

# OCR B GCSE Chemistry

## Topic 1: Air and water

**Why are there temperatures changes in chemical reactions?**

Notes



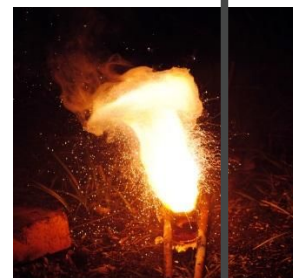


## 1. Distinguish between endothermic and exothermic reactions on the basis of the temperature change of the surroundings

- 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.



## 2. Draw and label a reaction profile for an exothermic and an endothermic reaction, identifying activation energy

- Activation energy = minimum amount of energy that particles must have to react
- to identify whether an energy profile diagram is exo or endothermic, think about whether the reactants or products have more energy
  - in an exothermic reaction, energy is released to the surroundings, meaning that the products must have less energy than the reactants (remember that energy must be conserved)
  - in an endothermic reaction, energy is taken in from the surroundings, meaning that products must have more energy than reactants

3.





*Explain activation energy as...*

- The energy needed for a reaction to occur

*4. Interpret charts and graphs when dealing with reaction profiles*

*5. (HT only) calculate energy changes in a chemical reaction by considering bond breaking and bond making energies*

- During a chemical reaction:
  - o Energy must be taken in to break bonds in the reactants
  - o Energy is released when bonds in the products are formed
    - bonds take many routes: **breaking bonds** takes energy in, **making bonds** releases energy
  - o Sum of energy to BREAK – sum of energy RELEASED = overall energy change
- Energy needed to BREAK > energy RELEASED **ENDOTHERMIC**
- Energy needed to BREAK < energy RELEASED **EXOTHERMIC**

*6. Carry out arithmetic computations when calculating energy changes*

- use 5 above

*7. Describe how you would investigate a chemical reaction to determine whether it is endothermic or exothermic (separate science only)*

- Carry out the chemical reaction as an experiment, but use a thermometer to measure the temperature throughout the reaction
  - o 1 take the first measurement of temperature before the reaction
  - o 2 take the second measurement of temperature at the maximum/minimum point – throughout the reaction watch the temperature to write down the maximum or minimum that it reaches
- If there is an increase in temperature = exothermic (given out to surroundings)
- If there is a decrease in temperature = endothermic (taken from the surroundings)



*8. Recall that a chemical cell produces a potential difference until the reactants are used up (separate science only)*

- this can be set up by:
  - setup 2 beakers with 2 solutions containing ions of different metals in, and with the respective solid metals as electrodes in each solution.
  - connect the solutions in the beakers using filter paper soaked in KCl
  - connect the electrodes with crocodile clips and wires, with a voltmeter joining the two
- electrons will flow from the more to the less reactive metal and this creates a current, so creates electricity

