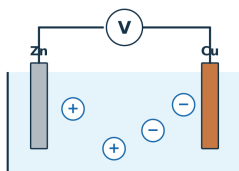


C5 Chemical cells and fuel cells

AQA Separate Chemistry 8462 | Paper 1 extras | Foundation + Higher

1 A simple chemical cell



Electrolyte: mobile ions

Two different metal electrodes contact an **electrolyte** containing mobile ions. Chemical reactions produce a potential difference and can power a circuit.

Voltage depends on electrodes and electrolyte.

2 Batteries

Cells connected in series



Same direction: $1.5 + 1.5 = 3.0 \text{ V}$

A battery contains two or more cells connected in **series**.

In the same direction their voltages add: $1.5 \text{ V} + 1.5 \text{ V} = 3.0 \text{ V}$.

Use data to compare cell materials and practical uses.

3 Rechargeable cells

Using the cell
Chemical reactions produce an electrical transfer

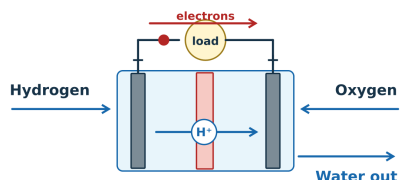
Recharging
External current reverses the chemical reactions

Non-rechargeable cells stop when a reactant is used up. Standard alkaline cells are non-rechargeable.

An external current **reverses reactions** in a rechargeable cell.

Compare cost, life and disposal.

4 Hydrogen fuel cells



Hydrogen ions cross; electrons take the circuit.

Supply **hydrogen and oxygen/air** continuously. The reactions produce a potential difference. The fuel cell keeps operating while reactants are supplied. Hydrogen is oxidised; electrical energy is transferred.

5 The product is water

Hydrogen + oxygen → water



Electrical energy transfer

No carbon dioxide at the point of use



Water is the product. There is no CO_2 from this reaction at the point of use.

This does not prove the whole system has no environmental impact.

6 Evaluate the whole system

Fuel cell
External fuel supply
Refuelling infrastructure
Hydrogen storage

Rechargeable battery
Stored reactants
Recharging time
Limited cycle life

Compare the full system using the data given.

Compare fuel-cell and battery systems using range, cost, lifetime, efficiency and refuelling/recharging data.

Hydrogen storage is difficult; it is flammable. Production needs energy and may cause emissions.

AQA section 4.5.2.