

NEET COORDINATION COMPOUNDS — VALENCE BOND THEORY (VBT) IN COORDINATION COMPOUNDS — PYQS

Max. Marks: 88

Questions: 22

Section A (MCQ) — 22 questions

Q.1 Match **List I** with **List II** : [NEET (UG) 2026]

List I (Complex/ion)		List II (Shape/geometry)	
A.	$[\text{PtCl}_2(\text{NH}_3)_2]$	I.	Octahedral
B.	$[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$	II.	Trigonal bipyramidal
C.	$[\text{NiCl}_4]^{2-}$	III.	Square planar
D.	$[\text{Fe}(\text{CO})_5]$	IV.	Tetrahedral

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

 Scan or tap for the
full solution

Q.2 Which of the following are paramagnetic?

- A. $[\text{NiCl}_4]^{2-}$ B. $\text{Ni}(\text{CO})_4$
C. $[\text{Ni}(\text{CN})_4]^{2-}$ D. $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$
E. $\text{Ni}(\text{PPh}_3)_4$

Choose the correct answer from the options given below : [NEET (UG) 2025]

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

 Scan or tap for the
full solution

Q.3 Given below are two statements :

Statement-I: Both $[\text{Co}(\text{NH}_3)_6]^{3+}$ and $[\text{CoF}_6]^{3-}$ complexes are octahedral but differ in their magnetic behaviour.

Statement-II: $[\text{Co}(\text{NH}_3)_6]^{3+}$ is diamagnetic whereas $[\text{CoF}_6]^{3-}$ is paramagnetic.

In the light of the above statements, choose the correct answer from the options given below: [NEET (UG) 2024]

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

 Scan or tap for the
full solution

Q.4 Match the metal ions given in **Column I** with the spin magnetic moments of the ions given in **Column II** and assign the correct code : [NEET 2018]

Column-I		Column-II	
a.	Co^{3+}	i.	$\sqrt{8}$ B.M.
b.	Cr^{3+}	ii.	$\sqrt{35}$ B.M.
c.	Fe^{3+}	iii.	$\sqrt{3}$ B.M.
d.	Ni^{2+}	iv.	$\sqrt{24}$ B.M.
		v.	$\sqrt{15}$ B.M.

- (1) (a)-(iv), (b)-(v), (c)-(ii), (d)-(i)
(2) (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)
(3) (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)
(4) (a)-(iii), (b)-(v), (c)-(i), (d)-(ii)

 Scan or tap for the
full solution

Q.5 The geometry and magnetic behaviour of the complex $[\text{Ni}(\text{CO})_4]$ are [NEET 2018]

- (1) square planar geometry and diamagnetic
(2) tetrahedral geometry and diamagnetic
(3) square planar geometry and paramagnetic
(4) tetrahedral geometry and paramagnetic

 Scan or tap for the
full solution

Q.6 Pick out the correct statement with respect to $[\text{Mn}(\text{CN})_6]^{3-}$. [NEET 2017]

- (1) It is sp^3d^2 hybridised and tetrahedral.
(2) It is d^2sp^3 hybridised and octahedral.
(3) It is dsp^2 hybridised and square planar.
(4) It is sp^3d^2 hybridised and octahedral.

 Scan or tap for the
full solution

Q.7 The hybridization involved in complex $[\text{Ni}(\text{CN})_4]^{2-}$ is (At. No. Ni = 28) [AIPMT 2015]

- (1) sp^3 (2) d^2sp^2 (3) d^2sp^3 (4) dsp^2

 Scan or tap for the
full solution


Q.8 A magnetic moment of 1.73 BM will be shown by one among the following [NEET 2013]

- (1) TiCl_4 (2) $[\text{CoCl}_6]^{4-}$
(3) $[\text{Cu}(\text{NH}_3)_4]^{2+}$ (4) $[\text{Ni}(\text{CN})_4]^{2-}$

Scan or tap for the full solution



Q.9 Which among the following is a paramagnetic complex? [NEET 2013 (Karnataka)]

- (1) $[\text{Co}(\text{NH}_3)_6]^{3+}$ (2) $[\text{Pt}(\text{en})\text{Cl}_2]$
(3) $[\text{CoBr}_4]^{2-}$ (4) $\text{Mo}(\text{CO})_6$

Scan or tap for the full solution



Q.10 Which is diamagnetic? [NEET 2013 (Karnataka)]

- (1) $[\text{Co}(\text{F})_6]^{3-}$ (2) $[\text{Ni}(\text{CN})_4]^{2-}$
(3) $[\text{NiCl}_4]^{2-}$ (4) $[\text{Fe}(\text{CN})_6]^{3-}$

Scan or tap for the full solution



Q.11 Which one of the following is an outer orbital complex and exhibits paramagnetic behaviour? [AIPMT 2012 (Prelims)]

- (1) $[\text{Ni}(\text{NH}_3)_6]^{2+}$ (2) $[\text{Zn}(\text{NH}_3)_6]^{2+}$
(3) $[\text{Cr}(\text{NH}_3)_6]^{3+}$ (4) $[\text{Co}(\text{NH}_3)_6]^{3+}$

Scan or tap for the full solution



Q.12 Which of the following complex compounds will exhibit highest paramagnetic behaviour? (At. No. Ti = 22, Cr = 24, Co = 27, Zn = 30) [AIPMT 2011 (Mains)]

- (1) $[\text{Cr}(\text{NH}_3)_6]^{3+}$ (2) $[\text{Co}(\text{NH}_3)_6]^{3+}$
(3) $[\text{Zn}(\text{NH}_3)_6]^{2+}$ (4) $[\text{Ti}(\text{NH}_3)_6]^{3+}$

Scan or tap for the full solution



Q.13 Of the following complex ions, which is diamagnetic in nature? [AIPMT 2011 (Prelims)]

- (1) $[\text{NiCl}_4]^{2-}$ (2) $[\text{Ni}(\text{CN})_4]^{2-}$
(3) $[\text{CuCl}_4]^{2-}$ (4) $[\text{CoF}_6]^{3-}$

Scan or tap for the full solution



Q.14 The d-electron configurations of Cr^{2+} , Mn^{2+} , Fe^{2+} and Co^{2+} are d^4 , d^5 , d^6 and d^7 respectively. Which one of the following will exhibit minimum paramagnetic behaviour? (At. Nos. Cr = 24, Mn = 25, Fe = 26, Co = 27) [AIPMT 2011 (Prelims)]

- (1) $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$ (2) $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$
(3) $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$ (4) $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$

Scan or tap for the full solution



Q.15 Which of the following complex compounds will exhibit highest paramagnetic behaviour? [AIPMT 2011 (Prelims)]

- (1) $[\text{Ti}(\text{NH}_3)_6]^{3+}$ (2) $[\text{Cr}(\text{NH}_3)_6]^{3+}$
(3) $[\text{Co}(\text{NH}_3)_6]^{3+}$ (4) $[\text{Zn}(\text{NH}_3)_6]^{2+}$

Scan or tap for the full solution



Q.16 The d electron configurations of Cr^{2+} , Mn^{2+} , Fe^{2+} and Ni^{2+} are $3d^4$, $3d^5$, $3d^6$ and $3d^8$ respectively. Which one of the following aqua complexes will exhibit the minimum paramagnetic behaviour? (At. No. Cr = 24, Mn = 25, Fe = 26, Ni = 28) [AIPMT 2007]

- (1) $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$ (2) $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$
(3) $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$ (4) $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$

Scan or tap for the full solution



Q.17 Which one of the following is an inner orbital complex as well as diamagnetic in behaviour? [AIPMT 2005]

- (1) $[\text{Zn}(\text{NH}_3)_6]^{2+}$ (2) $[\text{Cr}(\text{NH}_3)_6]^{3+}$
(3) $[\text{Co}(\text{NH}_3)_6]^{3+}$ (4) $[\text{Ni}(\text{NH}_3)_6]^{2+}$

Scan or tap for the full solution



Q.18 Among $[\text{Ni}(\text{CO})_4]$, $[\text{Ni}(\text{CN})_4]^{2-}$, $[\text{NiCl}_4]^{2-}$ species, the hybridisation states at the Ni atom are, respectively [Atomic number of Ni = 28] [AIPMT 2004]

- (1) sp^3 , dsp^2 , dsp^2 (2) sp^3 , dsp^2 , sp^3
(3) sp^3 , sp^3 , dsp^2 (4) dsp^2 , sp^3 , sp^3

Scan or tap for the full solution



Q.19 In an octahedral structure, the pair of d orbitals involved in d^2sp^3 hybridisation is [AIPMT 2004]

- (1) $d_{x^2-y^2}$, d_{z^2} (2) d_{xz} , $d_{x^2-y^2}$
(3) d_{z^2} , d_{xz} (4) d_{xy} , d_{yz}

Scan or tap for the full solution



Q.20 The number of unpaired electrons in the complex ion $[\text{CoF}_6]^{3-}$ is (Atomic no. : Co = 27) [AIPMT 2003]

- (1) 2 (2) 3 (3) 4 (4) zero

Scan or tap for the full solution



Q.21 Atomic number of Cr and Fe are respectively 24 and 26, which of the following is paramagnetic with the spin of electron? [AIPMT 2002]

- (1) $[\text{Cr}(\text{CO})_6]$ (2) $[\text{Fe}(\text{CO})_5]$
(3) $[\text{Fe}(\text{CN})_6]^{4-}$ (4) $[\text{Cr}(\text{NH}_3)_6]^{3+}$

Scan or tap for the full solution



Q.22 Which statement is incorrect? [AIPMT 2001]

- (1) $\text{Ni}(\text{CO})_4$ – tetrahedral, paramagnetic
- (2) $[\text{Ni}(\text{CN})_4]^{2-}$ – square planar, diamagnetic
- (3) $\text{Ni}(\text{CO})_4$ – tetrahedral, diamagnetic
- (4) $[\text{NiCl}_4]^{2-}$ – tetrahedral, paramagnetic.

Scan or tap for the
full solution



ANSWER KEY

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	3	1	1	1	2	2	4	3	3	2	1
Ques.	12	13	14	15	16	17	18	19	20	21	22
Ans.	1	2	3	2	2	3	2	1	3	4	1