

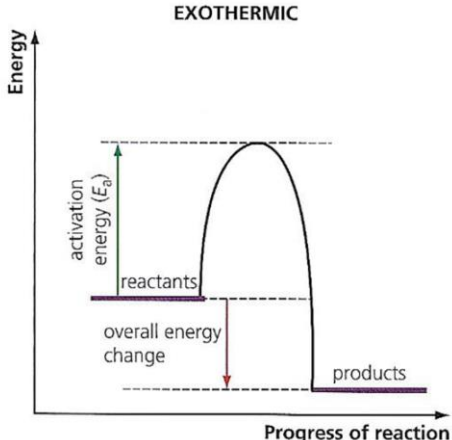
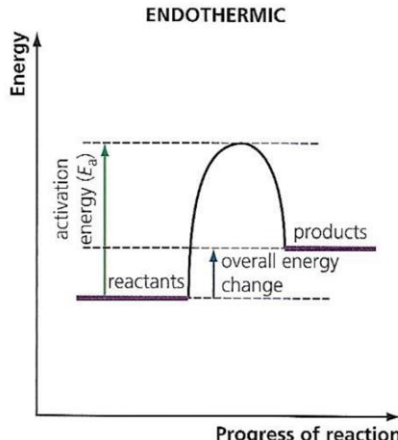
Exothermic and Endothermic

1	An exothermic reaction is one that transfers energy to the surroundings so the temperature of the surroundings increases.
2	An endothermic reaction is one that takes in energy from the surroundings so the temperature of the surroundings decreases
3	Everyday uses of exothermic reactions include self-heating cans and hand warmers.
4	Endothermic reactions include thermal decompositions and everyday uses include sports injury packs.

Energy changes (Higher Tier)

1	During a chemical reaction energy must be supplied to break bonds in the reactants and energy is released when bonds in the products are formed.
2	In an exothermic reaction, more energy is released making the bonds than is taken in to break the bonds and in an endothermic reaction, more energy is taken in to break the bonds than is released when new bonds are made.
3	Energy change = bond energy in reactants – bond energy in products

Reaction profiles

1	Reaction profiles can be used to show the relative energies of reactants and products, the activation energy and the overall energy change of a reaction
2	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>EXOTHERMIC</p>  </div> <div style="text-align: center;"> <p>ENDOTHERMIC</p>  </div> </div>

Chemistry Only - Chemical Cells

1	Cells contain chemicals which react to produce electricity. They are made of two different metals in contact with an electrolyte.
2	The potential difference of a cell is dependant on the metals. The bigger the difference in reactivity of the metals, the greater the potential difference.
3	In non-rechargeable cells the chemical reactions stop when one of the reactants is used up. In rechargeable cells and batteries, like the one used to power your mobile phone, the chemical reactions can be reversed when an external circuit is supplied.

Key Vocabulary

1	Exothermic	Energy is transferred to the surroundings
2	Endothermic	Energy is taken in from the surroundings
3	Activation energy	The minimum amount of energy that particles must have to react.

Chemistry Only - Fuel Cells

1	A fuel cell works by having a constant supply of a fuel and oxygen from the air. The fuel is oxidised electrochemically to produce a potential difference. Hydrogen fuel cells are an alternative to rechargeable cells and batteries.
2	A fuel cell has 2 electrodes, the anode (negative) and cathode (positive), and an electrolyte.
3	The overall reaction in a hydrogen-oxygen fuel cell is: hydrogen + oxygen → water $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{l})$
4	Half equations: Anode: $2\text{H}_2 \rightarrow 4\text{H}^+ + 4\text{e}^-$ Cathode: $\text{O}_2 + 4\text{H}^+ + 4\text{e}^- \rightarrow 2\text{H}_2\text{O}$