

4.2 Hydrogen-oxygen fuel cells

Name: _____ Class: _____ Date: _____

Total: 8 marks

KEY WORDS fuel cell
 • hydrogen • oxygen

• hydrogen–oxygen fuel cells

• pollutants

Objective

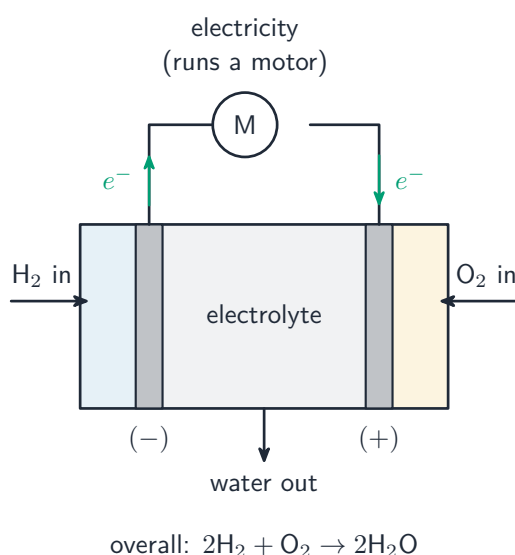
Build the skills to answer exam questions on **hydrogen–oxygen fuel cells**
 – how they work and how they compare with a petrol engine.

You must be able to:

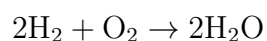
- give the overall reaction in a hydrogen–oxygen fuel cell
- state the advantages and disadvantages vs a petrol engine
- explain why the only product is water

1 Key knowledge and worked examples

■ The fuel cell



A fuel cell turns chemical energy straight into electricity; water is the only product



- **advantage:** only product is water – no air pollution.
- **disadvantage:** hydrogen is hard/dangerous to store; making it may use fossil fuels.

2 Practice

2.1 A hydrogen–oxygen fuel cell takes in 4 g of hydrogen. Write the overall equation for the cell, and state the only product. [2]

2.2 State the only chemical product of the fuel cell. [1]

3 Exam-style questions

3.1 A key advantage of a hydrogen fuel cell over a petrol engine is that it: [1]

☐

- A is easier to refuel
- B produces only water, not pollutants
- C uses no energy
- D stores its fuel more easily

3.2 Compare a hydrogen–oxygen fuel cell with a petrol engine.

(a) Give one advantage of the fuel cell. [1]

(b) Give one disadvantage of the fuel cell. [1]

3.3 Explain why using a hydrogen fuel cell may still cause some pollution overall. [2]

Solutions

Each answer shows the steps, then the **result**.

2.1

- overall: $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
- the only product is **water**, so the cell releases no carbon dioxide

2.2

- the only chemical product is **water**

3.1 B

- it produces **only water, not pollutants**
- A and D are disadvantages; C is false

3.2

(a)

- the only product is water, so it **does not pollute the air**

(b)

- hydrogen is **hard/dangerous to store and transport**

3.3

- hydrogen is often made using energy from **fossil fuels**
- burning those fuels releases **pollutants / CO₂ elsewhere**