

NEET COORDINATION COMPOUNDS — CRYSTAL FIELD THEORY (CFT) — PYQS

Max. Marks: 64

Questions: 16

Section A (MCQ) — 16 questions

Q.1 According to crystal field theory, the correct order of ligands with respect to their decreasing order of field strength is [RE-NEET (UG) 2026]

- (1) $\text{Cl}^- > \text{NH}_3 > \text{H}_2\text{O} > \text{CO}$
- (2) $\text{CO} > \text{NH}_3 > \text{H}_2\text{O} > \text{Cl}^-$
- (3) $\text{CO} > \text{H}_2\text{O} > \text{NH}_3 > \text{Cl}^-$
- (4) $\text{Cl}^- > \text{H}_2\text{O} > \text{NH}_3 > \text{CO}$

 Scan or tap for the
full solution


Q.2 Among the species given below, the spin-only magnetic moment is highest for (Given: Atomic number of Ti = 22, Mn = 25, Fe = 26 and Co = 27) [RE-NEET (UG) 2026]

- (1) $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$
- (2) $[\text{Mn}(\text{CN})_6]^{3-}$
- (3) $[\text{Fe}(\text{CN})_6]^{3-}$
- (4) $[\text{Co}(\text{NH}_3)_6]^{3+}$

 Scan or tap for the
full solution


Q.3 Match List-I with List-II :

List-I		List-II	
a.	$[\text{Fe}(\text{CN})_6]^{3-}$	i.	5.92 BM
b.	$[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$	ii.	0 BM
c.	$[\text{Fe}(\text{CN})_6]^{4-}$	iii.	4.90 BM
d.	$[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$	iv.	1.73 BM

Choose the correct answer from the options given below. [NEET (UG) 2021]

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

 Scan or tap for the
full solution


Q.4 Which of the following is the correct order of increasing field strength of ligands to form coordination compounds? [NEET (UG) 2020]

- (1) $\text{SCN}^- < \text{F}^- < \text{CN}^- < \text{C}_2\text{O}_4^{2-}$
- (2) $\text{F}^- < \text{SCN}^- < \text{C}_2\text{O}_4^{2-} < \text{CN}^-$
- (3) $\text{CN}^- < \text{C}_2\text{O}_4^{2-} < \text{SCN}^- < \text{F}^-$
- (4) $\text{SCN}^- < \text{F}^- < \text{C}_2\text{O}_4^{2-} < \text{CN}^-$

 Scan or tap for the
full solution


Q.5 What is the **correct** electronic configuration of the central atom in $\text{K}_4[\text{Fe}(\text{CN})_6]$ based on crystal field theory? [NEET (UG) 2019]

- (1) $t_{2g}^4 e_g^2$
- (2) $t_{2g}^6 e_g^0$
- (3) $e^3 t_2^3$
- (4) $e^4 t_2^2$

 Scan or tap for the
full solution


Q.6 Jahn-Teller effect is not observed in high spin complexes of [NEET 2016 (Phase 2)]

- (1) d^7
- (2) d^8
- (3) d^4
- (4) d^9

 Scan or tap for the
full solution


Q.7 Which of these statements about $[\text{Co}(\text{CN})_6]^{3-}$ is true? [AIPMT 2015 (Cancelled)]

- (1) $[\text{Co}(\text{CN})_6]^{3-}$ has four unpaired electrons and will be in a high-spin configuration.
- (2) $[\text{Co}(\text{CN})_6]^{3-}$ has no unpaired electrons and will be in a high-spin configuration.
- (3) $[\text{Co}(\text{CN})_6]^{3-}$ has no unpaired electrons and will be in a low-spin configuration.
- (4) $[\text{Co}(\text{CN})_6]^{3-}$ has four unpaired electrons and will be in a low-spin configuration.

 Scan or tap for the
full solution


Q.8 Among the following complexes the one which shows zero crystal field stabilization energy (CFSE) is [AIPMT 2014]

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

 Scan or tap for the
full solution


- Q.9** Crystal field splitting energy for high spin d^4 octahedral complex is [NEET 2013 (Karnataka)]
 (1) $-1.2 \Delta_o$ (2) $-0.6 \Delta_o$ (3) $-0.8 \Delta_o$ (4) $-1.6 \Delta_o$

Scan or tap for the full solution



- Q.10** Low spin complex of d^6 -cation in an octahedral field will have the following energy

[AIPMT 2012 (Mains)]

- (1) $\frac{-12}{5} \Delta_o + P$ (2) $\frac{-12}{5} \Delta_o + 3P$
 (3) $\frac{-2}{5} \Delta_o + 2P$ (4) $\frac{-2}{5} \Delta_o + P$

Scan or tap for the full solution



- Q.11** Crystal field stabilization energy for high spin d^4 octahedral complex is [AIPMT 2010 (Prelims)]

- (1) $-1.8 \Delta_o$ (2) $-1.6 \Delta_o + P$
 (3) $-1.2 \Delta_o$ (4) $-0.6 \Delta_o$

Scan or tap for the full solution



- Q.12** Which of the following complexes exhibits the highest paramagnetic behaviour?
 where gly = glycine, en = ethylenediamine and bpy = bipyridyl moieties.
 (At. nos. Ti = 22, V = 23, Fe = 26, Co = 27)

[AIPMT 2008]

- (1) $[\text{Co}(\text{ox})_2(\text{OH})_2]^-$
 (2) $[\text{Ti}(\text{NH}_3)_6]^{3+}$
 (3) $[\text{V}(\text{gly})_2(\text{OH})_2(\text{NH}_3)_2]^+$
 (4) $[\text{Fe}(\text{en})(\text{bpy})(\text{NH}_3)_2]^{2+}$

Scan or tap for the full solution



- Q.13** In which of the following coordination entities the magnitude of Δ_o (CFSE in octahedral field) will be maximum?

(At. No. Co = 27)

[AIPMT 2008]

- (1) $[\text{Co}(\text{CN})_6]^{3-}$ (2) $[\text{Co}(\text{C}_2\text{O}_4)_3]^{3-}$
 (3) $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$ (4) $[\text{Co}(\text{NH}_3)_6]^{3+}$

Scan or tap for the full solution



- Q.14** $[\text{Cr}(\text{H}_2\text{O})_6]\text{Cl}_3$ (At. no. of Cr = 24) has a magnetic moment of 3.83 B.M. The correct distribution of 3d electrons in the chromium of the complex is

[AIPMT 2006]

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

Scan or tap for the full solution



- Q.15** CN^- is a strong field ligand. This is due to the fact that [AIPMT 2004]

- (1) it carries negative charge
 (2) it is a pseudohalide
 (3) it can accept electrons from metal species
 (4) it forms high spin complexes with metal species.

Scan or tap for the full solution



- Q.16** Considering H_2O as a weak field ligand, the number of unpaired electrons in $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$ will be (atomic number of Mn = 25) [AIPMT 2004]

- (1) three (2) five (3) two (4) four

Scan or tap for the full solution



ANSWER KEY

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	2	2	1	4	2	2	3	2	2	2	4
Ques.	12	13	14	15	16						
Ans.	1	1	4	2	2						