Exercise walk-through

Hydrogen–oxygen fuel cells ▪ 4.2

eXercise

You must be able to

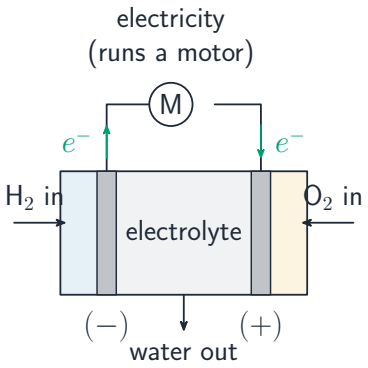
- give the overall reaction in a hydrogen–oxygen fuel cell
- state the advantages and disadvantages vs a petrol engine
- explain why the only product is water

Method — The fuel cell

$$2H_2 + O_2 \rightarrow 2H_2O$$

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

Method — The fuel cell



overall: $2H_2 + O_2 \rightarrow 2H_2O$

A hydrogen-oxygen fuel cell running a motor, water as the only product

Practice 2.1 ▪ 2 marks

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

Solution 2.1

Method: The fuel cell

Worked steps

$2H_2 + O_2 \rightarrow 2H_2O$ B1; the only product is water, which is why the cell releases no carbon dioxide B1.

Practice 2.2 ▪ 1 mark

State the only chemical product of the fuel cell.

Solution 2.2

Method: The fuel cell

Worked steps

water B1.

Exam-style 3.1 ▪ 1 mark

A key advantage of a hydrogen fuel cell over a petrol engine is that it:

A is easier to refuel

B produces only water, not pollutants

C uses no energy

D stores its fuel more easily

Solution 3.1

Method: The fuel cell

A is easier to refuel

B produces only water, not pollutants ✓

C uses no energy

D stores its fuel more easily

Worked steps

B. It produces only water, not pollutants.

Exam-style 3.2 ▪ 1 mark

Compare a hydrogen–oxygen fuel cell with a petrol engine.
(a) Give one advantage of the fuel cell.
(b) Give one disadvantage of the fuel cell.

Solution 3.2

Method: The fuel cell

Worked steps

(a) the only product is water, so it does not pollute the air B1.
(b) hydrogen is hard/dangerous to store and transport B1.

Exam-style 3.3 ▪ 2 marks

Explain why using a hydrogen fuel cell may still cause some pollution overall.

Solution 3.3

Method: The fuel cell

Worked steps

the hydrogen fuel is often made using energy from fossil fuels M1; burning those fuels releases pollutants/carbon dioxide elsewhere A1.