

WJEC England GCSE Chemistry

Topic 8: Energy changes in chemistry

Notes

(Content in bold is for Higher Tier only)





Energy transfer during exothermic and endothermic reactions

- When chemical reactions occur, energy is transferred to or from its surroundings – it is conserved.
 - The amount of energy at the beginning is the same as at the end.

Exothermic reactions

- An exothermic reaction is one that transfers energy to the surroundings so the temperature of the surroundings increases.
- Examples of exothermic reactions include; combustion, many oxidation reactions and neutralisation.
- Everyday examples of exothermic reactions include; self-heating cans (e.g for coffee) and hand warmers.



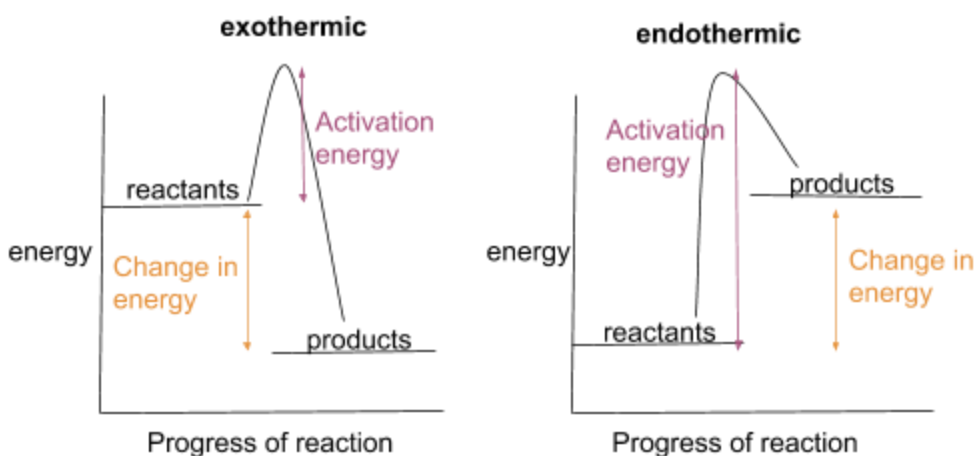
Endothermic reactions

- An endothermic reaction is one that takes in energy from the surroundings so the temperature of the surroundings decreases.
- Examples of endothermic reactions are thermal decomposition and the reaction of citric acid and sodium hydrogencarbonate.
- Some sports injury packs are based on endothermic reactions.



Reaction profiles

- Chemical reactions can occur only when reacting particles collide with each other and with sufficient energy.
 - Activation energy = minimum amount of energy that particles must have to react
- 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.





The energy change of reactions

- During a chemical reaction:
 - Energy must be SUPPLIED to BREAK bonds in the reactants
 - Energy is RELEASED when bonds in the products are FORMED
 - Energy needed to BREAK bonds and energy RELEASED when bonds are formed can both be calculated from bond energies
 - Sum of energy to break bonds – sum of energy released when bonds form = overall energy change
- Energy needed to break > energy released **ENDOTHERMIC**
- Energy needed to break < energy released **EXOTHERMIC**

Chemical cells

- Produces a potential difference until the reactants are used up

Fuel cells

- Supplied by an external source of fuel (eg hydrogen) and oxygen or air
 - Oxidised electrochemically within the fuel cell to produce a potential difference
 - Overall reaction in a hydrogen fuel cell involves the oxidation of hydrogen to produce water
 - These offer a potential alternative to rechargeable cells & batteries
- Advantages
 - Greater efficiency
 - Better for environment – only produces water
- Disadvantages
 - Transport of hydrogen difficulties
 - Production of hydrogen difficulties
 - Explosiveness of hydrogen make it dangerous

Practical assessments

- SP8 Determination of the amount of energy released by a fuel

