

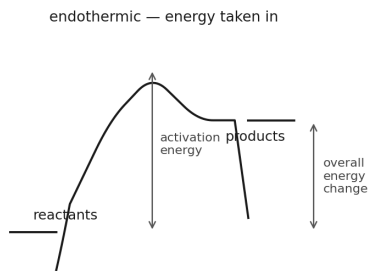
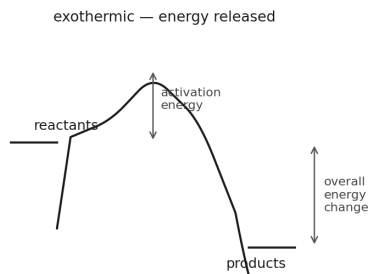
Exercise walk-through

5.1

Exothermic and endothermic reactions (4.5.1.1–4.5.1.3)

AQA · GCSE · Chemistry

Reaction profiles



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

Exercises 2.1·2.3

2.1 A thermometer in a reaction mixture falls from 21 °C to 15 °C. Classify the reaction. [1]

2.2 Name the minimum energy particles need to react. [1]

2.3 Name one everyday use of an exothermic reaction. [1]

Exercises 2.1·2.3

2.1 A thermometer in a reaction mixture falls from 21 °C to 15 °C. Classify the reaction. [1]

2.1 Endothermic – the surroundings cool.

2.2 Name the minimum energy particles need to react. [1]

2.2 Activation energy.

2.3 Name one everyday use of an exothermic reaction. [1]

2.3 Hand warmer / self-heating can.

Exercises 3.1·3.2

3.1 Sketch the reaction profile for an endothermic reaction, labelling the reactants, products, activation energy and overall energy change. [4]

3.2 (*HT*) In a reaction, 1000 kJ/mol is needed to break bonds and 850 kJ/mol is released forming bonds. Calculate the overall energy change and classify the reaction. [3]

Exercises 3.1·3.2

3.1 Sketch the reaction profile for an endothermic reaction, labelling the reactants, products, activation energy and overall energy change. [4]

3.1 Products drawn above reactants; a curved line from reactants over a hump; activation energy arrow from reactant level to the peak; overall energy change arrow from reactant level up to product level.

3.2 (*HT*) In a reaction, 1000 kJ/mol is needed to break bonds and 850 kJ/mol is released forming bonds. Calculate the overall energy change and classify the reaction. [3]

3.2 Overall change = $1000 - 850 = +150$ kJ/mol; positive – energy taken in; endothermic reaction.

Exercise 3.3

3.3 Hand warmers and injury packs use opposite reaction types. Explain how each works and evaluate one limitation of each. [5]

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3.3 Hand warmers use an exothermic reaction – oxidation of iron – releasing energy that warms the hands; limited because they eventually run out of reactants/oxygen and cannot be reused if disposable. Injury packs use an endothermic reaction – ammonium nitrate dissolving takes in energy, cooling the injury; limited because the cooling is temporary until the reaction finishes; reusable gel packs reverse the process by re-crystallising in hot water.