1.9 Electrolysis

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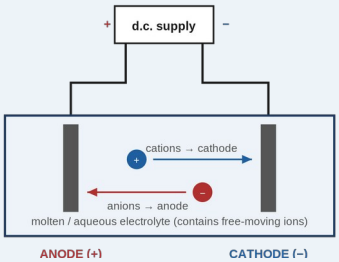
1. KEY VOCABULARY

TERM	MEANING
Electrolysis	Using electricity to break down an ionic compound.
Electrolyte	The molten or dissolved ionic compound being broken down.
Electrode	A conducting rod dipped into the electrolyte.
Anode	The positive electrode.
Cathode	The negative electrode.
Half-equation	Shows the electron gain or loss at one electrode.
Inert	Unreactive — takes no part in the reaction (e.g. carbon).

2. THE ELECTROLYSIS CELL



Positive ions → cathode. Negative ions → anode.

3. AT EACH ELECTRODE

Cathode (−): positive ions gain electrons — this is reduction.
Anode (+): negative ions lose electrons — this is oxidation.
Memory aid: OIL RIG — Oxidation Is Loss, Reduction Is Gain (of electrons).

4. MOLTEN vs AQUEOUS

Molten ionic compound: metal forms at the cathode, non-metal at the anode.
Aqueous solution: at the cathode you get hydrogen UNLESS the metal is less reactive than hydrogen (then the metal forms). At the anode you get oxygen UNLESS a halide is present (then the halogen forms).

5. HALF-EQUATIONS — EXAMPLES

Cathode: $Na^+ + e^- \rightarrow Na$
Cathode: $2H^+ + 2e^- \rightarrow H_2$
Anode: $2Cl^- \rightarrow Cl_2 + 2e^-$
Electrons are written so charges balance.

6. THE WHY

Why the compound must be molten or dissolved: the ions must be free to move so they can travel to the electrodes and carry charge.
Why a solid ionic compound can't be electrolysed: its ions are locked in the lattice and cannot move.

7. COMMON EXAM MISTAKES

✗ "The cathode is positive."
✓ Cathode = negative; anode = positive.
✗ "Oxidation is gain of electrons."
✓ Oxidation Is Loss; Reduction Is Gain (OIL RIG).
✗ "Solid ionic compounds can be electrolysed."
✓ They must be molten or in solution — ions must move.

8. SELF-CHECK · cover & quiz

Can you…

1. Label an electrolysis cell and name both electrodes?
2. Say which ions go to which electrode — and why?
3. Define oxidation and reduction in terms of electrons?
4. Predict the products of electrolysing a molten compound?
5. Predict the products for an aqueous solution?
6. Write a half-equation for each electrode?