

JEE MAIN COORDINATION COMPOUNDS — PYQS

Max. Marks: 224

Questions: 56

Section A (MCQ) — 41 questions

Q.1 Match the LIST-I with LIST-II

[JEE Main 2026 (Online) 6th April Morning Shift]

Electronic configuration of tetrahedral metal ion		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

- (1) A-III, B-IV, C-II, D-I (2) A-III, B-I, C-IV, D-II
 (3) A-III, B-IV, C-I, D-II (4) A-II, B-I, C-IV, D-III

 Scan or tap for the
full solution


Q.2 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 options given below : [JEE Main 2026 (Online) 6th April Morning Shift]

- (1) A, B and D only (2) A and B only
 (3) B and D only (4) B, C and D only

 Scan or tap for the
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Q.3 Which of the following sequences of hybridisation, geometry and magnetic nature are correct for the given coordination compounds ?

- A. $[\text{NiCl}_4]^{2-} - sp^3$, tetrahedral, paramagnetic
 B. $[\text{Ni}(\text{NH}_3)_6]^{2+} - sp^3d^2$, octahedral, paramagnetic
 C. $[\text{Ni}(\text{CO})_4] - sp^3$, tetrahedral, paramagnetic
 D. $[\text{Ni}(\text{CN})_4]^{2-} - dsp^2$, square planar, diamagnetic

Choose the correct answer from the options given below : [JEE Main 2026 (Online) 6th April Evening Shift]

- (1) A, B, C and D (2) B, C and D only
 (3) A, C and D only (4) A, B and D only

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full solution


Q.4 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 : [JEE Main 2026 (Online) 5th April Morning Shift]

- (1) A and B Only (2) A, C and D Only
 (3) B and C Only (4) A and D Only

 Scan or tap for the
full solution


Q.5 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

[JEE Main 2026 (Online) 5th April Morning Shift]

- (1) Both Statement-I and Statement-II are correct
 (2) Both Statement-I and Statement-II are incorrect
 (3) Statement-I is correct but Statement-II is incorrect
 (4) Statement-I is incorrect but Statement-II is correct

 Scan or tap for the
full solution


Q.6 Identify the correct statements from the following Choose the correct answer from the options given below :

- A. $[\text{Fe}(\text{C}_2\text{O}_4)_3]^{3-}$ is the most stable complex among $[\text{Fe}(\text{OH})_6]^{3-}$, $[\text{Fe}(\text{C}_2\text{O}_4)_3]^{3-}$ and $[\text{Fe}(\text{SCN})_6]^{3-}$
 B. The stability of $[\text{Cu}(\text{NH}_3)_4]^{2+}$ is greater than that of $[\text{Cu}(\text{en})_2]^{2+}$
 C. The hybridization of Fe in $\text{K}_4[\text{Fe}(\text{CN})_6]$ is d^2sp^3
 D. $[\text{Fe}(\text{NO}_2)_3\text{Cl}_3]^{3-}$ exhibits linkage isomerism

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

[JEE Main 2026 (Online) 5th April Evening Shift]

- (1) A, B, C, D and E (2) B, C and D only
(3) A, C and D only (4) A, C and E only

Scan or tap for the full solution



Q.7 Consider the metal complexes $[\text{Ni(en)}_3]^{2+}$ (A), $[\text{NiCl}_4]^{2-}$ (B) and $[\text{Ni}(\text{NH}_3)_6]^{2+}$ (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.

[JEE Main 2026 (Online) 4th April Evening Shift]

- (1) 2, 2, 2 and (A) > (C) > (B)
(2) 0, 2, 0 and (A) > (C) > (B)
(3) 2, 2, 0 and (B) > (C) > (A)
(4) 2, 2, 2 and (C) > (A) > (B)

Scan or tap for the full solution



Q.8 Match List - I with List - II.

[JEE Main 2026 (Online) 2nd April Morning Shift]

Chromium (III) Complexes (en = ethylene diamine)		Δ_o (cm^{-1})	
A.	$[\text{Cr}(\text{CN})_6]^{3-}$	I.	15,060
B.	$[\text{CrF}_6]^{3-}$	II.	17,400
C.	$[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$	III.	22,300
D.	$[\text{Cr(en)}_3]^{3+}$	IV.	26,600

- (1) A-I, B-II, C-III, D-IV (2) A-II, B-III, C-IV, D-I
(3) A-III, B-IV, C-I, D-II (4) A-IV, B-I, C-II, D-III

Scan or tap for the full solution



Q.9 Which of the following complexes will show coordination isomerism?

- A. $[\text{Ag}(\text{NH}_3)_2][\text{Ag}(\text{CN})_2]$
B. $[\text{Co}(\text{NH}_3)_6][\text{Cr}(\text{CN})_6]$
C. $[\text{Co}(\text{NH}_3)_6][\text{Co}(\text{CN})_6]$
D. $[\text{Fe}(\text{NH}_3)_6][\text{Co}(\text{CN})_6]$
E. $[\text{Co}(\text{NH}_3)_6][\text{Fe}(\text{CN})_6]$

Choose the correct answer from the options given below:

[JEE Main 2026 (Online) 2nd April Evening Shift]

- (1) B, C and D Only (2) B, D and E Only
(3) A, C and D Only (4) C, D and E Only

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Q.10 The correct statement among the following is:

[JEE Main 2026 (Online) 28th January Morning Shift]

(1) $[\text{Ni}(\text{CN})_4]^{2-}$ and $[\text{NiCl}_4]^{2-}$ are diamagnetic and $\text{Ni}(\text{CO})_4$ is paramagnetic.

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

(3) $\text{Ni}(\text{CO})_4$ and $[\text{NiCl}_4]^{2-}$ are diamagnetic and $[\text{Ni}(\text{CN})_4]^{2-}$ is paramagnetic.

(4) $\text{Ni}(\text{CO})_4$ and $[\text{Ni}(\text{CN})_4]^{2-}$ are diamagnetic and $[\text{NiCl}_4]^{2-}$ is paramagnetic.

Scan or tap for the full solution



Q.11 The correct increasing order of spin-only magnetic moment values of the complex ions

$[\text{MnBr}_4]^{2-}$ (A), $[\text{Cu}(\text{H}_2\text{O})_6]^{2+}$ (B), $[\text{Ni}(\text{CN})_4]^{2-}$ (C) and $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$ (D) is :

[JEE Main 2026 (Online) 28th January Evening Shift]

- (1) $A = B < D < C$ (2) $C = D < B < A$
(3) $C < B < D < A$ (4) $A = B < C < D$

Scan or tap for the full solution



Q.12 Given below are two statements :

Statement-I: Hybridisation, shape and spin only magnetic moment of $\text{K}_3[\text{Co}(\text{CO})_3]$ is sp^3d^2 , octahedral and 4.9 BM respectively.

Statement-II: Geometry, hybridisation and spin only magnetic moment values (BM) of the ions $[\text{Ni}(\text{CN})_4]^{2-}$, $[\text{MnBr}_4]^{2-}$ and $[\text{CoF}_6]^{3-}$ 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

[JEE Main 2026 (Online) 24th January Morning Shift]

- (1) Both Statement-I and Statement-II are false
(2) Statement-I is true but Statement-II is false
(3) Both Statement-I and Statement-II are true
(4) Statement-I is false but Statement-II is true

Scan or tap for the full solution



Q.13 Given below are two statements:

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

Statement-II: $\text{K}_4[\text{Fe}(\text{CN})_6] < \text{K}_3[\text{Fe}(\text{CN})_6] < [\text{Fe}(\text{H}_2\text{O})_6]\text{SO}_4 \cdot \text{H}_2\text{O} < [\text{Fe}(\text{H}_2\text{O})_6]\text{Cl}_3$ 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

[JEE Main 2026 (Online) 24th January Morning Shift]

- (1) Statement-I is true but Statement-II is false
 (2) Both Statement-I and Statement-II are false
 (3) Statement-I is false but Statement-II is true
 (4) Both Statement-I and Statement-II are true

Scan or tap for the
full solution



Q.14 Consider a mixture 'X' which is made by dissolving 0.4 mol of $[\text{Co}(\text{NH}_3)_5\text{SO}_4]\text{Br}$ and 0.4 mol of $[\text{Co}(\text{NH}_3)_5\text{Br}]\text{SO}_4$ 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?

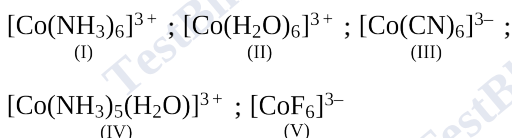
[JEE Main 2026 (Online) 24th January Morning Shift]

- (1) 0.1 mol of 'Y' is formed.
 (2) 0.4 mol of 'Z' is formed.
 (3) 0.2 mol of 'Z' is formed.
 (4) 'Y' is BaSO_4 and 'Z' is AgBr .

Scan or tap for the
full solution



Q.15 The wavelengths of light absorbed for the following complexes are in the order



- (1) III < IV < I < II < V (2) III < I < IV < V < II
 (3) III < I < IV < II < V (4) III < I < II < IV < V

Scan or tap for the
full solution



Q.16 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 :

[JEE Main 2026 (Online) 23rd January Morning Shift]

- (1) C and E Only (2) A, D and B Only
 (3) B, C and E Only (4) C and D Only

Scan or tap for the
full solution



Q.17 Given below are two statements :

Statement-I: $[\text{CoBr}_4]^{2-}$ ion will absorb light of lower energy than $[\text{CoCl}_4]^{2-}$ ion.

Statement-II: In $[\text{CoI}_4]^{2-}$ ion, the energy separation between the two sets of d-orbitals is more than $[\text{CoCl}_4]^{2-}$ ion.

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

[JEE Main 2026 (Online) 23rd January Morning Shift]

- (1) Both Statement-I and Statement-II are false
 (2) Both Statement-I and Statement-II are true
 (3) Statement-I is false but Statement-II is true
 (4) Statement-I is true but Statement-II is false

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full solution



Q.18 Identify the CORRECT set of details from the following :

Choose the correct answer from the options given below :

- A. $[\text{Co}(\text{NH}_3)_6]^{3+}$: Inner orbital complex; d^2sp^3 hybridized
 B. $[\text{MnCl}_6]^{3-}$: Outer orbital complex; sp^3d^2 hybridized
 C. $[\text{CoF}_6]^{3-}$: Outer orbital complex; d^2sp^3 hybridized
 D. $[\text{FeF}_6]^{3-}$: Outer orbital complex; sp^3d^2 hybridized
 E. $[\text{Ni}(\text{CN})_4]^{2-}$: Inner orbital complex; sp^3 hybridized

[JEE Main 2026 (Online) 23rd January Evening Shift]

- (1) C & D Only (2) A, C & E Only
 (3) A, B, C, D & E (4) A, B & D Only

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full solution



Q.19 Consider the transition metal ions Mn^{3+} , Cr^{3+} , Fe^{3+} and Co^{3+} and all form low spin octahedral complexes. The correct decreasing order of unpaired electrons in their respective d-orbitals of the complexes is

[JEE Main 2026 (Online) 22nd January Morning Shift]

- (1) $\text{Cr}^{3+} > \text{Mn}^{3+} > \text{Fe}^{3+} > \text{Co}^{3+}$
 (2) $\text{Mn}^{3+} > \text{Fe}^{3+} > \text{Co}^{3+} > \text{Cr}^{3+}$
 (3) $\text{Fe}^{3+} > \text{Co}^{3+} > \text{Mn}^{3+} > \text{Cr}^{3+}$
 (4) $\text{Cr}^{3+} > \text{Fe}^{3+} > \text{Co}^{3+} > \text{Mn}^{3+}$

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full solution



Q.20 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 $\text{H}_2\text{S}(\text{g})$ is passed through the solution. The amount of MS (metal sulphide) formed from the above reaction is ____ mol.

[JEE Main 2026 (Online) 22nd January Morning Shift]

- (1) 1 (2) 2 (3) 0 (4) 3

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- Q.21** $[\text{Ni}(\text{PPh}_3)_2\text{Cl}_2]$ is a paramagnetic complex. Identify the INCORRECT statements about this complex.
- The complex exhibits geometrical isomerism.
 - The complex is white in colour.
 - The calculated spin-only magnetic moment of the complex is 2.84 BM.
 - The calculated CFSE (Crystal Field Stabilization Energy) of Ni in this complex is $-0.8\Delta_o$.
 - The geometrical arrangement of ligands in this complex is similar to that in $\text{Ni}(\text{CO})_4$.
- Choose the correct answer from the options given below :

[JEE Main 2026 (Online) 22nd January Evening Shift]

- (1) C and D Only (2) A, B and D Only
(3) C, D and E Only (4) A and B Only



- Q.22** Given below are two statements :
- Statement-I:** Among $[\text{Cu}(\text{NH}_3)_4]^{2+}$, $[\text{Ni}(\text{en})_3]^{2+}$, $[\text{Ni}(\text{NH}_3)_6]^{2+}$ and $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$, $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$ has the maximum number of unpaired electrons.
- Statement-II:** The number of pairs among $\{[\text{NiCl}_4]^{2-}, [\text{Ni}(\text{CO})_4]\}$, $\{[\text{NiCl}_4]^{2-}, [\text{Ni}(\text{CN})_4]^{2-}\}$ and $\{[\text{Ni}(\text{CO})_4], [\text{Ni}(\text{CN})_4]^{2-}\}$ that contain only diamagnetic species is two.

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

[JEE Main 2026 (Online) 21st January Morning Shift]

- (1) Statement-I is false but Statement-II is true
(2) Both Statement-I and Statement-II are false
(3) Both Statement-I and Statement-II are true
(4) Statement-I is true but Statement-II is false



- Q.23** Given below are two statements :
- Statement-I:** Crystal Field Stabilization Energy (CFSE) of $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$ is greater than that of $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$.
- 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 :

[JEE Main 2026 (Online) 21st January Evening Shift]

- (1) Statement-I is true but Statement-II is false
(2) Both Statement-I and Statement-II are true
(3) Both Statement-I and Statement-II are false
(4) Statement-I is false but Statement-II is true



- Q.24** Match the LIST-I with LIST-II

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

Choose the correct answer from the options given below: [JEE Main 2025 (Online) 8th April Evening Shift]

- (1) A-I, B-II, C-III, D-IV (2) A-IV, B-I, C-III, D-II
(3) A-III, B-II, C-I, D-IV (4) A-III, B-IV, C-II, D-I



- Q.25** The number of species from the following that are involved in sp^3d^2 hybridization is :
- $[\text{Co}(\text{NH}_3)_6]^{3+}$, SF_6 , $[\text{CrF}_6]^{3-}$, $[\text{CoF}_6]^{3-}$, $[\text{Mn}(\text{CN})_6]^{3-}$, and $[\text{MnCl}_6]^{3-}$

[JEE Main 2025 (Online) 8th April Evening Shift]

- (1) 4 (2) 3 (3) 5 (4) 6



- Q.26** 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:

[JEE Main 2025 (Online) 8th April Evening Shift]

- (1) Statement-I is true but Statement-II is false
(2) Both Statement-I and Statement-II are true
(3) Both Statement-I and Statement-II are false
(4) Statement-I is false but Statement-II is true



- Q.27** An octahedral complex having molecular composition $\text{Co} \cdot 5\text{NH}_3 \cdot \text{Cl} \cdot \text{SO}_4$ 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,

[JEE Main 2025 (Online) 7th April Morning Shift]

- (1) Co-ordinate isomerism
(2) Ionisation isomerism
(3) Geometrical isomerism
(4) Linkage isomerism



- Q.28** Match List - I with List - II.

List - I Complex		List - II Primary valency and Secondary valency	
A.	[Co(en) ₂ Cl ₂]Cl	I.	3, 6
B.	[Pt(NH ₃) ₂ Cl(NO ₂)]	II.	3, 4
C.	Hg[Co(SCN) ₄]	III.	2, 6
D.	[Mg(EDTA)] ²⁻	IV.	2, 4

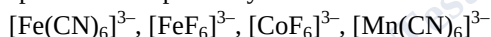
Choose the **correct** answer from the options given below : [JEE Main 2025 (Online) 7th April Evening Shift]

- (1) A-I, B-III, C-II, D-IV
 (2) A-II, B-III, C-IV, D-I
 (3) A-I, B-IV, C-IV, D-III
 (4) A-III, B-I, C-II, D-IV

Scan or tap for the
full solution



Q.29 The number of unpaired electrons responsible for the paramagnetic nature of the following complex species are respectively :



[JEE Main 2025 (Online) 7th April Evening Shift]

- (1) 1, 5, 4, 2 (2) 1, 4, 4, 2
 (3) 1, 5, 5, 2 (4) 1, 1, 4, 2

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Q.30 Which one of the following complexes will have $\Delta_o = 0$ and $\mu = 5.96$ B.M.?

[JEE Main 2025 (Online) 4th April Morning Shift]

- (1) [FeF₆]⁴⁻ (2) [Mn(SCN)₆]⁴⁻
 (3) [Co(NH₃)₆]³⁺ (4) [Fe(CN)₆]⁴⁻

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full solution



Q.31 Number of stereoisomers possible for the complexes, [CrCl₃(py)₃] and [CrCl₂(ox)₂]³⁻ are respectively (py = pyridine, ox = oxalate)

[JEE Main 2025 (Online) 4th April Morning Shift]

- (1) 3 & 3 (2) 2 & 3 (3) 1 & 2 (4) 2 & 2

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Q.32 'X' is the number of electrons in t_{2g} orbitals of the most stable complex ion among [Fe(NH₃)₆]³⁺, [FeCl₆]³⁻, [Fe(C₂O₄)₃]³⁻ and [Fe(H₂O)₆]³⁺. The nature of oxide of vanadium of the type V₂O_X is :

[JEE Main 2025 (Online) 4th April Evening Shift]

- (1) Amphoteric (2) Acidic
 (3) Basic (4) Neutral

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Q.33 The correct order of [FeF₆]³⁻, [CoF₆]³⁻, [Ni(CO)₄] and [Ni(CN)₄]²⁻ complex species based on the number of unpaired electrons present is:

[JEE Main 2025 (Online) 4th April Evening Shift]

- (1) [CoF₆]³⁻ > [FeF₆]³⁻ > [Ni(CO)₄] > [Ni(CN)₄]²⁻
 (2) [FeF₆]³⁻ > [CoF₆]³⁻ > [Ni(CN)₄]²⁻ > [Ni(CO)₄]
 (3) [FeF₆]³⁻ > [CoF₆]³⁻ > [Ni(CN)₄]²⁻ = [Ni(CO)₄]
 (4) [Ni(CN)₄]²⁻ > [FeF₆]³⁻ > [CoF₆]³⁻ > [Ni(CO)₄]

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full solution



Q.34 The correct order of the complexes [Co(NH₃)₅(H₂O)]³⁺ (A), [Co(NH₃)₆]³⁺ (B), [Co(CN)₆]³⁻ (C) and [CoCl(NH₃)₅]²⁺ (D) in terms of wavelength of light absorbed is

[JEE Main 2025 (Online) 3rd April Morning Shift]

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

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full solution



Q.35 Identify the diamagnetic octahedral complex ions from below ;

- A. [Mn(CN)₆]³⁻ B. [Co(NH₃)₆]³⁺
 C. [Fe(CN)₆]⁴⁻ D. [Co(H₂O)₆]³⁺

Choose the correct answer from the options given below: [JEE Main 2025 (Online) 3rd April Evening Shift]

- (1) B and C Only (2) A and C Only
 (3) B and D Only (4) A and D Only

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full solution



Q.36 Given below are two statements :

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

[JEE Main 2025 (Online) 2nd April Morning Shift]

- (1) Both Statement-I and Statement-II are incorrect
 (2) Statement-I is correct but Statement-II is incorrect
 (3) Statement-I is incorrect but Statement-II is correct
 (4) Both Statement-I and Statement-II are correct

Scan or tap for the
full solution



Q.37 The type of hybridization and the magnetic property of [MnCl₆]³⁻ are,

[JEE Main 2025 (Online) 2nd April Evening Shift]

- (1) sp^3d^2 , paramagnetic with four unpaired electrons.
 (2) d^2sp^3 , paramagnetic with four unpaired electrons.
 (3) sp^3d^2 , paramagnetic with two unpaired electrons.
 (4) d^2sp^3 , paramagnetic with two unpaired electrons.

Scan or tap for the full solution



Q.38 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:

[JEE Main 2025 (Online) 2nd April Evening Shift]

- (1) $t_{2g}^6 e_g^0$ (2) $t_{2g}^3 e_g^2$ (3) $t_{2g}^4 e_g^2$ (4) $t_{2g}^6 e_g^4$

Scan or tap for the full solution



Q.39 The correct increasing order of stability of the complexes based on Δ_0 value is :

- I. $[Mn(CN)_6]^{3-}$
 II. $[Co(CN)_6]^{4-}$
 III. $[Fe(CN)_6]^{4-}$
 IV. $[Fe(CN)_6]^{3-}$

[JEE Main 2025 (Online) 29th January Morning Shift]

- (1) $I < II < IV < III$ (2) $IV < III < II < I$
 (3) $III < II < IV < I$ (4) $II < III < I < IV$

Scan or tap for the full solution



Q.40 Match List - I with List - II.

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

Choose the correct answer from the options given below :

[JEE Main 2025 (Online) 29th January Morning Shift]

- (1) (A)-(III), (B)-(I), (C)-(I), (D)-(IV)
 (2) (A)-(III), (B)-(II), (C)-(III), (D)-(IV)
 (3) (A)-(IV), (B)-(II), (C)-(I), (D)-(III)
 (4) (A)-(IV), (B)-(I), (C)-(II), (D)-(III)

Scan or tap for the full solution



Q.41 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:

[JEE Main 2025 (Online) 28th January Evening Shift]

- (1) (A)-(I), (B)-(II), (C)-(III), (D)-(IV)
 (2) (A)-(III), (B)-(IV), (C)-(I), (D)-(II)
 (3) (A)-(I), (B)-(IV), (C)-(III), (D)-(II)
 (4) (A)-(III), (B)-(II), (C)-(I), (D)-(IV)

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Section B (Numerical) — 15 questions

Q.42 Number of paramagnetic complexes among the following is _____.

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

[JEE Main 2026 (Online) 8th April Evening Shift]

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Q.43 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)

[JEE Main 2026 (Online) 6th April Evening Shift]

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Q.44 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 _____. [JEE Main 2026 (Online) 5th April Evening Shift]

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Q.45 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]

[JEE Main 2026 (Online) 2nd April Morning Shift]

Scan or tap for the full solution



- Q.46** X is the number of geometrical isomers exhibited by $[\text{Pt}(\text{NH}_3)(\text{H}_2\text{O})\text{BrCl}]$.
Y is the number of optically inactive isomer(s) exhibited by $[\text{CrCl}_2(\text{ox})_2]^{3-}$.
Z is the number of geometrical isomers exhibited by $[\text{Co}(\text{NH}_3)_3(\text{NO}_2)_3]$.
The value of $X + Y + Z$ is _____.

[JEE Main 2026 (Online) 28th January Morning Shift]



- Q.47** 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 $\text{CoCl}_3(\text{en})_2\text{NH}_3$ with excess of AgNO_3 solution, then the number of electrons present in the t_{2g} orbital of the complex is _____.

[JEE Main 2026 (Online) 28th January Evening Shift]



- Q.48** A chromium complex with a formula $\text{CrCl}_3 \cdot 6\text{H}_2\text{O}$ 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]

[JEE Main 2026 (Online) 24th January Evening Shift]



- Q.49** The crystal field stabilisation energy of $[\text{Co}(\text{oxalate})_3]^{3-}$ complex is 'n' times that of the $[\text{Cr}(\text{oxalate})_3]^{3-}$ complex. Here 'n' is _____. (Assume $\Delta_o \gg P$)

[JEE Main 2026 (Online) 23rd January Morning Shift]



- Q.50** Total number of unpaired electrons present in the central metal atoms/ions of $[\text{Ni}(\text{CO})_4]$, $[\text{NiCl}_4]^{2-}$, $[\text{PtCl}_2(\text{NH}_3)_2]$, $[\text{Ni}(\text{CN})_4]^{2-}$ and $[\text{Pt}(\text{CN})_4]^{2-}$ is _____.

[JEE Main 2026 (Online) 23rd January Evening Shift]



- Q.51** Identify the metal ions among Co^{2+} , Ni^{2+} , Fe^{2+} , V^{3+} and Ti^{2+} having a spin-only magnetic moment value more than 3.0 BM. The sum of unpaired electrons present in the high spin octahedral complexes formed by those metal ions is _____.

[JEE Main 2026 (Online) 21st January Evening Shift]

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- Q.52** The number of paramagnetic complexes among $[\text{FeF}_6]^{3-}$, $[\text{Fe}(\text{CN})_6]^{3-}$, $[\text{Mn}(\text{CN})_6]^{3-}$, $[\text{Co}(\text{C}_2\text{O}_4)_3]^{3-}$, $[\text{MnCl}_6]^{3-}$, and $[\text{CoF}_6]^{3-}$, which involve d^2sp^3 hybridization is _____.

[JEE Main 2025 (Online) 7th April Morning Shift]

Scan or tap for the full solution



- Q.53** The number of paramagnetic metal complex species among $[\text{Co}(\text{NH}_3)_6]^{3+}$, $[\text{Co}(\text{C}_2\text{O}_4)_3]^{3-}$, $[\text{MnCl}_6]^{3-}$, $[\text{Mn}(\text{CN})_6]^{3-}$, $[\text{CoF}_6]^{3-}$, $[\text{Fe}(\text{CN})_6]^{3-}$ and $[\text{FeF}_6]^{3-}$ with same number of unpaired electrons is _____.

[JEE Main 2025 (Online) 7th April Evening Shift]

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- Q.54** A metal complex with a formula $\text{MCl}_4 \cdot 3\text{NH}_3$ 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 electrons present in the central atom of BrF_5 . Then the number of geometrical isomers exhibited by the complex is _____.

[JEE Main 2025 (Online) 4th April Evening Shift]

Scan or tap for the full solution



- Q.55** The number of optical isomers exhibited by the iron complex (A) obtained from the following reaction is _____.
 $\text{FeCl}_3 + \text{KOH} + \text{H}_2\text{C}_2\text{O}_4 \longrightarrow \text{A}$

[JEE Main 2025 (Online) 3rd April Morning Shift]

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- Q.56** A transition metal (M) among Mn, Cr, Co and Fe has the highest standard electrode potential (M^{3+}/M^{2+}). It forms a metal complex of the type $[\text{M}(\text{CN})_6]^{4-}$. The number of electrons present in the e_g orbital of the complex is _____.

[JEE Main 2025 (Online) 2nd April Morning Shift]

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ANSWER KEY

Section A (MCQ) — 41 questions

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	3	1	4	2	1	3	1	4	2	4	3
Ques.	12	13	14	15	16	17	18	19	20	21	22
Ans.	3	4	3	3	3	4	4	1	3	2	4
Ques.	23	24	25	26	27	28	29	30	31	32	33
Ans.	2	3	2	1	2	3	1	2	2	1	3
Ques.	34	35	36	37	38	39	40	41			
Ans.	3	1	4	1	1	1	3	4			

Section B (Numerical) — 15 questions

Ques.	42	43	44	45	46	47	48	49	50	51	52
Ans.	6	5	15	33	6	6	3	2	2	7	2
Ques.	53	54	55	56							
Ans.	2	2	2	1							