

## Topic 5: Energy changes

AQA GCSE Chemistry 8462 · spec 4.5 · sheets 5.1–5.2

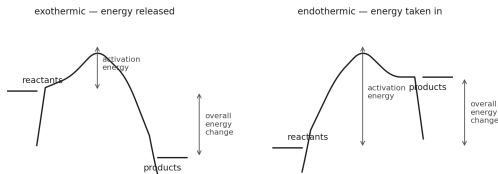
## Hot reactions, cold reactions

- Exothermic — energy out, surroundings warm.
- Endothermic — energy in, surroundings cool.
- Energy is conserved — it moves between system and surroundings.

## Exothermic and endothermic

- Exothermic — combustion, oxidation, neutralisation; hand warmers, self-heating cans.
- Endothermic — thermal decomposition, citric acid + sodium hydrogencarbonate; injury packs.
- RP4 — variables affecting temperature changes in reacting solutions.

# Reaction profiles



- Collisions need at least the activation energy.
- Exothermic — products below reactants; endothermic — above.
- Label the activation energy and overall change arrows.

## Bond energies

- Breaking bonds costs energy; forming bonds releases it.
- Overall change = bonds broken minus bonds formed.
- Exothermic — forming wins; endothermic — breaking wins.

## Cells and batteries

- Two different metals in an electrolyte make a simple cell.
- Voltage depends on the electrodes and electrolyte.
- Batteries — cells in series; non-rechargeable stops, rechargeable reverses.

## Hydrogen fuel cells

- Hydrogen and oxygen fed in; water is the only product.
- (HT) anode and cathode half-equations; overall  $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$ .
- Evaluate against rechargeable batteries for vehicles.

## Check yourself

- Checklist before you call this topic done.
- Temperature rule with examples and uses; both profiles drawn.
- Bond-energy sum; cell voltage factors; fuel-cell equations and evaluation.