Past Paper Audit

Prepared for [Student X]

LEVEL

J1 H2 Chemistry

TEST

CA1 · 2026

RESULT

11 / 25 (44%)

Quick Summary

- Full marks on combustion balancing and gas-volume ratios in Q1.
- Calculation questions requiring electron ratios and mole conversions were the main obstacle.
- Redox equations and atomic-structure explanations also cost marks.
- Start with calculations in Q2–Q4, then revisit ions, d orbitals and ionisation energy.

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Easy marks to recover

Performance by Topic

Topic	Questions	Marks	Result
The Mole Concept and Stoichiometry	Q1–Q2	3 / 7	43%
Electrochemistry	Q3–Q4	3 / 6	50%
Atomic Structure, Periodicity and Transition Elements	Q5–Q7	5 / 12	42%
Total		11 / 25	44%

Lost Marks Analysis

Atomic Structure, Periodicity and Transition Elements

Question	Learning objective	Classification	Knowledge gaps
Q7(a)	1d: Deduce the numbers of protons, neutrons and electrons present in both atoms and ions given proton and nucleon numbers and charge.	Recall	Treated the electron count as the proton number, forgetting that a 2− ion has gained two electrons.
Q5(b)	1g: Describe the shapes of s, p and d orbitals.	Recall	Mixed up the orbital shapes and axis positions: d_{xy} lies between the x- and y-axes, while d_{z^2} lies along z with a torus around the nucleus.
Q6(b)	1i: Explain the factors influencing the ionisation energies of elements.	Explanation	Used general shell and shielding ideas but missed that the electron removed changes from the 3s subshell to the higher-energy 3p subshell.

Lost Marks Analysis

Atomic Structure, Periodicity and Transition Elements

Question	Learning objective	Classification	Knowledge gaps
Q6(c)	1k: Interpret successive ionisation energy data of an element in terms of the position of that element within the Periodic Table.	Interpretation	Treated the point after the large jump as the group-defining point; the jump is between T and U, so U has three outer electrons and is Group 13.
Q7(b)	5b: Describe and explain qualitatively the general trends and variations in atomic radius, ionic radius, first ionisation energy and electronegativity.	Explanation	Treated N^{3-} and O^{2-} as having different shielding, even though they are isoelectronic; O^{2-} is smaller because its greater nuclear charge attracts the same electrons more strongly.

Lost Marks Analysis

The Mole Concept and Stoichiometry

Question	Learning objective	Classification	Knowledge gaps
Q2(a), Q2(b)	6g: Perform calculations involving reacting masses, gas volumes, and solution volumes and concentrations.	Calculation	Started the concentration and mole calculation but did not carry the volume and concentration data consistently into the required amount and mass.
Q2(c)	6h: Deduce stoichiometric relationships from calculations such as those in 6g.	Calculation	Calculated the amount of water but did not compare it with the amount of $CuSO_4$ to obtain the whole-number ratio in $CuSO_4 \cdot 5H_2O$.
Q3(b)(ii)	6h: Deduce stoichiometric relationships from calculations such as those in 6g.	Calculation	Used the calculated iodine or thiosulfate amount without applying the balanced-equation ratio that converts it into the amount of oxygen.

Lost Marks Analysis

Electrochemistry

Question	Learning objective	Classification	Knowledge gaps
Q4 second mark	12a: Describe and explain redox processes in terms of electron transfer and/or changes in oxidation number.	Application	Mistook M for being oxidised, when Sn^{2+} loses electrons and M must gain them, so M is reduced.
Q3(a)	12h: Construct redox equations using the relevant half-equations.	Explanation	Treated the alkaline half-equation as if balancing atoms alone was enough, without balancing oxygen, hydrogen and charge using H_2O, OH^- and electrons.

What Went Well

[Student X] scored well in these concepts:

- Hydrocarbon combustion and gas-volume calculations (Q1).
- Quantitative redox and stoichiometry calculations (Q3(b) and Q4).
- Copper(I) electronic configuration (Q5(a)).
- Charged-particle deflection in electric fields (Q5(c)(i)–(ii)).
- Third ionisation-energy equation (Q6(a)).

Quick Wins

Mistakes that can be corrected immediately in future exams

Question	Mistake		Correction
Q3(a)	Alkaline half-equation not balanced.	→	Balance atoms, then balance charge with electrons.
Q3(b)(ii)	Oxygen mole ratio was not used.	→	Use the iodine-to-oxygen ratio from the balanced equation.
Q4	M was treated as oxidised.	→	Sn^{2+} loses electrons, so M gains them.
Q5(b)	d-orbital axes were mixed up.	→	Draw dxy between x/y and dz^2 along z.
Q6(b)	Used only a shell explanation.	→	Identify the 3s-to-3p subshell change.
Q6(c)	Assigned Group 13 to V.	→	The drop is T to U, so U is Group 13.
Q7(a)	Forgot electrons in a 2− ion.	→	Add 2 electrons to the proton number.

Concepts to Revisit

Atomic Structure, Periodicity and Transition Elements

Concept	Question(s)	What to practise
Electrons in ions	Q7(a)	Verify electron counts from proton number and charge.
d-orbital shapes and orientations	Q5(b)	Draw and label dxy and dz^2.
Factors affecting ionisation energy	Q6(b)	Explain subshell, distance, shielding and nuclear attraction.
Successive ionisation-energy data	Q6(c)	Map a graph jump to the correct labelled element and group.
Ionic-radius trends	Q7(b)	Compare isoelectronic ions using nuclear charge.

Concepts to Revisit

The Mole Concept, Stoichiometry and Electrochemistry

Concept	Question(s)	What to practise
Quantitative mole calculations	Q2(a), Q2(b)	Practise n = cV, dilution and amount-to-mass conversions.
Stoichiometric relationships	Q2(c), Q3(b)(ii)	Write the formula or balanced-equation ratio first.
Redox as electron transfer	Q4	Identify oxidation/reduction and count electrons.
Redox equations from half-equations	Q3(a)	Balance alkaline half-equations for atoms and charge.