Physical Setting/Chemistry

Original exam A, full-length form B and three-week preparation

Why these demands were selected

MC slots explicitly mapped to the 2011 reference tables averaged 20.5 in January, 22.4 in June and 19.8 in August. In January 2026, students worked with a gas sample, a cooling investigation, electrochemistry and neutralization in written-response sets.

The reference-table tag can accompany a content or process tag. Adding percentages across these tags double counts items. The new chemistry exam uses a different reference resource.

Released forecast example **State design / administration guidance**

Original exam A

Four sets, 8 multiple-choice and 4 written responses. Suggested time: 35–50 min; adjust to local conditions. Each selected response earns one local point. Each written response earns one local point per numbered criterion on the key. Maximum 16 local points. Accept defensible alternative reasoning. Allow consistent follow-through where the local criterion assesses a new operation; annotate the originating error.

Full-length form B

Use the intact linked 2026-06 official booklet except 80. The insert preserves one response position and its maximum credit. Report the original-component subtotal and replacement result separately. State conversion charts are specific to the unmodified state form. Record prior exposure if students have used the released booklet in preparation.

Preparation and feedback

Use the six Studio sessions, then one new retrieval check per week. Use Form A as an independent transfer check after preparation. Form B is optional for full-length rehearsal. On return after absence, students can start with the re-entry line on the current week’s sheet. After testing, return to the first unsupported step in the student’s reasoning.

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Questions 1–6 • One point per selected response.

1 A • X only
Both are liquid at 20 °C but only X is above its normal boiling point at 80 °C.

2 C • Solid
Zero is below Y’s 5 °C melting point.

3 Written response / 2 local points
1. Y boils at 105 °C versus 65 °C for X.
2. The higher boiling temperature is consistent with stronger attractions between Y molecules and more energy required to separate them.

4 D • 14
Neutrons = 26 − 12.

5 C • Loss of two electrons
Removing negative charge produces a positive ion while keeping the same nucleus.

6 Written response / 2 local points
1. 0.75(24) + 0.25(26) = 24.5 u.
2. Z-24 is more abundant, so it contributes more heavily to the average.

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Questions 7–12 • One point per selected response.

7 B • Ag^+
Silver ions gain electrons to form silver atoms.

8 A • Mg(s)
Magnesium supplies electrons to the silver ions.

9 Written response / 2 local points
1. Oxidation: $Mg \rightarrow Mg^{2+} + 2e^-$.
2. Reduction: $2Ag^+ + 2e^- \rightarrow 2Ag$. Both involve two electrons, which cancel when the equations are added.

10 B • 72 g
48(150/100) = 72 g.

11 D • Unsaturated
The 60 g present is below the 72 g maximum.

12 Written response / 2 local points
1. At 20 °C up to 36 g remains dissolved, so 60 − 36 = 24 g crystallizes.
2. At dynamic equilibrium dissolution and crystallization continue at equal rates; equal rates do not imply equal amounts in each phase.

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Replacement scoring and retrieval-check keys

Form B replacement / 80 / 1 credits maximum

Award one local point for equal, ongoing forward and reverse reaction rates. Equal concentrations or stopped reactions alone are insufficient.

Public scoring materials for base form

Week 1 / retrieval check

Element Q has 15 protons and mass number 31. Give neutrons and electrons for Q^{3-}.
16 neutrons and 18 electrons.

Week 2 / retrieval check

If 40 g dissolves per 100 g water, how much dissolves at saturation in 75 g water?
30 g, proportional to solvent mass.

Week 3 / retrieval check

Why do concentrations stay constant at dynamic equilibrium even with unequal amounts of reactant and product?
Equal forward and reverse rates offset changes; amounts need not be equal.

Department follow-up

CHEM_LEG-C1 Account for transferred electrons
Count electrons lost and gained for the whole reaction. How can the totals be checked?

CHEM_LEG-C2 Separate element identity from isotope mass
What must stay fixed for both atoms to be europium? What can change?

CHEM_LEG-C3 Explain dynamic equilibrium
Can two containers have different numbers of particles while particles transfer at equal rates?

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Use the independent exam only after practice, or document the order if using it diagnostically.

Which preparation sessions lead into each exam set?

A1 · A miniature reference table / Studio session(s) 1

A2 · Atoms in a labeled sample / Studio session(s) 2

A3 · An aqueous redox reaction / Studio session(s) 3

A4 · A dissolving and cooling sample / Studio session(s) 6

Likely reading of a partial response to investigate

A crystal mass is calculated from the change in maximum capacity even though the starting solution was unsaturated. Ask for actual dissolved mass at the start.

Bridge rehearsal / worked feedback

A salt dissolves to 30 g per 100 g water at room temperature. A warm solution contains 43 g in 100 g water. Find what crystallizes on cooling to room temperature.

13 g crystallizes if equilibrium is reached without evaporation. Start from 43 g actually present.

How to choose the next round

If the model or source was misread, return to the matching prep set and ask for a new representation. If the computation or claim is correct but support is missing, request one neutral explanation and give a parallel independent check. Keep the independent result separate from prompted work.