EdLoop JEE

CHEMISTRY · JEE MAIN

Coordination Compounds

Previous Year Questions with answers

359 questions · **195** papers · **2002–2026** · newest paper first

Step-by-step solutions for every question: free in the EdLoop JEE app (Google Play) · pyq.edloop.in

What is in this PDF: every Coordination Compounds question we hold from past JEE Main and AIEEE papers, with its options and answer. Where an answer comes from a source other than the official final key, it says so next to the answer.

Step-by-step solutions for every question are free in the EdLoop JEE app (Google Play) and on app.edloop.in. More chapters: pyq.edloop.in/free-pdfs/

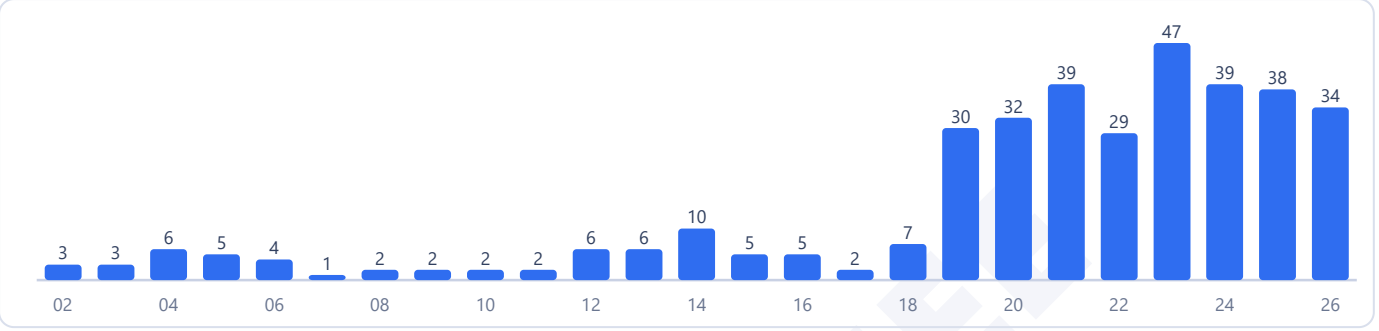
EdLoop

Chapter at a glance

6.3%	359	158 of 162	283 / 76
of Chemistry questions, 2019–2026	questions, 2002–2026	papers asked it, 2019–2026	MCQ / numerical, 2002–2026

Trend. Steady: 1.9 questions per paper in 2024–2026 against 1.7 in 2019–2023.

Questions per year



Counts are the questions we hold: 359 in 195 papers. 2 questions in this chapter came back in more than one paper.

Most-asked topics in this chapter (2002–2026)



How often it comes up

Coordination compounds encompasses Werner's coordination theory and Crystal Field Theory under Unit 12: Coordination Compounds in the Class 12 curriculum, commanding rank 1 of 31 chapters with a 6.3% share of all chemistry questions. During the 2019 to 2026 testing cycle, Coordination Compounds contributed 288 questions across 162 exam papers, making up 6.3% of all chemistry questions and commanding rank 1 of 31 chapters. In the earlier 2002 to 2018 dataset, it yielded 71 questions across 38 papers with a 5.3% share. In the recent 2024 to 2026 window, question volume surged to 111 questions across 58 papers, capturing a massive 7.2% share. The chapter's weight has trended up across recent sessions.

Questions have appeared every year from 2019 to 2026. Students faced an average of 1.8 questions per paper across 2019 to 2026, and 1.9 questions per paper in the 2024 to 2026 interval, meaning most test sessions feature one or two questions from this unit. Additionally, it produced 76 numerical answer questions between 2019 and 2026.

Most-asked topics

The syllabus organizes into four distinct areas:

- Bonding Theories: The dominant area with 199 total questions (169 in 2019 to 2026), examined extensively through 2026. Questions explore Crystal Field Splitting Energy (CFSE) in octahedral and tetrahedral environments, high-spin versus low-spin configurations, pairing energy comparisons, spectrochemical series, inner versus outer orbital complexes (d^2sp^3 versus sp^3d^2), and magnetic moments.
- Basics & Nomenclature: Accounted for 67 total questions (49 in 2019 to 2026), evaluated continuously through 2026. Focuses on Werner's primary and secondary valencies, precipitation reactions with silver nitrate or barium chloride, denticity of ligands (such as oxalate and EDTA), and systematic IUPAC naming rules.

- Isomerism: Generated 58 total questions (41 in 2019 to 2026), active through 2026. Core concepts evaluate structural isomerism (ionisation, linkage, hydrate, and coordination isomers) and stereoisomerism (geometrical cis-trans and facial-meridional forms, optical activity of bis- and tris-chelated complexes).
- Stability & Applications: Provided 35 total questions (29 in 2019 to 2026), asked up through 2026. Explores stability constants, the chelate effect, metal extraction processes, and biological complexes like hemoglobin and chlorophyll.

What the questions look like

Test problems in this unit are predominantly conceptual applications of Crystal Field Theory. Examiners routinely provide four metal complexes and ask students to order them by CFSE, spin-only magnetic moments, or wavelengths of light absorbed.

Questions also test Werner's precipitation logic, where passing a coordination compound through silver nitrate yields specific moles of silver chloride precipitate, revealing how many chloride ions reside outside the coordination sphere. Geometrical and optical isomerism problems require counting total stereoisomers for octahedral complexes containing symmetrical or unsymmetrical bidentate ligands.

How to practise it

Because Coordination Compounds ranks first in chemistry weight, invest dedicated time into systematic practice:

1. Memorize the spectrochemical series: Know ligand field strengths accurately (halides < oxygen donors < nitrogen donors < carbon donors) to quickly discern pairing behavior. 2. Calculate CFSE confidently: Practise splitting diagrams for octahedral and tetrahedral ligand fields, tracking stabilization and destabilization contributions relative to the barycenter. 3. Distinguish geometrical and optical isomers: Draw cis and trans isomers for complexes like $[M(AA)_2B_2]$ and $[MA_3B_3]$ (fac-mer). Remember that trans-$[M(AA)_2B_2]$ possesses a plane of symmetry and is optically inactive, while the cis form is chiral. 4. Master linkage isomerism: Recognize ambidentate ligands such as SCN^-/NCS^- and NO_2^-/ONO^-. 5. Solve numerical PYQs on magnetic moments: With 76 numerical problems recorded from 2019 to 2026, be ready to quickly calculate the spin-only formula.

EdLoop JEE

Q1 JEE Main 2026 · 8 Apr · Shift 2 · Numerical

Number of paramagnetic complexes among the following is _____.

$[MnBr_4]^{2-}$, $[NiCl_4]^{2-}$, $[Ni(CN)_4]^{2-}$, $[Ni(CO)_4]$, $[CoF_6]^{3-}$, $[Fe(CN)_6]^{4-}$, $[Mn(CN)_6]^{3-}$, $[Ti(CN)_6]^{3-}$, $[Cu(H_2O)_6]^{2+}$, $[Co(C_2O_4)_3]^{3-}$

Numerical value type: the answer is a number.

Answer: 6. · Official NTA final key

Q2 JEE Main 2026 · 6 Apr · Shift 1 · MCQ

Match the **LIST-I** with **LIST-II**

List-I Electronic configuration of tetrahedral metal ion	**List-II Crystal Field Stabilization Energy (Δ_t)**
A. d^2	I. -0.6
B. d^4	II. -0.8
C. d^6	III. -1.2
D. d^8	IV. -0.4

Choose the ***correct*** answer from the options given below:

(A) A-III, B-IV, C-II, D-I
(B) A-III, B-I, C-IV, D-II
(C) A-III, B-IV, C-I, D-II
(D) A-II, B-I, C-IV, D-III

Answer: (C) A-III, B-IV, C-I, D-II · Official NTA final key

Q3 JEE Main 2026 · 6 Apr · Shift 1 · MCQ

Which of the following are true about the energy of the given d-orbitals of a tetrahedral complex?

A. $d_{xy} = d_{xz} > d_{x^2-y^2}$

B. $d_{xy} = d_{yz} > d_{z^2}$

C. $d_{x^2-y^2} > d_{z^2} > d_{xz}$

D. $d_{x^2-y^2} = d_{z^2} < d_{xz}$

Choose the correct answer from the given below:

(A) A, B and D only
(B) A and B only
(C) B and D only
(D) B, C and D only

Answer: (A) A, B and D only · Official NTA final key

EdLoop JEE

Q4 JEE Main 2026 · 6 Apr · Shift 2 MCQ

Which of the following sequences of hybridisation, geometry and magnetic nature are **correct** for the given coordination compounds ?

A. $[NiCl_4]^{2-}$ – sp^3, tetrahedral, paramagnetic

B. $[Ni(NH_3)_6]^{2+}$ – sp^3d^2, octahedral, paramagnetic

C. $[Ni(CO)_4]$ – sp^3, tetrahedral, paramagnetic

D. $[Ni(CN)_4]^{2-}$ – dsp^2, square planar, diamagnetic

Choose the **correct** answer from the options given below :

(A) A, B, C and D
(B) B, C and D only
(C) A, C and D only
(D) A, B and D only

Answer: (D) A, B and D only · Official NTA final key

Q5 JEE Main 2026 · 6 Apr · Shift 2 Numerical

An excess of $AgNO_3$ is added to 100 mL of a 0.05 M solution of tetraaquadichloridochromium (III) chloride. The number of moles of AgCl precipitated will be _____ $\times 10^{-3}$. (Nearest integer)

Numerical value type: the answer is a number.

Answer: 5. · Official NTA final key

Q6 JEE Main 2026 · 5 Apr · Shift 1 MCQ

The **correct** statements about metal carbonyls are

A. The metal-carbon bonds in metal carbonyls possess both σ and π-character.

B. Due to synergic bonding interactions between metal and CO ligand, the metal-carbon bond becomes weak.

C. The metal-carbon σ bond is formed by the donation of lone pair of electrons on the carbonyl carbon into a vacant orbital of metal.

D. The metal-carbon π bond is formed by the donation of electrons from filled d-orbital of metal into vacant π^* orbital of CO.

Choose the correct answer from the options given below:

(A) A and B Only
(B) A, C and D Only
(C) B and C Only
(D) A and D Only

Answer: (B) A, C and D Only · Official NTA final key

Q7 JEE Main 2026 · 5 Apr · Shift 1 MCQ

Given below are two statements:

Statement I: Each electron in e_g orbitals destabilizes the orbitals by $+0.6\ \Delta_o$ and each electron in the t_{2g} orbitals stabilizes the orbitals by $-0.4\ \Delta_o$ in an octahedral field on the basis of crystal field theory.

Statement II: All the d - orbitals of the transition metals have the same energy in their free atomic state but when a complex is formed the ligands destroy the degeneracy of these orbitals on the basis of crystal field theory.

In the light of the above statements, choose the *__correct__* answer from the options given below

(A) Both Statement I and Statement II are correct
(B) Both Statement I and Statement II are incorrect
(C) Statement I is correct but Statement II is incorrect
(D) Statement I is incorrect but Statement II is correct

Answer: (A) Both Statement I and Statement II are correct · Official NTA final key

Q8 JEE Main 2026 · 5 Apr · Shift 2 MCQ

Identify the **correct** statements from the following

A. $[Fe(C_2O_4)_3]^{3-}$ is the most stable complex among $[Fe(OH)_6]^{3-}$, $[Fe(C_2O_4)_3]^{3-}$ and $[Fe(SCN)_6]^{3-}$

B. The stability of $[Cu(NH_3)_4]^{2+}$ is greater than that of $[Cu(en)_2]^{2+}$

C. The hybridization of Fe in $K_4[Fe(CN)_6]$ is d^2sp^3

D. $[Fe(NO_2)_3Cl_3]^{3-}$ exhibits linkage isomerism

E. NO_2^- and SCN^- ligands are NOT ambidentate ligands

Choose the **correct** answer from the options given below :

(A) A, B, C, D and E
(B) B, C and D only
(C) A, C and D only
(D) A, C and E only

Answer: (C) A, C and D only · Official NTA final key

Q9 JEE Main 2026 · 5 Apr · Shift 2 Numerical

The total number of unpaired electrons present in the d^3, d^4 (low spin) d^5 (high spin), d^6 (high spin) and d^7 (low spin) octahedral complex systems is _____.

Numerical value type: the answer is a number.

Answer: 15. · Official NTA final key

Q10 JEE Main 2026 · 4 Apr · Shift 1 MCQ

Match the **LIST-I** with **LIST-II**

List-I Complex ion	List-II Calculated spin only magnetic moment (BM)
A. $[Cr(H_2O)_6]^{2+}$	I. 3.87
B. $[Co(H_2O)_6]^{2+}$	II. 5.92
C. $[Cu(H_2O)_6]^{2+}$	III. 4.90
D. $[Mn(H_2O)_6]^{2+}$	IV. 1.73

Choose the ***correct*** answer from the options given below:

(A) A-I, B-III, C-IV, D-II
(B) A-II, B-I, C-III, D-IV
(C) A-IV, B-II, C-I, D-III
(D) A-III, B-I, C-IV, D-II

Answer: (D) A-III, B-I, C-IV, D-II · Official NTA final key

Q11 JEE Main 2026 · 4 Apr · Shift 2 MCQ

Consider the metal complexes $[Ni(en)_3]^{2+}$ (A), $[NiCl_4]^{2-}$ (B) and $[Ni(NH_3)_6]^{2+}$ (C). Choose the **CORRECT** option by considering the number of unpaired electrons present in (A), (B) and (C) respectively and the order of frequency of absorption.

(A) 2, 2, 2 and (A) > (C) > (B)
(B) 0, 2, 0 and (A) > (C) > (B)
(C) 2, 2, 0 and (B) > (C) > (A)
(D) 2, 2, 2 and (C) > (A) > (B)

Answer: (A) 2, 2, 2 and (A) > (C) > (B) · Official NTA final key

---

Q12 JEE Main 2026 · 2 Apr · Shift 1 MCQ

Match **List - I** with **List - II**.

List - I Chromium (III) Complexes (en = ethylene diamine)	List - II Δ_o (cm^{-1})
A. $[Cr(CN)_6]^{3-}$	I. 15,060
B. $[CrF_6]^{3-}$	II. 17,400
C. $[Cr(H_2O)_6]^{3+}$	III. 22,300
D. $[Cr(en)_3]^{3+}$	IV. 26,600

Choose the **correct** answer from the options given below :

(A) A-I, B-II, C-III, D-IV
(B) A-II, B-III, C-IV, D-I
(C) A-III, B-IV, C-I, D-II
(D) A-IV, B-I, C-II, D-III

Answer: (D) A-IV, B-I, C-II, D-III · Official NTA final key

EdLoop JEE

Q13 JEE Main 2026 · 2 Apr · Shift 1 Numerical

5.33 g of $CrCl_3 \cdot 6H_2O$, which is a 1 : 3 electrolyte, is dissolved in water and is passed through a cation exchanger. The chloride ions in the eluted solution, on treatment with $AgNO_3$ results in 8.61 g of AgCl. The ratio of moles of complex reacted and moles of AgCl formed is _____ $\times 10^{-2}$. (Nearest integer)

[Molar mass in g mol^{-1} Cr : 52, Ag : 108, Cl : 35.5, H : 1, O : 16]

Numerical value type: the answer is a number.

Answer: 33. · Official NTA final key

Q14 JEE Main 2026 · 2 Apr · Shift 2 MCQ

Given below are two statements :

Statement I : Among Zn, Mn, Sc and Cu, the energy required to remove the third valence electron is highest for Zn and lowest for Sc.

Statement II : The correct order of the following complexes in terms of CFSE is $[Co(H_2O)_6]^{2+} < [Co(H_2O)_6]^{3+} < [Co(en)_3]^{3+}$.

In the light of the above statements, choose the **correct** answer from the options given below :

(A) Both **Statement I** and **Statement II** are true
(B) Both **Statement I** and **Statement II** are false
(C) **Statement I** is true but **Statement II** is false
(D) **Statement I** is false but **Statement II** is true

Answer: (A) Both **Statement I** and **Statement II** are true · Official NTA final key

Q15 JEE Main 2026 · 2 Apr · Shift 2 MCQ

Which of the following complexes will show coordination isomerism ?

A. $[Ag(NH_3)_2][Ag(CN)_2]$

B. $[Co(NH_3)_6][Cr(CN)_6]$

C. $[Co(NH_3)_6][Co(CN)_6]$

D. $[Fe(NH_3)_6][Co(CN)_6]$

E. $[Co(NH_3)_6][Fe(CN)_6]$

Choose the **correct** answer from the options given below :

(A) B, C and D Only
(B) B, D and E Only
(C) A, C and D Only
(D) C, D and E Only

Answer: (B) B, D and E Only · Official NTA final key

Q16 JEE Main 2026 · 28 Jan · Shift 1 MCQ

The correct statement among the following is:

(A) $Ni(CO)_4$ is diamagnetic and $[NiCl_4]^{2-}$ and $[Ni(CN)_4]^{2-}$ are paramagnetic.

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

(C) $[Ni\,(CN)_4]^{2-}$ and $[NiCl_4]^{2-}$ are diamagnetic and $Ni(CO)_4$ is paramagnetic.

(D) $Ni(CO)_4$ and $[Ni(CN)_4]^{2-}$ are diamagnetic and $[NiCl_4]^{2-}$ is paramagnetic.

Answer: (D) $Ni(CO)_4$ **and** $[Ni(CN)_4]^{2-}$ **are diamagnetic and** $[NiCl_4]^{2-}$ **is paramagnetic.** · Official NTA final key

Q17 JEE Main 2026 · 28 Jan · Shift 1 Numerical

X is the number of geometrical isomers exhibited by $[Pt(NH_3)(H_2O)BrCl]$.

Y is the number of optically inactive isomer(s) exhibited by $[CrCl_2(ox)_2]^{3-}$

Z is the number of geometrical isomers exhibited by $[Co(NH_3)_3(NO_2)_3]$.

The value of X + Y + Z is _____.

Numerical value type: the answer is a number.

Answer: 6. · Official NTA final key

Q18 JEE Main 2026 · 28 Jan · Shift 2 MCQ

The correct increasing order of spin-only magnetic moment values of the complex ions $[MnBr_4]^{2-}$ (A), $[Cu(H_2O)_6]^{2+}$ (B), $[Ni(CN)_4]^{2-}$ (C) and $[Ni(H_2O)_6]^{2+}$ (D) is :

(A) A = B < C < D

(B) A = B < D < C

(C) C = D < B < A

(D) C < B < D < A

Answer: (D) C < B < D < A · Official NTA final key

Q19 JEE Main 2026 · 28 Jan · Shift 2 Numerical

The number of isoelectronic species among Sc^{3+}, Cr^{2+}, Mn^{3+}, Co^{3+} and Fe^{3+} is 'n'. If 'n' moles of AgCl is formed during the reaction of complex with formula $CoCl_3(en)_2NH_3$ with excess of $AgNO_3$ solution, then the number of electrons present in the t_{2g} orbital of the complex is _____.

Numerical value type: the answer is a number.

Answer: 6. · Official NTA final key

Q20 JEE Main 2026 · 24 Jan · Shift 1 MCQ

Given below are two statements:

Statement I: Hybridisation, shape and spin only magnetic moment of $K_3[Co(CO_3)_3]$ is sp^3d^2, octahedral and 4.9 BM respectively.

Statement II: Geometry, hybridisation and spin only magnetic moment values (BM) of the ions $[Ni(CN)_4]^{2-}$, $[MnBr_4]^{2-}$ and $[CoF_6]^{3-}$ respectively are square planar, tetrahedral, octahedral; dsp^2, sp^3, sp^3d^2 and 0, 5.9, 4.9.

In the light of the above statements, choose the ***correct*** answer from the options given below

(A) Statement I is false but Statement II is true
(B) Statement I is true but Statement II is false
(C) Both Statement I and Statement II are true
(D) Both Statement I and Statement II are false

Options (3) or (1) were accepted. More than one answer was accepted. · Official NTA final key

---

Q21 JEE Main 2026 · 24 Jan · Shift 1 MCQ

Consider a mixture 'X' which is made by dissolving 0.4 mol of $[Co(NH_3)_5SO_4]Br$ and 0.4 mol of $[Co(NH_3)_5Br]SO_4$ in water to make 4 L of solution. When 2 L of mixture 'X' is allowed to react with excess of $AgNO_3$, it forms precipitate 'Y'. The rest 2 L of mixture 'X' reacts with excess $BaCl_2$ to form precipitate 'Z'. Which of the following statements is **CORRECT**?

(A) 'Y' is $BaSO_4$ and 'Z' is AgBr.
(B) 0.1 mol of 'Y' is formed.
(C) 0.2 mol of 'Z' is formed.
(D) 0.4 mol of 'Z' is formed.

Answer: (C) 0.2 mol of 'Z' is formed. · Official NTA final key

---

Q22 JEE Main 2026 · 24 Jan · Shift 1 MCQ

Given below are two statements:

Statement I: The number of paramagnetic species among $[CoF_6]^{3-}$, $[TiF_6]^{3-}$, V_2O_5 and $[Fe(CN)_6]^{3-}$ is 3.

Statement II:

$K_4[Fe(CN)_6] < K_3[Fe(CN)_6] < [Fe(H_2O)_6]SO_4 \cdot H_2O < [Fe(H_2O)_6]Cl_3$ is the correct order in terms of number of unpaired electron(s) present in the complexes.

In the light of the above statements, choose the ***correct*** answer from the options given below

(A) Both Statement I and Statement II are false
(B) Statement I is false but Statement II is true
(C) Statement I is true but Statement II is false
(D) Both Statement I and Statement II are true

Answer: (D) Both Statement I and Statement II are true · Official NTA final key

---

Q23 JEE Main 2026 · 24 Jan · Shift 2 MCQ

The wavelength of light absorbed for the following complexes are in the order

$[Co(NH_3)_6]^{3+}$; $[Co(H_2O)_6]^{3+}$; $[Co(CN)_6]^{3-}$; $[Co(NH_3)_5(H_2O)]^{3+}$; $[CoF_6]^{3-}$

(I) (II) (III) (IV) (V)

(A) III < I < IV < II < V

(B) III < I < II < IV < V

(C) III < IV < I < II < V

(D) III < I < IV < V < II

Answer: (A) III < I < IV < II < V · Official NTA final key

Q24 JEE Main 2026 · 24 Jan · Shift 2 Numerical

A chromium complex with a formula $CrCl_3 \cdot 6H_2O$ has a spin only magnetic moment value of 3.87 BM and its solution conductivity corresponds to 1 : 2 electrolyte. 2.75 g of the complex solution was initially passed through a cation exchanger. The solution obtained after the process was reacted with excess of $AgNO_3$. The amount of AgCl formed in the above process is _____ g. (Nearest integer)

[Given: Molar mass in g mol^{-1} Cr : 52; Cl: 35.5, Ag:108, O:16, H:1]

Numerical value type: the answer is a number.

Answer: 3. · Official NTA final key

Q25 JEE Main 2026 · 23 Jan · Shift 1 MCQ

Given below are two statements :

Statement I : $[CoBr_4]^{2-}$ ion will absorb light of lower energy than $[CoCl_4]^{2-}$ ion.

Statement II : In $[CoI_4]^{2-}$ ion, the energy separation between the two set of d-orbitals is more than $[CoCl_4]^{2-}$ ion.

In the light of the above statements, choose the **correct** answer from the options given below :

(A) Both **Statement I** and **Statement II** are true

(B) **Statement I** is false but **Statement II** is true

(C) **Statement I** is true but **Statement II** is false

(D) Both **Statement I** and **Statement II** are false

Answer: (C) Statement I is true but **Statement II** is false · Official NTA final key

Q26 JEE Main 2026 · 23 Jan · Shift 1 MCQ

The statements that are **incorrect** about the nickel(II) complex of dimethylglyoxime are :

A. It is red in colour.

B. It has a high solubility in water at pH$= 9$.

C. The Ni ion has two unpaired d-electrons.

D. The N$-$Ni$-$N bond angle is almost close to 90°.

E. The complex contains four five-membered metallacycles (metal containing rings).

Choose the **correct** answer from the options given below :

(A) C and E Only
(B) B, C and E Only
(C) A, D and B Only
(D) C and D Only

Answer: (B) B, C and E Only · Official NTA final key

Q27 JEE Main 2026 · 23 Jan · Shift 1 · Numerical

The crystal field splitting energy of $[\mathrm{Co(oxalate)_3}]^{3-}$ complex is 'n' times that of the $[\mathrm{Cr(oxalate)_3}]^{3-}$ complex. Here 'n' is _____. (Assume $\Delta_o >> P$)

Numerical value type: the answer is a number.

Answer: 2. · Official NTA final key

Q28 JEE Main 2026 · 23 Jan · Shift 2 · MCQ

Identify the **CORRECT** set of details from the following:

A. $[\mathrm{Co(NH_3)_6}]^{3+}$: Inner orbital complex; $\mathrm{d^2sp^3}$ hybridized

B. $[\mathrm{MnCl_6}]^{3-}$: Outer orbital complex; $\mathrm{sp^3d^2}$ hybridized

C. $[\mathrm{CoF_6}]^{3-}$: Outer orbital complex; $\mathrm{d^2sp^3}$ hybridized

D. $[\mathrm{FeF_6}]^{3-}$: Outer orbital complex; $\mathrm{sp^3d^2}$ hybridized

E. $[\mathrm{Ni(CN)_4}]^{2-}$: Inner orbital complex; $\mathrm{sp^3}$ hybridized

Choose the correct answer from the options given below:

(A) A, B, C, D & E
(B) C & D Only
(C) A, B & D Only
(D) A, C & E Only

Answer: (C) A, B & D Only · Official NTA final key

Q29 JEE Main 2026 · 23 Jan · Shift 2 · Numerical

Total number of unpaired electrons present in the central metal atoms/ions of $[\mathrm{Ni(CO)_4}]$, $[\mathrm{NiCl_4}]^{2-}$, $[\mathrm{PtCl_2(NH_3)_2}]$, $[\mathrm{Ni(CN)_4}]^{2-}$ and $[\mathrm{Pt(CN)_4}]^{2-}$ is _____.

Numerical value type: the answer is a number.

Answer: 2. · Official NTA final key

Q30 JEE Main 2026 · 22 Jan · Shift 1 · MCQ

Consider the transition metal ions $\mathrm{Mn^{3+}}$, $\mathrm{Cr^{3+}}$, $\mathrm{Fe^{3+}}$ and $\mathrm{Co^{3+}}$ and all form low spin octahedral complexes. The correct decreasing order of unpaired electrons in their respective d-orbitals of the

EdLoop JEE

complexes is

(A) $Cr^{3+} > Mn^{3+} > Fe^{3+} > Co^{3+}$

(B) $Fe^{3+} > Co^{3+} > Mn^{3+} > Cr^{3+}$

(C) $Mn^{3+} > Fe^{3+} > Co^{3+} > Cr^{3+}$

(D) $Cr^{3+} > Fe^{3+} > Co^{3+} > Mn^{3+}$

Answer: (A) $Cr^{3+} > Mn^{3+} > Fe^{3+} > Co^{3+}$ · Official NTA final key

---

Q31 JEE Main 2026 · 22 Jan · Shift 1 MCQ

A first row transition metal (M) does not liberate H_2 gas from dilute HCl. 1 mol of aqueous solution of MSO_4 is treated with excess of aqueous KCN and then $H_2S(g)$ is passed through the solution. The amount of MS (metal sulphide) formed from the above reaction is _____ mol.

(A) 1

(B) 0

(C) 2

(D) 3

Answer: (B) 0 · Official NTA final key

Q32 JEE Main 2026 · 22 Jan · Shift 2 MCQ

$[Ni(PPh_3)_2Cl_2]$ is a paramagnetic complex. Identify the **INCORRECT** statements about this complex.

A. The complex exhibits geometrical isomerism.

B. The complex is white in colour.

C. The calculated spin-only magnetic moment of the complex is 2.84 BM.

D. The calculated CFSE (Crystal Field Stabilization Energy) of Ni in this complex is $-0.8\,\Delta_o$.

E. The geometrical arrangement of ligands in this complex is similar to that in $Ni(CO)_4$.

Choose the **correct** answer from the options given below :

(A) C, D and E Only

(B) A and B Only

(C) A, B and D Only

(D) C and D Only

Answer: (C) A, B and D Only · Official NTA final key

Q33 JEE Main 2026 · 21 Jan · Shift 1 MCQ

Given below are two statements :

Statement I : Among $[Cu(NH_3)_4]^{2+}$, $[Ni(en)_3]^{2+}$, $[Ni(NH_3)_6]^{2+}$ and $[Mn(H_2O)_6]^{2+}$, $[Mn(H_2O)_6]^{2+}$ has the maximum number of unpaired electrons.

Statement II : The number of pairs among $\{[NiCl_4]^{2-}, [Ni(CO)_4]\}$, $\{[NiCl_4]^{2-}, [Ni(CN)_4]^{2-}\}$ and $\{[Ni(CO)_4], [Ni(CN)_4]^{2-}\}$ that contain only diamagnetic species is two.

In the light of the above statements, choose the **correct** answer from the options given below :

(A) **Statement I** is false but **Statement II** is true
(B) **Statement I** is true but **Statement II** is false
(C) Both **Statement I** and **Statement II** are true
(D) Both **Statement I** and **Statement II** are false

Answer: (B) Statement I is true but **Statement II** is false · Official NTA final key

---

Q34 JEE Main 2026 · 21 Jan · Shift 2 MCQ

Given below are two statements :

Statement I : Crystal Field Stabilization Energy (CFSE) of $[Cr(H_2O)_6]^{2+}$ is greater than that of $[Mn(H_2O)_6]^{2+}$.

Statement II : Potassium ferricyanide has a greater spin-only magnetic moment than sodium ferrocyanide.

In the light of the above statements, choose the **correct** answer from the options given below :

(A) **Statement I** is true but **Statement II** is false
(B) **Statement I** is false but **Statement II** is true
(C) Both **Statement I** and **Statement II** are true
(D) Both **Statement I** and **Statement II** are false

Answer: (C) Both Statement I and Statement II are true · Official NTA final key

---

Q35 JEE Main 2025 · 8 Apr · Shift 2 MCQ

Given below are two statements:

Statement I : A homoleptic octahedral complex, formed using monodentate ligands, will not show stereoisomerism

Statement II : cis- and trans - platin are heteroleptic complexes of Pd .

In the light of the above statements, choose the correct answer from the options given below

(A) Both Statement I and Statement II are false
(B) Both Statement I and Statement II are true
(C) Statement I is false but Statement II is true
(D) Statement I is true but Statement II is false

Answer: (D) Statement I is true but Statement II is false · Key from source paper

---

Q36 JEE Main 2025 · 8 Apr · Shift 2 MCQ

Match the LIST-I with LIST-II

LIST-I (Complex/Species)	LIST-II (Shape & magnetic moment)
A. $[Ni(CO)_4]$	I. Tetrahedral, 2.8 BM
B. $[Ni(CN)_4]^{2-}$	II. Square planar, 0 BM
C. $[NiCl_4]^{2-}$	III. Tetrahedral, 0 BM
D. $[MnBr_4]^{2-}$	IV Tetrahedral, 5.9 BM

Choose the correct answer from the options given below:

(A) A-IV, B-I, C-III, D-II
(B) A-III, B-IV, C-II, D-I
(C) A-III, B-II, C-I, D-IV
(D) A-I, B-II, C-III, D-IV

Answer: (C) A-III, B-II, C-I, D-IV · Key from source paper

Q37 JEE Main 2025 · 8 Apr · Shift 2 MCQ

The number of species from the following that are involved in sp^3d^2 hybridization is

$[Co(NH_3)_6]^{3+}$, SF_6, $[CrF_6]^{3-}$, $[CoF_6]^{3-}$, $[Mn(CN)_6]^{3-}$ and $[MnCl_6]^{3-}$

(A) 4
(B) 6
(C) 5
(D) 3

Answer: (D) 3 · Checked by our team

Q38 JEE Main 2025 · 7 Apr · Shift 1 MCQ

An octahedral complex having molecular composition $Co.5NH_3 \cdot Cl^2.SO_4$ has two isomers A and B. The solution of A gives a white precipitate with $AgNO_3$ solution and the solution of B gives white precipitate with $BaCl_2$ solution. The type of isomerism exhibited by the complex is,

(A) Co-ordinate isomerism
(B) Ionisation isomerism
(C) Linkage isomerism
(D) Geometrical isomerism

Answer: (B) Ionisation isomerism · Key from source paper

Q39 JEE Main 2025 · 7 Apr · Shift 1 Numerical

The number of paramagnetic complexes among $[FeF_6]^{3-}$, $[Fe(CN)_6]^{3-}$, $[Mn(CN)_6]^{3-}$, $[Co(C_2O_4)_3]^{3-}$, $[MnCl_6]^{3-}$, and $[CoF_6]^{3-}$, which involved d^2sp^3 hybridization is

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q40 JEE Main 2025 · 7 Apr · Shift 2 MCQ

Match List - I with List - II.

List-I (Complex)		List-II (Primary valency and Secondary valency)	
(A) $[Co(en)_2Cl_2]Cl$	(I)	3	6
(B) $[Pt(NH_3)_2Cl(NO_2)]$	(II)	3	4
(C) $Hg[Co(SCN)_4]$	(III)	2	6
(D) $[Mg(EDTA)]^{2-}$	(IV)	2	4

Choose the correct answer from the options given below :

(A) (A)-(II), (B)-(III), (C)-(IV), (D)-(I)

(B) (A)-(I), (B)-(III), (C)-(II), (D)-(IV)

(C) (A)-(III), (B)-(I), (C)-(II), (D)-(IV)

(D) (A)-(I), (B)-(IV), (C)-(II), (D)-(III)

Answer: (D) (A)-(I), (B)-(IV), (C)-(II), (D)-(III) · Key from source paper

---

Q41 JEE Main 2025 · 7 Apr · Shift 2 MCQ

The number of unpaired electrons responsible for the paramagnetic nature of the following complex species are respectively :

$[Fe(CN)_6]^{3-}$, $[FeF_6]^{3-}$, $[CoF_6]^{3-}$, $[Mn(CN)_6]^{3-}$

(A) 1,1,4,2

(B) 1,4,4,2

(C) 1,5,4,2

(D) 1,5,5,2

Answer: (C) 1,5,4,2 · Key from source paper

Q42 JEE Main 2025 · 7 Apr · Shift 2 Numerical

The number of paramagnetic metal complex species among $[Co(NH_3)_6]^{3+}$, $[Co(C_2O_4)_3]^{3-}$, $[MnCl_6]^{3-}$, $[Mn(CN)_6]^{3-}$, $[CoF_6]^{3-}$, $[Fe(CN)_6]^{3-}$ and $[FeF_6]^{3-}$ with same number of unpaired electrons is _____ .

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

EdLoop JEE

Q43 JEE Main 2025 · 4 Apr · Shift 1 MCQ

Number of stereoisomers possible for the complexes, $[CrCl_3(py)_3]$ and $[CrCl_2(ox)_2]^{3-}$ are respectively (py = pyridine, ox = oxalate)

(A) 2 & 3
(B) 2 & 2
(C) 3 & 3
(D) 1 & 2

Answer: (A) 2 & 3 · Key from source paper

Q44 JEE Main 2025 · 4 Apr · Shift 1 MCQ

Which one of the following complexes will have $\Delta_o = 0$ and $\mu = 5.96$ B.M?

(A) $[FeF_6]^{4-}$
(B) $[Fe(CN)_6]^{4-}$
(C) $[Co(NH_3)_6]^{3+}$
(D) $[Mn(SCN)_6]^{4-}$

Answer: (D) $[Mn(SCN)_6]^{4-}$ · Key from source paper

Q45 JEE Main 2025 · 4 Apr · Shift 2 MCQ

The correct order of $[FeF_6]^{3-}$, $[CoF_6]^{3-}$, $[Ni(CO)_4]$ and $[Ni(CN)_4]^{2-}$ complex species based on the number of unpaired electrons present is :

(A) $[Ni(CN)_4]^{2-} > [FeF_6]^{3-} > [CoF_6]^{3-} > [Ni(CO)_4]$
(B) $[FeF_6]^{3-} > [CoF_6]^{3-} > [Ni(CN)_4]^{2-} > [Ni(CO)_4]$
(C) $[FeF_6]^{3-} > [CoF_6]^{3-} > [Ni(CN)_4]^{2-} = [Ni(CO)_4]$
(D) $[CoF_6]^{3-} > [FeF_6]^{3-} > [Ni(CO)_4] > [Ni(CN)_4]^{2-}$

Answer: (C) $[FeF_6]^{3-} > [CoF_6]^{3-} > [Ni(CN)_4]^{2-} = [Ni(CO)_4]$ · Key from source paper

Q46 JEE Main 2025 · 4 Apr · Shift 2 MCQ

'X' is the number of electrons in t_{2g} orbitals of the most stable complex ion among $[Fe(NH_3)_6]^{3+}$, $[FeCl_6]^{3-}$, $[Fe(C_2O_4)_3]^{3-}$ and $[Fe(H_2O)_6]^{3+}$. The nature of oxide of vanadium of the type V_2O_X is :

(A) Neutral
(B) Basic
(C) Acidic
(D) Amphoteric

Answer: (B) Basic · Checked by our team

Q47 JEE Main 2025 · 4 Apr · Shift 2 Numerical

A metal complex with a formula $MCl_4 \cdot 3NH_3$ is involved in sp^3d^2 hybridisation. It upon reaction with excess of $AgNO_3$ solution gives ' x ' moles of AgCl . Consider ' x ' is equal to the number of lone pairs of electron present in central atom of BrF_5. Then the number of geometrical isomers exhibited by the complex is _____ .

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q48 JEE Main 2025 · 3 Apr · Shift 1 MCQ

The correct order of the complexes

$[Co(NH_3)_5(H_2O)]^{3+}$ (A), $[Co(NH_3)_6]^{3+}$ (B), $[Co(CN)_6]^{3-}$ (C) and $[CoCl(NH_3)_5]^{2+}$ (D) in terms of wavelength of light absorbed is

(A) C > B > A > D
(B) D > C > B > A
(C) C > B > D > A
(D) D > A > B > C

Answer: (D) D > A > B > C · Key from source paper

Q49 JEE Main 2025 · 3 Apr · Shift 1 Numerical

The number of optical isomers exhibited by the iron complex (A) obtained from the following reaction is _____

$$FeCl_3 + KOH + H_2C_2O_4 \rightarrow A$$

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q50 JEE Main 2025 · 3 Apr · Shift 2 MCQ

Identify the diamagnetic octahedral complex ions from below ;

A. $[Mn(CN)_6]^{3-}$ B. $[Co(NH_3)_6]^{3+}$ C. $[Fe(CN)_6]^{4-}$ D. $[Co(H_2O)_3F_3]$

Choose the correct answer from the options given below:

(A) A and D Only
(B) A and C Only
(C) B and C Only
(D) B and D Only

Answer: (C) B and C Only · Key from source paper

Q51 JEE Main 2025 · 2 Apr · Shift 1 MCQ

Given below are two statements :

Statement (I): In octahedral complexes, when $\Delta_o < P$ high spin complexes are formed. When $\Delta_0 > P$ low spin complexes are formed.

Statement (II) : In tetrahedral complexes because of $\Delta_t < P$, low spin complexes are rarely formed.

In the light of the above statements, choose the most appropriate answer from the options given below :

(A) Statement I is incorrect but Statement II is correct
(B) Both Statement I and Statement II are incorrect
(C) Both Statement I and Statement II are correct
(D) Statement I is correct but Statement II is incorrect

Answer: (C) Both Statement I and Statement II are correct · Key from source paper

Q52 JEE Main 2025 · 2 Apr · Shift 1 Numerical

A transition metal (M) among Mn, Cr, Co and Fe has the highest standard electrode potential $\left(M^{3+}/M^{2+}\right)$. It forms a metal complex of the type $[M(CN)_6]^{4-}$. The number of electrons present in the e_g orbital of the complex is _____

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q53 JEE Main 2025 · 2 Apr · Shift 2 MCQ

The type of hybridization and the magnetic property of $[MnCl_6]^{3-}$ are,

(A) d^2sp^3, paramagnetic with two unpaired electrons.
(B) d^2s^3, paramagnetic with four unpaired electrons.
(C) sp^3d^2, paramagnetic with four unpaired electrons.
(D) sp^3d^2, paramagnetic with two unpaired electrons.

Answer: (C) sp^3d^2, paramagnetic with four unpaired electrons. · Key from source paper

Q54 JEE Main 2025 · 2 Apr · Shift 2 MCQ

The d-orbital electronic configuration of the complex among $[Co(en)_3]^{3+}$, $[CoF_6]^{3-}$, $[Mn\,(H_2O)_6]^{2+}$ and $[Zn\,(H_2O)_6]^{2+}$ that has the highest CFSE is :

(A) $t_{2g}^4 e_g^2$
(B) $t_{2g}^6 e_g^4$
(C) $t_{2g}^3 e_g^2$
(D) $t_{2g}^6 e_g^0$

Answer: (D) $t_{2g}^6 e_g^0$ · Key from source paper

Q55 JEE Main 2025 · 2 Apr · Shift 2 Numerical

The spin-only magnetic moment value of M^{n+} ion formed among Ni, Zn, Mn and Cu that has the least enthalpy of atomisation is _____ . (in nearest integer) Here n is equal to the number of diamagnetic complexes among $K_2\left[NiCl_4\right]$, $\left[Zn\left(H_2O\right)_6\right]Cl_2$, $K_3\left[Mn(CN)_6\right]$ and $\left[Cu\left(PPh_3\right)_3 I\right]$

Numerical value type: the answer is a number.

Answer: 0. · Key from source paper

Q56 JEE Main 2025 · 29 Jan · Shift 1 MCQ

Match List - I with List - II.

List - I (Complex)	List - II (Hybridisation & Magnetic characters)
(A) $[\mathrm{MnBr_4}]^{2-}$	(I) d^2s^3 & diamagnetic
(B) $[\mathrm{FeF_6}]^{3-}$	(II) $\mathrm{sp^3\,d^2}$ & paramagnetic
(C) $[\mathrm{Co(C_2O_4)_3}]^{3-}$	(III) $\mathrm{sp^3}$ & diamagnetic
(D) $[\mathrm{Ni(CO)_4}]$	(IV) $\mathrm{sp^3}$ & paramagnetic

Choose the correct answer from the options given below :

(A) (A) –(IV), (B) – (II), (C) – (I), (D) – (III)
(B) (A) – (III), (B) – (I), (C) – (II), (D) – (IV)
(C) (A) –(IV), (B) – (I), (C) – (II), (D) – (III)
(D) (A) – (III), (B) – (II), (C) – (I), (D) – (IV)

Answer: (A) (A) –(IV), (B) – (II), (C) – (I), (D) – (III) · Key from source paper

---

Q57 JEE Main 2025 · 29 Jan · Shift 1 MCQ

The correct increasing order of stability of the complexes based on Δ_o value is : I. $[\mathrm{Mn(CN)_6}]^{3-}$ II. $[\mathrm{Co(CN)_6}]^{4-}$ III. $[\mathrm{Fe(CN)_6}]^{4-}$ IV. $[\mathrm{Fe(CN)_6}]^{3-}$

(A) IV < III < II < I
(B) I < II < IV < III
(C) III < II < IV < I
(D) II < III < I < IV

Answer: (B) I < II < IV < III · Key from source paper

EdLoop JEE

Q58 JEE Main 2025 · 29 Jan · Shift 2 MCQ

Identify the homoleptic complexes with odd number of d electrons in the central metal : (A) $[FeO_4]^{2-}$ (B) $[Fe(CN)_6]^{3-}$ (C) $[Fe(CN)_5NO]^{2-}$ (D) $[CoCl_4]^{2-}$ (E) $[Co(H_2O)_3F_3]$ Choose the correct answer from the options given below :

(A) (A), (B) and (D) only
(B) (C) and (E) only
(C) (B) and (D) only
(D) (A), (C) and (E) only

Answer: (C) (B) and (D) only · Key from source paper

Q59 JEE Main 2025 · 29 Jan · Shift 2 MCQ

The calculated spin-only magnetic moments of $K_3[Fe(OH)_6]$ and $K_4[Fe(OH)_6]$ respectively are :

(A) 3.87 and 4.90 B.M.
(B) 4.90 and 5.92 B.M.
(C) 4.90 and 4.90 B.M.
(D) 5.92 and 4.90 B.M.

Answer: (D) 5.92 and 4.90 B.M. · Key from source paper

Q60 JEE Main 2025 · 29 Jan · Shift 2 Numerical

Consider the following low-spin complexes $K_3[Co(NO_2)_6]$, $K_4[Fe(CN)_6]$, $K_3[Fe(CN)_6]$, $Cu_2[Fe(CN)_6]$ and $Zn_2[Fe(CN)_6]$ The sum of the spin-only magnetic moment values of complexes having yellow colour is. _____ B.M. (answer in nearest integer)

Numerical value type: the answer is a number.

Answer: 0. · Key from source paper

Q61 JEE Main 2025 · 28 Jan · Shift 2 MCQ

Match List - I with List - II.

List - I (Complex)	List - II (Hybridisation of central metal ion)
(A) $[CoF_6]^{3-}$	(I) d^2sp^3
(B) $[NiCl_4]^{2-}$	(II) sp^3
(C) $[Co(NH_3)_6]^{3+}$	(III) sp^3d^2
(D) $[Ni(CN)_4]^{2-}$	(IV) dsp^2

Choose the correct answer from the options given below :

(A) (A)-(I), (B)-(IV), (C)-(III), (D)-(II)
(B) (A)-(I), (B)-(II), (C)-(III), (D)-(IV)
(C) (A)-(III), (B)-(IV), (C)-(I), (D)-(II)
(D) (A)-(III), (B)-(II), (C)-(I), (D)-(IV)

Answer: (D) (A)-(III), (B)-(II), (C)-(I), (D)-(IV) · Key from source paper

---

Q62 JEE Main 2025 · 24 Jan · Shift 1 MCQ

One mole of the octahedral complex compound $\mathrm{Co(NH_3)_5Cl_3}$ gives 3 moles of ions on dissolution in water. One mole of the same complex reacts with excess of $\mathrm{AgNO_3}$ solution to yield two moles of $\mathrm{AgCl_{(s)}}$. The structure of the complex is:

(A) $\mathrm{[Co(NH_3)_4Cl_2]\cdot Cl\cdot NH_3}$
(B) $\mathrm{[Co(NH_3)_3Cl_3]\cdot 2NH_3}$
(C) $\mathrm{[Co(NH_3)_5Cl]Cl_2}$
(D) $\mathrm{[Co(NH_3)_4Cl]\cdot Cl_2\cdot NH_3}$

Answer: (C) $\mathrm{[Co(NH_3)_5Cl]Cl_2}$ · Key from source paper

---

Q63 JEE Main 2025 · 24 Jan · Shift 2 MCQ

When Ethane-1,2-diamine is added progressively to an aqueous solution of Nickel (II) chloride, the sequence of colour change observed will be :

(A) Violet $\rightarrow$ Blue $\rightarrow$ Pale Blue $\rightarrow$ Green
(B) Pale Blue $\rightarrow$ Blue $\rightarrow$ Green $\rightarrow$ Violet
(C) Green $\rightarrow$ Pale Blue $\rightarrow$ Blue $\rightarrow$ Violet
(D) Pale Blue $\rightarrow$ Blue $\rightarrow$ Violet $\rightarrow$ Green

Answer: (C) Green $\rightarrow$ Pale Blue $\rightarrow$ Blue $\rightarrow$ Violet · Key from source paper

---

Q64 JEE Main 2025 · 24 Jan · Shift 2 MCQ

The conditions and consequence that favours the $t_{2g}{}^{g}e_{g}{}^{1}$ configuration in a metal complex are

(A) weak field ligand, low spin complex
(B) weak field ligand, high spin complex
(C) strong field ligand, high spin complex
(D) strong field ligand, low spin complex

Answer: (B) weak field ligand, high spin complex · Key from source paper

---

Q65 JEE Main 2025 · 23 Jan · Shift 1 MCQ

The complex that shows Facial - Meridional isomerism is:

(A) $[Co(en)_2Cl_2]^+$
(B) $[Co(en)_3]^{3+}$
(C) $[Co(NH_3)_3Cl_3]$
(D) $[Co(NH_3)_4Cl_2]^+$

Answer: (C) $[Co(NH_3)_3Cl_3]$ · Key from source paper

Q66 JEE Main 2025 · 23 Jan · Shift 1 MCQ

The d- electronic configuration of an octahedral Co(II) complex having magnetic moment of 3.95 BM is:

(A) $t_{2g}^3 e_g^0$
(B) $t_{2g}^6 e_g^1$
(C) $t_{2g}^5 e_g^2$
(D) $e^4 t_2^3$

Answer: (C) $t_{2g}^5 e_g^2$ · Key from source paper

Q67 JEE Main 2025 · 23 Jan · Shift 2 MCQ

Identify the coordination complexes in which the central metal ion has d^4 configuration.

(A) $[FeO_4]^{2-}$

(B) $[Mn(CN)_6]^{3-}$

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

(D) $Cr_2(O-\overset{O}{\overset{\|}{C}}-Me)_4(H_2O)_2$

(E) $[NiF_6]^{2-}$

Choose the correct answer from the options given below :

(A) (B), (C) and (D) only
(B) (C) and (E) only
(C) (B) and (D) only
(D) (A), (B) and (E) only

Answer: (C) (B) and (D) only · Key from source paper

Q68 JEE Main 2025 · 22 Jan · Shift 1 MCQ

In which of the following complexes the CFSE, Δ_o will be equal to zero?

(A) $[Fe(en)_3]Cl_3$
(B) $K_4[Fe(CN)_6]$
(C) $[Fe(NH_3)_6]Br_2$
(D) $K_3[Fe(SCN)_6]$

Answer: (D) $K_3[Fe(SCN)_6]$ · Key from source paper

Q69 JEE Main 2025 · 22 Jan · Shift 1 MCQ

From the magnetic behaviour of $[NiCl_4]^{2-}$ (paramagnetic) and $[Ni(CO)_4]$ (diamagnetic), choose the correct geometry and oxidation state.

(A) $[NiCl_4]^{2-}$: Ni^{II}, tetrahedral $[Ni(CO)_4]$: Ni^{II}, square planar
(B) $[NiCl_4]^{2-}$: Ni^{II}, square planar $[Ni(CO)_4]$: Ni(0) , square planar
(C) $[NiCl_4]^{2-}$: Ni^{II}, tetrahedral $[Ni(CO)_4]$: Ni(0), tetrahedral
(D) $[NiCl_4]^{2-}$: Ni(0), tetrahedral $[Ni(CO)_4]$: Ni(0), square planar

Answer: (C) $[NiCl_4]^{2-}$: Ni^{II}, **tetrahedral** $[Ni(CO)_4]$: **Ni(0), tetrahedral** · Key from source paper

---

Q70 JEE Main 2025 · 22 Jan · Shift 2 MCQ

The correct order of the following complexes in terms of their crystal field stabilization energies is :

(A) $[Co(NH_3)_4]^{2+} < [Co(NH_3)_6]^{2+} < [Co(en)_3]^{3+} < [Co(NH_3)_6]^{3+}$
(B) $[Co(NH_3)_6]^{2+} < [Co(NH_3)_6]^{3+} < [Co(NH_3)_4]^{2+} < [Co(en)_3]^{3+}$
(C) $[Co(en)_3]^{3+} < [Co(NH_3)_6]^{3+} < [Co(NH_3)_6]^{2+} < [Co(NH_3)_4]^{2+}$
(D) $[Co(NH_3)_4]^{2+} < [Co(NH_3)_6]^{2+} < [Co(NH_3)_6]^{3+} < [Co(en)_3]^{3+}$

Answer: (D) $[Co(NH_3)_4]^{2+} < [Co(NH_3)_6]^{2+} < [Co(NH_3)_6]^{3+} < [Co(en)_3]^{3+}$ · Key from source paper

---

Q71 JEE Main 2025 · 22 Jan · Shift 2 MCQ

Identify the homoleptic complex(es) that is/are low spin. (A) $[Fe(CN)_5NO]^{2-}$ (B) $[CoF_6]^{3-}$ (C) $[Fe(CN)_6]^{4-}$ (D) $[Co(NH_3)_6]^{3+}$ (E) $[Cr(H_2O)_6]^{2+}$ Choose the correct answer from the options given below :

(A) (C) only
(B) (C) and (D) only
(C) (A) and (C) only
(D) (B) and (E) only

Answer: (B) (C) and (D) only · Key from source paper

Q72 JEE Main 2025 · 22 Jan · Shift 2 Numerical

The complex of Ni^{2+} ion and dimethyl glyoxime contains _____ number of Hydrogen (H) atoms.

Numerical value type: the answer is a number.

Answer: 14. · Key from source paper

Q73 JEE Main 2024 · 9 Apr · Shift 1 MCQ

Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R). Assertion (A) : The total number of geometrical isomers shown by $[Co(en)_2Cl_2]^+$ complex ion is three. Reason (R): $[Co(en)_2Cl_2]^+$ complex ion has an octahedral geometry. In the light of the above statements, choose the most appropriate answer from the options given below :

(A) Both (A) and (R) are correct but (R) is not the correct explanation of (A)

(B) (A) is not correct but (R) is correct

(C) Both (A) and (R) are correct and (R) is the correct explanation of (A)

(D) (A) is correct but (R) is not correct

Answer: (B) (A) is not correct but (R) is correct · Key from source paper

---

Q74 JEE Main 2024 · 9 Apr · Shift 1 Numerical

Number of ambidentate ligands among the following is _____
$NO_2^-, SCN^-, C_2O_4^{2-}, NH_3, CN^-, SO_4^{2-}, H_2O.$

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q75 JEE Main 2024 · 9 Apr · Shift 2 MCQ

Match List I with List II

List - I	List - II
A. $K_2[Ni(CN)_4]$	I. sp^3
B. $[Ni(CO)_4]$	II. sp^3d^2
C. $[Co(NH_3)_6]Cl_3$	III. dsp^2
D. $Na_3[CoF_6]$	IV. d^2sp^3

Choose the correct answer from the options given below:

(A) A-III, B-I, C-IV, D-II

(B) A-III, B-I, C-II, D-IV

(C) A-I, B-III, C-II, D-IV

(D) A-III, B-II, C-IV, D-I

Answer: (A) A-III, B-I, C-IV, D-II · Key from source paper

Q76 JEE Main 2024 · 9 Apr · Shift 2 MCQ

The coordination environment of Ca^{2+} ion in its complex with $EDTA^{4-}$ is :

(A) tetrahedral
(B) trigonal prismatic
(C) octahedral
(D) square planar

Answer: (C) octahedral · Key from source paper

Q77 JEE Main 2024 · 8 Apr · Shift 1 MCQ

Given below are two statements: Statement I: $N(CH_3)_3$ and $P(CH_3)_3$ can act as ligands to form transition metal complexes. Statement II: As N and P are from same group, the nature of bonding of $N(CH_3)_3$ and $P(CH_3)_3$ is always same with transition metals. In the light of the above statements, choose the most appropriate answer from the options given below:

(A) Statement I is correct but Statement II is incorrect.
(B) Statement I is incorrect but Statement II is correct.
(C) Both Statement I and Statement II are correct.
(D) Both Statement I and Statement II are incorrect.

Answer: (A) Statement I is correct but Statement II is incorrect. · Key from source paper

---

Q78 JEE Main 2024 · 8 Apr · Shift 1 MCQ

Number of Complexes with even number of electrons in t_{2g} orbitals is -

$[Fe(H_2O)_6]^{2+}$, $[Co(H_2O)_6]^{2+}$, $[Co(H_2O)_6]^{3+}$, $[Cu(H_2O)_6]^{2+}$, $[Cr(H_2O)_6]^{2+}$

(A) 2
(B) 3
(C) 1
(D) 5

Answer: (B) 3 · Key from source paper

Q79 JEE Main 2024 · 8 Apr · Shift 1 MCQ

An octahedral complex with the formula $CoCl_3 \cdot nNH_3$ upon reaction with excess of $AgNO_3$ solution gives 2 moles of AgCl. Consider the oxidation state of Co in the complex is ' x '. The value of " $x+n$ " is _____

(A) 6
(B) 8
(C) 3
(D) 5

Answer: (B) 8 · Key from source paper

Q80 JEE Main 2024 · 8 Apr · Shift 2 MCQ

Match List - I with List - II. Choose the correct answer from the options given below :

List - I (Complex ion)	List - II (Spin only magnetic moment in B.M.)
(A) $[\mathrm{Cr(NH_3)_6}]^{3+}$	(I) 4.90
(B) $[\mathrm{NiCl_4}]^{2-}$	(II) 3.87
(C) $[\mathrm{CoF_6}]^{3-}$	(III) 0.0
(D) $[\mathrm{Ni(CN)_4}]^{2-}$	(IV) 2.83

(A) (A)-(II), (B)-(III), (C)-(I), (D)-(IV)
(B) (A)-(II), (B)-(IV), (C)-(I), (D)-(III)
(C) (A)-(I), (B)-(IV), (C)-(II), (D)-(III)
(D) (A)-(IV), (B)-(III), (C)-(I), (D)-(II)

Answer: (B) (A)-(II), (B)-(IV), (C)-(I), (D)-(III) · Key from source paper

Q81 JEE Main 2024 · 8 Apr · Shift 2 Numerical

Total number of unpaired electrons in the complex ions $[\mathrm{Co(NH_3)_6}]^{3+}$ and $[\mathrm{NiCl_4}]^{2-}$ is _____

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q82 JEE Main 2024 · 6 Apr · Shift 1 MCQ

The following complexes $[CoCl(NH_3)_5]^{2+}$, $[Co(CN)_6]^{3-}$, $[Co(NH_3)_5(H_2O)]^{3+}$, $[Cu(H_2O)_4]^{2+}$ The correct order of A, B, C and D in terms of wavenumber of light absorbed is :

(A) C < D < A < B
(B) B < C < A < D
(C) A < C < B < D
(D) D < A < C < B

Answer: (D) D < A < C < B · Key from source paper

Q83 JEE Main 2024 · 6 Apr · Shift 2 MCQ

The correct IUPAC name of $[PtBr_2(PMe_3)_2]$ is :

(A) dibromodi(trimethylphosphine)platinum(II)
(B) bis(trimethylphosphine)dibromoplatinum(II)
(C) dibromobis(trimethylphosphine)platinum(II)
(D) bis[bromo(trimethylphosphine)]platinum(II)

Answer: (C) dibromobis(trimethylphosphine)platinum(II) · Key from source paper

EdLoop JEE

Q84 JEE Main 2024 · 6 Apr · Shift 2 MCQ

Match List - I with List - II.

List - I Reaction	List - II Type of redox reaction
(A) $TiCl_4$	(I) e^2, t_2^0
(B) $[FeO_4]^{2-}$	(II) e^4, t_2^3
(C) $[FeCl_4]^{-}$	(III) e^0, t_2^0
(D) $[CoCl_4]^{2-}$	(IV) e^2, t_2^3

Choose the correct answer from the options given below :

(A) (A)-(III), (B)-(IV), (C)-(II), (D)-(I)

(B) (A)-(IV), (B)-(III), (C)-(I), (D)-(II)

(C) (A)-(III), (B)-(I), (C)-(IV), (D)-(II)

(D) (A)-(I), (B)-(III), (C)-(IV), (D)-(II)

Answer: (C) (A)-(III), (B)-(I), (C)-(IV), (D)-(II) · Key from source paper

Q85 JEE Main 2024 · 6 Apr · Shift 2 Numerical

Consider the following reactions $NiS + HNO_3 + HCl \rightarrow A + NO + S + H_2O$

$A + NH_4OH + H_3C - \underset{\displaystyle |}{C} = N - OH$

$H_3C - C = N - OH \rightarrow B + NH_4Cl + H_2O$ The number of protons that do not involve in hydrogen bonding in the product B is _____.

Numerical value type: the answer is a number.

Answer: 12. · Key from source paper

Q86 JEE Main 2024 · 5 Apr · Shift 1 MCQ

Which one of the following complexes will exhibit the least paramagnetic behaviour? [Atomic number, Cr = 24, Mn = 25, Fe = 26, Co = 27]

(A) $[\mathrm{Cr(H_2O)_6}]^{2+}$

(B) $[\mathrm{Fe(H_2O)_6}]^{2+}$

(C) $[\mathrm{Co(H_2O)_6}]^{2+}$

(D) $[\mathrm{Mn(H_2O)_6}]^{2+}$

Answer: (C) $[\mathrm{Co(H_2O)_6}]^{2+}$ · Key from source paper

Q87 JEE Main 2024 · 5 Apr · Shift 1 MCQ

The correct order of ligands arranged in increasing field strength.

(A) $F^- < Br^- < I^- < NH_3$

(B) $Br^- < F^- < H_2O < NH_3$

(C) $H_2O < -OH < CN^- < NH_3$

(D) $Cl^- < -OH < Br^- < CN^-$

Answer: (B) $Br^- < F^- < H_2O < NH_3$ · Key from source paper

Q88 JEE Main 2024 · 5 Apr · Shift 2 MCQ

The number of complexes from the following with no electrons in the t_2 orbital is

$TiCl_4$, $[MnO_4]^-$, $[FeO_4]^{2-}$, $[FeCl_4]^-$, $[CoCl_4]^{2-}$

(A) 1

(B) 4

(C) 3

(D) 2

Answer: (C) 3 · Key from source paper

Q89 JEE Main 2024 · 5 Apr · Shift 2 MCQ

The metal atom present in the complex MABXL (where A, B, X and L are unidentate ligands and M is metal) involves sp^3 hybridization. The number of geometrical isomers exhibited by the complex is:

(A) 2

(B) 0

(C) 4

(D) 3

Answer: (B) 0 · Key from source paper

Q90 JEE Main 2024 · 4 Apr · Shift 1 MCQ

Number of complexes from the following with even number of unpaired " d " electrons is

$[V(H_2O)_6]^{3+}$, $[Cr(H_2O)_6]^{2+}$, $[Fe(H_2O)_6]^{3+}$, $[Ni(H_2O)_6]^{3+}$, $[Cu(H_2O)_6]^{2+}$ [Given atomic numbers : V = 23, Cr = 24, Fe = 26, Ni = 28Cu = 29]

(A) 2

(B) 1

(C) 4

(D) 5

Answer: (A) 2 · Key from source paper

Q91 JEE Main 2024 · 4 Apr · Shift 1 MCQ

The correct sequence of ligands in the order of decreasing field strength is :

(A) $NCS^- > EDTA^{4-} > CN^- > CO$

(B) $CO > H_2O > F^- > S^{2-}$

(C) $S^{2-} > {}^-OH > EDTA^{4-} > CO$

(D) ${}^-OH > F^- > NH_3 > CN^-$

Answer: (B) $CO > H_2O > F^- > S^{2-}$ · Key from source paper

---

Q92 JEE Main 2024 · 4 Apr · Shift 2 MCQ

If an iron (III) complex with the formula $[Fe(NH_3)_x(CN)_y]^-$ has no electron in its e_g orbital, then the value of $x + y$ is

(A) 4

(B) 5

(C) 6

(D) 3

Answer: (C) 6 · Key from source paper

Q93 JEE Main 2024 · 4 Apr · Shift 2 MCQ

The number of unpaired d-electrons in $[Co(H_2O)_6]^{3+}$ is

(A) 2

(B) 1

(C) 0

(D) 4

Answer: (C) 0 · Key from source paper

Q94 JEE Main 2024 · 1 Feb · Shift 1 MCQ

Which of the following complex is homoleptic?

(A) $Ni(CN)_4^{2-}$

(B) $NiNH_3{}_2Cl_2$

(C) $FeNH_3{}_4Cl_2^+$

(D) $CoNH_3{}_4Cl_2^+$

Answer: (A) $Ni(CN)_4^{2-}$ · Key from source paper

Q95 JEE Main 2024 · 1 Feb · Shift 1 MCQ

Given below are two statements:

Statement (I): A solution of $NiH_2O_6^{2+}$ is green in colour.

Statement (II): A solution of $Ni(CN)_4^{2-}$ is colourless.

In the light of the above statements, choose the most appropriate answer from the options given below:

(A) Both Statement I and Statement II are incorrect
(B) Both Statement I and Statement II are correct
(C) Statement I is incorrect but Statement II is correct
(D) Statement I is correct but Statement II is incorrect

Answer: (B) Both Statement I and Statement II are correct · Key from source paper

---

Q96 JEE Main 2024 · 1 Feb · Shift 2 MCQ

Given below are two statements :

Statement (I) : Dimethyl glyoxime forms a six membered covalent chelate when treated with $\mathrm{NiCl_2}$ solution in presence of $\mathrm{NH_4OH}$.

Statement (II) : Prussian blue precipitate contains iron both in +2 and +3 oxidation states.

In the light of the above statements, choose the most appropriate answer from the options given below:

(A) Statement I is false but Statement II is true
(B) Both Statement I and Statement II are true
(C) Both Statement I and Statement II are false
(D) Statement I is true but Statement II is false

Answer: (A) Statement I is false but Statement II is true · Key from source paper

---

Q97 JEE Main 2024 · 1 Feb · Shift 2 MCQ

$\mathrm{CoNH_3{}_6^{3+}}$ and $\mathrm{CoF_6^{3-}}$ are respectively known as:

(A) Spin free Complex, Spin paired Complex
(B) Spin paired Complex, Spin free Complex
(C) Outer orbital Complex, Inner orbital Complex
(D) Inner orbital Complex, Spin paired Complex

Answer: (B) Spin paired Complex, Spin free Complex · Key from source paper

---

Q98 JEE Main 2024 · 31 Jan · Shift 1 MCQ

The correct statements from the following are:

A. The strength of anionic ligands can be explained by crystal field theory.

B. Valence bond theory does not give a quantitative interpretation of kinetic stability of coordination compounds.

C. The hybridization involved in formation of $[Ni(CN)_4]^{2-}$ complex is dsp^2.

D. The number of possible isomer(s) of cis-$[PtCl_2\ (en)_2]^{2+}$ is one

Choose the correct answer from the options given below:

(A) A, D only
(B) A, C only
(C) B, D only
(D) B, C only

Answer: (D) B, C only · Key from source paper

Q99 JEE Main 2024 · 31 Jan · Shift 1 Numerical

The 'Spin only' Magnetic moment for $[Ni(NH_3)_6]^{2+}$ is _____ $\times 10^{-1}$ BM. (given = Atomic number of Ni : 28)
Round off your answer to the nearest integer.

Numerical value type: the answer is a number.

Answer: 28. · Key from source paper

Q100 JEE Main 2024 · 31 Jan · Shift 2 MCQ

Select the option with correct property:

(A) $NiCO_4$ and $NiCl_4^{2-}$ both diamagnetic
(B) $NiCO_4$ and $NiCl_4^{2-}$ both paramagnetic
(C) $NiCl_4^{2-}$ diamagnetic, $NiCO_4$ paramagnetic
(D) $NiCO_4$ diamagnetic, $NiCl_4^{2-}$ paramagnetic

Answer: (D) $NiCO_4$ diamagnetic, $NiCl_4^{2-}$ paramagnetic · Key from source paper

---

Q101 JEE Main 2024 · 31 Jan · Shift 2 MCQ

Match List I with List II

LIST – I (Complex ion)		LIST – II (Electronic Configuration)
A.	$CrH_2O_6^{3+}$	I. $t_{2g}^2e_g^0$
B.	$FeH_2O_6^{3+}$	II. $t_{2g}^3e_g^0$
C.	$NiH_2O_6^{2+}$	III. $t_{2g}^3e_g^2$
D.	$VH_2O_6^{3+}$	IV. $t_{2g}^6e_g^2$

Choose the correct answer from the options given below :

(A) A-III, B-II, C-IV, D-I
(B) A-IV, B-I, C-II, D-III
(C) A-IV, B-III, C-I, D-II
(D) A-II, B-III, C-IV, D-I

Answer: (D) A-II, B-III, C-IV, D-I · Key from source paper

Q102 JEE Main 2024 · 30 Jan · Shift 1 MCQ

Choose the correct Statements from the following:

(A) Ethane – 1 , 2 – diamine is a chelating ligand.

(B) Metallic aluminium is produced by electrolysis of aluminium oxide in presence of cryolite.

(C) Cyanide ion is used as ligand for leaching of silver.

(D) Phosphine act as a ligand in Wilkinson catalyst.

(E) The stability constants of Ca^{2+} and Mg^{2+} are similar with EDTA complexes.

Choose the correct answer from the options given below:

(A) (B), (C), (E) only

(B) (C), (D), (E) only

(C) (A), (B), (C) only

(D) (A), (D), (E) only

Answer: (C) (A), (B), (C) only · Key from source paper

Q103 JEE Main 2024 · 30 Jan · Shift 2 MCQ

The coordination geometry around the manganese in decacarbonyldimanganese0

(A) Octahedral

(B) Trigonal bipyramidal

(C) Square pyramidal

(D) Square planar

Answer: (A) Octahedral · Key from source paper

Q104 JEE Main 2024 · 30 Jan · Shift 2 Numerical

Number of complexes which show optical isomerism among the following is _____.

cis - $Cr(ox)_2Cl_2^{3-}$, $Co(en)_3^{3+}$, cis - $Pt(en)_2Cl_2^{2+}$, cis - $Co(en)_2Cl_2^{+}$, trans - $Pt(en)_2Cl_2^{2+}$, trans - $Cr(ox)_2Cl_2^{3-}$

Numerical value type: the answer is a number.

Answer: 4. · Key from source paper

Q105 JEE Main 2024 · 29 Jan · Shift 1 MCQ

In which one of the following metal carbonyls, CO forms a bridge between metal atoms?

(A) $[Co_2(CO)_8]$
(B) $[Mn_2(CO)_{10}]$
(C) $[Os_3(CO)_{12}]$
(D) $[Ru_3(CO)_{12}]$

Answer: (A) $[Co_2(CO)_8]$ · Key from source paper

Q106 JEE Main 2024 · 29 Jan · Shift 1 MCQ

Match List I with List II

List I (Substances)	List II (Element Present)
A. Ziegler catalyst	I. Rhodium
B. Blood Pigment	II. Cobalt
C. Wilkinson catalyst	III. Iron
D. Vitamin B12	IV. Titanium

Choose the correct answer from the options given below:

(A) A-II, B-IV, C-I, D-III
(B) A-II, B-III, C-IV, D-I
(C) A-III, B-II, C-IV, D-I
(D) A-IV, B-III, C-I, D-II

Answer: (D) A-IV, B-III, C-I, D-II · Key from source paper

Q107 JEE Main 2024 · 29 Jan · Shift 2 MCQ

The correct IUPAC name of K_2MnO_4 is:

(A) Potassium tetraoxopermanganate (VI)
(B) Potassium tetraoxidomanganate (VI)
(C) Dipotassium tetraoxidomanganate (VII)
(D) Potassium tetraoxidomanganese (VI)

Answer: (B) Potassium tetraoxidomanganate (VI) · Key from source paper

Q108 JEE Main 2024 · 29 Jan · Shift 2 Numerical

Oxidation state of Fe(Iron) in complex formed in Brown ring test.

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q109 JEE Main 2024 · 27 Jan · Shift 1 MCQ

Consider the following complex ions

P = $[FeF_6]^{3-}$, Q = $[V(H_2O)_6]^{2+}$, R = $[Fe(H_2O)_6]^{2+}$

EdLoop JEE

The correct order of the complex ions, according to their spin only magnetic moment values (in B.M.) is :

(A) $R < Q < P$
(B) $R < P < Q$
(C) $Q < R < P$
(D) $Q < P < R$

Answer: (C) $Q < R < P$ · Key from source paper

Q110 JEE Main 2024 · 27 Jan · Shift 2 MCQ

Identify from the following species in which d^2sp^3 hybridization is shown by central atom:

(A) $CoNH_{36}^{3+}$
(B) BrF_5
(C) $Pt(Cl)_4^{2-}$
(D) SF_6

Answer: (A) $CoNH_{36}^{3+}$ · Key from source paper

Q111 JEE Main 2024 · 27 Jan · Shift 2 Numerical

The Spin only magnetic moment value of square planar complex $PtNH_{32}ClNH_2CH_3Cl$ is _____ B.M.

(Nearest integer)

(Given atomic number for Pt = 78)

Numerical value type: the answer is a number.

Answer: 0. · Key from source paper

Q112 JEE Main 2023 · 15 Apr · Shift 1 Numerical

The volume (in mL) of 0.1 M $AgNO_3$ required for complete precipitation of chloride ions present in 20 mL of 0.01 M solution of $[Cr(H_2O)_5Cl]Cl_2$ as silver chloride is _____

Numerical value type: the answer is a number.

Answer: 4. · Key from source paper

Q113 JEE Main 2023 · 15 Apr · Shift 1 Numerical

The homoleptic and octahedral complex of Co^{2+} and H_2O has _____ unpaired electron(s) in the t_{2g} set of orbitals.

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q114 JEE Main 2023 · 13 Apr · Shift 1 MCQ

The mismatched combinations are

A. Chlorophyll- Co

B. Water hardness- EDTA

C. Photography-$[Ag(CN)_2]^-$

D. Wilkinson catalyst-$[(Ph_3P)_3RhCl]$

E. Chelating ligand-D-Penicillamine

Choose the correct answer from the options given below.

(A) A, C and E only

(B) A and C only

(C) A and E only

(D) D and E only

Answer: (B) A and C only · Key from source paper

Q115 JEE Main 2023 · 13 Apr · Shift 2 MCQ

Which of the following complexes will exhibit maximum attraction to an applied magnetic field?

(A) $[Ni(H_2O)_6]^{2+}$

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

(C) $[Zn(H_2O)_6]^{2+}$

(D) $[Co(H_2O)_6]^{2+}$

Answer: (D) $[Co(H_2O)_6]^{2+}$ · Key from source paper

Q116 JEE Main 2023 · 13 Apr · Shift 2 MCQ

The total number of stereoisomers for the complex $[Cr(ox)_2ClBr]^{3-}$ (where ox = oxalate) is

(A) 3

(B) 2

(C) 4

(D) 1

Answer: (A) 3 · Key from source paper

Q117 JEE Main 2023 · 12 Apr · Shift 1 MCQ

Match List I with List II

List I Complex

A. $[Cu(NH_3)_6]^{2+}$

B. $[Ti(H_2O)_6]^{3+}$

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

D. $[NiF_6]^{4-}$

List II $CFSE$ (Δ_0)

I. -0.6

II. -2.0

III. -1.2

IV. -0.4

Choose the correct answer from the options below:

(A) A(III), B(IV), C(I), D(II)

(B) A(I), B(IV), C(II), D(III)

(C) A(I), B(II), C(IV), D(III)

(D) A(II), B(III), C(I), D(IV)

Answer: (B) A(I), B(IV), C(II), D(III) · Key from source paper

---

Q118 JEE Main 2023 · 11 Apr · Shift 1 MCQ

The complex that dissolves in water is

(A) $NH_{43}AsMo_3O_{104}$

(B) $Fe_4Fe(CN)_{63}$

(C) K_3CoNO_{26}

(D) $Fe_3(OH)_2(OAc)_6Cl$

Answer: (D) $Fe_3(OH)_2(OAc)_6Cl$ · Key from source paper

Q119 JEE Main 2023 · 11 Apr · Shift 1 MCQ

The set which does not have ambidentate ligand(s) is

(A) $C_2O_4^{2-}$, ethylene diammine, H_2O

(B) $EDTA^{4-}$, NCS^-, $C_2O_4^{2-}$

(C) NO_2^-, $C_2O_4^{2-}$, $EDTA^{4-}$

(D) $C_2O_4^{2-}$, NO_2^-, NCS^-

Answer: (A) $C_2O_4^{2-}$, ethylene diammine, H_2O · Key from source paper

---

Q120 JEE Main 2023 · 11 Apr · Shift 1 MCQ

Which of the following complex has a possibility to exist as meridional isomer?

(A) $[Co(NH_3)_3(NO_2)_3]$

(B) $[Pt(NH_3)_2Cl_2]$

(C) $[Co(en)_2Cl_2]$

(D) $[Co(en)_3]$

Answer: (A) $[Co(NH_3)_3(NO_2)_3]$ · Key from source paper

EdLoop JEE

Q121 JEE Main 2023 · 11 Apr · Shift 1 · Numerical

The ratio of spin-only magnetic moment values $\mu_{\text{eff}}\text{Cr(CN)}_6^{3-}/\mu_{\text{eff}}\text{CrH}_2\text{O}_6^{3+}$ is _____

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q122 JEE Main 2023 · 11 Apr · Shift 2 · MCQ

If Ni^{2+} is replaced by Pt^{2+} in the complex $[\text{NiCl}_2\ \text{Br}_2]^{2-}$, which of the following properties are expected to get changed?

A. Geometry
B. Geometrical isomerism
C. Optical isomerism
D. Magnetic properties

(A) A and D
(B) A, B and C
(C) B and C
(D) A, B and D

Answer: (D) A, B and D · Key from source paper

Q123 JEE Main 2023 · 11 Apr · Shift 2 · MCQ

Given below are two statements, one is labelled as assertion **A** and the other is labelled as Reason **R**.
assertion **A** : $[\text{CoCl}\ (\text{NH}_3)_5]^{2+}$ absorbs at lower wavelength of light with respect to $[\text{Co}\ (\text{NH}_3)_5(\text{H}_2\text{O})]^{3+}$
Reason **R**: It is because the wavelenght of light absorbed depends on the oxidation state of the metal ion.
In the light of the above statements, choose the correct answer from the options given below:

(A) **A** is false but **R** is true
(B) **A** is true but **R** is false
(C) Both **A** and **R** are true and **R** is the correct explaination of **A**
(D) Both **A** and **R** are true and **R** is NOT the correct explaination of **A**

Answer: (A) A is false but R is true · Key from source paper

Q124 JEE Main 2023 · 11 Apr · Shift 2 · MCQ

The magnetic moment is measured in Bohr Magneton (BM). Spin only magnetic moment of Fe in $[\text{Fe}\ (\text{H}_2\text{O})_6]^{3+}$ and $[\text{Fe}\ (\text{CN})_6]^{3-}$ complexes respectively is:

EdLoop JEE

(A) 6.92 B.M. in both
(B) 3.87 B.M. and1.732 B.M.
(C) 5.92 B.M. and 1.732 B.M.
(D) 4.89 B.M. and 6.92 B.M.

Answer: (C) 5.92 B.M. and 1.732 B.M. · Key from source paper

Q125 JEE Main 2023 · 10 Apr · Shift 1 MCQ

The octahedral diamagnetic low spin complex among the following is

(A) $CoNH_{36}^{3+}$
(B) CoF_6^{3-}
(C) $CoCl_6^{3-}$
(D) $NiCl_4^2$

Answer: (A) $CoNH_{36}^{3+}$ · Key from source paper

Q126 JEE Main 2023 · 10 Apr · Shift 1 Numerical

In potassium ferrocyanide, there are _____ pairs of electrons in the t_{2g} set of orbitals.

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q127 JEE Main 2023 · 10 Apr · Shift 2 MCQ

Match List-I with List-II.
List-I Complex List-II Crystal Field splitting energy (Δ_o)
A. $[Ti(H_2O)_6]^{2+}$ I. -1.2
B. $[V(H_2O)_6]^{2+}$ II. -0.6
C. $[Mn(H_2O)_6]^{3+}$ III. 0
D. $[Fe(H_2O)_6]^{3+}$ IV. -0.8
Choose the correct answer from the options given below:

(A) A-II, B-IV, C-I, D-III
(B) A-IV, B-I, C-III, D-II
(C) A-IV, B-I, C-II, D-III
(D) A-II, B-IV, C-III, D-I

Answer: (C) A-IV, B-I, C-II, D-III · Key from source paper

Q128 JEE Main 2023 · 10 Apr · Shift 2 MCQ

The correct order of the number of unpaired electrons in the given complexes is
(A) $[Fe(CN)_6]^{3-}$
(B) FeF_6^{3-}

(C) CoF_6^{3-}
(D) $Cr(oxalate)_3^{3-}$
(E) $Ni(CO)_4$
Choose the correct answer from the options given below:

(A) $E < A < D < C < B$
(B) $E < A < B < D < C$
(C) $A < E,\ C < B < D$
(D) $A < E < D < C < B$

Answer: (A) $E < A < D < C < B$ · Key from source paper

Q129 JEE Main 2023 · 8 Apr · Shift 1 MCQ

Which of the following complex is octahedral, diamagnetic and the most stable?

(A) $Na_3[CoCl_6]$
(B) $[Ni(NH_3)_6]Cl_2$
(C) $K_3[Co(CN)_6]$
(D) $[Co(H_2O)_6]Cl_2$

Answer: (C) $K_3[Co(CN)_6]$ · Key from source paper

Q130 JEE Main 2023 · 8 Apr · Shift 1 MCQ

The correct order of spin only magnetic moments for the following complex ions is

(A) $[Fe(CN)_6]^{3-} < [CoF_6]^{3-} < [MnBr_4]^{2-} < [Mn(CN)_6]^{3-}$
(B) $[CoF_6]^{3-} < [MnBr_4]^{2-} < [Fe(CN)_6]^{3-} < [Mn(CN)_6]^{3-}$
(C) $[Fe(CN)_6]^{3-} < [Mn(CN)_6]^{3-} < [CoF_6]^{3-} < [MnBr_4]^{2-}$
(D) $[MnBr_4]^{2-} < [CoF_6]^{3-} < [Fe(CN)_6]^{3-} < [Mn(CN)_6]^{3-}$

Answer: (C) $[Fe(CN)_6]^{3-} < [Mn(CN)_6]^{3-} < [CoF_6]^{3-} < [MnBr_4]^{2-}$ · Key from source paper

Q131 JEE Main 2023 · 8 Apr · Shift 2 MCQ

Match List-I with List-II

LIST-I Coordination Complex	LIST-II Number of unpaired electrons
A. $[Cr(CN)_6]^{3-}$	I. 0
B. $[Fe(H_2O)_6]^{2+}$	II. 3
C. $[Co(NH_3)_6]^{3+}$	III. 2
D. $[Ni(NH_3)_6]^{2+}$	IV. 4

Choose the correct answer from the options given below:

(A) A-II, B-IV, C-I, D-III
(B) A-III, B-IV, C-I, D-II
(C) A-II, B-I, C-IV, D-III
(D) A-IV, B-III, C-II, D-I

Answer: (A) A-II, B-IV, C-I, D-III · Key from source paper

Q132 JEE Main 2023 · 8 Apr · Shift 2 Numerical

The observed magnetic moment of the complex $[\mathrm{Mn(NCS)_6}]^{x-}$ is 6.06 BM. The numerical value of x is

Numerical value type: the answer is a number.

Answer: 4. · Key from source paper

Q133 JEE Main 2023 · 6 Apr · Shift 1 MCQ

Given below are two statements, one is labelled as Assertion A and the other is labelled as Reason R.

Assertion A: The spin only magnetic moment value for $\mathrm{Fe(CN)_6^{3-}}$ is 1.74 BM, whereas for [Fe(H2O)6] $\mathrm{FeH_2O_6^{3+}}$ is 5.92 BM.

Reason R: In both complexes, Fe is present in +3 oxidation state.

In the light of the above statements, choose the correct answer from the options given below:

(A) A is false but R is true
(B) A is true but R is false
(C) Both A and R are true but R is NOT the correct explanation of A
(D) Both A and R are true andR is the correct explanation of A

Answer: (C) Both A and R are true but R is NOT the correct explanation of A · Key from source paper

---

Q134 JEE Main 2023 · 6 Apr · Shift 1 Numerical

Number of ambidentate ligands in a representative metal complex $\mathrm{M(en)(SCN)_4}$ is _____ . [en = ethylenediamine]

Numerical value type: the answer is a number.

Answer: 4. · Key from source paper

Q135 JEE Main 2023 · 6 Apr · Shift 2 MCQ

The IUPAC name of $\mathrm{K_3[Co(C_2O_4)_3]}$ is:

(A) Potassium tris(oxalato)cobaltate(III)
(B) Potassium tris(oxalato)cobalt(III)
(C) Potassium trioxalatocobalt(III)
(D) Potassium trioxalatocobaltate(III)

Answer: (D) Potassium trioxalatocobaltate(III) · Key from source paper

---

Q136 JEE Main 2023 · 6 Apr · Shift 2 MCQ

Given below are two statements: one is labelled as "Assertion A" and the other is labelled as "Reason R"

Assertion A : In the complex $\mathrm{Ni(CO)_4}$ and $\mathrm{Fe(CO)_5}$, the metals have zero oxidation state.

Reason R : Low oxidation states are found when a complex has ligands capable of π-donor character in addition to the σ-bonding.

In the light of the above statements, choose the most appropriate answer from the options given below

(A) A is correct but R is not correct
(B) A is not correct but R is correct
(C) Both A and R are correct but R is NOT the correct explanation of A
(D) Both A and R are correct and R is the correct explanation of A

Answer: (A) A is correct but R is not correct · Key from source paper

---

Q137 JEE Main 2023 · 1 Feb · Shift 1 MCQ

Which of the following complex will show largest splitting of d-orbitals?

(A) $\mathrm{FeC_2O_{43}^{3-}}$
(B) $\mathrm{FeF_6^{3-}}$
(C) $\mathrm{Fe(CN)_6^{3-}}$
(D) $\mathrm{FeNH_{36}^{3+}}$

Answer: (C) $\mathrm{Fe(CN)_6^{3-}}$ · Key from source paper

Q138 JEE Main 2023 · 1 Feb · Shift 1 MCQ

Which of the following are the example of double salt?
(A) $\mathrm{FeSO_4 \cdot NH_{4_2}SO_4 \cdot 6H_2O}$
(B) $\mathrm{CuSO_4 \cdot 4NH_3 \cdot H_2O}$
(C) $\mathrm{K_2SO_4 \cdot Al_2SO_{4_3} \cdot 24H_2O}$
(D) $\mathrm{Fe(CN)_2 \cdot 4KCN}$
Choose the correct answer.

(A) A and C only
(B) A and B only
(C) A, B and D only
(D) B and D only

Answer: (A) A and C only · Key from source paper

Q139 JEE Main 2023 · 1 Feb · Shift 2 MCQ

The complex cation which has two isomers is:

(A) $[Co(H_2O)_6]^{3+}$
(B) $[Co(NH_3)_5Cl]^{2+}$
(C) $[Co(NH_3)_5NO_2]^{2+}$
(D) $[Co(NH_3)_5Cl]^{+}$

Answer: (C) $[Co(NH_3)_5NO_2]^{2+}$ · Key from source paper

Q140 JEE Main 2023 · 1 Feb · Shift 2 Numerical

The spin only magnetic moment of $[Mn(H_2O)_6]^{2+}$ complexes is _____ B. M. (Nearest integer)
(Given atomic number of Mn = 25)

Numerical value type: the answer is a number.

Answer: 6. · Key from source paper

Q141 JEE Main 2023 · 31 Jan · Shift 1 MCQ

Cobalt chloride when dissolved in water forms pink colored complex X which has octahedral geometry. This solution on treating with cone HCl forms deep blue complex, Y which has a Z geometry. X, Y and Z, respectively, are

(A) X = $CoH_2O_6^{2+}$, Y = $CoCl_4^{2-}$, Z = Tetrahedral
(B) X = $CoH_2O_6^{2+}$, Y = $CoCl_6^{3-}$, Z = Octahedral
(C) X = $CoH_2O_6^{3+}$, Y = $CoCl_6^{3-}$, Z = Octahedral
(D) X = $CoH_2O_4Cl_2^{+}$, Y = $CoCl_4^{2-}$, Z = Tetrahedral

Answer: (A) X = $CoH_2O_6^{2+}$, Y = $CoCl_4^{2-}$, Z = Tetrahedral · Key from source paper

---

Q142 JEE Main 2023 · 31 Jan · Shift 2 Numerical

If the CFSE of $[Ti(H_2O)_6]^{3+}$ is -96.0 kJ / mol, this complex will absorb maximum at wavelength nm. (nearest integer)
Assume Planck' constant (h) = 6.4×10^{-34} Js, Speed of light (c) = 3.0×10^{8} m/s and Avogadro's constant (N_A) = 6×10^{23} / mol.

Numerical value type: the answer is a number.

Answer: 480. · Key from source paper

Q143 JEE Main 2023 · 30 Jan · Shift 1 MCQ

Which of the following is correct order of ligand field strength?

(A) $CO < en < NH_3 < C_2O_4^{2-} < S^{2-}$

(B) $S^{2-} < C_2O_4^{2-} < NH_3 < en < CO$

(C) $NH_3 < en < CO < S^{2-} < C_2O_4^{2-}$

(D) $S^{2-} < NH_3 < en < CO < C_2O_4^{2-}$

Answer: (B) $S^{2-} < C_2O_4^{2-} < NH_3 < en < CO$ · Key from source paper

Q144 JEE Main 2023 · 30 Jan · Shift 1 MCQ

To inhibit the growth of tumours, identify the compounds used from the following:

(A) EDTA

(B) Coordination Compounds of Pt

(C) D-Penicillamine

(D) Cis - Platin

Choose the correct answer from the option given below:

(A) B and D Only

(B) C and D Only

(C) A and B Only

(D) A and C Only

Answer: (A) B and D Only · Key from source paper

Q145 JEE Main 2023 · 30 Jan · Shift 2 MCQ

Match List I with List II:

List I (Complexes)

(A) $[Ni(CO)_4]$

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

(C) $[Fe\,(NH_3)_6]^{2+}$

(D) $[Fe\,(H_2O)_6]^{2+}$

List II (Hybridisation)

I sp^3

II dsp^2

III $sp^3\,d^2$

IV $d^2\,sp^3$

EdLoop JEE

(A) A - II, B - I, C - III, D - IV
(B) A - I, B - II, C - III, D - IV
(C) A - II, B - I, C - IV, D - III
(D) A - I, B- II, C - IV, D - III

Answer: (D) A - I, B- II, C - IV, D - III · Key from source paper

---

Q146 JEE Main 2023 · 30 Jan · Shift 2 MCQ

1 L, 0.02M solution of $[Co(NH_3)_5SO_4]Br$ is mixed with 1 L, 0.02M solution of $[Co(NH_3)_5Br]SO_4$. The resulting solution is divided into two equal parts (X) and treated with excess $AgNO_3$ solution and $BaCl_2$ solution respectively as shown below:
1 L Solution (X) + $AgNO_3$ solution (excess) $\rightarrow$ Y
1 L Solution (X) + $BaCl_2$ solution (excess) $\rightarrow$ Z
The number of moles of Y and Z respectively are

(A) 0.02, 0.02
(B) 0.01, 0.01
(C) 0.02, 0.01
(D) 0.01, 0.02

Answer: (B) 0.01, 0.01 · Key from source paper

Q147 JEE Main 2023 · 30 Jan · Shift 2 MCQ

The $Cl-Co-Cl$ bond angle values in a fac- $[Co(NH_3)_3Cl_3]$ complex is/are:

(A) 90° & 180°
(B) 90°
(C) 180°
(D) 90° & 120°

Answer: (B) 90° · Key from source paper

Q148 JEE Main 2023 · 29 Jan · Shift 1 MCQ

Chiral complex from the following is :
Here en = ethylene diamine

(A) cis $-[PtCl_2(en)_2]^{2+}$
(B) trans $-[PtCl_2(en)_2]^{2+}$
(C) cis $-[PtCl_2(NH_3)_2]$
(D) trans $-[Co(NH_3)_4Cl_2]^{+}$

Answer: (A) cis $-[PtCl_2(en)_2]^{2+}$ · Key from source paper

Q149 JEE Main 2023 · 29 Jan · Shift 1 Numerical

The sum of bridging carbonyls in $W(CO)_6$ and $Mn_2(CO)_{10}$ is _____ .

Numerical value type: the answer is a number.

Answer: 0. · Key from source paper

Q150 JEE Main 2023 · 29 Jan · Shift 2 MCQ

Correct order of spin only magnetic moment of the following complex ions is:
(Given At. No. Fe : 26, Co : 27)

(A) $[FeF_6]^{3-} > [CoF_6]^{3-} > [Co(C_2O_4)_3]^{3-}$
(B) $[Co(C_2O_4)_3]^{3-} > [CoF_6]^{3-} > [FeF_6]^{3-}$
(C) $[FeF_6]^{3-} > [Co(C_2O_4)_3]^{3-} > [CoF_6]^{3-}$
(D) $[CoF_6]^{3-} > [FeF_6]^{3-} > [Co(C_2O_4)_3]^{3-}$

Answer: (A) $[FeF_6]^{3-} > [CoF_6]^{3-} > [Co(C_2O_4)_3]^{3-}$ · Key from source paper

Q151 JEE Main 2023 · 29 Jan · Shift 2 Numerical

The denticity of the ligand present in the Fehling's reagent is _____ .

Numerical value type: the answer is a number.

Answer: 4. · Key from source paper

Q152 JEE Main 2023 · 25 Jan · Shift 1 Numerical

The number of paramagnetic species from the following is
$[Ni(CN)_4]^{2-}$, $[Ni(CO)_4]$, $[NiCl_4]^{2-}$
$[Fe(CN)_6]^{4-}$, $[Cu(NH_3)_4]^{2+}$
$[Fe(CN)_6]^{3-}$ and $[Fe(H_2O)_6]^{2+}$

Numerical value type: the answer is a number.

Answer: 4. · Key from source paper

Q153 JEE Main 2023 · 25 Jan · Shift 2 MCQ

Match List I with List II

List I Coordination entity	List II Wavelength of light absorbed in nm
A. $[CoCl(NH_3)_5]^{2+}$	I. 310
B. $[Co(NH_3)_6]^{3+}$	II. 475
C. $[Co(CN)_6]^{3-}$	III. 535
D. $[Cu(H_2O)_4]^{2+}$	IV. 600

Choose the correct answer from the options given below :-

(A) A – IV, B – I, C – III, D – II
(B) A – III, B – II, C – I, D – IV
(C) A – III, B – I, C – II, D – IV
(D) A – II, B – III, C – IV, D – I

Answer: (B) A – III, B – II, C – I, D – IV · Key from source paper

---

Q154 JEE Main 2023 · 25 Jan · Shift 2 Numerical

Total number of moles of AgCl precipitated on addition of excess of $AgNO_3$ to one mole each of the following complexes $[Co(NH_3)_4Cl_2]Cl$, $[Ni(H_2O)_6]Cl_2$, $[Pt(NH_3)_2Cl_2]$ and $[Pd(NH_3)_4]Cl_2$ is

Numerical value type: the answer is a number.

Answer: 5. · Key from source paper

Q155 JEE Main 2023 · 24 Jan · Shift 1 MCQ

The primary and secondary valencies of cobalt respectively in $Co(NH_3)_5ClCl_2$ are:

(A) 3 and 5
(B) 2 and 6
(C) 2 and 8
(D) 3 and 6

Answer: (D) 3 and 6 · Key from source paper

Q156 JEE Main 2023 · 24 Jan · Shift 1 Numerical

The d-electronic configuration of $CoCl_4^{2-}$ in tetrahedral crystal field is $e^m t_2^n$. The sum of m and number of unpaired electrons is

Numerical value type: the answer is a number.

Answer: 7. · Key from source paper

Q157 JEE Main 2023 · 24 Jan · Shift 2 MCQ

Which of the following cannot be explained by crystal field theory?

(A) The order of spectrochemical series
(B) Magnetic properties of transition metal complexes
(C) Colour of metal complexes
(D) Stability of metal complexes

Answer: (A) The order of spectrochemical series · Key from source paper

---

Q158 JEE Main 2023 · 24 Jan · Shift 2 MCQ

The hybridization and magnetic behaviour of cobalt ion in $[Co(NH_3)_6]^{3+}$ complex, respectively is

(A) sp^3d^2 and diamagnetic
(B) d^2sp^3 and paramagnetic
(C) d^2sp^3 and diamagnetic
(D) sp^3d^2 and paramagnetic

Answer: (C) d^2sp^3 and diamagnetic · Key from source paper

Q159 JEE Main 2022 · 29 Jul · Shift 1 Numerical

$[Fe(CN)_6]^{3-}$ should be an inner orbital complex. Ignoring the pairing energy, the value of crystal field stabilization energy for this complex is $(-)$ _____ Δ_0.

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q160 JEE Main 2022 · 29 Jul · Shift 2 MCQ

Octahedral complexes of copper II undergo structural distortion (Jahn-Teller). Which one of the given copper II complexes will show the maximum structural distortion?
(en-ethylenediamine; $H_2N-CH_2-CH_2-NH_2$)

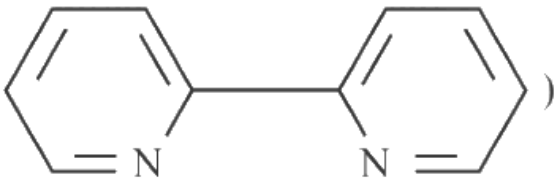
(A) $CuH_2O_6SO_4$
(B) $CuenH_2O_4SO_4$
(C) cis-$Cuen_2Cl_2$
(D) trans-$Cuen_2Cl_2$

Answer: (A) $CuH_2O_6SO_4$ · Key from source paper

Q161 JEE Main 2022 · 29 Jul · Shift 2 Numerical

Sum of oxidation state (magnitude) and coordination number of cobalt in $NaCobpyCl_4$ is
(Given bpy = *(see the figure above)*)

Q58. Sum of oxidation state (magnitude) and coordination number of cobalt in $NaCobpyCl_4$ is

(Given bpy = 

)

Numerical value type: the answer is a number.

Answer: 9. · Key from source paper

Q162 JEE Main 2022 · 28 Jul · Shift 1 Numerical

Total number of relatively more stable isomer(s) possible for octahedral complex $Cuen_2SCN_2$ will be _____

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q163 JEE Main 2022 · 28 Jul · Shift 2 MCQ

Match List-I with List-II

List-I (Complex)

A. $\mathrm{Ni(CO)_4}$

B. $\mathrm{[Ni(CN)_4]^{2-}}$

C. $\mathrm{[Co(CN)_6]^{3-}}$

D. $\mathrm{[CoF_6]^{3-}}$

List-II (Hybridization)

I. $\mathrm{sp^3}$

II. $\mathrm{sp^3d^2}$

III. $\mathrm{d^2sp^3}$

IV. $\mathrm{dsp^2}$

Choose the correct answer from the options given below

(A) A – IV, B – I, C – III, D – II

(B) A – I, B – IV, C – III, D – II

(C) A – I, B – IV, C – II, D – III

(D) A – IV, B – I, C – II, D – III

Answer: (B) A – I, B – IV, C – III, D – II · Key from source paper

---

Q164 JEE Main 2022 · 27 Jul · Shift 1 Numerical

The conductivity of a solution of complex with formula $\mathrm{CoCl_3(NH_3)_4}$ corresponds to 1 : 1 electrolyte, then the primary valency of central metal ion is

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q165 JEE Main 2022 · 27 Jul · Shift 2 MCQ

Low oxidation state of metals in their complexes are common when ligands

(A) have good π-accepting character

(B) have good σ-donor character

(C) are havind good π-donating ability

(D) are havind poor σ-donating ability

Answer: (A) have good π-accepting character · Key from source paper

Q166 JEE Main 2022 · 27 Jul · Shift 2 Numerical

The spin only magnetic moment of the complex present in Fehling's reagent is _____ B.M. (Round off your answer to the nearest integer)

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q167 JEE Main 2022 · 26 Jul · Shift 1 Numerical

The difference between spin only magnetic moment values of $[\mathrm{Co}\,(\mathrm{H_2O})_6]\,\mathrm{Cl_2}$ and $[\mathrm{Cr}\,(\mathrm{H_2O})_6]\,\mathrm{Cl_3}$ is

Numerical value type: the answer is a number.

Answer: 0. · Key from source paper

Q168 JEE Main 2022 · 26 Jul · Shift 2 MCQ

The metal complex that is diamagnetic is (Atomic number : Fe, 26; Cu, 29)

(A) $\mathrm{K_3CuCN_4}$
(B) $\mathrm{K_2CuCN_4}$
(C) $\mathrm{K_3FeCN_4}$
(D) $\mathrm{K_4FeCl_6}$

Answer: (A) $\mathrm{K_3CuCN_4}$ · Key from source paper

Q169 JEE Main 2022 · 25 Jul · Shift 1 Numerical

Consider the following metal complexes :
$\mathrm{CoNH_3^{3+}}$
$\mathrm{CoClNH_{35}^{2+}}$
$\mathrm{Co(CN)_6^{3-}}$
$\mathrm{CoNH_{35}H_2O^{3+}}$
The spin-only magnetic moment value of the complex that absorbs light with shortest wavelength is B.M. (Nearest integer)

Numerical value type: the answer is a number.

Answer: 0. · Key from source paper

Q170 JEE Main 2022 · 25 Jul · Shift 2 MCQ

The correct order of energy of absorption for the following metal complexes is
$\mathrm{A} : [\mathrm{Ni(en)_3}]^{2+}$, $\mathrm{B} : [\mathrm{Ni(NH_3)_6}]^{2+}$, $\mathrm{C} : [\mathrm{Ni(H_2O)_6}]^{2+}$

(A) $C < B < A$
(B) $B < C < A$
(C) $C < A < B$
(D) $A < C < B$

Answer: (A) $C < B < A$ · Key from source paper

Q171 JEE Main 2022 · 29 Jun · Shift 2 MCQ

Given below are two statements .
Statement I : In $CuSO_4 \cdot 5H_2O$, Cu − O bonds are present.
Statement II : In $CuSO_4.\ 5H_2O$, ligands coordinating with Cu (II) ion are O-and S-based ligands.
In the light of the above statements, choose the correct answer from the options given below

(A) Both Statement I and Statement II are correct
(B) Both Statement I and Statement II are incorrect
(C) Statement I is correct but Statement II is incorrect
(D) Statement I is incorrect but Statement II is correct

Answer: (C) Statement I is correct but Statement II is incorrect · Key from source paper

---

Q172 JEE Main 2022 · 29 Jun · Shift 2 Numerical

For the reaction given below:
$CoCl_3.\ xNH_3 + AgNO_3(aq) \rightarrow$
If two equivalents of AgCl precipitate out, then the value of x will be _____

Numerical value type: the answer is a number.

Answer: 5. · Key from source paper

Q173 JEE Main 2022 · 29 Jun · Shift 2 Numerical

Spin only magnetic moment of $[MnBr_6]^{4-}$ is _____ B.M. (round off to the closest integer)

Numerical value type: the answer is a number.

Answer: 6. · Key from source paper

Q174 JEE Main 2022 · 28 Jun · Shift 1 MCQ

Given below are two statements :
Statement I: $[Ni(CN)_4]^{2-}$ is square planar and diamagnetic complex, with dsp^2 hybridization for Ni but $[Ni(CO)_4]$ is tetrahedral, paramagnetic and with sp^3 hybridication for Ni.
Statement II : $[NiCl_4]^{2-}$ and $[Ni(CO)_4]$ both have same d-electron configuration, have same geometry and are paramagnetic.
In light of the above statements, choose the correct answer form the options given below

(A) Both Statement I and Statement II are true.
(B) Statement I is correct but statement II is false.
(C) Statement I is incorrect but statement II is true.
(D) Both Statement I and Statement II are false.

Answer: (D) Both Statement I and Statement II are false. · Key from source paper

Q175 JEE Main 2022 · 28 Jun · Shift 1 Numerical

Number of complexes which will exhibit synergic bonding amongst, $[Cr(CO)_6]$, $[Mn(CO)_5]$ and $[Mn_2(CO)_{10}]$ is

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q176 JEE Main 2022 · 28 Jun · Shift 2 Numerical

$[Fe\,(CN)_6]^{4-}$
$[Fe\,(CN)_6]^{3-}$
$[Ti\,(CN)_6]^{3-}$
$[Ni\,(CN)_4]^{2-}$
$[Co\,(CN)_6]^{3-}$
Among the given complexes, number of paramagnetic complexes is

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q177 JEE Main 2022 · 28 Jun · Shift 2 Numerical

(a) $CoCl_3.\,4NH_3$,
(b) $CoCl_3 \cdot 5\,NH_3$,
(c) $CoCl_3 \cdot 6\,NH_3$ and
(d) $CoCl\,(NO_3)_2 \cdot 5\,NH_3$
Number of complex(es) which will exist in cis-trans form is/are

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q178 JEE Main 2022 · 27 Jun · Shift 1 MCQ

Which of the following will have maximum stabilization due to crystal field?

(A) $[\mathrm{Ti}\,(\mathrm{H_2O})_6]^{3+}$
(B) $[\mathrm{Co}\,(\mathrm{H_2O})_6]^{2+}$
(C) $[\mathrm{Co}\,(\mathrm{CN})_6]^{3-}$
(D) $[\mathrm{Cu}\,(\mathrm{NH_3})_4]^{2+}$

Answer: (C) $[\mathrm{Co}\,(\mathrm{CN})_6]^{3-}$ · Key from source paper

Q179 JEE Main 2022 · 27 Jun · Shift 2 MCQ

Arrange the following coordination compounds in the increasing order of magnetic moments.
(Atomic numbers: Mn = 25; Fe = 26)
A. $[\mathrm{FeF_6}]^{3-}$
B. $[\mathrm{Fe}\,(\mathrm{CN})_6]^{3-}$
C. $[\mathrm{MnCl_6}]^{3-}$ (high spin)
D. $[\mathrm{Mn}\,(\mathrm{CN})_6]^{3-}$
Choose the correct answer from the options given below

(A) A < B < D < C
(B) B < D < C < A
(C) A < C < D < B
(D) B < D < A < C

Answer: (B) B < D < C < A · Key from source paper

Q180 JEE Main 2022 · 26 Jun · Shift 1 Numerical

The spin-only magnetic moment value of an octahedral complex among $\mathrm{CoCl_3 \cdot 4NH_3}$, $\mathrm{NiCl_2 \cdot 6H_2O}$ and $\mathrm{PtCl_4 \cdot 2HCl}$, which upon reaction with excess of $\mathrm{AgNO_3}$ gives 2 moles of AgCl is _____ B.M. (Nearest Integer)

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q181 JEE Main 2022 · 26 Jun · Shift 2 Numerical

Reaction of $[\mathrm{Co(H_2O)_6}]^{2+}$ with excess ammonia and in the presence of oxygen results into a diamagnetic product. Number of electrons present in $\mathrm{t_{2g}}$-orbitals of the product is

Numerical value type: the answer is a number.

Answer: 6. · Key from source paper

Q182 JEE Main 2022 · 25 Jun · Shift 1 MCQ

White precipitate of AgCl dissolves in aqueous ammonia solution due to formation of

(A) $AgNH_{34}Cl_2$
(B) $AgCl_2NH_{32}$
(C) $AgNH_{32}Cl$
(D) $AgNH_3ClCl$

Answer: (C) $AgNH_{32}Cl$ · Key from source paper

Q183 JEE Main 2022 · 25 Jun · Shift 1 Numerical

If $CuH_2O_4^{2+}$ absorbs a light of wavelength $600\ nm$ for d - d transition, then the value of octahedral crystal field splitting energy for $CuH_2O_6^{2+}$ will be _____ $\times 10^{-21}$ J [Nearest integer]
(Given : $h = 6.63 \times 10^{-34} Js$ and $c = 3.08 \times 10^{8}\ ms^{-1}$)

Numerical value type: the answer is a number.

Answer: 766. · Key from source paper

Q184 JEE Main 2022 · 25 Jun · Shift 2 Numerical

Amongst $FeCl_3 \cdot 3H_2O$, K_3FeCN_6 and $CoNH_{3\,6}Cl_3$, the spin-only magnetic moment value of the inner-orbital complex that absorbs light at shortest wavelength is _____ B.M. [nearest integer]

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q185 JEE Main 2022 · 24 Jun · Shift 1 MCQ

Match List - I with List - II :

List-I	List-II
(A) $[PtCl_4]^{2-}$	(I) sp^3d
(B) BrF_5	(II) d^2sp^3
(C) PCl_5	(III) dsp^2
(D) $[Co(NH_3)_6]^{3+}$	(IV) sp^3d^2

Choose the most appropriate answer from the options given below

(A) (A) – (II), (B) – (IV), (C) – (I), (D) – (III)
(B) (A) – (III), (B) – (IV), (C) – (I), (D) – (II)
(C) (A) – (III), (B) – (I), (C) – (IV), (D) – (II)
(D) (A) – (II), (B) – (I), (C) – (IV), (D) – (III)

Answer: (B) (A) – (III), (B) – (IV), (C) – (I), (D) – (II) · Key from source paper

---

Q186 JEE Main 2022 · 24 Jun · Shift 1 Numerical

In the cobalt-carbonyl complex : $[Co_2(CO)_8]$, number of Co – Co bonds is "X" and terminal CO ligands is "Y". X + Y = _____

Numerical value type: the answer is a number.

Answer: 7. · Key from source paper

Q187 JEE Main 2022 · 24 Jun · Shift 2 MCQ

Transition metal complex with highest value of crystal field splitting (Δ_0) will be

(A) $[Mo(H_2O)_6]^{3+}$
(B) $[Cr(H_2O)_6]^{3+}$
(C) $[Os(H_2O)_6]^{3+}$
(D) $[Fe(H_2O)_6]^{3+}$

Answer: (C) $[Os(H_2O)_6]^{3+}$ · Key from source paper

Q188 JEE Main 2021 · 1 Sep · Shift 2 MCQ

The Crystal Field Stabilization Energy (CFSE) and magnetic moment (spin-only) of an octahedral aqua complex of a metal ion M^{Z+} are $-0.8\Delta_0$ and 3.87 BM, respectively. Identify M^{Z+} :

(A) V^{3+}
(B) Co^{2+}
(C) Cr^{3+}
(D) Mn^{4+}

Answer: (B) Co^{2+} · Key from source paper

Q189 JEE Main 2021 · 1 Sep · Shift 2 Numerical

The sum of oxidation states of two silver ions in $[Ag(NH_3)_2][Ag(CN)_2]$ complex is _____.

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q190 JEE Main 2021 · 31 Aug · Shift 1 MCQ

The denticity of an organic ligand, biuret is :

(A) 2
(B) 3
(C) 4
(D) 6

Answer: (A) 2 · Key from source paper

Q191 JEE Main 2021 · 31 Aug · Shift 2 MCQ

Spin only magnetic moment in BM of $FeCO_4C_2O_4^+$ is :

(A) 5.92
(B) 1
(C) 0
(D) 1.73

Answer: (D) 1.73 · Key from source paper

Q192 JEE Main 2021 · 27 Aug · Shift 1 · Numerical

The number of moles of NH_3, that must be added to 2 L of 0.80 M $AgNO_3$ in order to reduce the concentration of Ag^+ ions to 5.0×10^{-8}M($K_{formation}$ for $[Ag(NH_3)_2]^+ = 1.0 \times 10^8$) is _____. (Nearest integer) [Assume no volume change on adding NH_3]

Numerical value type: the answer is a number.

Answer: 4. · Key from source paper

Q193 JEE Main 2021 · 27 Aug · Shift 1 · Numerical

1 mol of an octahedral metal complex with formula $MCl_3 \cdot 2L$ on reaction with excess of $AgNO_3$ gives 1 mol of AgCl. The denticity of Ligand L is _____ (Integer answer)

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q194 JEE Main 2021 · 27 Aug · Shift 2 · Numerical

The number of optical isomers possible for $[Cr\,(C_2O_4)_3]^{3-}$ is:

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q195 JEE Main 2021 · 26 Aug · Shift 2 · MCQ

Arrange the following Cobalt complexes in the order of increasing Crystal Field Stabilization Energy (CFSE) value.
Complexes: $[CoF_6]^{3-}$, $[Co(H_2O)_6]^{2+}$, $[Co(NH_3)_6]^{3+}$ and $[Co(en)_3]^{3+}$ (labelled A, B, C and D respectively)
Choose the correct option :

(A) B < C < D < A
(B) B < A < C < D
(C) A < B < C < D
(D) C < D < B < A

Answer: (C) A < B < C < D · Checked by our team

Q196 JEE Main 2021 · 26 Aug · Shift 2 MCQ

Indicate the complex/complex ion which did not show any geometrical isomerism :

(A) $[Co(NH_3)_4Cl_2]^+$

(B) $[Co(NH_3)_3(NO_2)_3]$

(C) $[Co(CN)_5(NC)]^{3-}$

(D) $[CoCl_2(en)_2]$

Answer: (C) $[Co(CN)_5(NC)]^{3-}$ · Key from source paper

Q197 JEE Main 2021 · 26 Aug · Shift 2 Numerical

The overall stability constant of the complex ion $[Cu(NH_3)_4]^{2+}$ is 2.1×10^{13}. The overall dissociation constant is $y \times 10^{-14}$. Then y is (Nearest integer)

Numerical value type: the answer is a number.

Answer: 5. · Key from source paper

Q198 JEE Main 2021 · 27 Jul · Shift 1 MCQ

The type of hybridisation and magnetic property of the complex $[MnCl_6]^{3-}$, respectively, are:

(A) $sp^3\,d^2$ and diamagnetic

(B) $d^2\,sp^3$ and diamagnetic

(C) $d^2\,sp^3$ and paramagnetic

(D) $sp^3\,d^2$ and paramagnetic

Answer: (D) $sp^3\,d^2$ **and paramagnetic** · Key from source paper

Q199 JEE Main 2021 · 27 Jul · Shift 1 MCQ

The number of geometrical isomers found in the metal complexes $[PtCl_2\,(NH_3)_2]$, $[Ni(CO)_4]$, $[Ru\,(H_2O)_3\,Cl_3]$ and $[CoCl_2\,(NH_3)_4]^+$ respectively, are:

(A) 1, 1, 1, 1

(B) 2, 0, 2, 2

(C) 2, 1, 2, 2

(D) 2, 1, 1, 2

Answer: (B) 2, 0, 2, 2 · Key from source paper

Q200 JEE Main 2021 · 27 Jul · Shift 1 Numerical

The number of geometrical isomers possible in triamminetrinitrocobalt (III) is X and in trioxalatochromate (III) is Y. Then the value of X + Y is _____.

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q201 JEE Main 2021 · 27 Jul · Shift 2 MCQ

Given below are two statements :
Statement I: $[Mn(CN)_6]^{3-}$, $[Fe(CN)_6]^{3-}$ and $[Co(C_2O_4)_3]^{3-}$ are d^2sp^3 hybridised.
Statement II : $[MnCl_6]^{3-}$ and $[FeF_6]^{3-}$ are paramagnetic and have 4 and 5 unpaired electrons, respectively.
In the light of the above statements, choose the correct answer from the options given below:

(A) Statement I is correct but statement II is false
(B) Both statement I and statement II are false
(C) Statement I is incorrect but statement II is true
(D) Both statement I and statement II are are true

Answer: (D) Both statement I and statement II are are true · Key from source paper

Q202 JEE Main 2021 · 27 Jul · Shift 2 Numerical

3 moles of metal complex with formula $Co(en)_2Cl_3$ gives 3 moles of silver chloride on treatment with excess of silver nitrate. The secondary valency of Co in the complex is (Round off to the nearest integer)

Numerical value type: the answer is a number.

Answer: 6. · Key from source paper

Q203 JEE Main 2021 · 25 Jul · Shift 1 MCQ

Which one of the following species responds to an external magnetic field?

(A) $FeH_2O_6^{3+}$
(B) $NiCN_4^{2-}$
(C) $CoCN_6^{3-}$
(D) $NiCO_4$

Answer: (A) $FeH_2O_6^{3+}$ · Key from source paper

Q204 JEE Main 2021 · 25 Jul · Shift 1 Numerical

Three moles of AgCl get precipitated when one mole of an octahedral co-ordination compound with empirical formula $CrCl_3.3NH_3.3H_2O$ reacts with excess of silver nitrate. The number of chloride ions satisfying the secondary valency of the metal ion is _____.

Numerical value type: the answer is a number.

Answer: 0. · Key from source paper

Q205 JEE Main 2021 · 25 Jul · Shift 2 MCQ

Which one of the following metal complexes is most stable?

(A) $[Co(en)(NH_3)_4]\,Cl_2$
(B) $[Co(en)_3]\,Cl_2$
(C) $[Co(en)_2(NH_3)_2]\,Cl_2$
(D) $[Co\,(NH_3)_6]\,Cl_2$

Answer: (B) $[Co(en)_3]\,Cl_2$ · Key from source paper

Q206 JEE Main 2021 · 22 Jul · Shift 1 Numerical

The total number of unpaired electrons present in $[Co(NH_3)_6]Cl_2$ and $[Co(NH_3)_6]Cl_3$ is

Numerical value type: the answer is a number.

Accepted answers: 1 or 3. · Key from source paper

Q207 JEE Main 2021 · 20 Jul · Shift 1 MCQ

According to the valence bond theory the hybridization of central metal atom is dsp^2 for which one of the following compounds?

(A) $NiCl_2 \cdot 6H_2O$
(B) $K_2[Ni(CN)_4]$
(C) $[Ni(CO)_4]$
(D) $Na_2[NiCl_4]$

Answer: (B) $K_2[Ni(CN)_4]$ · Key from source paper

Q208 JEE Main 2021 · 20 Jul · Shift 1 MCQ

The correct order of intensity of colors of the compounds is:

(A) $[Ni(CN)_4]^{2-} > [NiCl_4]^{2-} > [Ni(H_2O)_6]^{2+}$
(B) $[Ni(H_2O)_6]^{2+} > [NiCl_4]^{2-} > [Ni(CN)_4]^{2-}$
(C) $[NiCl_4]^{2-} > [Ni(H_2O)_6]^{2+} > [Ni(CN)_4]^{2-}$
(D) $[NiCl_4]^{2-} > [Ni(CN)_4]^{2-} > [Ni(H_2O)_6]^{2+}$

Answer: (C) $[NiCl_4]^{2-} > [Ni(H_2O)_6]^{2+} > [Ni(CN)_4]^{2-}$ · Key from source paper

Q209 JEE Main 2021 · 20 Jul · Shift 1 Numerical

The spin-only magnetic moment value for the complex $[Co(CN)_6]^{4-}$ is..... BM. (nearest integer value)
[At. no. of Co = 27]

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q210 JEE Main 2021 · 20 Jul · Shift 2 MCQ

Spin only magnetic moment of an octahedral complex of Fe^{2+} in the presence of a strong field ligand in BM is:

(A) 4.89
(B) 2.82
(C) 0
(D) 3.46

Answer: (C) 0 · Key from source paper

Q211 JEE Main 2021 · 20 Jul · Shift 2 Numerical

An aqueous solution of $NiCl_2$ was heated with excess sodium cyanide in presence of strong oxidizing agent to form $[Ni(CN)_6]^{2-}$. The total change in number of unpaired electrons on metal centre is _____ .

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q212 JEE Main 2021 · 18 Mar · Shift 1 MCQ

Match List–I with List– II
List–I
List– II
(a) Chlorophyll (i) Ruthenium
(b) Vitamin–B_{12} (ii) Platinum
(c) Anticancer drug (iii) Cobalt
(d) Grubbs catalyst (iv) Magnesium
Choose the most appropriate answer from the options given below:

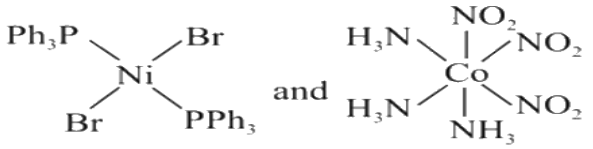
(A) a – iii , b – ii, c – iv, d – i
(B) a – iv, b – iii , c – ii, d – i
(C) a – iv, b – iii, c – i, d – ii
(D) a – iv, b – ii, c – iii, d – i

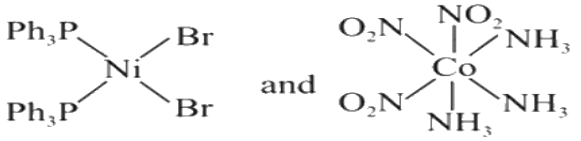
Answer: (B) a – iv, b – iii , c – ii, d – i · Key from source paper

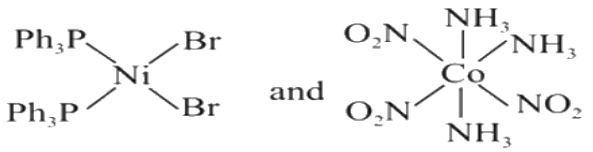
Q213 JEE Main 2021 · 18 Mar · Shift 1 MCQ

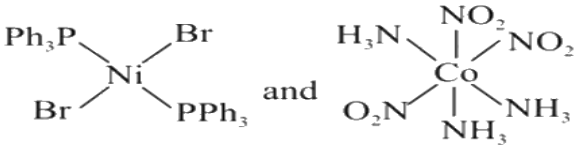
The correct structures of trans -\left[\mathrm{NiBr\,_2(PPh_3)_2}\right] and meridional – $[Co(NH_3)_3(NO_2)_3]$ respectively, are:

Q43. The correct structures of trans $-[NiBr_2(PPh_3)_2]$ and meridional $-[Co(NH_3)_3(NO_2)_3]$ respectively, are:

(1) 

(2) 

(3) 

(4) 

(A) *see figure*

(B) *see figure*

(C) *see figure*

(D) *see figure*

Answer: (D) · Key from source paper

Q214 JEE Main 2021 · 18 Mar · Shift 1 Numerical

The total number of unpaired electrons present in the complex $K_3[Cr(oxalate)_3]$ is _____ .

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q215 JEE Main 2021 · 18 Mar · Shift 2 MCQ

The secondary valency and the number of hydrogen bonded water molecule(s) in $CuSO_4 \cdot 5H_2O$, respectively, are

(A) 6 and 4

(B) 4 and 1

(C) 6 and 5

(D) 5 and 1

Answer: (B) 4 and 1 · Key from source paper

Q216 JEE Main 2021 · 17 Mar · Shift 2 MCQ

Match List-I with List-II :

List-I : a $[Co(NH_3)_6][Cr(CN)_6]$, b $[Co(NH_3)_3(NO_2)_3]$, c $[Cr(H_2O)_6]Cl_3$, d $cis-[CrCl_2(ox)_2]^{3-}$

List-II : i Linkage isomerism, ii Solvate isomerism, iii Co-ordination isomerism, iv Optical isomerism
Choose the correct answer from the options given below:

(A) (a) – (iii), (b) – (i), (c) – (ii), (d) – (iv)
(B) (a) – (iv), (b) – (ii), (c) – (iii), (d) – (i)
(C) (a) – (ii), (b) – (i), (c) – (iii), (d) – (iv)
(D) (a) – (i), (b) – (ii), (c) – (iii), (d) – (iv)

Answer: (A) (a) – (iii), (b) – (i), (c) – (ii), (d) – (iv) · Key from source paper

---

Q217 JEE Main 2021 · 17 Mar · Shift 2 Numerical

On complete reaction of $FeCl_3$ with oxalic acid in aqueous solution containing KOH, resulted in the formation of product A. The secondary valency of Fe in the product A is _____. (Round off to the Nearest Integer).

Numerical value type: the answer is a number.

Answer: 6. · Key from source paper

Q218 JEE Main 2021 · 16 Mar · Shift 1 Numerical

The equivalents of ethylene diamine required to replace the neutral ligands from the coordination sphere of the trans-complex of $CoCl_3 \cdot 4NH_3$ is _____. (Round off to the Nearest Integer).

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q219 JEE Main 2021 · 16 Mar · Shift 2 Numerical

$[Ti(H_2O)_6]^{3+}$ absorbs light of wavelength $498\ nm$ during a d – d transition. The octahedral splitting energy for the above complex is _____ $\times 10^{-19}$ J. (Round off to the Nearest Integer).
$h = 6.626 \times 10^{-34}$ Js; $c = 3 \times 10^8\ ms^{-1}$

Numerical value type: the answer is a number.

Answer: 4. · Key from source paper

Q220 JEE Main 2021 · 26 Feb · Shift 1 Numerical

Number of bridging CO ligands in $[Mn_2(CO)_{10}]$ is _____

Numerical value type: the answer is a number.

Answer: 0. · Key from source paper

Q221 JEE Main 2021 · 26 Feb · Shift 2 Numerical

The number of stereo isomers possible for $[Co(ox)_2(Br)(NH_3)]^{2-}$ is _____. [ox = oxalate]

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q222 JEE Main 2021 · 25 Feb · Shift 1 MCQ

The hybridization and magnetic nature of $[\mathrm{Mn}(\mathrm{CN})_6]^{4-}$ and $[\mathrm{Fe}(\mathrm{CN})_6]^{3-}$, respectively are :

(A) $\mathrm{sp}^3\ \mathrm{d}^2$ and diamagnetic
(B) $\mathrm{d}^2\ \mathrm{sp}^3$ and paramagnetic
(C) $\mathrm{sp}^3\ \mathrm{d}^2$ and paramagnetic
(D) $\mathrm{d}^2\ \mathrm{sp}^3$ and diamagnetic

Answer: (B) $\mathrm{d}^2\ \mathrm{sp}^3$ **and paramagnetic** · Key from source paper

Q223 JEE Main 2021 · 25 Feb · Shift 2 MCQ

In which of the following order the given complex ions are arranged correctly with respect to their decreasing spin only magnetic moment?
(i) $[\mathrm{FeF}_6]^{3-}$
(ii) $[\mathrm{Co}(\mathrm{NH}_3)_6]^{3+}$
(iii) $[\mathrm{NiCl}_4]^{2-}$
(iv) $[\mathrm{Cu}(\mathrm{NH}_3)_4]^{2+}$

(A) (ii) > (i) > (iii) > (iv)
(B) (iii) > (iv) > (ii) > (i)
(C) (i) > (iii) > (iv) > (ii)
(D) (ii) > (iii) > (i) > (iv)

Answer: (C) (i) > (iii) > (iv) > (ii) · Key from source paper

Q224 JEE Main 2021 · 25 Feb · Shift 2 MCQ

Given below are two statements:
Statement I : The identification of Ni^{2+} is carried out by dimethyl glyoxime in the presence of $\mathrm{NH_4\,OH}$.
Statement II :The dimethyl glyoxime is a bidentate neutral ligand.
In the light of the above statements, choose the correct answer from the options given below:

(A) Statement I is false but Statement II is true.
(B) Statement I is true but Statement II is false.
(C) Both Statement I and Statement II are true.
(D) Both Statement I and Statement II are false.

Answer: (B) Statement I is true but Statement II is false. · Key from source paper

Q225 JEE Main 2021 · 24 Feb · Shift 1 Numerical

The stepwise formation of $CuNH_3{}_4^{2+}$ is given below:

$Cu^{2+} + NH_3 \overset{K_1}{\rightleftharpoons} CuNH_3^{2+}$

$CuNH_3^{2+} + NH_3 \overset{K_2}{\rightleftharpoons} CuNH_3{}_2^{2+}$

$CuNH_3{}_2^{2+} + NH_3 \overset{K_3}{\rightleftharpoons} CuNH_3{}_3^{2+}$

$CuNH_3{}_3^{2+} + NH_3 \overset{K_4}{\rightleftharpoons} CuNH_3{}_4^{2+}$

The value of stability constants K_1, K_2, K_3 and K_4 are 10^4, 1.58×10^3, 5×10^2 and 10^2 respectively. The overall equilibrium constants for dissociation of $CuNH_3{}_4^{2+}$ is $x \times 10^{-12}$. The value of x is _____ (Rounded off to the nearest integer)

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q226 JEE Main 2021 · 24 Feb · Shift 2 MCQ

The calculated magnetic moments (spin only value) for species $[FeCl_4]^{2-}$, $[Co(C_2O_4)_3]^{3-}$ and MnO_4^{2-} respectively are:

(A) 4.90, 0 and 1.73 BM

(B) 4.90, 0 and 2.83 BM

(C) 5.82, 0 and 0 BM

(D) 5.92, 4.90 and 0 BM

Answer: (A) 4.90, 0 and 1.73 BM · Key from source paper

Q227 JEE Main 2020 · 6 Sep · Shift 1 MCQ

The species that has a spin-only magnetic moment of 5.9 BM, is :
(T_d =tetrahedral)

(A) $[Ni(CN)_4]^{2-}$ (square planar)

(B) $[NiCl_4]^{2-}$ (T_d)

(C) $Ni(CO)_4(T_d)$

(D) $[MnBr_4]^{2-}$ (T_d)

Answer: (D) $[MnBr_4]^{2-}$ (T_d) · Key from source paper

Q228 JEE Main 2020 · 6 Sep · Shift 2 MCQ

For a d^4 metal ion in an octahedral field, the correct electronic configuration is :

(A) $t_{2g}^3\ e_g^1$ when $\Delta_O < P$
(B) $t_{2g}^3\ e_g^1$ when $\Delta_O > P$
(C) $t_{2g}^4\ e_g^0$ when $\Delta_O < P$
(D) $e_g^2\ t_{2g}^2$ when $\Delta_O < P$

Answer: (A) $t_{2g}^3\ e_g^1$ when $\Delta_O < P$ · Key from source paper

---

Q229 JEE Main 2020 · 5 Sep · Shift 1 MCQ

The values of the crystal field stabilization energies for a high spin d^6 metal ion in octahedral and tetrahedral fields, respectively, are:

(A) $-0.4\ \Delta_o$ and $-0.6\Delta_t$
(B) $-2.4\ \Delta_o$ and $-0.6\ \Delta_t$
(C) $-1.6\ \Delta_o$ and $-0.4\Delta_t$
(D) $-0.4\ \Delta_o$ and $-0.27\ \Delta_t$

Answer: (A) $-0.4\ \Delta_o$ and $-0.6\Delta_t$ · Key from source paper

---

Q230 JEE Main 2020 · 5 Sep · Shift 1 Numerical

The total number of coordination sites in ethylenediaminetetraacetate ($EDTA^{4-}$) is .....

Numerical value type: the answer is a number.

Answer: 6. · Key from source paper

Q231 JEE Main 2020 · 5 Sep · Shift 2 MCQ

Consider the complex ions, trans- $[Co(en)_2Cl_2]^+$ (A) and cis – $[Co(en)_2Cl_2]^+$ (B). The correct statement regarding them is :

(A) both (A) and (B) cannot be optically active.
(B) (A) can be optically active, but (B) cannot be optically active.
(C) both (A) and (B) can be optically active.
(D) (A) cannot be optically active, but (B) can be optically active.

Answer: (D) (A) cannot be optically active, but (B) can be optically active. · Key from source paper

---

Q232 JEE Main 2020 · 5 Sep · Shift 2 Numerical

Considering that $\Delta_0 > P$, the magnetic moment (in BM) of $[Ru(H_2O)_6]^{2+}$ would be

Numerical value type: the answer is a number.

Answer: 0. · Key from source paper

Q233 JEE Main 2020 · 4 Sep · Shift 1 MCQ

The number of isomers possible for $[Pt(en)(NO_2)_2]$ is:

(A) 2
(B) 4
(C) 1
(D) 3

Answer: (D) 3 · Key from source paper

Q234 JEE Main 2020 · 4 Sep · Shift 1 MCQ

The pair in which both the species have the same magnetic moment (spin only) is:

(A) $[\mathrm{Cr}\ (\mathrm{H_2O})_6]^{2+}$ and $[\mathrm{Fe}\ (\mathrm{H_2O})_6]^{2+}$
(B) $[\mathrm{Co}\ (\mathrm{OH})_4]^{2-}$ and $[\mathrm{Fe}\ (\mathrm{NH_3})_6]^{2+}$
(C) $[\mathrm{Mn}\ (\mathrm{H_2O})_6]^{2+}$ and $[\mathrm{Cr}\ (\mathrm{H_2O})_6]^{2+}$
(D) $[\mathrm{Cr}\ (\mathrm{H_2O})_6]^{2+}$ and $[\mathrm{CoCl_4}]^{2-}$

Answer: (A) $[\mathrm{Cr}\ (\mathrm{H_2O})_6]^{2+}$ **and** $[\mathrm{Fe}\ (\mathrm{H_2O})_6]^{2+}$ · Key from source paper

---

Q235 JEE Main 2020 · 4 Sep · Shift 2 MCQ

The molecule in which hybrid MOs involve only one d-robital of the central atom is :

(A) $[\mathrm{Ni(CN)_4}]^{2-}$
(B) $\mathrm{BrF_5}$
(C) $\mathrm{XeF_4}$
(D) $[\mathrm{CrF_6}]^{3-}$

Answer: (A) $[\mathrm{Ni(CN)_4}]^{2-}$ · Key from source paper

---

Q236 JEE Main 2020 · 4 Sep · Shift 2 MCQ

The Crystal Field Stabilization Energy (CFSE) of $[\mathrm{CoF_3(H_2O)_3}](\Delta_0 < \mathrm{P})$ is :

(A) $-0.8\ \Delta_0 + 2\mathrm{P}$
(B) $-0.4\ \Delta_0$
(C) $-0.8\ \Delta_0$
(D) $-0.4\ \Delta_0 + \mathrm{P}$

Answer: (B) $-0.4\ \Delta_0$ · Key from source paper

Q237 JEE Main 2020 · 4 Sep · Shift 2 MCQ

The one that can exhibit highest paramagnetic behaviour among the following is : gly = glycinato; bpy = 2, 2' −bipyridine

(A) $[Pd(gly)_2]$
(B) $[Fe(en)(bpy)(NH_3)_2]^{2+}$
(C) $[Co(OX)_2(OH)_2]^-(\Delta_0 > P)$
(D) $[Ti(NH_3)_6]^{3+}$

Answer: (C) $[Co(OX)_2(OH)_2]^-(\Delta_0 > P)$ · Key from source paper

Q238 JEE Main 2020 · 3 Sep · Shift 1 MCQ

The electronic spectrum of $[Ti\ (H_2O)_6]^{3+}$ shows a single broad peak with a maximum at $20,300\ cm^{-1}$. The crystal field stabilization energy (CFSE) of the complex ion, in $kJmol^{-1}$, is : $(1\ kJmol^{-1} = 83.7\ cm^{-1})$

(A) 145.5
(B) 242.5
(C) 83.7
(D) 97

Answer: (D) 97 · Key from source paper

Q239 JEE Main 2020 · 3 Sep · Shift 1 MCQ

The complex that can show optical activity is :

(A) trans $-[Cr\ (Cl_2)(Ox)_2]^{3-}$
(B) trans $-[Fe\ (NH_3)_2(CN)_4]^-$
(C) cis $-[Fe\ (NH_3)_2(CN)_4]^-$
(D) cis $-[CrCl_2\ (ox)_2]^{3-}$ (ox = oxalate)

Answer: (D) cis $-[CrCl_2\ (ox)_2]^{3-}$ **(ox = oxalate)** · Key from source paper

Q240 JEE Main 2020 · 3 Sep · Shift 2 MCQ

Complex A has a composition of $H_{12}O_6Cl_3\ Cr$. If the complex on treatment with conc. $H_2\ SO_4$ loses 13.5% of its original mass, the correct molecular formulas of A is: [Given : atomic mass of $Cr = 52$ amu and $CI = 35$ amu]

(A) $[Cr(H_2O_6]\ Cl_3$
(B) $[Cr\ (H_2O)_3\ Cl_3] \cdot 3H_2O$
(C) $[Cr\ (H_2O)_5\ Cl]\ Cl_2 \cdot H_2O$
(D) $[Cr\ (H_2O)_4\ Cl_2]Cl \cdot 2H_2O$

Answer: (D) $[Cr\ (H_2O)_4\ Cl_2]Cl \cdot 2H_2O$ · Key from source paper

Q241 JEE Main 2020 · 3 Sep · Shift 2 MCQ

The d-electron configuration of $[Ru(en)_3]\ Cl_2$, and $[Fe\ (H_2O)_6]\ Cl_2$ respectively are:

(A) $t_{2g}^6 e_g^0$ and $t_{2g}^6 e_g^0$
(B) $t_{2g}^4 e_g^2$ and $t_{2g}^6 e_g^0$
(C) $t_{2g}^6 e_g^0$ and $t_{2g}^4 e_g^2$
(D) $t_{2g}^4 e_g^2$ and $t_{2g}^4 e_g^2$

Answer: (C) $t_{2g}^6 e_g^0$ and $t_{2g}^4 e_g^2$ · Key from source paper

Q242 JEE Main 2020 · 2 Sep · Shift 1 MCQ

Consider that d^6 metal ion (M^{2+}) forms a complex with aqua ligands, and the spin only magnetic moment of the complex is 4.90 BM. The geometry and the crystal field stabilization energy of the complex is :

(A) octahedral and $-2.4\Delta_0 + 2P$
(B) tetrahedral and $-0.6\ \Delta_t$
(C) octahedral and $-1.6\Delta_0$
(D) tetrahedral and $-1.6\Delta_t + 1P$

Answer: (B) tetrahedral and $-0.6\ \Delta_t$ · Key from source paper

Q243 JEE Main 2020 · 2 Sep · Shift 1 MCQ

For octahedral Mn(II) and tetrahedral Ni(II) complexes, consider the following statements :
(I) both the complexes can be high spin.
(II) Ni(II) complex can very rarely be of low spin.
(III) with strong field ligands, Mn(II) complexes can be low spin.
(IV) aqueous solution of Mn(II) ions is yellow in color.
The correct statements are :

(A) (I) and (II) only
(B) (I), (II) and (IV) only
(C) (I), (II) and (III) only
(D) (II), (III) and (IV) only

Answer: (C) (I), (II) and (III) only · Key from source paper

Q244 JEE Main 2020 · 2 Sep · Shift 1 Numerical

The oxidation states of iron atoms in compounds (A), (B) and (C), respectively, are x, y and z. Then sum of x, y and z is ..... $Na_4[Fe(CN)_5(NOS)]$ $Na_4[FeO_4]$ $[Fe_2(CO)_9]$

Numerical value type: the answer is a number.

Answer: 6. · Key from source paper

Q245 JEE Main 2020 · 2 Sep · Shift 2 MCQ

Simplified absorption spectra of three complexes ((i) and (ii) and (iii)) of M^{+n} ion are provided below; their λ_{max} values are marked as A, B and C respectively. The correct match between the complexes and their λ_{max} values is:

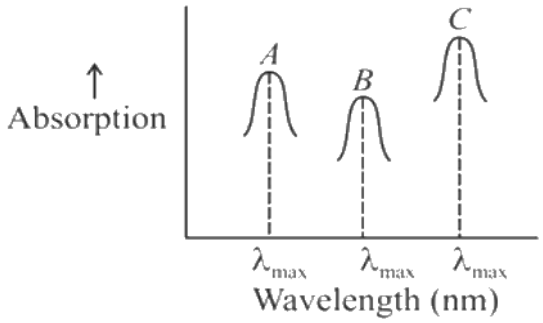
(see the figure above)

(i) $[M(NCS)_6]^{(-6+n)}$

(ii) $[MF_6]^{(-6+n)}$

(iii) $[M(NH_3)_6]^{n+}$

Q39. Simplified absorption spectra of three complexes ((i) and (ii) and (iii)) of M^{+n} ion are provided below; their λ_{max} values are marked as A, B and C respectively. The correct match between the complexes and their λ_{max} values is:



(i) $[M(NCS)_6]^{(-6+n)}$

(ii) $[MF_6]^{(-6+n)}$

(iii) $[M(NH_3)_6]^{n+}$

(1) A – (iii), (B) – (i), C – (ii)

(2) A – (ii), (B) – (i), C – (iii)

(3) A – (ii), (B) – (iii), C – (i)

(4) A – (i), (B) – (ii), C – (iii)

(A) A – (iii), (B) – (i), C – (ii)

(B) A – (ii), (B) – (i), C – (iii)

(C) A – (ii), (B) – (iii), C – (i)

(D) A – (i), (B) – (ii), C – (iii)

Answer: (A) A – (iii), (B) – (i), C – (ii) · Key from source paper

Q246 JEE Main 2020 · 2 Sep · Shift 2 MCQ

The one that is not expected to show isomerism is:

(A) $[Ni\ (NH_3)_4(H_2O)_2]^{2+}$

(B) $[Ni(en)_3]^{2+}$

(C) $[Ni\ (NH_3)_2\ Cl_2]$

(D) $[Pt\ (NH_3)_2\ Cl_2]$

Answer: (C) $[Ni\ (NH_3)_2\ Cl_2]$ · Key from source paper

Q247 JEE Main 2020 · 9 Jan · Shift 1 MCQ

Complex X Of composition $Cr(H_2O)_6Cl_n$ Has a spin only magnetic moment of 3.83 B. M. It reacts with $AgNO_3$ And shows geometrical isomerism. The IUPAC nomenclature of X Is:

(A) Hexaaqua chromium(III) chloride
(B) Tetraaquadichlorido chromium(IV) chloride dihydrate
(C) Dichloridotetraaqua chromium(IV) chloride dihydrate
(D) Tetraaquadichlorido chromium(III) chloride dihydrate

Answer: (D) Tetraaquadichlorido chromium(III) chloride dihydrate · Key from source paper

Q248 JEE Main 2020 · 9 Jan · Shift 1 MCQ

$[Pd(F)(Cl)(Br)(I)]^{2-}$ has n number of geometrical isomers. Then, the spin-only magnetic moment and crystal field stabilization energy [CFSE] of $[Fe(CN)_6]^{n-6}$, respectively, are:
[Note: Ignore the pairing energy]

(A) 2.84 BM and $-16\Delta_0$
(B) 5.92 BM and 0
(C) 1.73 BM and $-2.0\Delta_0$
(D) 0 BM and $-2.4\Delta_0$

Answer: (C) 1.73 BM and $-2.0\Delta_0$ · Key from source paper

Q249 JEE Main 2020 · 9 Jan · Shift 2 MCQ

The correct order of the spin-only magnetic moments of the following complexes is:
(I) $[Cr(H_2O)_6]Br_2$
(II) $Na_4[Fe(CN)_6]$
(III) $Na_3[Fe(C_2O_4)_3](\Delta_0 > P)$
(IV) $(Et_4N)_2[CoCl_4]$

(A) (III) > (I) > (IV) > (II)
(B) (III) > (I) > (II) > (IV)
(C) (I) > (IV) > (III) > (II)
(D) (II) $\approx$ (I) > (IV) > (III)

Answer: (C) (I) > (IV) > (III) > (II) · Key from source paper

Q250 JEE Main 2020 · 9 Jan · Shift 2 MCQ

The isomer(s) of $[Co(NH_3)_4Cl_2]$ that has/ have a $Cl-Co-Cl$ angle of 90°, is/are:

(A) meridional and trans
(B) cis and trans
(C) trans only
(D) cis only

Answer: (D) cis only · Key from source paper

Q251 JEE Main 2020 · 8 Jan · Shift 1 MCQ

The complex that can show fac - and mer -isomers is:

(A) $[Co(NH_3)_4Cl_2]^+$
(B) $[Pt(NH_3)_2Cl_2]$
(C) $[CoCl_2(en)_2]$
(D) $[Co(NH_3)_3(NO_2)_3]$

Answer: (D) $[Co(NH_3)_3(NO_2)_3]$ · Key from source paper

Q252 JEE Main 2020 · 8 Jan · Shift 1 Numerical

The volume (in mL) of 0.125 M $AgNO_3$ required to quantitatively precipitate chloride ions in 0.3g of $[Co(NH_3)_6]Cl_3$ is _____.
${}^{M}[Co(NH_3)_6]Cl_3 = 267.46 g/mol$
${}^{M}AgNO_3 = 169.87 g/mol$
Report the nearest integer as the answer.

Numerical value type: the answer is a number.

Answer: 27. · Key from source paper

Q253 JEE Main 2020 · 8 Jan · Shift 2 MCQ

Among $(a) - (d)$, the complexes that can show geometrical isomerism are:
(a) $[Pt(NH_3)_3Cl]^+$
(b) $[Pt(NH_3)Cl_5]^-$
(c) $[Pt(NH_3)_2Cl(NO_2)]$
(d) $[Pt(NH_3)_4ClBr]^{2+}$

(A) b and c
(B) d and a
(C) c and d
(D) a and b

Answer: (C) c and d · Key from source paper

Q254 JEE Main 2020 · 8 Jan · Shift 2 MCQ

The correct order of the calculated spin-only magnetic moments of complexes (A) to (D) is:
(A) $Ni(CO)_4$
(B) $[Ni(H_2O)_6]Cl_2$
(C) $Na_2[Ni(CN)_4]$
(D) $PdCl_2(PPh_3)_2$

(A) $(A) \approx (C) < (B) \approx (D)$
(B) $(C) < (D) < (B) < (A)$
(C) $(C) \approx (D) < (B) < (A)$
(D) $(A) \approx (C) \approx (D) < (B)$

Answer: (D) $(A) \approx (C) \approx (D) < (B)$ · Key from source paper

Q255 JEE Main 2020 · 7 Jan · Shift 1 MCQ

The IUPAC name of the complex $[\mathrm{Pt(NH_3)_2Cl(NH_2CH_3)]Cl}$ is

(A) Diamminechlorido (methanamine) platinum (II) chloride
(B) Diammine(methanamine)chlorido platinum (II) chloride
(C) Diamminechlorido (aminomethane) platinum (II) chloride
(D) Bisammine (methanamine) chlorido platinum (II) chloride

Answer: (A) Diamminechlorido (methanamine) platinum (II) chloride · Key from source paper

Q256 JEE Main 2020 · 7 Jan · Shift 1 MCQ

The theory that can completely/properly explain the nature of bonding in $[\mathrm{Ni\,(CO)_4}]$ is:

(A) Werner's theory
(B) Molecular orbital theory
(C) Crystal field theory
(D) Valence bond theory

Answer: (B) Molecular orbital theory · Key from source paper

Q257 JEE Main 2020 · 7 Jan · Shift 2 MCQ

The number of possible optical isomers for the complexes $\mathrm{MA_2B_2}$ with $\mathrm{sp^3}$ and $\mathrm{dsp^2}$ hybridized metal atom, respectively, is:
Note: A and B are unidentate neutral and unidentate monoanionic ligands, respectively.

(A) 0 and 2
(B) 2 and 2
(C) 0 and 0
(D) 0 and 1

Answer: (C) 0 and 0 · Key from source paper

Q258 JEE Main 2020 · 7 Jan · Shift 2 MCQ

Among the statements (a) − (d) , the incorrect ones are:
(a) Octahedral Co(III) complexes with strong field ligands have very high magnetic moments
(b) When $\Delta_0 < P$, the d-electron configuration of Co(III) in an octahedral complex is $t_{2g}^4 e_g^2$
(c) Wavelength of light absorbed by $[\mathrm{Co(en)_3}]^{3+}$ is lower than that of $[\mathrm{CoF_6}]^{3-}$
(d) If the Δ_0 for an octahedral complex of Co(III) is $18{,}000\mathrm{cm}^{-1}$, the Δ_t for its tetrahedral complex with the same ligand will be $16{,}000\mathrm{cm}^{-1}$.

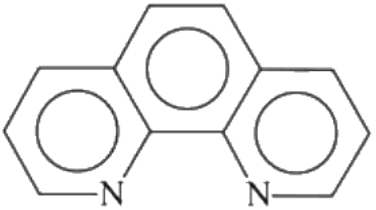
(A) (a) and (d) only
(B) (c) and (d) only
(C) (a) and (b) only
(D) (b) and (c) only

Answer: (A) (a) and (d) only · Key from source paper

Q259 JEE Main 2019 · 12 Apr · Shift 1 MCQ

The complex ion that will lose its crystal field stabilization energy upon oxidation of metal to +3 state is:
(Phen =
(see the figure above)
and ignore pairing energy)

Q53. The complex ion that will lose its crystal field stabilization energy upon oxidation of metal to +3 state is:

(Phen = 

and
ignore pairing energy)

(1) $\mathrm{Niphen_3}^{2+}$
(2) $\mathrm{Fephen_3}^{2+}$
(3) $\mathrm{Cophen_3}^{2+}$
(4) $\mathrm{Znphen_3}^{2+}$

(A) $Niphen_3^{2+}$

(B) $Fephen_3^{2+}$

(C) $Cophen_3^{2+}$

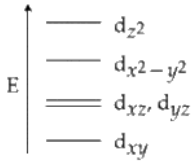
(D) $Znphen_3^{2+}$

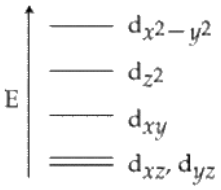
Answer: (B) $Fephen_3^{2+}$ · Key from source paper

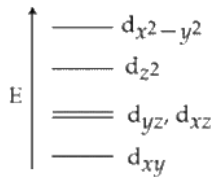
Q260 JEE Main 2019 · 12 Apr · Shift 1 MCQ

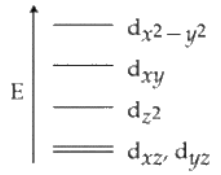
Complete removal of both the axial ligands (along the z - axis) from an octahedral complex leads to which of the following splitting patterns? (relative orbital energies not on scale).

Q54. Complete removal of both the axial ligands (along the z - axis) from an octahedral complex leads to which of the following splitting patterns? (relative orbital energies not on scale).

(1) 

(2) 

(3) 

(4) 

(A) *see figure*

(B) *see figure*

(C) *see figure*

(D) *see figure*

Answer: (D) · Key from source paper

Q261 JEE Main 2019 · 12 Apr · Shift 2 MCQ

The coordination numbers of Co and Al in $[Co(Cl)(en)_2]Cl$ and $K_3[Al(C_2O_4)_3]$, respectively are:
(en = ethane-1, 2-diamine)

(A) 3 and 3

(B) 5 and 3

(C) 5 and 6

(D) 6 and 6

Answer: (C) 5 and 6 · Key from source paper

Q262 JEE Main 2019 · 12 Apr · Shift 2 MCQ

The compound used in the treatment of lead poisoning is:

(A) Desferrioxime B
(B) EDTA
(C) Cis-platin
(D) D−penicillamine

Answer: (B) EDTA · Key from source paper

Q263 JEE Main 2019 · 10 Apr · Shift 1 MCQ

The species that can have a trans-isomer is:
(en = ethane − 1, 2 − diamine, ox = oxalate)

(A) $[Cr(en)_2(ox)]^+$
(B) $[Pt(en)Cl_2]$
(C) $[Zn(en)Cl_2]$
(D) $[Pt(en)_2Cl_2]^{2+}$

Answer: (D) $[Pt(en)_2Cl_2]^{2+}$ · Key from source paper

Q264 JEE Main 2019 · 10 Apr · Shift 1 MCQ

Three complexes,
$[CoCl(NH_3)_5]^{2+}$(I), $[Co(NH_3)_5H_2O]^{3+}$(II) and $[Co(NH_3)_6]^{3+}$(III)
absorb light in the visible region. The correct order of the wavelength of light absorbed by them is:

(A) (II) > (I) > (III)
(B) (III) > (II) > (I)
(C) (I) > (II) > (III)
(D) (III) > (I) > (II)

Answer: (C) (I) > (II) > (III) · Key from source paper

Q265 JEE Main 2019 · 10 Apr · Shift 2 MCQ

The incorrect statement is.

(A) The spin-only magnetic moments of $FeH_2O_6^{2+}$ and $CrH_2O_6^{2+}$ are nearly similar.
(B) The spin-only magnetic moment of $NiNH_{34}H_2O_2^{2+}$ is 2.83 BM .
(C) The gemstone, ruby, has Cr^{3+} ions occupying the octahedral sites of beryl.
(D) The color of $CoClNH_{35}^{2+}$ is violet as it absorbs the yellow light.

Answer: (C) The gemstone, ruby, has Cr^{3+} ions occupying the octahedral sites of beryl. · Key from source paper

---

Q266 JEE Main 2019 · 10 Apr · Shift 2 MCQ

The crystal field stabilization energy (CFSE) of $FeH_2O_6Cl_2$ and K_2NiCl_4, respectively, are:

(A) $-0.4\Delta_o$ and $-1.2\Delta_t$
(B) $-2.4\Delta_o$ and $-1.2\Delta_t$
(C) $-0.4\Delta_o$ and $-0.8\Delta_t$
(D) $-0.6\Delta_o$ and $-0.8\Delta_t$

Answer: (C) $-0.4\Delta_o$ **and** $-0.8\Delta_t$ · Key from source paper

Q267 JEE Main 2019 · 9 Apr · Shift 1 MCQ

The number of water molecules not coordinated to copper ion directly in $CuSO_4 \cdot 5H_2O$, is

(A) 4
(B) 2
(C) 1
(D) 3

Answer: (C) 1 · Key from source paper

Q268 JEE Main 2019 · 9 Apr · Shift 1 MCQ

The degenerate orbitals of $[Cr(H_2O)_6]^{3+}$ are

(A) $d_{x^2-y^2}$ and d_{xy}.
(B) d_{z^2} and d_{xz}.
(C) d_{yz} and d_{z^2}.
(D) d_{xz} and d_{yz}.

Answer: (D) d_{xz} **and** d_{yz}. · Key from source paper

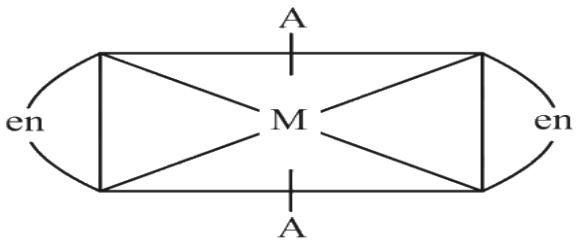
Q269 JEE Main 2019 · 9 Apr · Shift 1 MCQ

The one that will show optical activity is (en =ethane$-$1, 2$-$diamine)
(see the figure above)

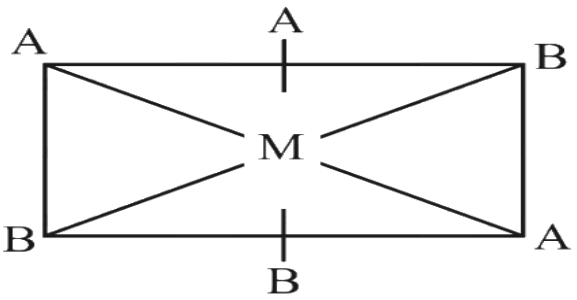
EdLoop JEE

Q54. The one that will show optical activity is
(en =ethane−1, 2−diamine)

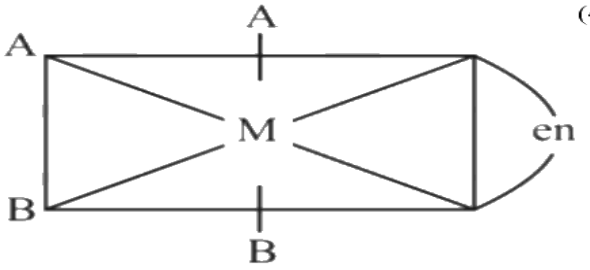
(1)



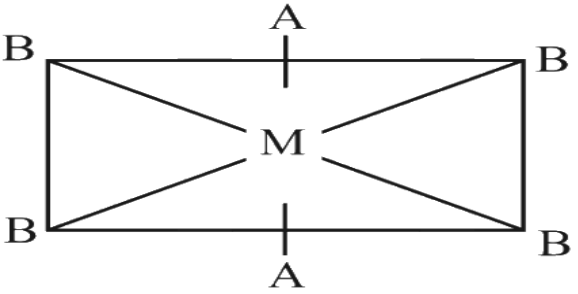
(2)



(3)



(4)



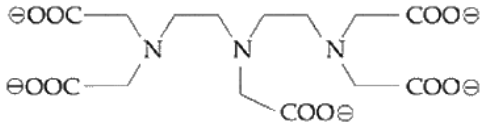
(A) *see figure*
(B) *see figure*
(C) *see figure*
(D) *see figure*

Answer: (C) · Key from source paper

Q270 JEE Main 2019 · 9 Apr · Shift 2 MCQ

The maximum possible denticities of a ligand given below towards a common transition and inner-transition metal ion, respectively, are:
(see the figure above)

Q49. The maximum possible denticities of a ligand given below towards a common transition and inner-transition metal ion, respectively, are:



(1) 8 and 6
(2) 6 and 6
(3) 8 and 8
(4) 6 and 8

(A) 8 and 6
(B) 6 and 6
(C) 8 and 8
(D) 6 and 8

Answer: (D) 6 and 8 · Key from source paper

Q271 JEE Main 2019 · 9 Apr · Shift 2 MCQ

The correct statements among I to III are:
(I) Valence bond theory cannot explain the color exhibited by transition metal complexes.
(II) Valence bond theory can predict quantitatively the magnetic properties of transition metal complexes.
(III) Valence bond theory cannot distinguish ligands as weak and strong field ones.

(A) (I) and (II) only
(B) (II) and (III) only
(C) (I) and (III) only
(D) (I), (II) and (III)

Answer: (C) (I) and (III) only · Checked by our team

Q272 JEE Main 2019 · 8 Apr · Shift 1 MCQ

The correct order of the spin -only magnetic moment of metal ions in the following low-spin complexes, $[V(CN)_6]^{4-}$, $[Fe(CN)_6]^{4-}$, $[Ru(NH_3)_6]^{3+}$ and $[Cr(NH_3)_6]^{2+}$, is:

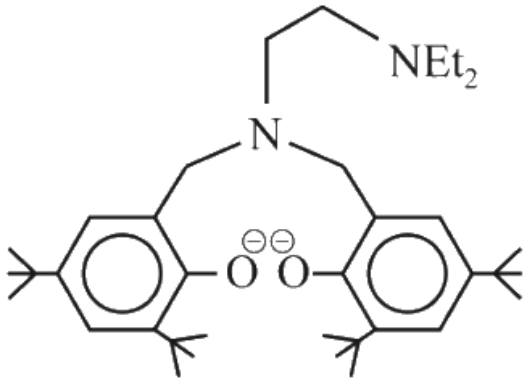
(A) $V^{2+} > Cr^{2+} > Ru^{3+} > Fe^{2+}$
(B) $Cr^{2+} > V^{2+} > Ru^{3+} > Fe^{2+}$
(C) $Cr^{2+} > Ru^{3+} > Fe^{2+} > V^{2+}$
(D) $V^{2+} > Ru^{3+} > Cr^{2+} > Fe^{2+}$

Answer: (A) $V^{2+} > Cr^{2+} > Ru^{3+} > Fe^{2+}$ · Key from source paper

Q273 JEE Main 2019 · 8 Apr · Shift 1 MCQ

The following ligand is:
(see the figure above)

Q53. The following ligand is:



(1) tridentate (2) hex dentate (3) bidentate (4) tetradentate

(A) tridentate
(B) hex dentate
(C) bidentate
(D) tetradentate

Answer: (D) tetradentate · Key from source paper

Q274 JEE Main 2019 · 8 Apr · Shift 2 MCQ

The compound that inhibits the growth of tumors is:

(A) trans - $\mathrm{PtCl_2NH_{3_2}}$
(B) cis - $\mathrm{PtCl_2NH_{3_2}}$
(C) cis - $\mathrm{PdCl_2NH_{3_2}}$
(D) trans - $\mathrm{PdCl_2NH_{3_2}}$

Answer: (B) cis - $\mathrm{PtCl_2NH_{3_2}}$ · Key from source paper

---

Q275 JEE Main 2019 · 8 Apr · Shift 2 MCQ

The calculated spin-only magnetic moments BM of the anionic and cationic species of $\mathrm{FeH_2O_6^{+2}}$ and $\mathrm{Fe\ CN_6^{4-}}$ respectively, are:

(A) 0 and 4.9
(B) 2.84 and 5.92
(C) 4.9 and 0
(D) 0 and 5.92

Answer: (A) 0 and 4.9 · Key from source paper

Q276 JEE Main 2019 · 12 Jan · Shift 1 MCQ

The metal's $d-$ orbitals that are directly facing the ligands in $K_3[Co(CN)_6]$ are:

(A) d_{xy}, d_{xz} and d_{yz}
(B) $d_{x^2-y^2}$ and d_{z^2}
(C) d_{xy} and $d_{x^2-y^2}$
(D) d_{xz}, d_{yz} and d_{z^2}

Answer: (B) $d_{x^2-y^2}$ and d_{z^2} · Key from source paper

---

Q277 JEE Main 2019 · 12 Jan · Shift 1 MCQ

$Mn_2(CO)_{10}$ is an organometallic compound due to the presence of:

(A) $Mn - O$ bond
(B) $Mn - Mn$ bond
(C) $C - O$ bond
(D) $Mn - C$ bond

Answer: (D) $Mn - C$ **bond** · Key from source paper

Q278 JEE Main 2019 · 12 Jan · Shift 2 MCQ

The magnetic moment of an octahedral homoleptic Mn(II) complex is 5 .9 B. M. . The suitable ligand for this complex is:

(A) CN^-
(B) CO
(C) Ethylenediamine
(D) NCS^-

Answer: (D) NCS^- · Key from source paper

Q279 JEE Main 2019 · 11 Jan · Shift 1 MCQ

Match the metals (column I) with the coordination compound(s)/enzyme(s) (column II) :
(column I) Metals
(A) Co
(B) Zn
(C) Rh
(D) Mg
(column II) Coordination compound(s)/enzyme(s)
(i) Wilkinson catalyst
(ii) Chlorophyll
(iii) Vitamin B_{12}
(iv) Carbonic anhydrase

(A) (A)-(iii); (B)-(iv); (C)-(i); (D)-(ii)
(B) (A)-(i); (B)-(ii); (C)-(iii); (D)-(iv)
(C) (A)-(ii); (B)-(i); (C)-(iv); (D)-(iii)
(D) (A)-(iv); (B)-(iii); (C)-(i); (D)-(ii)

Answer: (A) (A)-(iii); (B)-(iv); (C)-(i); (D)-(ii) · Key from source paper

---

Q280 JEE Main 2019 · 11 Jan · Shift 2 MCQ

The coordination number of Th in K_4 [$Th(C_2O_4)_4(H_2O)_2$] is: ($C_2O_4^{2-}$ = oxalato)

(A) 14
(B) 6
(C) 8
(D) 10

Answer: (D) 10 · Key from source paper

Q281 JEE Main 2019 · 11 Jan · Shift 2 MCQ

The number of bridging CO ligand(s) and Co-Co bond(s) in $Co_2(CO)_8$, respectively are:

(A) 2 and 1
(B) 2 and 0
(C) 0 and 2
(D) 4 and 0

Answer: (A) 2 and 1 · Key from source paper

Q282 JEE Main 2019 · 10 Jan · Shift 1 MCQ

The total number of isomers for a square planar complex: $[MCl(F)(NO_2)(SCN)]$ is:

(A) 12
(B) 16
(C) 4
(D) 8

Answer: (A) 12 · Key from source paper

Q283 JEE Main 2019 · 10 Jan · Shift 1 MCQ

Wilkinson catalyst is

(A) $[(Et_3\ P)_3\ IrCl]$ $(Et = C_2H_5)$
(B) $[(Ph_3\ P)_3\ RhCl]$
(C) $[(Ph_3\ P)_3\ IrCl]$
(D) $[(Et_3\ P)_3\ RhCl]$

Answer: (B) $[(Ph_3\ P)_3\ RhCl]$ · Key from source paper

Q284 JEE Main 2019 · 10 Jan · Shift 2 MCQ

A reaction of cobalt (III) chloride and ethylenediamine in a $1\ :\ 2$ mole ratio generates two isomeric products A (violet-coloured) and B (green-coloured). A can show optical activity, but, B is optically inactive. What type of isomers do A and B represent?

(A) Coordination isomers
(B) Linkage isomers
(C) Ionisation isomers
(D) Geometrical isomers

Answer: (D) Geometrical isomers · Key from source paper

Q285 JEE Main 2019 · 10 Jan · Shift 2 MCQ

The difference in the number of unpaired electrons of a metal ion in its high-spin and low-spin octahedral complexes is two. The metal ion is:

(A) Fe^{2+}
(B) Co^{2+}
(C) Ni^{2+}
(D) Mn^{2+}

Answer: (B) Co^{2+} · Key from source paper

Q286 JEE Main 2019 · 9 Jan · Shift 1 MCQ

Two complexes $CrH_2O_6\ Cl_3$ A and $CrNH_3{}_6Cl_3$ B are violet and yellow coloured, respectively, The incorrect statement regarding them is:

(A) Both are paramagnetic with three unpaired electrons
(B) Δ_0 value of A is less than that of B
(C) Δ_0 values of A and B are calculated from the energies violet and yellow light, respectively.
(D) Both absorb energies corresponding to their complementary colors.

Answer: (C) Δ_0 values of A and B are calculated from the energies violet and yellow light, respectively. · Key from source paper

Q287 JEE Main 2019 · 9 Jan · Shift 2 MCQ

Homoleptic octahedral complexes of a metal ion M^{3+} with three monodentate ligands L_1, L_2 and L_3 absorb wavelengths in the region of green, blue and red respectively. The increasing order of the ligand strength is:

(A) $L_3 > L_1 > L_2$.
(B) $L_1 > L_2 > L_3$.
(C) $L_2 > L_1 > L_3$.
(D) $L_3 > L_2 > L_1$.

Answer: (C) $L_2 > L_1 > L_3$. · Key from source paper

Q288 JEE Main 2019 · 9 Jan · Shift 2 MCQ

The complex that has highest crystal field splitting energy (Δ) , is:

(A) $K_3[Co(CN)_6]$
(B) $[Co(NH_3)_5Cl\,]\,Cl_2$
(C) $[Co(NH_3)_5(H_2O)]Cl_3$
(D) $K_2[CoCl_4]$

Answer: (A) $K_3[Co(CN)_6]$ · Key from source paper

Q289 JEE Main 2018 · 16 Apr · Online MCQ

In Wilkinson's catalyst, the hybridization of central metal ion and its shape are respectively:

(A) sp^3d, trigonal bipyramidal
(B) d^2sp^3, octahedral
(C) dsp^2, square planar
(D) sp^3, tetrahedral

Answer: (C) dsp^2, **square planar** · Key from source paper

Q290 JEE Main 2018 · 16 Apr · Online MCQ

Which of the following complexes will show geometrical isomerism?

(A) Potassium tris(oxalato)chromate(III)
(B) Pentaaquachlorochromium(II)chloride
(C) Aquachlorobis(ethylenediamine)cobalt(II)chloride
(D) Potassiumamminetrichloroplatinate(II)

Answer: (C) Aquachlorobis(ethylenediamine)cobalt(II)chloride · Key from source paper

Q291 JEE Main 2018 · 15 Apr · Shift 1 MCQ

The correct combination is :

(A) $[NiCl_4]^{2-}$ - square-planar; $[Ni(CN)_4]^{2-}$ - paramagnetic
(B) $[Ni(CN)_4]^{2-}$-tetrahedral; $[Ni(CO)_4]$ - paramagnetic
(C) $[NiCl_4]^{2-}$ - paramagnetic; $[Ni(CO)_4]$ - tetrahedral
(D) $[NiCl_4]^{2-}$ - dimagnetic (sic); $[Ni(CO)_4]$ -square-planar

Answer: (C) $[NiCl_4]^{2-}$ **- paramagnetic;** $[Ni(CO)_4]$ **- tetrahedral** · Key from source paper

Q292 JEE Main 2018 · 15 Apr · Shift 2 MCQ

The correct order of spin-only magnetic moments among the following is: (Atomic number: Mn = 25, Co = 27, Ni = 28, Zn = 30)

(A) $[ZnCl_4]^{2-} > [NiCl_4]^{2-} > [CoCl_4]^{2-} > [MnCl_4]^{2-}$
(B) $[CoCl_4]^{2-} > [MnCl_4]^{2-} > [NiCl_4]^{2-} > [ZnCl_4]^{2-}$
(C) $[NiCl_4]^{2-} > [CoCl_4]^{2-} > [MnCl_4]^{2-} > [ZnCl_4]^{2-}$
(D) $[MnCl_4]^{2-} > [CoCl_4]^{2-} > [NiCl_4]^{2-} > [ZnCl_4]^{2-}$

Answer: (D) $[MnCl_4]^{2-} > [CoCl_4]^{2-} > [NiCl_4]^{2-} > [ZnCl_4]^{2-}$ · Key from source paper

Q293 JEE Main 2018 · 15 Apr · Shift 2 MCQ

The total number of possible isomers for squareplanar $[Pt(Cl)\,(NO_2)\,(NO_3)(SCN)]^{2-}$ is:

(A) 16
(B) 12
(C) 8
(D) 24

Answer: (B) 12 · Key from source paper

Q294 JEE Main 2018 · 8 Apr · Offline MCQ

Consider the following reaction and statements:
$[Co\,(NH_3)_4\,Br_2]^+ + Br^- \rightarrow [Co\,(NH_3)_3\,Br_3] + NH_3$
(i) Two isomers are produced if the reactant complex ion is a cis-isomer.
(ii) Two isomers are produced if the reactant complex ion is a trans-isomer.
(iii) Only one isomer is produced if the reactant complex ion is a trans-isomer.
(iv) Only one isomer is produced if the reactant complex ion is a cis-isomer.
The correct statements are

(A) (ii) and (iv)
(B) (i) and (ii)
(C) (i) and (iii)
(D) (iii) and (iv)

Answer: (C) (i) and (iii) · Key from source paper

Q295 JEE Main 2018 · 8 Apr · Offline MCQ

The oxidation states of Cr in $[Cr\,(H_2O)_6]\,Cl_3$, $[Cr\,(C_6H_6)_2]$ and $K_2[Cr\,(CN)_2(O)_2(O_2)(NH_3)\,]$, respectively, are:

(A) $+3,\ 0$ and $+4$
(B) $+3,\ +4$ and $+6$
(C) $+3,\ +2$ and $+4$
(D) $+3,\ 0$ and $+6$

Answer: (D) $+3,\ 0$ and $+6$ · Key from source paper

Q296 JEE Main 2017 · 9 Apr · Online MCQ

$[Co_2(CO)_8]$ displays

(A) no Co - Co bonds, six terminal CO and two bridging CO.
(B) no Co - Co bonds, four terminal CO and four bridging CO.
(C) one Co - Co bonds, six terminal CO and two bridging CO.
(D) one Co - Co bonds, four terminal CO and four bridging CO.

Answer: (C) one Co - Co bonds, six terminal CO and two bridging CO. · Key from source paper

Q297 JEE Main 2017 · 2 Apr · Offline MCQ

On treatment of $100\ \text{mL}$ of $0.1\ \text{M}$ solution of $CoCl_3.6H_2O$ with excess $AgNO_3$; 1.2×10^{22} ions are precipitated. The complex is:

(A) $CoH_2O_3Cl_3.3H_2O$
(B) $CoH_2O_6Cl_3$
(C) $CoH_2O_5ClCl_2.H_2O$
(D) $CoH_2O_4Cl_2Cl.2H_2O$

Answer: (C) $CoH_2O_5ClCl_2.H_2O$ · Key from source paper

Q298 JEE Main 2016 · 10 Apr · Online MCQ

Which of the following is an example of homoleptic complex?

(A) $[Co(NH_3)_6]Cl_3$
(B) $[Pt(NH_3)_2Cl_2]$
(C) $[Co(NH_3)_4Cl_2]$
(D) $[Co(NH_3)_5Cl]Cl_2$

Answer: (A) $[Co(NH_3)_6]Cl_3$ · Key from source paper

Q299 JEE Main 2016 · 9 Apr · Online MCQ

Which one of the following complexes will consume more equivalents of aqueous solution of $AgNO_3$?

(A) $Na_2[CrCl_5(H_2O)]$
(B) $Na_3[CrCl_6]$
(C) $[Cr(H_2O)_5Cl]Cl_2$
(D) $[Cr(H_2O)_6]Cl_3$

Answer: (D) $[Cr(H_2O)_6]Cl_3$ · Key from source paper

Q300 JEE Main 2016 · 9 Apr · Online MCQ

Identify the correct trend given below:
(Atomic No. = Ti : 22, Cr : 24 and Mo : 42)

(A) Δ of $[Cr(H_2O)_6]^{2+} > [Mo(H_2O)_6]^{2+}$ and Δ of $[Ti(H_2O)_6]^{3+} > [Ti(H_2O)_6]^{2+}$
(B) Δ of $[Cr(H_2O)_6]^{2+} > [Mo(H_2O)_6]^{2+}$ and Δ of $[Ti(H_2O)_6]^{3+} < [Ti(H_2O)_6]^{2+}$
(C) Δ of $[Cr(H_2O)_6]^{2+} < [Mo(H_2O)_6]^{2+}$ and Δ of $[Ti(H_2O)_6]^{3+} > [Ti(H_2O)_6]^{2+}$
(D) Δ of $[Cr(H_2O)_6]^{2+} < [Mo(H_2O)_6]^{2+}$ and Δ of $[Ti(H_2O)_6]^{3+} < [Ti(H_2O)_6]^{2+}$

Answer: (C) Δ of $[Cr(H_2O)_6]^{2+} < [Mo(H_2O)_6]^{2+}$ and Δ of $[Ti(H_2O)_6]^{3+} > [Ti(H_2O)_6]^{2+}$ · Key from source paper

Q301 JEE Main 2016 · 3 Apr · Offline MCQ

Which one of the following complexes shows optical isomerism? (en=ethylendiamine)

(A) trans $[Co(en)_2\ Cl_2]\ Cl$
(B) $[Co(NH_3)_4\ Cl_2]\ Cl$
(C) $[Co\ (NH_3)_3\ Cl_3]$
(D) cis $[Co(en)_2\ Cl_2]Cl$

Answer: (D) cis $[Co(en)_2\ Cl_2]Cl$ · Key from source paper

Q302 JEE Main 2016 · 3 Apr · Offline MCQ

The pair having the same magnetic moment is:
[At. No. : Cr = 24, Mn = 25, Fe = 26, Co = 27]

(A) $[Mn\ (H_2O)_6]^{2+}$ and $[Cr(H_2O)_6]^{2+}$
(B) $[CoCl_4]^{2-}$ and $[Fe(H_2O)_6]^{2+}$
(C) $[Cr(H_2O)_6]^{2+}$ and $[CoCl_4]^{2-}$
(D) $[Cr(H_2O)_6]^{2+}$ and $[Fe(H_2O)_6]^{2+}$

Answer: (D) $[Cr(H_2O)_6]^{2+}$ and $[Fe(H_2O)_6]^{2+}$ · Key from source paper

Q303 JEE Main 2015 · 11 Apr · Online MCQ

Which of the following complex ions has electrons that are symmetrically filled in both t_{2g} and e_g orbitals?

(A) $[Co(NH_3)_6]^{2+}$
(B) $[Mn(CN)_6]^{4-}$
(C) $[CoF_6]^{3-}$
(D) $[FeF_6]^{3-}$

Answer: (D) $[FeF_6]^{3-}$ · Key from source paper

Q304 JEE Main 2015 · 11 Apr · Online MCQ

When concentrated HCl is added to aqueous solution of $CoCl_2$, its colour changes from reddish pink to deep blue. Which complex ion gives blue colour in reaction?

(A) $[CoCl_6]^{4-}$
(B) $[CoCl_6]^{3-}$
(C) $[Co(H_2O)_6]^{2+}$
(D) $[CoCl_4]^{2-}$

Answer: (D) $[CoCl_4]^{2-}$ · Key from source paper

Q305 JEE Main 2015 · 10 Apr · Online MCQ

Which molecule/ion among the following cannot act as a ligand in complex compounds?

(A) CN^-
(B) CH_4
(C) CO
(D) Br^-

Answer: (B) CH_4 · Key from source paper

Q306 JEE Main 2015 · 10 Apr · Online MCQ

The correct statement on the isomerism associated with the following complex ions.
(a) $[Ni(H_2O)_5NH_3]^{2+}$
(b) $[Ni(H_2O)_4(NH_3)_2]^{2+}$ and
(c) $[Ni(H_2O)_3(NH_3)_3]^{2+}$ is:

(A) (a) and (b) show only geometrical isomerism
(B) (a) and (b) show geometrical and optical isomerism
(C) (b) and (c) show geometrical and optical isomerism
(D) (b) and (c) show only geometrical isomerism

Answer: (D) (b) and (c) show only geometrical isomerism · Key from source paper

Q307 JEE Main 2015 · 4 Apr · Offline MCQ

The number of geometrical isomers that can exist for square planar $[Pt(Cl)(py)(NH_3)(NH_2OH)]^+$ is (py = pyridine):

(A) 6
(B) 2
(C) 3
(D) 4

Answer: (C) 3 · Key from source paper

Q308 JEE Main 2014 · 19 Apr · Online MCQ

An octahedral complex with molecular composition $\mathrm{M.5NH_3.Cl.SO_4}$ has two isomers, A and B. The solution of A gives a white precipitate with $\mathrm{AgNO_3}$ solution and the solution of B gives white precipitate with $\mathrm{BaCl_2}$ solution .The type of isomerism exhibited by the complex is :

(A) Coordinate isomerism
(B) Geometrical isomerism
(C) Ionisation isomerism
(D) Linkage isomerism

Answer: (C) Ionisation isomerism · Key from source paper

Q309 JEE Main 2014 · 19 Apr · Online MCQ

Nickel $(\mathrm{Z} = 28)$ combines with a uninegative monodentate ligand to form a diamagnetic complex $[\mathrm{NiL_4}]^{2-}$. The hybridisation involved and the number of unpaired electrons present in the complex are respectively:

(A) $\mathrm{dsp^2}$, zero
(B) $\mathrm{sp^3}$, zero
(C) $\mathrm{dsp^2}$,, one
(D) $\mathrm{sp^3}$, two

Answer: (A) $\mathrm{dsp^2}$**, zero** · Key from source paper

Q310 JEE Main 2014 · 12 Apr · Online MCQ

Among the following species the one which causes the highest CFSE, Δ_0 as a ligand is:

(A) $\mathrm{CN^-}$
(B) $\mathrm{NH_3}$
(C) $\mathrm{F^-}$
(D) CO

Answer: (D) CO · Key from source paper

Q311 JEE Main 2014 · 12 Apr · Online MCQ

Which one of the following complexes will most likely absorb visible light? (At nos. $\mathrm{Sc} = 21$, $\mathrm{Ti} = 22$, $\mathrm{V} = 23$, $\mathrm{Zn} = 30$)

(A) $[\mathrm{Sc(H_2O)_6}]^{3+}$
(B) $[\mathrm{Ti(NH_3)_6}]^{4+}$
(C) $[\mathrm{V(NH_3)_6}]^{3+}$
(D) $[\mathrm{Zn(NH_3)_6}]^{2+}$

Answer: (C) $[\mathrm{V(NH_3)_6}]^{3+}$ · Key from source paper

Q312 JEE Main 2014 · 11 Apr · Online MCQ

Which of the following name formula combinations is not correct?

(A) $K_2[Pt(CN)_4]$ - Potassium tetracyanoplatinate (II)

(B) $[Mn(CN)_5]^{2-}$ - Pentacyanomagnate (II) ion

(C) $K[Cr(NH_3)_2Cl_4]$ - Potassium diammine tetrachlorochromate (III)

(D) $[Co(NH_3)_4(H_2O)I]SO_4$ - Magnetron value.

Answer: (B) $[Mn(CN)_5]^{2-}$ **- Pentacyanomagnate (II) ion** · Key from source paper

Q313 JEE Main 2014 · 11 Apr · Online MCQ

Consider the coordination compound, $[Co(NH_3)_6]Cl_3$. In the formation of this complex, the species which acts as the Lewis acid is:

(A) $[Co(NH_3)_6]^{3+}$

(B) Cl^-

(C) Co^{3+}

(D) NH_3

Answer: (C) Co^{3+} · Checked by our team

Q314 JEE Main 2014 · 9 Apr · Online MCQ

The correct statement about the magnetic properties of $[Fe(CN)_6]^{3-}$ and $[FeF_6]^{3-}$ is : (Z = 26).

(A) Both are paramagnetic.

(B) Both are diamagnetic.

(C) $[Fe(CN)_6]^{3-}$ is paramagnetic, $[FeF_6]^{3-}$ is diamagnetic.

(D) $[Fe(CN)_6]^{3-}$ is diamagnetic, $[FeF_6]^{3-}$ is paramagnetic.

Answer: (A) Both are paramagnetic. · Key from source paper

Q315 JEE Main 2014 · 9 Apr · Online MCQ

An octahedral complex of Co^{3+} is diamagnetic. The hybridisation involved in the formation of the complex is :

(A) dsp^2

(B) d^2sp^3

(C) dsp^3d

(D) sp^3d^2

Answer: (B) d^2sp^3 · Key from source paper

Q316 JEE Main 2014 · 6 Apr · Offline MCQ

The equation which is balanced and represents the correct product(s) is

(A) $Li_2O + 2KCl \rightarrow 2LiCl + K_2O$

(B) $[CoCl(NH_3)_5]^+ + 5H^+ \rightarrow Co^{2+} + 5\,NH_4^+ + Cl^-$

(C) $[Mg(H_2O)_6]^{2+} + (EDTA)^{4-} \xrightarrow{\text{excess NaOH}} [Mg(EDTA)]^{2-} + 6H_2O$

(D) $CuSO_4 + 4KCN \rightarrow K_2[Cu(CN)_4] + K_2\,SO_4$

Answer: (B) $[CoCl(NH_3)_5]^+ + 5H^+ \rightarrow Co^{2+} + 5\,NH_4^+ + Cl^-$ · Key from source paper

Q317 JEE Main 2014 · 6 Apr · Offline MCQ

The octahedral complex of a metal ion M^{3+} with four monodentate ligands L_1, L_2, L_3 and L_4 absorb wavelengths in the region of red, green, yellow and blue, respectively. The increasing order of ligand strength of the four ligands is

(A) $L_4 < L_3 < L_2 < L_1$

(B) $L_1 < L_3 < L_2 < L_4$

(C) $L_3 < L_2 < L_4 < L_1$

(D) $L_1 < L_2 < L_4 < L_3$

Answer: (B) $L_1 < L_3 < L_2 < L_4$ · Key from source paper

Q318 JEE Main 2013 · 25 Apr · Online MCQ

The structure of which of the following chloro species can be explained on the basis of dsp^2 hybridization?

(A) $PdCl_4^{2-}$

(B) $FeCl_4^{2-}$

(C) $CoCl_4^{2-}$

(D) $NiCl_4^{2-}$

Answer: (A) $PdCl_4^{2-}$ · Key from source paper

Q319 JEE Main 2013 · 25 Apr · Online MCQ

In which of the following octahedral complex species the magnitude of Δ_o will be maximum?

(A) $[Co(H_2O)_6]^{2+}$

(B) $[Co(CN)_6]^{3-}$

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

(D) $[Co(NH_3)_6]^{3+}$

Answer: (B) $[Co(CN)_6]^{3-}$ · Key from source paper

Q320 JEE Main 2013 · 23 Apr · Online MCQ

The magnetic moment of the complex anion $[Cr(NO)\,(NH_3)(CN)_4]^{2-}$ is :

(A) 5.91BM
(B) 3.87BM
(C) 1.73BM
(D) 2.82BM

Answer: (C) 1.73BM · Checked by our team

Q321 JEE Main 2013 · 22 Apr · Online MCQ

Which of the following is diamagnetic ?

(A) $[Fe(CN)_6]^{3-}$
(B) $[Co(ox)_3]^{3-}$
(C) $[FeF_6]^{3-}$
(D) $[CoF_6]^{3-}$

Answer: (B) $[Co(ox)_3]^{3-}$ · Key from source paper

Q322 JEE Main 2013 · 9 Apr · Online MCQ

Type of isomerism which exists between $[Pd(C_6H_5)_2(SCN)_2]$ and $[Pd(C_6H_5)_2(NCS)_2]$ is :

(A) Linkage isomerism
(B) Coordination isomerism
(C) Ionisation isomerism
(D) Solvate isomerism

Answer: (A) Linkage isomerism · Key from source paper

Q323 JEE Main 2013 · 7 Apr · Offline MCQ

Which of the following complex species is not expected to exhibit optical isomerism?

(A) $[Co(NH_3)_3Cl_3]$
(B) $[Co(en)(NH_3)_2Cl_2]^+$
(C) $[Co(en)_3]^{3+}$
(D) $[Co(en)_2Cl_2]^+$

Answer: (A) $[Co(NH_3)_3Cl_3]$ · Key from source paper

Q324 AIEEE 2012 · 26 May · Online MCQ

The complex ion $[Pt\,(NO_2)(Py)\,(NH_3)\,(NH_2OH)]^+$ will give

(A) 2 isomers (Geometrical)
(B) 3 isomers (Geometrical)
(C) 6 isomers (Geometrical)
(D) 4 isomers (Geometrical)

Answer: (B) 3 isomers (Geometrical) · Key from source paper

Q325 AIEEE 2012 · 19 May · Online MCQ

The correct order of ligands in the spectrochemical series is

(A) $\mathrm{Cl^- > en > CN^- > NCS^-}$
(B) $\mathrm{CN^- > en > NCS^- > Cl^-}$
(C) $\mathrm{NCS^- > CN^- > Cl^- > en}$
(D) $\mathrm{en > CN^- > Cl^- > NCS^-}$

Answer: (B) $\mathrm{CN^- > en > NCS^- > Cl^-}$ · Key from source paper

---

Q326 AIEEE 2012 · 19 May · Online MCQ

Square-planar geometry is shown by

(A) $\mathrm{[PtCl_2(NH_3)_2]}$
(B) $\mathrm{[NiCl_4]^{2-}}$
(C) $\mathrm{MnO_4^-}$
(D) $\mathrm{CrO_4^{2-}}$

Answer: (A) $\mathrm{[PtCl_2(NH_3)_2]}$ · Key from source paper

---

Q327 AIEEE 2012 · 12 May · Online MCQ

Which of the following complex ions will exhibit optical isomerism? (en = 1, 2-diamine ethane).

(A) $\mathrm{[Cr(NH_3)_2Cl_2]^+}$
(B) $\mathrm{[Co(en)_2Cl_2]^+}$
(C) $\mathrm{[Co(NH_3)_4Cl_2]^+}$
(D) $\mathrm{[Zn(en)_2]^{2+}}$

Answer: (B) $\mathrm{[Co(en)_2Cl_2]^+}$ · Key from source paper

---

Q328 AIEEE 2012 · 7 May · Online MCQ

The d-electron configurations of $\mathrm{Cr^{2+}}$, $\mathrm{Mn^{2+}}$, $\mathrm{Fe^{2+}}$ and $\mathrm{Co^{2+}}$ are d^4, d^5, d^6 and d^7 respectively. Which one of the following will exhibit the lowest paramagnetic behaviour? (Atomic no. Cr = 24, Mn = 25, Fe = 26, Co = 27).

(A) $[Co(H_2O)_6]^{2+}$
(B) $[Cr(H_2O)_6]^{2+}$
(C) $[Mn(H_2O)_6]^{2+}$
(D) $[Fe(H_2O)_6]^{2+}$

Answer: (A) $[Co(H_2O)_6]^{2+}$ · Key from source paper

Q329 AIEEE 2012 · Offline MCQ

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

(A) $[Cr(en)_3]Br_3$
(B) $[Cr(en)_2Br_2]Br$
(C) $[Cr(\ en\ )Br_4]^-$
(D) $[Cr(en)Br_2]Br$

Answer: (B) $[Cr(en)_2Br_2]Br$ · Key from source paper

Q330 AIEEE 2011 MCQ

The magnetic moment (spin only) of $[NiCl_4]^{2-}$ is

(A) 5.46BM
(B) 2.83BM
(C) 1.41BM
(D) 1.82BM

Answer: (B) 2.83BM · Key from source paper

Q331 AIEEE 2011 MCQ

Which of the following facts about the complex $[Cr(NH_3)_6]Cl_3$ s wrong ?

(A) The complex is paramagnetic
(B) The complex is an outer orbital complex
(C) The complex gives white precipitate with silver nitrate solution
(D) The complex involves d^2sp^3 hybridization and is octahedral in shape.

Answer: (B) The complex is an outer orbital complex · Key from source paper

Q332 AIEEE 2010 MCQ

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

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

Answer: (A) $[Co(NH_3)_6]Cl_3$ · Key from source paper

Q333 AIEEE 2010 MCQ

Which one of the following has an optical isomer ? (en = ethylenediamine)

(A) $[Zn(en)(NH_3)_2]^{2+}$
(B) $[Co(en)_3]^{3+}$
(C) $[Co(H_2O)_4(\text{ en })]^{3+}$
(D) $[Zn(\text{ en })_2]^{2+}$

Answer: (B) $[Co(en)_3]^{3+}$ · Key from source paper

Q334 AIEEE 2009 MCQ

Which of the following has an optical isomer ?

(A) $[Co(NH_3)_3Cl]^+$
(B) $[Co(\text{ en })(NH_3)_2]^{2+}$
(C) $[Co(H_2O)_4(en)]^{3+}$
(D) $[Co(en)_2(NH_3)_2]^{3+}$

Answer: (D) $[Co(en)_2(NH_3)_2]^{3+}$ · Key from source paper

Q335 AIEEE 2009 MCQ

Which of the following pairs represents linkage isomers ?

(A) $[Cu(NH_3)_4]\,[PtCl_4]$ and $[Pt(NH_3)_4]\,[CuCl_4]$
(B) $[Pd(PPh_3)_2(NCS)_2]$ and $[Pd(PPh_3)_2(SCN)_2]$
(C) $[Co(NH_3)_5NO_3]SO_4$ and $[Co(NH_3)_5SO_4]NO_3$
(D) $[PtCl_2(NH_3)_4]Br$ and $[PtBr_2(NH_3)_4]Cl_2$

Answer: (B) $[Pd(PPh_3)_2(NCS)_2]$ **and** $[Pd(PPh_3)_2(SCN)_2]$ · Key from source paper

Q336 AIEEE 2008 MCQ

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 ethylene diamine) are, respectively,

(A) 6 and 2
(B) 4 and 2
(C) 4 and 3
(D) 6 and 3

Answer: (D) 6 and 3 · Key from source paper

Q337 AIEEE 2008 MCQ

In which of the following octahedral complexes of Co (at. no. 27), will the magnitude of Δ_o be the highest?

(A) $[Co(CN)_6]^{3-}$
(B) $[Co(C_2O_4)_3]^{3-}$
(C) $[Co(H_2O)_6]^{3+}$
(D) $[Co(NH_3)_6]^{3+}$

Answer: (A) $[Co(CN)_6]^{3-}$ · Key from source paper

Q338 AIEEE 2007 MCQ

Which one of the following has a square planar geometry?

(A) $[CoCl_4]^{2-}$
(B) $[FeCl_4]^{2-}$
(C) $[NiCl_4]^{2-}$
(D) $[PtCl_4]^{2-}$

Answer: (D) $[PtCl_4]^{2-}$ · Key from source paper

Q339 AIEEE 2006 MCQ

The IUPAC name for the complex $[Co\,(NO_2)(NH_3)_5]Cl_2$ is

(A) nitrito-N-pentaamminecobalt (III) chloride
(B) nitrito-N-pentaamminecobalt (II) chloride
(C) pentaammine nitrito- N-cobalt (II) chloride
(D) pentaammine nitrito- N-cobalt (III) chloride

Answer: (D) pentaammine nitrito- N-cobalt (III) chloride · Key from source paper

Q340 AIEEE 2006 MCQ

Nickel ($Z = 28$) combines with a uninegative monodentate ligand X^- to form a paramagnetic complex $[NiX_4]^{2-}$. The number of unpaired electron(s) in the nickel and geometry of this complex ion are, respectively

(A) one, tetrahedral
(B) two, tetrahedral
(C) one, square planar
(D) two, square planar

Answer: (B) two, tetrahedral · Key from source paper

Q341 AIEEE 2006 MCQ

In $Fe(CO)_5$, the Fe - C bond possesses

(A) π-character only
(B) both σ and π characters
(C) ionic character
(D) σ-character only

Answer: (B) both σ and π characters · Key from source paper

Q342 AIEEE 2006 MCQ

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

(A) six
(B) three
(C) one
(D) two

Answer: (C) one · Key from source paper

Q343 AIEEE 2005 MCQ

The oxidation state of Cr in $[Cr(NH_3)_4Cl_2]^+$ is

(A) +3
(B) +2
(C) +1
(D) 0

Answer: (A) +3 · Key from source paper

Q344 AIEEE 2005 MCQ

The IUPAC name of the coordination compound $K_3[Fe(CN)_6]$ is

(A) Potassium hexacyanoferrate (II)
(B) Potassium hexacyanoferrate (III)
(C) Potassium hexacyanoiron (II)
(D) tripotassium hexcyanoiron (II) (sic)

Answer: (B) Potassium hexacyanoferrate (III) · Key from source paper

Q345 AIEEE 2005 MCQ

Which of the following compounds shows optical isomerism?

(A) $[Cu(NH_3)_4]^{+2}$
(B) $[ZnCl_4]^{-2}$
(C) $[Cr(C_2O_4)_3]^{-3}$
(D) $[Co(CN)_6]^{-3}$

Answer: (C) $[Cr(C_2O_4)_3]^{-3}$ · Key from source paper

Q346 AIEEE 2005 MCQ

Which one of the following cyano complexes would exhibit the lowest value of paramagnetic behaviour? (At. No. Cr = 24, Mn = 25, Fe = 26, Co = 27)

(A) $[Cr(CN)_6]^{-3}$
(B) $[Mn(CN)_6]^{-3}$
(C) $[Fe(CN)_6]^{-3}$
(D) $[Co(CN)_6]^{-3}$

Answer: (D) $[Co(CN)_6]^{-3}$ · Key from source paper

Q347 AIEEE 2005 MCQ

The value of the 'spin only' magnetic moment for one of the following configurations is 2.84 BM. The correct one is

(A) d^4 (in strong ligand filed) (sic)
(B) d^4 (in weak ligand filed) (sic)
(C) d^3 (in weak as well as in strong fields)
(D) d^5 (in strong ligand filed) (sic)

Answer: (A) d^4 **(in strong ligand filed) (sic)** · Key from source paper

Q348 AIEEE 2004 MCQ

Among the properties (a) reducing (b) oxidising (c) complexing, the set of properties shown by CN^- ion towards metal species is

(A) a, b, c
(B) a, b, c
(C) c, a
(D) b, c

Answer: (C) c, a · Key from source paper

Q349 AIEEE 2004 MCQ

The coordination number of 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) the number of ligands around a metal ion bonded by sigma bonds · Key from source paper

---

Q350 AIEEE 2004 MCQ

Which one of the following complexes in an outer orbital complex?

(A) $[Fe(CN)_6]^{4-}$
(B) $[Ni(NH_3)_6]^{2+}$
(C) $[Co(NH_3)_6]^{3+}$
(D) $[Mn(CN)_6]^{4-}$

Answer: (B) $[Ni(NH_3)_6]^{2+}$ · Key from source paper

Q351 AIEEE 2004 MCQ

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

(A) Chlorophylls are green pigments in plants and contains calcium
(B) Carboxypeptidase $-$A is an enzyme and contains zinc
(C) Cyanocobalamin is B_{12} and contains cobalt
(D) Haemoglobin is the red pigment of blood and contains iron

Answer: (A) Chlorophylls are green pigments in plants and contains calcium · Key from source paper

---

Q352 AIEEE 2004 MCQ

Which one of the following has largest number of isomers?

(A) $[Ru(NH_3)_4Cl_2^+]$
(B) $[Co(en)_2Cl_2]^+$
(C) $[Ir\ (PR_3)_2H(CO)]^{2+}$
(D) $[Co(NH_3)_5Cl]^{2+}$ (R-= alkyl group, en = ethylenediamine)

Answer: (B) $[Co(en)_2Cl_2]^+$ · Key from source paper

Q353 AIEEE 2004 MCQ

The correct order of magnetic moments (spin only values in B.M.) among is
(Atomic numbers: Mn = 25; Fe = 26, Co = 27)

(A) $[MnCl_4]^{2-} > [CoCl_4]^{-2} > [Fe(CN)_6]^{-4}$
(B) $[Fe(CN)_6]^{-4} > [CoCl_4]^{2-} > [MnCl_4]^{2-}$
(C) $[Fe(CN)_6]^{4-} > [MnCl_4]^{2-} > [CoCl_4]^{2-}$
(D) $[MnCl_4]^{2-} > [Fe(CN)_6]^{4-} > [CoCl_4]^{2-}$

Answer: (A) $[MnCl_4]^{2-} > [CoCl_4]^{-2} > [Fe(CN)_6]^{-4}$ · Key from source paper

Q354 AIEEE 2003 MCQ

Ammonia forms the complex ion $[Cu(NH_3)_4]^{2+}$ with copper ions in alkaline solutions but not in acidic solutions. What is the reason for it?

(A) In acidic solutions protons coordinate with ammonia molecules forming NH_4^+ ions and NH_3 molecules are 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 ions.

Answer: (A) In acidic solutions protons coordinate with ammonia molecules forming NH_4^+ ions and NH_3 molecules are not available · Key from source paper

Q355 AIEEE 2003 MCQ

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

(A) $[Co(NH_3)_3Cl_3] \cdot 2NH_3$
(B) $[Co(NH_3)_4Cl_2]Cl.NH_3$
(C) $[Co(NH_3)_4Cl]Cl_2.NH_3$
(D) $[Co(NH_3)_5Cl]Cl_2$

Answer: (D) $[Co(NH_3)_5Cl]Cl_2$ · Key from source paper

Q356 AIEEE 2003 MCQ

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

(A) 0
(B) $+1$
(C) $+2$
(D) -1

Answer: (A) 0 · Key from source paper

Q357 AIEEE 2002 MCQ

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

(A) s, p_x, p_y, d_{yz}
(B) $\mathbf{s}, \mathbf{p}_x, \mathbf{p}_y, \mathrm{d}_{x^2-y^2}$
(C) s, p_x, p_y, d_{z^2}
(D) $\mathbf{s}, \mathbf{p}_y, \mathrm{p}_z, \mathrm{d}_{\mathrm{xy}}$

Answer: (B) $\mathbf{s}, \mathbf{p}_x, \mathbf{p}_y, \mathrm{d}_{x^2-y^2}$ · Key from source paper

Q358 AIEEE 2002 MCQ

The type of isomerism present in nitropentamine chromium (III) chloride is

(A) optical
(B) linkage
(C) ionization
(D) polymerisation

Answer: (B) linkage · Key from source paper

Q359 AIEEE 2002 MCQ

The most stable ion is

(A) $[Fe(OH)_3]^{3-}$
(B) $[Fe(Cl)_6]^{3-}$
(C) $[Fe(CN)_6]^{3-}$
(D) $[Fe(H_2O)_6]^{3+}$

Answer: (C) $[Fe(CN)_6]^{3-}$ · Checked by our team

EdLoop JEE