



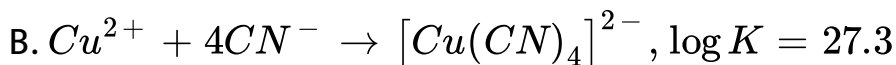
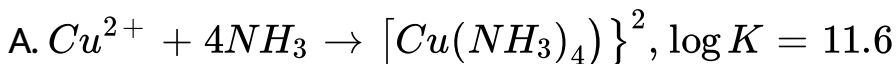
CHEMISTRY

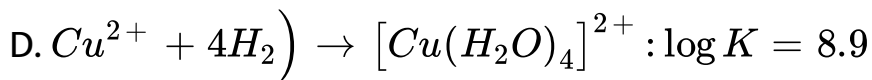
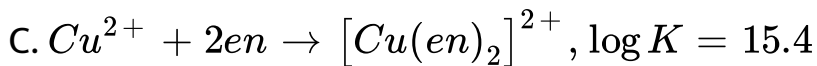
BOOKS - CBSE COMPLEMENTARY MATERIAL CHEMISTRY (HINGLISH)

COORDINATION COMPOUNDS

Mcq

1. Which of the following complexes formed by Cu^{2+} ions is most stable ?

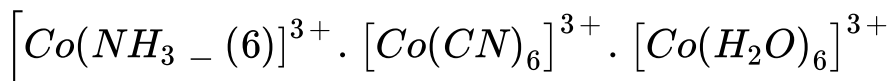




Answer: B

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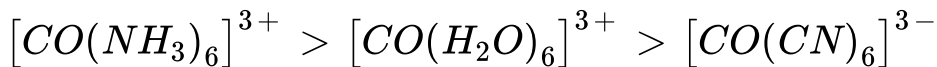
2. The colour of the coordination compounds depends on the crystal field splitting. What will be the correct order of absorption of wavelength of light of the visible region, for the _____ complexes,



A.



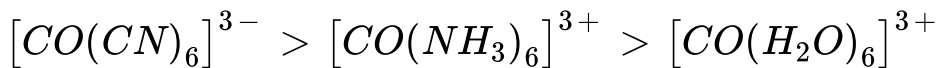
B.



C.



D.



Answer: C



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

A. 1:3 electrolyte

B. 1:2 electrolyte

C. 1:1 electrolyte

D. 3:1 electrolyte

Answer: B



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4. The correct IUPAC name of $[Pt(NH_3)_2Cl_2]$ is

A. Diamminedichloridoplatinum(II)

B. Diamminedichlorideplatinum(IV)

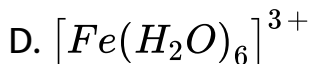
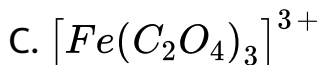
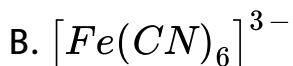
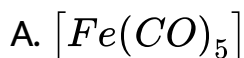
C. Diamminedichlorideplatinum(0)

D. Diamminedichlorideplatinum(IV)

Answer: A

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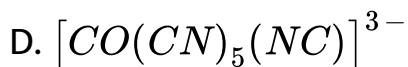
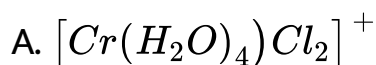
5. The stabilization of coordination compound due to chelation is called the chelate effect. Which of the following is the most stable complex species?



Answer: C

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6. Indicate the complex ion which shows geometrical isomerism.



Answer: A

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7. The CFSE for octahedral $[CoCl_6]^{4-}$ is $18,000\text{cm}^{-1}$. The CFSE for tetrahedral $[CoCl_4]^{2-}$ will be

A. 18000cm^{-1}

B. $16,000\text{cm}^{-1}$

C. 8000cm^{-1}

D. 20000cm^{-1}

Answer: C



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8. Due to the presence of ambidentate ligands coordination compounds show isomerism. Palladium complexes of the

type $[Pd(C_6H_5)_2(SCN)_2]$ & $[Pd(C_6H_5)_2(NCS)_2]$ are

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

Answer: A



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9. The compounds $[CO(SO_4NH_3)_5Br]$ and $[CO(SO_4NH_3)_5Cl]$ represent.

- A. Linkage isomerism

B. Ionisation isomerism

C. Coordination isomerism

D. No isomerism

Answer: D



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10. Which of the following species is not expected to be a ligand?

A. NO

B. NH_4^+

C. $NH_2CH_2NH_2$

D. CO

Answer: B



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11. What kind of isomerism exist between $[Cr(H_2O)_6]Cl_3$ (violet) and $[Cr(H_2O)_5Cl]Cl_2 \cdot (H_2O)$ (greyish green)?

- A. Linkage isomerism
- B. Saluate isomerism
- C. Ionisation isomerism
- D. Coodrination isomerism

Answer: B

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

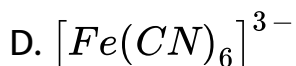
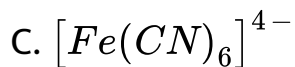
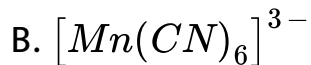
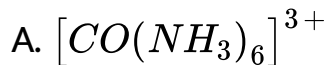
- A. Platinum disminechlorite
- B. Chloronitriti-N-ammine platinum(II)
- C. Diamminechloridonitritr-N-platinum(II)
- D. Diamminechlornitrite-N-platinate(II)

Answer: C

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13. Atomic number of Mn, Fe and Co are 25, 26 and 27 respectively. Which of the following inner orbital

octahedral complex ions are diamagnetic ?



Answer: A::C



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14. Which of the following options are correct for

$[Fe(CN)_6]^{3-}$ complex ?

A. $d^2 sp^3$ hybridisation

B. sp^3d^2 hybridisation

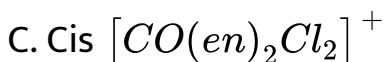
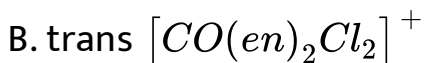
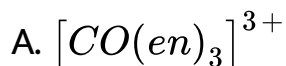
C. paramagnetic

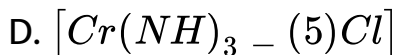
D. diamagnetic

Answer: A::C

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15. Identify the optically active compounds from the following





Answer: A::C

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16. Match the complex ions given in column 1 with the hybridisation and number of unpaired electrons given in column 2 and assign the correct code.

Column I

Column II

- | | |
|-------------------------|---------------|
| (A) $[Cr(H_2O)_6]^{3+}$ | (1) dsp^2 |
| (B) $[Co(CN)_4]^{2-}$ | (2) sp^3d^2 |
| (C) $[Ni(NH_3)_6]^{2+}$ | (3) d^2sp^3 |
| (D) $[MnF_6]^{4-}$ | (4) sp^3 |
| (5) sp^3d^2 | |

A. A-3, B-1, C-5, D-2

B. A-4, B-3, C-2, D-1

C. A-3, B-2, C-4, D-1

D. A-4, B-1, C-2, D-3

Answer: (b)



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17. Match the complex ions given in column 1 with the hybridisation and number of unpaired electrons given in column 2 and assign the correct code.

Column 1

Column 2

(A) $[CO(NCS)(NH_3)_5](SO_3)$ (1) + 4

(B) $[Co(NH_3)_4Cl_2]SO_4$ (2)0

(C) $[CO(S_2O_3)_3]Na_4$ (3) + 1

(D) $[CO_2(CO)_8]$ ((4) + 2)

(5) + 3

A. A-1,B-2,C-4,D-5

B. A-4,B-3,C-2,D-1

C. A-5,B-1,C-4,D-2

D. A-4,B-2,C-2,D-3

Answer: (d)



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18. Assertion (A) Toxic metal ions are removed by the chelating ligands.

Reason (R) Chelate complexes tend to be more stable.

A. Both assertion and reason are True, and reason is the correct explanation of the assertion.

- B. Both assertion and reason are True, but reason is not the correct explanation of the assertion
- C. Assertion is True, but reason is false.
- D. Both assertion and reason are false

Answer: (a)

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19. Assertion (A) $[Fe(CN)_6]^{3-}$ ion shows magnetic moment corresponding to two unpaired electrons.

Reason (R) Because it has $d^2 sp^3$ type hybridisation.

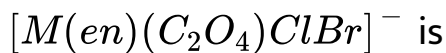
- A. Both assertion and reason are True, and reason is the correct explanation of the assertion.

- B. Both assertion and reason are True, but reason is not the correct explanation of the assertion
- C. Assertion is True, but reason is false.
- D. Both assertion and reason are false

Answer: (d)

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20. The coordination number of metal M in the complex



5	6	8	4	2	0
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Very Short Answer Type Questions

1. What are ambidentate ligands? Give an example.

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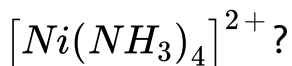
2. Write the IUPAC name of $[PtCl_2(en)_2(NO_3)_2]$.

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3. What is a chelate ligand? Give one example

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4. How many geometrical isomers are possible for the



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5. Define coordination polyhedron.



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6. Give the chemical formula of potassium hexacyano ferrate (II)



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7. Give one use of Ziegler Natta catalyst.

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8. Name the metal present in: (i) Chlorophyll

(ii) Haemoglobin

(iii) Vit. B-12

(iv) cis platin

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9. The chemical formula of Wilkinson's catalyst is :

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10. Which of the two is more stable- $K_4[Fe(CN)_6]$ or $K_3[Fe(CN)_6]$

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11. Arrange the following complexes in order of increasing electrical conductivity: $[Co(NH_3)_3Cl_3]$, $[Co(NH_3)_5Cl]Cl_2$, $[Co(NH_3)_6]Cl_3$

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Short Answer I Type Questions

1. Calculate the magnetic moments of the following complexes: (i) $[Fe(CN)_6]^{-4}$

(ii) $[FeF_6]^{-3}$

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2. Explain the following : (i) NH_3 act as a lihand but NH_4^+ does not.

(ii) CN^- is a ambidetate ligand.

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3. Mention the main postulates of Werner theory.

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4. Draw the structure of: (i) $[Ni(CO)_4]$ (ii) $[Fe(H_2O)_6]^{+3}$

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5. How does EDTA help as a cure for lead poisoning?

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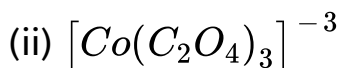
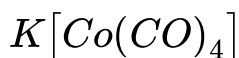
6. Explain homoleptic and heteroleptic complexes.

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7. $[NiCl_4]^{2-}$ is paramagnetic while $[Ni(CO)_4]$ is diamagnetic though both are tetrahedral. Why?

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8. The oxidation number of cobalt in the complex: (i)



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9. What are t_{2g} and e_g orbitals?

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10. What is the solution in which photographic film is washed? What reaction takes place?

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11. What is spectrochemical series?

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12. What are the assumptions of Crystal Field theory.

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13. $CuSO_4$ is colourless while $CuSO_4 \cdot 5H_2O$ is coloured.

Why?



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14. What is the difference between inner and outer orbital complexes?



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15. How is stability of coordination compound determined in a aqueous solution?



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16. In a complex ion $[Co(NH_3)_5NO_2]Cl_2$,

(i) Identify the ligand.

(ii) Oxidation number of metal ion.



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17. Explain how the nature of ligand affects the stability of complex ion.



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18. What is meant by denticity of a ligand? Find out denticity of: (i) $C_2O_4^{-2}$

(ii) EDTA

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Short Answer II Type Questions

1. A coordination compound has the formula $CoCl_3 \cdot 4NH_3$. It does not liberate NH_3 but forms a precipitate with $AgNO_3$. Write the structure and IUPAC name of the complex compound. Does it show geometrical isomerism?

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2. Why does a tetrahedral complex of the type $[MA_2B_2]$ not show geometrical isomerism?

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3. The molar conductivity of the complex $CoCl_3.4NH_3.2H_2O$ is found to be same as that of 3:1 electrolyte. What is the structural formula. Name and number of geometrical isomer of the complex.

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4. $[Ti(H_2O)_6]^{3+}$ is coloured while $[Sc(H_2O)_6]^{3+}$ is colourless. Why?

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5. Describe with an example of each, the role of coordination compounds in :

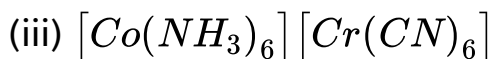
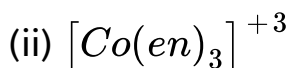
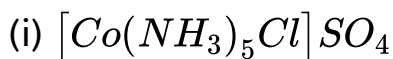
(i) Biological System

(ii) Analytical Chemistry

(iii) Medicinal Chemistry

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6. Write the type of isomerism exhibited by the following complexes:



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7. Explain the following:

(i) CO is stronger ligand than NH_3 .

(ii) Low spin octahedral complexes of nickel are not known.

(iii) Aqueous solution of $[Ti(H_2O)_6]^{3+}$ is coloured.

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8. Write all the geometrical isomers of $[Pt(NH_3)(Br)(Cl)(py)]$ and how many of these will exhibit optical isomers?

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Long Answer Type Questions

1. A metal ion M^{n+} having d^4 valence electronic configuration combines with three didentate ligands to form a complex compound. Assuming $\Delta_o > P$:

(i) Draw the diagram showing d-orbital splitting during this complex formation.

(ii) What type of hybridisation will M^{n+} have?

(iii) Name the type of isomerism exhibited by this complex.

(iv) Write the electronic configuration of metal M^{n+}

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2. (i) Discuss the nature of bonding in metal carbonyls.

(ii) Draw figure to show the splitting of d-orbitals in an octahedral crystal field and write electronic configuration of Mn^{2+} ion when:

(a) $p > \Delta_o$

(b) $\Delta_o > p$

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3. (i) $[Fe(CN)_6]^{4-}$ and $[Fe(H_2O)_6]^{2+}$ are of different colours in dilute solution. Why?

(ii) A complex is prepared by mixing $CoCl_3$ and NH_3 in the molar ratio of 1: 2. 0.1 M solution of this complex was found to freeze at $-0.372^\circ C$. What is the formula of the complex? $K_f = 1.86^\circ \frac{C}{M}$

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