



CHEMISTRY

BOOKS - MTG WBJEE CHEMISTRY (HINGLISH)

COORDINATION COMPOUNDS

Wbjee Workout Category 1 Single Option Correct Type

1. IUPAC name of the compound $[Cr(NH_3)_5CO_3]Cl$ is

- A. pentaamminecarbonatochromium (III) chloride
- B. pentaamminocarbonatochromium(III) chloride
- C. pentaamminocarbonatochromium (II) chloride

D. pentaamminecarbonatochromium(II) chloride

Answer:

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2. When AgCl is treated with KCN

- A. Ag is precipitated
- B. a complex ion is formed
- C. double decomposition takes place
- D. no reaction takes place.

Answer:

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3. The sp^3d^2 hybridization of central atom of molecule would lead to

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

Answer:

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4. When 0.1 mol of $CoCl_3(NH_3)_5$ is treated with excess of $AgNO_3$, 0.2 mol of $AgCl$ is obtained. The conductivity of solution will correspond to

A. 1:3 electroylte

B. 1:2 electroyle

C. 1:1 electrolyte

D. 3:1 electrolyte

Answer:



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

A. Six

B. Three

C. One

D. Two

Answer:

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6. Which of the following statements is not correct?

A. Pt^{2+} compounds are more stable than Ni^{2+} .

Pt^{4+} compounds are more stable than Ni^{2+}

B. Pt^{4+} compounds are more stable than Ni^{2+}

C. K_2PtCl_6 is well known compound but K_2NiCl_6 is not known.

D. $[Pt(NH_3)_2Cl_2]$ shows geometrical isomerism.

Answer:



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

- A. are satisfied by negative ions and neutral molecules
- B. are satisfied by negative ions
- C. are equal to its coordination number
- D. decide the geometry of the complex.

Answer:



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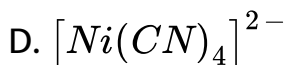
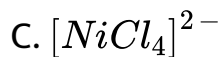
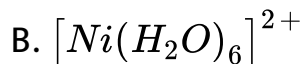
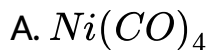
8. Aqueous solution of nickel sulphate on treating with pyridine and then adding a solution of sodium nitrate gives dark blue crystals of

- A. $[Ni(py)_4]SO_4$
- B. $[Ni(py)_2(NO_2)_2]$
- C. $[Ni(py)_4](NO_2)_2$
- D. $[Ni(py)^3(NO_2)_2]SO_4$

Answer:

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9. Which of the following compounds is square planar and does have any unpaired electron?

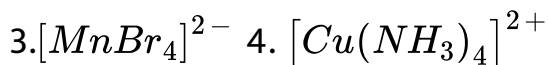
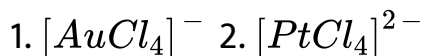


Answer:



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10. Which of the following are square planar complexes?



A. 1 and 2 only

B. 2 and 3 only

C. 2 and 4 only

D. 1,2 and 4 only

Answer:

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11. Ammonia forms the complex ion, $[Cu(NH_3)_4]^{2+}$ with copper ions alkaline solutions but not in acidic solution. This is because

A. in acidic solutions, protons coordinate with ammonia molecules forming NH_4^+ ions and NH_3 molecules are thus, not available

- B. in alkaline solutions, insoluble $Cu(OH)_2$ is precipitated which is soluble in excess of any alkali
- C. copper hydroxide is an amphoteric substance
- D. in acidic solutions, hydration protects copper ion.

Answer:

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12. The spin only magnetic moment of Ni^{2+} in aqueous solution would be

- A. 0B.M
- B. 1.73B.M.
- C. 2.83B.M.

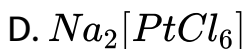
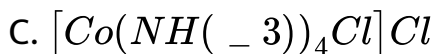
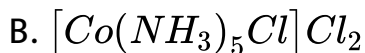
D. 4.90B.M.

Answer:



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



Answer:



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14. Which of the following descriptions about $[FeCl_6]^{4-}$ is correct?

- A. dsp^3 inner orbital complex, diamagnetic
- B. sp^3d^2 , outer orbital complex, paramagnetic
- C. d^2sp^3 inner orbital complex, paramagnetic
- D. sp^3d^2 , outer orbital complex, diamagnetic

Answer:



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

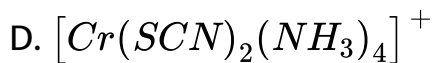
- A. both square planar
- B. tetrahedral and square planar respectively
- C. both tetrahedral
- D. square planar and tetrahedral respectively.

Answer:

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16. Which of the following complexes will give maximum number of isomers?

- A. $[Co(NH_3)_4Cl_2]$
- B. $[Ni(en)(NH_3)_4]^{2+}$
- C. $[Ni(C_2O_4)_{en} - (2)]^{2-}$



Answer:



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17. In solid $CuSO_4 \cdot 5H_2O$ copper is coordinated to

A. 4 water molecules

B. 5 water molecules

C. 1 sulphate

D. 1 water molecule

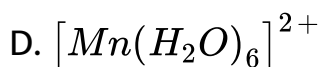
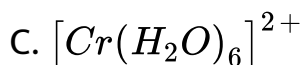
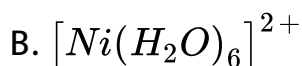
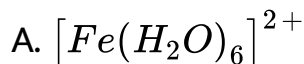
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18. Which one of the following aqua complexes will exhibit the minimum paramagnetic behaviour?

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

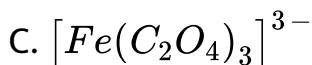
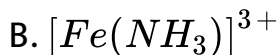
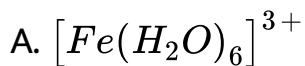


Answer:



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19. Amongst the following the most stable complex is

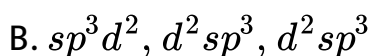
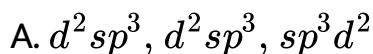


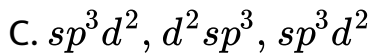
Answer:



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20. In $[Fe(H_2O)_6]^{3+}$, $[Fe(CN)_6]^{3-}$, $[Fe(Cl)_6]^{3-}$ species, the hybridisation states of the Fe atoms are, respectively



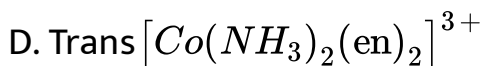
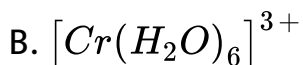
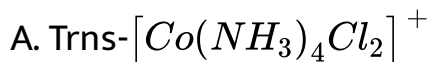


D. None of these

Answer:

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21. Which complex is likely to show optical activity?



Answer:

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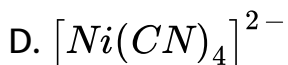
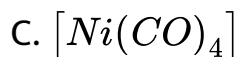
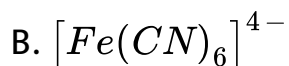
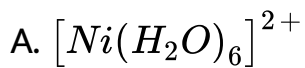
22. $[CoF_6]^{3-}$ is

- A. paramagnetic and under sp^3d^2 hybridisation
- B. diamagnetic and undergoes d^2sp^3 hybridisation
- C. paramagnetic and undergoes sp^3d hybridisation
- D. diamagnetic and undergoes sp^3 hybridisation.

Answer:

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23. Which of the following ions is paramagnetic?



Answer:



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24. Prussian blue is obtained by mixing together aqueous solution of Fe^{3+} salt with

A. ferricyanide

B. ferrocyanide

C. hydrogen cyanide

D. sodium cyanide

Answer:



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25. The number of unpaired electrons in the square planar

$[Pt(CN)_4]^{2-}$ ion is

A. 2

B. 1

C. 0

D. 3

Answer:



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26. Magnetic moment of $(NH_4)_2[MnBr_4]$ is _____ B.M.

- A. 5.91
- B. 4.91
- C. 3.91
- D. 2.46

Answer:

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27. The correct IUPAC name of the compound

$[Cr(NH_3)_5(NCS)][ZnCl_4]$, is

A. pentaamminetisothiocyanatochromium(III)

tetrachloridozincate(II)

B. pentaammineisothiocyanatozinc chloridochromate(III)

C. pentaammineisothiocyanatochromate(I)

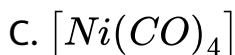
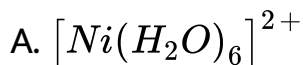
D. isothiocyanatopentaamminechromium(II)zincchlorido(IV)

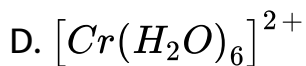
Answer:



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28. Which of the following ions is diamagnetic?





Answer:



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Wbjee Workout Category 2 Single Option Correct Type

1. A complex compound of Co^{3+} with molecular formula $CoCl_x \cdot yNH_3$ gives a total of 3 ions on dissolving it in water. To satisfy both primary and secondary valencies in this complex, the number of Cl^- ions required is

A. one

B. four

C. three

D. zero

Answer:

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2. Consider the 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 ion are , respectively.

A. 6,3,6,0

B. 7,2,7,1

C. 7,1,6,4

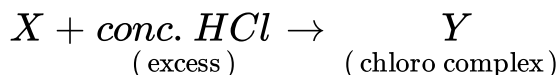
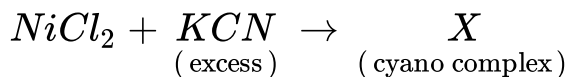
D. 6,2,7,3

Answer:



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3. The coordination number of nickel (II) ion is 4.



The IUPAC names for the complexes X and Y are respectively.

A. potassium tetracyanonickel (II) , potassium tetrachloridonickel (II)

B. tetracyanonickel(II), tetracyanonickel(II)

C. tetracyanido potassium nickelate(II), tetrachlorido potassium nickelate(III)

D. potassium tetracyanidonickelate(II), potassium tetrachloridonickelate (II).

Answer:

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4. Among $[Ni(CO)_4]$, $[NiCl_4]^{2-}$, $[Co(NH_3)_4Cl_2]ClNa_3[CoF_6]$, Na_2O_2 and CsO_2 the total number of paramagnetic compounds is

A. 2

B. 3

C. 4

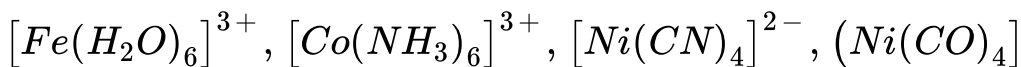
D. 5

Answer:



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5. The hybridisation of atomic orbitals of the transition metals in the following complexes are respectively.



A. $d^2 sp^3, sp^3 d^2, dsp^2, sp^3$

B. $sp^3 d^2, d^2 sp^3, sp^3, dsp^2$

C. $sp^3 d^2, d^2 sp^3, dsp^2, sp^3$

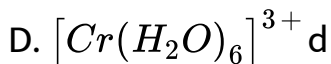
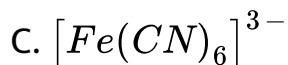
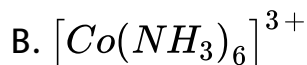
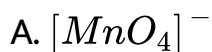
D. $d^2 sp^3, sp^3 d^2, sp^3, dsp^2$

Answer:



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

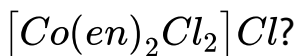


Answer:



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7. Which is not true about the coordination compound



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

Answer:

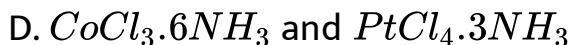
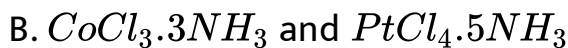
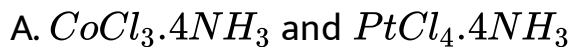


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8. Both Co^{3+} and Pt^{4+} have a coordination number of six.

Which of the following pairs of complexes will show

approximately the same electrical conductance for their 0.001 M aqueous solutions?



Answer:

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9. What is the likely configuration of the cobalt d-electrons for the species $CoCl_6^{3-}$ and $Co(NO_2)_6^{3-}$?



B. $CoCl_6^{3-}$, high spin , $Co(NO_2)_6^{3-}$: low spin

C. $CoCl_6^{3-}$: low spin , $Co(NO_2)_6^{3-}$: high spin

D. $CoCl_6^{3-}$: high spin , $Co(NO_2)_6^{3-}$: high spin

Answer:

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

A. $[Fe(CN)_6]^{4-}$, $[Co(CN)_6]^{3-}$

B. CrO_2Cl_2 , MnO_4^-

C. TiO_2 , MnO_2

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

Answer:



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11. Geometrical shapes of the complexes formed by the reaction of Ni^{2+} with Cl^- , CN^- and H_2O respectively are

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

Answer:



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12. The IUPAC name of $[Pt(py)_4][PtCl_4]$ is

A. tetrakis (pyridine) platinum (II)

tetrachloridoplatinate(II)

B. tetraphyridine tetrachloridodiplatinum(IV)

C. tetrachloridotetrapyridine diplatinum (II)

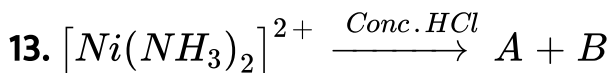
D. tetrakis (pyridine) platinum (IV)

tetrachloridoplatinum(IV)

Answer:



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The molecular formula of both A and B is same.

A can be converted to B by boiling in dil. HCl.

A on reaction with oxalic acid yields a complex having the formula $Ni(NH_3)_2(C_2O_4)$ but B does not.

From the above information we can say that

A. A is square planar but B is tetrahedral

B. A and B both are tetrahedral A is optically active compound whereas B is optically inactive

C. both A and B are square planar A is trans isomer and B is cis-isomer

D. both A and B are square planar A is cis-isomer and B is trans-isomer.

Answer:



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Wbjee Workout Category 3 One Or More Than One Option
Correct Type

1. In which of the following cases, the complex ion formed will migrate towards the anode under the electric field?

A. Excess of aqueous KCN added to $CdSO_4$

B. Aqueous solution of $CuSO_4$ containing excess of
 NH_3

C. AgBr added by hypo solution in excess

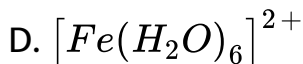
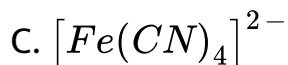
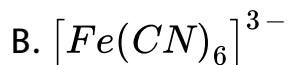
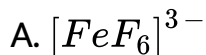
D. A solution of $AgNO_3$ in aqueous KCN

Answer:



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2. Which of the following are outer orbital octahedral complexes?

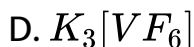
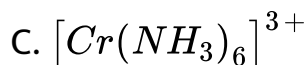
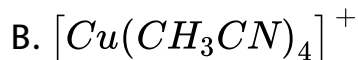
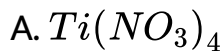


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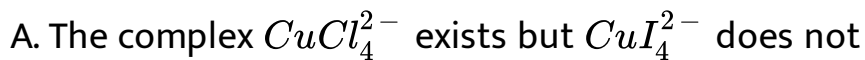
3. Identify the complexes which are expected to be coloured.



Answer:

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4. Which of the following statements is/are correct?



B. A bidentate chelating ligand replaces two monodentate ligands located in cis positions of square planar complex.

C. A singly bidentate chelating ligand replaces two monodentate ligands located in trans positions of square planar complex.

D. $[Fe(CN)_6]^{3-}$ is more stable than $[Fe(CN)_6]^{4-}$

Answer:

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5. Which of the following statements are false?

A. $[Ni(CO)_4]$ is high spin complex

B. Weak ligands like F^- , Cl^- and OH^- usually form low spin complexes.

C. $[FeF_6]^{3-}$ is a high spin complex

D. Strong ligand like CN^- and NO_2^- generally form high spin complexes.

Answer:

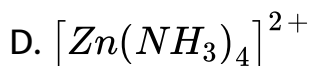
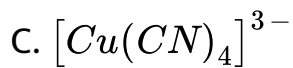


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6. Which of the following involves sp^3 hybridisation and are tetrahedral?

A. $Ni(CO)_4$

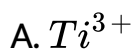
B. $[Cu(NH_3)_4]^{2+}$



Answer:

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7. Which of the following ions show higher spin only magnetic moment values ?



Answer:

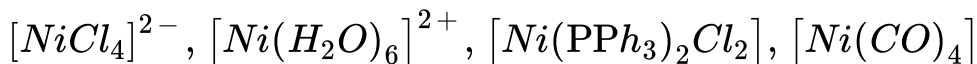


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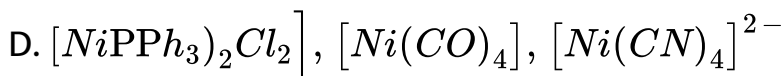
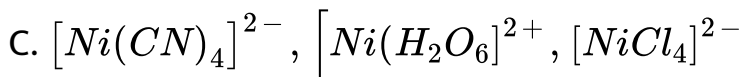
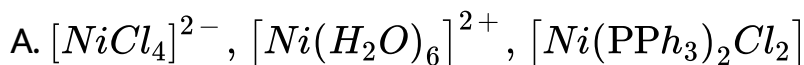
Wb Jee Previous Years Questions Category 1 Single Option
Correct Type

1.

Amongst



and $[Ni(CNO_4)]^{2-}$ the paramagnetic species are



Answer:

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2. Cold ferrous sulphate solution on absorption of NO develops brown colour due to the formation of

- A. paramagnetic $[\text{Fe}(\text{H}_2\text{O})_5(\text{NO})]\text{SO}_4$
- B. diamagnetic $[\text{Fe}(\text{H}_2\text{O})_5(\text{N}_3)]\text{SO}_4$
- C. paramagnetic $[\text{Fe}(\text{H}_2\text{O})_5(\text{NO}_3)](\text{SO}_4)_2$
- D. diamagnetic $[\text{Fe}(\text{H}_2\text{O})_4(\text{SO}_4)]\text{NO}_3$

Answer:

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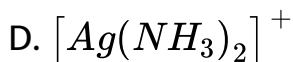
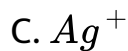
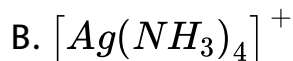
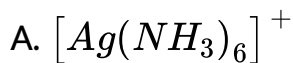
3. The number of unpaired electrons in $[NiCl_4]^{2-}$, $Ni(CO)_4$ and $[Cu(NH_3)_4]^{2+}$ respectively are

- A. 2,2,1
- B. 2,0,1
- C. 0,2,1
- D. 2,2,0

Answer:

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4. Silver chloride dissolves in excess of ammonium hydroxide solution. The cation present in the resulting solution is

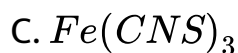
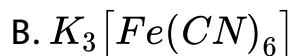
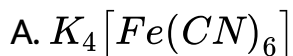


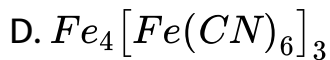
Answer:



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5. Ferric ion forms a prussian blue precipitate due to the formation of





Answer:



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6. The conductivity measurement of a coordination compound of cobalt (III) shows that it dissociates into 3 ions in solution. The compound is

- A. hexaamminecobalt (III) chloride
- B. pentaamminesulphatecobalt (III) chloride
- C. pentaamminechloridocobalt(III) sulphate
- D. pentaamminechloridocobalt (III) chloride

Answer:



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Wb Jee Previous Years Questions Category 3 One Or More Than One Option Correct Type

1. In basic medium the amount of Ni^{2+} in a solution can be estimated with the dimethylglyoxime reagent. The correct statement (s) about the reaction and the product is (are)

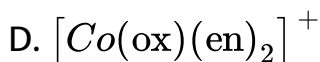
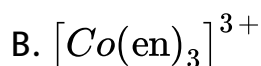
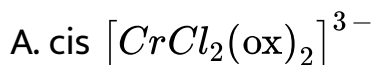
- A. in ammoniacal solution Ni^{2+} salts give cherry red precipitate of nickel (II) dimethylglyoximate
- B. two dimethylglyoximate units are bound to one Ni^{2+}
- C. in the complex dimethylglyoximate units are hydrogen bonded to each other

D. each dimethylglyoximate unit forms a six membered chelate ring with Ni^{2+}

Answer:

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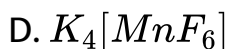
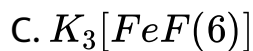
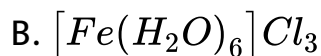
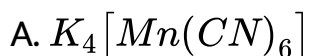
2. Optical isomerism is exhibited by (ax= oxalate anion, en=ethylenediamine)



Answer:

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3. Compounds with spin only magnetic moment equivalent to five unpaired electrons are



Answer:

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