

Chemistry

Daily Practice Paper #1 · JEE Advanced 2026 · Class 12

SolveFlow · Demo Paper

Field	Value
Subject	Chemistry
Total Questions	10
Total Marks	40
Negative Marking	-1 per wrong answer
Time Suggested	30 minutes
Syllabus	Class 12 — Electrochemistry, Kinetics, p-Block, d-Block, Coordination, Organic

CO & Bloom's Level Mapping

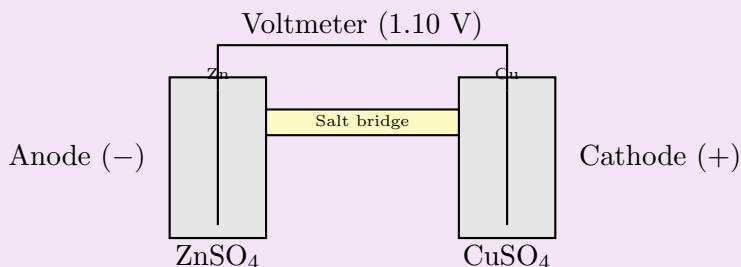
Q No.	Topic	CO	Bloom's Level
1	Electrochemistry — Daniell Cell	CO1	L3 — Apply
2	Chemical Kinetics — First Order	CO1	L3 — Apply
3	Surface Chemistry — Adsorption	CO2	L2 — Understand
4	p-Block — Bond Angles	CO2	L4 — Analyse
5	d-Block — Oxidation States	CO3	L2 — Understand
6	Coordination Chemistry — IUPAC	CO3	L3 — Apply
7	Aldehydes & Ketones — Tollens'	CO4	L4 — Analyse
8	Amines — Basic Strength	CO4	L4 — Analyse
9	Polymers — Nylon-6,6	CO5	L1 — Remember
10	Biomolecules — Protein Structure	CO5	L2 — Understand

Instructions

- Each question carries **4 marks** for a correct answer.
- **-1 mark** is deducted for each incorrect answer.
- No marks are deducted for unattempted questions.
- Use of calculator is **not** permitted.
- All reactions assumed to occur in aqueous solution unless stated otherwise.

Q1 | Electrochemistry — Daniell Cell Marks: 4 | CO/BL: CO1 / L3

The standard electrode potentials are: $E^\circ(\text{Zn}^{2+}/\text{Zn}) = -0.76 \text{ V}$ and $E^\circ(\text{Cu}^{2+}/\text{Cu}) = +0.34 \text{ V}$. The EMF of the Daniell cell $\text{Zn} \mid \text{ZnSO}_4 \parallel \text{CuSO}_4 \mid \text{Cu}$ under standard conditions is:



- (A) -1.10 V
- (B) $+1.10 \text{ V}$
- (C) $+0.42 \text{ V}$
- (D) -0.42 V

Solution — Correct Answer: (B)

Cu has a higher reduction potential, so it acts as the **cathode**; Zn is the **anode**:

$$E_{\text{cell}}^\circ = E_{\text{cathode}}^\circ - E_{\text{anode}}^\circ \quad (1)$$

$$= (+0.34) - (-0.76) \quad (2)$$

$$= \boxed{+1.10 \text{ V}} \quad (3)$$

Cell reaction: $\text{Zn} + \text{Cu}^{2+} \rightarrow \text{Zn}^{2+} + \text{Cu}$

Key Point

$\Delta G^\circ = -nFE_{\text{cell}}^\circ$. For the Daniell cell: $n = 2$, so $\Delta G^\circ = -2 \times 96485 \times 1.10 \approx -212 \text{ kJ/mol}$ (spontaneous).

Q2 | Chemical Kinetics — First Order Reaction Marks: 4 | CO/BL: CO1 / L3

For a first-order reaction, the half-life $t_{1/2} = 693 \text{ s}$. The rate constant k is:

- (A) $1.0 \times 10^{-3} \text{ s}^{-1}$
- (B) 0.693 s^{-1}
- (C) $1.0 \times 10^{-2} \text{ s}^{-1}$
- (D) 693 s^{-1}

Solution — Correct Answer: (A)

For a first-order reaction:

$$t_{1/2} = \frac{\ln 2}{k} = \frac{0.693}{k} \quad (4)$$

$$k = \frac{0.693}{t_{1/2}} = \frac{0.693}{693 \text{ s}} = [1.0 \times 10^{-3} \text{ s}^{-1}] \quad (5)$$

Key Point

First-order: $t_{1/2} = 0.693/k$ — **independent of initial concentration.**

Second-order: $t_{1/2} = 1/(k[A]_0)$ — **depends on initial concentration.**

Q3 | Surface Chemistry — Physisorption vs Chemisorption Marks: 4 | CO/BL: CO2 / L

Physisorption differs from chemisorption primarily because physisorption:

- (A) Involves high activation energy
- (B) Is highly specific to the adsorbent
- (C) Is reversible and involves van der Waals forces
- (D) Forms covalent bonds with the surface

Solution — Correct Answer: (C)

Property	Physisorption	Chemisorption
Force	Van der Waals	Chemical bond
Reversibility	Reversible	Irreversible
Specificity	Non-specific	Highly specific
ΔH_{ads}	20–40 kJ/mol	40–400 kJ/mol
Activation energy	Low/None	High
Layers	Multilayer	Monolayer

Physisorption is [reversible, non-specific, and involves van der Waals forces].

Key Point

BET adsorption isotherm applies to physisorption (multilayers). Langmuir adsorption isotherm assumes monolayer (applies to chemisorption).

Q4 | *p-Block Elements — Bond Angles* Marks: 4 | CO/BL: CO2 / L4

The correct order of bond angles among NH_3 , NF_3 , and PH_3 is:

- (A) $\text{NH}_3 > \text{NF}_3 > \text{PH}_3$
- (B) $\text{NF}_3 > \text{NH}_3 > \text{PH}_3$
- (C) $\text{NH}_3 > \text{PH}_3 > \text{NF}_3$
- (D) $\text{PH}_3 > \text{NH}_3 > \text{NF}_3$

Solution — Correct Answer: (A)

All three molecules are pyramidal (sp^3 hybridised central atom, one lone pair):

Molecule	Bond Angle	Reason
NH_3	107.8°	H is less electronegative; bond pairs closer to N
NF_3	102.5°	F withdraws e^- density; bp-bp repulsion reduced
PH_3	93.3°	P is larger; poor p -orbital overlap; lp more diffuse

$$\therefore \boxed{\text{NH}_3 (107.8^\circ) > \text{NF}_3 (102.5^\circ) > \text{PH}_3 (93.3^\circ)}$$

Key Point

In PH_3 : P uses nearly pure p -orbitals for bonding (lone pair is in s -orbital), so the bond angle is close to 90° .

Q5 | *d-Block Elements — Manganese Oxoanions* Marks: 4 | CO/BL: CO3 / L2

The highest oxidation state of Mn in its common oxoanion is +7. The formula of the permanganate ion is:

- (A) MnO_4^-
- (B) MnO_4^{2-}
- (C) Mn_2O_7

(D) MnO_2

Solution — Correct Answer: (A)

Let oxidation state of Mn = x :

$$x + 4(-2) = -1 \quad (6)$$

$$x = -1 + 8 = \boxed{+7} \quad (7)$$

Formula: MnO_4^- (permanganate ion). Mn_2O_7 is the anhydride (Mn = +7 also) but it is a covalent compound, not the ion.

Key Point

Common Mn oxidation states: +2 (MnO , pale pink), +4 (MnO_2 , brown), +6 (MnO_4^{2-} , manganate, green), +7 (MnO_4^- , permanganate, purple).

Q6 | Coordination Chemistry — IUPAC Nomenclature Marks: 4 | CO/BL: CO3 / L3

The IUPAC name of $[\text{Co}(\text{NH}_3)_4(\text{NO}_2)\text{Cl}]\text{Cl}$ is:

- (A) Tetraamminechloronitrocobalt(III) chloride
- (B) Tetraamminechloridonitrito- κO -cobalt(III) chloride
- (C) Tetraamminenitrochloridocobalt(III) chloride
- (D) Chloridotetraamminenitroso-cobalt(III) chloride

Solution — Correct Answer: (B)

Step 1 — Identify ligands and metal:

- $4 \times \text{NH}_3$ = tetraammine
- Cl^- = chlorido (alphabetically before nitrito)
- NO_2^- via O = nitrito- κO
- Metal: Co; charge: +3 (from overall neutral complex with one outer Cl^-)

Step 2 — Alphabetical order of ligands: chlorido < nitrito < tetraammine

Name: Tetraamminechloridonitrito- κO -cobalt(III) chloride

Key Point

Ligands named alphabetically ignoring multiplying prefixes (di, tri, tetra). κO indicates the nitrito ligand is O-bonded (vs N-bonded = nitro).

Q7 | Aldehydes & Ketones — Tollens' vs Fehling's Test Marks: 4 | CO/BL: CO4 / L4

Which compound gives a **positive Tollens' test** but **negative Fehling's test**?

- (A) Formaldehyde (HCHO)
- (B) Acetaldehyde (CH_3CHO)
- (C) Benzaldehyde ($\text{C}_6\text{H}_5\text{CHO}$)
- (D) Acetone (CH_3COCH_3)

Solution — Correct Answer: (C)

Compound	Tollens'	Fehling's	Reason
Formaldehyde	+ve	+ve	Aliphatic aldehyde
Acetaldehyde	+ve	+ve	Aliphatic aldehyde
Benzaldehyde	+ve	-ve	Aromatic aldehyde
Acetone	-ve	-ve	Ketone

Benzaldehyde is an aldehyde, so it reduces Tollens' reagent ($\text{Ag}^+ \rightarrow \text{Ag}\downarrow$, silver mirror). But aromatic aldehydes *cannot* reduce Cu^{2+} in Fehling's reagent — only aliphatic aldehydes do.

Answer: (C) Benzaldehyde

Key Point

Tollens' test: *all* aldehydes react. Fehling's test: only *aliphatic* aldehydes react. Ketones fail both (no $-\text{CHO}$ group).

Q8 | Amines — Basic Strength in Aqueous Solution Marks: 4 | CO/BL: CO4 / L4

The correct order of basic strength of amines **in aqueous solution** is:

- (A) $(\text{CH}_3)_3\text{N} > (\text{CH}_3)_2\text{NH} > \text{CH}_3\text{NH}_2 > \text{NH}_3$
- (B) $(\text{CH}_3)_2\text{NH} > \text{CH}_3\text{NH}_2 > (\text{CH}_3)_3\text{N} > \text{NH}_3$
- (C) $\text{CH}_3\text{NH}_2 > (\text{CH}_3)_2\text{NH} > (\text{CH}_3)_3\text{N} > \text{NH}_3$
- (D) $\text{NH}_3 > \text{CH}_3\text{NH}_2 > (\text{CH}_3)_2\text{NH} > (\text{CH}_3)_3\text{N}$

Solution — Correct Answer: (B)

In aqueous solution, two effects compete:

1. **Inductive (+I) effect** — more methyl groups → higher electron density on N → stronger base.
2. **Solvation effect** — more methyl groups → more steric hindrance → less solvation of the cation → weaker base.

The secondary amine $(CH_3)_2NH$ achieves the best balance:

$$(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N > NH_3$$

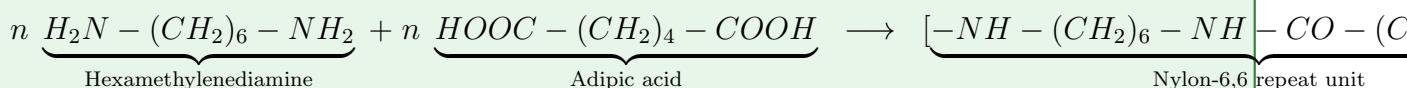
Key Point

In *gas phase*, order follows +I effect: $(CH_3)_3N > (CH_3)_2NH > CH_3NH_2 > NH_3$. In *aqueous solution*, solvation inverts the order of secondary vs. tertiary.

Q9 | Polymers — Nylon-6,6 Marks: 4 | CO/BL: CO5 / L1

Nylon-6,6 is formed by the condensation polymerisation of:

- (A) Caprolactam
- (B) Hexamethylenediamine and adipic acid
- (C) Hexamethylenediamine and sebacic acid
- (D) Glycol and terephthalic acid

Solution — Correct Answer: (B)

Both monomers have **6 carbon atoms** — hence the name **Nylon-6,6**. Answer: (B)

Compare: **Nylon-6** is made from caprolactam (ring-opening of a single 6-C monomer).

Key Point

Nylon-6,6: two different monomers (diamine + diacid), condensation polymer.

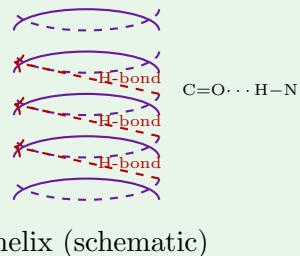
Nylon-6: one monomer (caprolactam), addition polymer via ring opening.

Q10 | Biomolecules — Protein Secondary Structure Marks: 4 | CO/BL: CO5 / L2

The secondary structure of a protein is maintained primarily by:

- (A) Peptide bonds ($-\text{CO}-\text{NH}-$)
- (B) Disulfide bridges ($-\text{S}-\text{S}-$)
- (C) Hydrogen bonds between $\text{C}=\text{O}$ and $\text{N}-\text{H}$ groups of the backbone
- (D) Ionic interactions between charged side chains

Solution — Correct Answer: (C)



α -helix (schematic)

The **secondary structure** (α -helix, β -sheet) is stabilised by **hydrogen bonds** between the $\text{C} = \text{O}$ of one peptide bond and the $\text{N} - \text{H}$ of another (4 residues away in an α -helix).

Answer: (C)

Key Point

Structure hierarchy: Primary = peptide bonds; Secondary = H-bonds; Tertiary = H-bonds, disulfide bridges, hydrophobic, ionic; Quaternary = interactions between subunits.