Core practical: aqueous electrolysis comparison

Teacher / technician

YEAR 11 / LESSON 112 / CHEMISTRY ONLY

Staff preparation and answer guidance. Keep separate from student sheets. Qualitative comparison, not a quantitative gas-yield measurement. Live gas identity tests are outside this method.

Coverage and delivery

Chemistry only: 1.60C with 1.58C–1.59C. Two non-halide electrolytes; named chloride/acid examples are covered in Lesson 111.

Allow about 60 minutes. Follow the student sequence and use the answers to check reasoning.

Requisition • class of 30, working in 15 pairs

Item	Per pair / setup	Class total
Booklet / writing tools	1 per learner	30 sets
Electrolysis / protection	2 beakers, 2 clean electrode pairs; goggles each	30 beakers; 60 rods; 30 goggles
DC supply / holders	1 checked set per pair	15 current-limited 6 V DC sets
0.50 M $CuSO_4$ / K_2SO_4	30 cm^3 each per pair	600 cm^3 each including spare

Immediate safety

Goggles; power off before adjustments. Keep clips dry and electrodes apart. No flames, sealed cells or gas collection; collect all copper waste.

Preparation and delivery

Read alongside the student method

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1. For 15 pairs supply 450 cm^3 of each 0.50 M electrolyte; prepare 600 cm^3 each including spare. Provide 30 beakers, 30 clean carbon-electrode pairs (60 rods), 15 holders/supplies/lead sets, cylinders, 30 goggles and separate labelled waste containers.

2. Check current-limited low-voltage DC supplies, insulation and stable electrode spacing. Use 6 V, no direct mains connection and no AC. Staff set a conservative current limit appropriate to the supplied equipment after a local trial. Stop at noticeable warming, vigorous gas evolution or faults.

3. Use at most three minutes per solution and good room ventilation. Hydrogen is flammable and oxygen supports combustion: remove flames/ignition sources, do not enclose cells or collect/mix gases. No chloride or bromide electrolyte is supplied.

4. Copper sulfate is harmful to aquatic life; avoid contact/ingestion and collect every copper-containing solution/rinse/solid as labelled metal waste. Collect potassium sulfate solution separately for the school disposal decision; do not cross-contaminate it.

5. Use separate cleaned rods for the two runs. Staff handle copper-coated electrodes; no pupil acid cleaning or nitric acid is included. Allow 15 minutes setup, 15 runs, 20 reasoning and 10 cleanup. Trial apparatus locally before teaching; predictions are not a guarantee of visible changes.

Close of lesson

• Switch off and disconnect. Staff collect labelled solutions and electrodes; rinse only into designated waste, clean benches and wash hands.

Check before teaching

Check the cards, reference data and quantities against this requisition. Keep the staff answer guide separate until the checking stage. Supplied numerical practice datasets are labelled examples; they are not class measurements.

Answers and teaching notes

Expected explanations • do not give as experimental observations

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- Accept observed deposits/bubbles or a documented inconclusive result; compare with predictions only afterwards.
- $Cu^{2+}+2e^- \rightarrow Cu$.
- $2H_2O+2e^- \rightarrow H_2+2OH^-$.
- $2H_2O \rightarrow O_2+4H^++4e^-$, or $4OH^- \rightarrow O_2+2H_2O+4e^-$.
- Copper contamination could change products and undermine the electrolyte comparison.
- Current, electrode area, gas dissolution, temperature and side processes can differ; voltage/time alone do not measure charge or gas volume.

References and provenance

Pearson Chemistry specification

RSC aqueous-electrolysis technique

RSC copper sulfate electrolysis

Prepared 22 November 2026. Original wording, tables and questions. Sources inform the concepts and technique; the lesson scope and classroom quantities are explicitly described here. No laboratory trial or final school risk approval is claimed.