_3$$

B. 
$$\left[Co(NH_3)_4Cl_2\right]ClNH_3$$

- $\mathsf{C.}\left[Co(NH_3)_4Cl\right]Cl_2$
- D.  $[Co(NH_3)_5Cl]Cl_2$

#### Answer: D

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**194.** The coordination number of a central metal atom

in a complex is determined by:

- A. the number of ligands around a metal ion bonded by sigma bonds
- B. the number of only anionic ligands bonded to

the metal ion

C. the number of ligands around a metal ion

bonded by sigma and pi-bonds both

D. the number of ligands around a metal ion

bonded by pi-bonds

#### Answer: A

**195.** The correct order of magnetic moments (spin values in B.M.) among is:

$$\begin{split} &\mathsf{A}. \left[ MnCl_4 \right]^2 > \left[ CoCl_4 \right]^{-2} > \left[ Fe(CN)_6 \right]^{-4} \\ &\mathsf{B}. \left[ Fe(CN)_6 \right]^{-4} > \left[ CoCl_4 \right]^{2-} > \left[ MnCl_4 \right]^{2-} \\ &\mathsf{C}. \left[ Fe(CN)_6 \right]^{4-} > \left[ MnCl_4 \right]^{2-} > \left[ CoCl_4 \right]^{2-} \\ &\mathsf{D}. \left[ MnCl_4 \right]^{2-} > \left[ Fe(CN)_6 \right]^{4-} > \left[ CoCl_4 \right]^{2-} \end{split}$$

#### Answer: A

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**196.** Which of the following compounds shows optical

isomerism?

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

B. 
$$\left[ ZnCl_{4}
ight] ^{-2}$$

C.  $[Cr(C_2O_4)_3]^{-3}$ 

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

#### Answer: C



**197.** In  $Fe(CO)_5$ , the Fe - C bond possesses:

A.  $\pi$ -character only

B. both  $\sigma$  and  $\pi$  characters

C. ionic character

D.  $\sigma$ -character only

#### Answer: B



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

A. 6 and 2

B. 4 and 2

C. 4 and 3

D. 6 and 3

Answer: D



199. Which of the following has an optical isomer?

- A.  $\left[CO(NH_3)_3Cl
  ight]^+$
- $\mathsf{B.}\left[CO(en)(NH_3)_2\right]^{2+}$

C.  $\left[CO(H_2O)_4(en)
ight]^{3+}$ 

D.  $\left[CO(en)_2(NH_3)_2
ight]^{2+}$ 



**200.** Which of the following pairs represents linkage isomers?

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

Β.

 $\left[Pd(PPh_3)_2(NCS)_2\right]$  and  $\left[Pd(PPh_3)_2\right](SCN)_2$ 

C.

 $[CO(NH_3)_5NO_3]SO_4$  and  $[CO(NH_3)_5SO_4]NO_3$ D.  $[PtCl_2(NH_3)_4]Br_2$  and  $[PtBr_2(NH_3)_4]Cl_2$ 



**202.** Which among the following will be named as dibromidobis (ethylene diamine) chromium (III) bromide?

- A.  $\left[ Cr(en)_3 
  ight] Br_3$
- $\mathbf{B.}\left[ Cr(en)_{2}Br_{2}\right] Br$
- $\mathsf{C}.\left[Cr(en)Br_4\right]^-$
- D.  $[Cr(en)Br_2]Br$

#### Answer: B



**203.** 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.  $Ni(CO)_{A}$  is diamagnetic and  $NiCl_{A}^{2-}$  and  $[Ni(CN_4)]^{2-}$  are paramagnetic

**204.** Among the following, the compound that is both paramagnetic and coloured is :-

A.  $K_2 Cr_2 O_7$ 

 $\mathsf{B.} (NH_4)_2 (TiCl_6)$ 

 $C.CoSO_4$ 

D.  $K_3 ig[ Cu(CN)_4 ig]$ 



**205.** Which of the following is an organometallic compound ?

A. Lithium methoxide

B. Lithium acetate

C. Lithium demethylamide

D. Methyl lithium

Answer: D



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

A.  $\left[MnO_4
ight]^-$ 

- $\mathsf{B.}\left[ Co(NH_3)_6 \right]^{3\,+}$
- $\mathsf{C.}\left[Fe(CN)_{6}\right]^{3\,-}$
- D.  $\left[ Cr(H_2O)_6 
  ight]^{3\,+}$

#### Answer: A



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

A. 
$$[Fe(CN)_{6}]^{3-}, [Co(CN)_{6}]^{3-}$$

B.  $CrO_2Cl_2, MnO_4^-$ 

 $\mathsf{C}.\,TiO_3,\,MnO_2$ 

D. 
$$\left[Co(CN)_6\right]^{3-}, MnO_3$$

**Answer: B** 


**208.** Which kind of isomerism is exhibited by octahedral

 $\left[ Co(NH_3)_4 Br_2 \right] CI$  ? .

A. Geometrical and Ionization

B. Geometrical and Optical

C. Optical and Ionization

D. Geometrical only

#### Answer: A



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

# A. Potassium ferrocyanide

B. Potassium tetracyanonickelate (II)

C.  $\left[ Co(en)_3 \right] Cl_3$ 

D. 
$$\left[ Co(NH_3)_4 Cl_2 \right] Cl$$

#### Answer: C



# 210. Which one of following hads oxidation number of

metal ion as 4?

A.  $KMnO_4$ 

 $\mathsf{B}.\,K_3[PtCl_4]$ 

 $\mathsf{C.}\,K_2MnO_4$ 

D.  $K_2[PtCl_6]$ 

#### Answer: D

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# 211. An example of bidentate ligand is

A. ac ac

B. Gly

C. Both (a) and (b)

D. Tripy

# Answer: C



# **212.** The EAN of $\left[ Mn(Cl)_6 ight]^{4-}$ is

A. 33

B. 34

C. 35

D. 36

### Answer: C



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

A.  $sp^3$ B.  $dsp^3$ C.  $sp^3d$ 

D.  $sp^3d^2$ 

#### Answer: D



214. 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



# 215. The molecular formula of Wilkinson's catalyst used

in the hydrogenation of alkenes is

A.  $Co(CO)_8$ 

 $\mathsf{B}.\,(Ph_3P)_3RhCl$ 



D.  $K \big[ Ag(CN)_2 \big]$ 

#### Answer: B

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**216.** Which of the following is a neutral complex ?

- A.  $\left[ Pt(NH_3)_2 Cl_2 \right]$
- $\mathsf{B.}\left[Co(NH_3)_6\right]Cl_3$
- C.  $[Ni(NH_3)_6]Cl_2$

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

#### Answer: A



**217.** The colour and magnetic nature of mangante ion  $\left(MnO_4^{2-}
ight)$  is

A. green, paramagnetic

B. purple, diamagnetic

C. green, diamagnetic

D. purple, paramagnetic

Answer: A



**218.** The correct charge on and co-ordination number of '*Fe*' in  $K_3[Fe(CN)_6]$  is

A. + 2, 4

- B. +3, 6
- C. +2, 6
- D. +3, 3

**Answer: B** 

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219. Which of the following co-ordinate complexes is an

exception to EAN rule ?

(Given

#### atomic

number

Pt = 078, Fe = 26, Zn = 30, Cu = 29)

A. 
$$\left[ Pt(NH_3)_6 
ight]^{4+2}$$

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

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

D. 
$$\left[ Cu(NH_3)_4 
ight]^{2\,+}$$

#### Answer: D



- 1. Which of the following is odd one out ?
  - A. Potassium ferrocyanide
  - B. Potassium ferricyanide
  - C. Ferrous ammonium sulphate
  - D. Tetraamminecopper (II) sulphate

Answer: B



**2.** 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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# **3.** $CuSO_4$ dissolves in $NH_3$ due to formation of

A.  $Cu(OH)_2$ 

B. CuO

 $\mathsf{C}.\left[Cu(NH_3)_4(OH)_2\right]$ 

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

#### Answer: D

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**4.** 
$$K_4ig[Fe(CN)_6ig]$$
 is a

- A. Complex compound
- B. Double salt
- C. Neutral molecule
- D. None of these

#### Answer: A





5. Some salts although containing two different metallic elements give test for one of them in solution. Such salts are:

A. Normal salt

**B.** Complex

C. Double salts

D. None of these

Answer: B



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

A. 34

B.35

C. 36

D. 37

#### Answer: B



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

B. 5

C. 4

D. 6

Answer: D

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8. According to Lewis the ligands are

A. Acidic in nature

B. Basic in nature

C. Neither acidic nor basic

D. Some are aceidic and others are basic



- **9.** According to the postulates of Werner for cooedination compounds
  - A. Primary valency is ionizable
  - B. Secondary valency is ionizable
  - C. Primary and secondary valency are non-ionizable
  - D. Only primary valency is non-ionizable

Answer: A



# 10. In $\left[ Co(NH_3)_6 ight] Cl_3$ , the number of covalent bonds is

A. 18

B. 6

C. 9

D. 3

#### Answer: A



11. Chemical formula for in iron(III) hexacyanoferrate(II)

is

A. 
$$Fe[Fe(CN)_6]$$
  
B.  $Fe_3[Fe(CN)_6]$ 

$$\mathsf{C}.\,Fe_3\big[Fe(CN)_6\big]_4$$

D. 
$$Fe_4 \big[ Fe(CN)_6 \big]_3$$

Answer: D



```
12. IUPAC name of Na_3 ig[ Co(NO_2)_6 ig] is
```

- A. Sodium cobaltinitrite
- B. Sodium hexanitritocobaltate (III)
- C. Sodium hexanitrocobalt (III)
- D. Hexanitrosodium cobaltate (III)

### Answer: B



13. Ligands in a complex salt are:

A. anions linked by co-ordinate bonds to a central

metal atom or ion

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

metal or ion

C. ions or molecules linked by co-ordinate bonds to

a central atom or ion

D. molecules linked by co-ordinate bonds to a

central metal or ion

Answer: D

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

A. Potassium trioxalatoiridium (III)

B. Potassium trioxalatoiridate (III)

C. Potassium tris (oxalato) iridium (III)

D. Potassium tris (oxalato) iridate (III)

Answer: B

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**15.** In  $\left[Cr(C_2O_4)_3
ight]^{3-}$ , the isorerism shown is

A. Optical

**B.** Geometrical

C. Ligand

D. Ionization

#### Answer: A



**16.** Which of the following complex will show geometrical as well as optical isomerism (en=ethylendiammine)

A.  $[Pt(NH_3)Cl_4]$ 

B.  $Pt(NH_3)_2Cl_2$ 

 $\mathsf{C.}\left[Pt(en)_3\right]^{4\,+}$ 

D.  $\left[ Pt(en)_2 Cl_2 \right]$ 

Answer: D



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

A. 
$$\left[ Co(NH_3)_4 NO_2 Cl 
ight] [(NH_3)Cl]$$

- $\mathsf{B}.\left[Co(NH_3)_5(NO_2)\right]Cl_2$
- $\mathsf{C}.\left[Co(NH_3)_5\right]\left[(NO_2)_2Cl_2\right]$

# D. $\left[ Co(NH_3)_5 Cl \right] \left[ Cl(NO)_2 \right]$

#### Answer: B



**18.** The number of isomers exhibited by  $\left[Cr(NH_3)_3Cl_3\right]$  is

A. 5

B. 4

C. 3

D. 2



**19.** Which of the following will give maximum number of isomer ?

- A.  $\left[Ni(en)(NH_3)_4
  ight]^{2+}$
- $\mathsf{B.}\left[Ni(C_2O_4)(en)_2\right]$
- $\mathsf{C}.\left[Co(NH_3)_4Cl_2\right]$
- D.  $\left[ Cr(SCN)_2(NH_3)_4 
  ight]^{2+}$

### Answer: D

20. 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. Ionisation isomers

C. Co-ordination isomers

D. Optical isomers

**Answer: B** 

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

A. each gives equal number of isomers for a given compound

- B. if in a compound one is present then so is the other
- C. both are included in stereoisomerism
- D. they have no similarity

# Answer: C



22. The type of isomerism present in intro pentaamine-

chromium(*III*)chloride is:

A. Ionization

**B.** Optical

C. Linkage

D. Polymerization

### Answer: C



23. Which of the following has square planar structure

- A.  $\left[NiCl_4
  ight]^{2\,-}$
- $\mathsf{B.}\left[Ni(CO)_4\right]$
- $\mathsf{C.}\left[Ni(CN)_4\right]^{2-}$
- D.  $\left[Ni(H_2O)_6
  ight]^{2+}$

### Answer: C



# **24.** The unpaired electrons in $Ni(CO)_4$ are

A. Zero

B. One

C. Three

#### D. Four

#### Answer: A



**25.** Which of the following species represent the example of  $dsp^2$ -hybridisation ?

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

- $\mathsf{B.}\left[Ni(CN)_4\right]^{2-}$
- $\mathsf{C.}\left[FeF_{6}\right]^{3-}$
- D.  $\left[Zn(NH_3)_4
  ight]^{2+}$



**26.** The correct structure of  $Fe(CO)_5$  is (Z= 26 for Fe)

A. Square pyramidal

B. Trigonal pyramidal

C. Octahedral

D. Tetrahedral

Answer: B



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

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

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

$$\mathsf{C.}\left[FeF_6\right]^{3-}$$

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

#### Answer: C



28. Which of the following is paramagnetic?

- A.  $\left[Ni(CO)_4\right]$
- $\mathsf{B.}\left[Fe(CN)_6\right]^{4-}$
- $\mathsf{C.}\left[Ni(CN)_4\right]^{2-}$
- D.  $\left[ CoF_{6} 
  ight]^{3\,-}$

#### Answer: D

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29. Which statement is incorrect ?

A.  $Ni(CO)_{4-}$  Tetrahedral, paramagnetic

B.  $\left[Ni(CN)_4
ight]^{2-}$  Square planar, diamagnetic

C.  $Ni(CO)_{4-}$  Tetrahedral, diamagnetic

D.  $[NiCl_4]^{2-}$  Tetrahedral, paramagnetic

#### Answer: A



**30.** Consider the following complex  $[Co(NH_3)_5CO_3]ClO_4$ 

The coordination number, oxidation number number of d-electrons and number of unpaired d-electrons on the metal are respectively

A. 6, 3, 6, 0

B. 6, 2, 7, 3

C. 7, 3, 7, 1

D. 7, 1, 6, 4

Answer: A

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**31.** Which of the following will exhibit maximum ionic conductivity ?

- A.  $K_4ig[Fe(CN)_6ig]$
- $\mathsf{B.}\left[Co(NH_3)_6\right]Cl_3$
- $\mathsf{C}.\left[Cu(NH_3)_4Cl_2\right]$
- D.  $\left[Ni(CO)_4\right]$
## Answer: A

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|----------------------|--|
|                      |  |

**32.** The catalyst used for the polymerization of olefins is:

A. Wilkinson's catalyst

B. Pd-catalyst

C. Zeise's salt catalyst

D. Ziegler-Natta catalyst

Answer: D

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33. Which of the following hydrate is diamagnetic?

A. 
$$\left[ Co(NH_3)_6 
ight]^{3\,+}$$

- $\mathsf{B.}\left[Mn(H_2O)_6\right]^{2+}$
- $\mathsf{C.}\left[ Co(H_2O)_6 \right]^{2\,+}$

D. 
$$\left[ Cu(H_2O)_6 
ight]^{3\,+}$$

#### Answer: A



34. Which of the following compounds is not coloured

A.  $Na_2[CuCl_6]$ 

?

 $\mathsf{B}.\,K_3\big[Fe(CN)_6\big]$ 

 $\mathsf{C.}\, Na_2[CdCl_4]$ 

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

Answer: C



**35.** The colour of  $CoCl_3 \cdot 5NH_3 \cdot H_2O$  is

A. Orange

B. Orange yellow

C. Green

D. Pink

Answer: D

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36. The most satble complex among the following is

A.  $K_3ig[Al(C_2O_4)_3ig]$ 

 $\mathbf{B.}\left[Pt(en)_2\right]Cl$ 

 $\mathsf{C}.\,K_2[Ni(EDTA)]$ 

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

## Answer: C



37. Magnesium is an important component of which

biomolecule occuring extensively in living world?

A. ATP

B. Chlorophyll

C. Florigen

D. Haemoglobin



**38.** 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 Ag from  $\left[Ag(CN)_2\right]^-$  ion

Answer: D



**39.** Which of the following is organo-metallic compound ?

A.  $Ti(C_2H_4)_4$ 

B.  $Ti(OC_2H_5)_4$ 

C.  $Ti(OCOCH_3)_4$ 

D.  $Ti(OC_6H_5)_4$ 

Answer: A

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40. Which of the following organometallic compound is

 $\sigma$  and  $\pi$ -bonded?

A. 
$$\Big[Feig(\eta^5-C_5H_5ig)_2\Big]$$

B. 
$$\left[PtCl_3ig(\eta^2-C_2H_4ig)
ight]$$

 $\mathsf{C.}\left[\mathit{Co}(\mathit{CO})_{5}\mathit{NH}_{3}\right]^{2+}$ 

D. 
$$Al(CH_3)_3$$

### Answer: C

