

4.2 Hydrogen-oxygen fuel cells

Name: _____ Class: _____ Date: _____

Total: 8 marks

KEY WORDS fuel cell 燃料电池 • hydrogen-oxygen fuel cells 氢氧燃料电池 • pollutants 污染物 • hydrogen 氢气
• oxygen 氧气

Objective

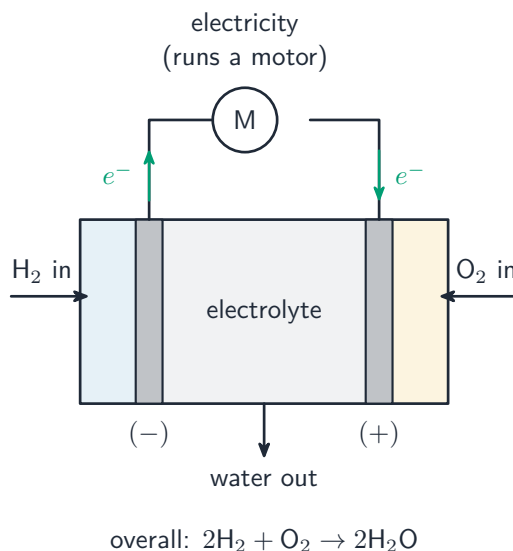
Build the skills to answer exam questions on **hydrogen-oxygen fuel cells** 氢氧燃料电池 — how they work and how they compare with a petrol engine.

You must be able to:

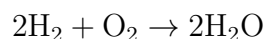
- give the overall reaction in a hydrogen-oxygen fuel cell
- state the advantages and disadvantages vs a petrol engine
- explain why the only product is water

1 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
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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

2.1 $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$; the only product is water, which is why the cell releases no carbon dioxide.

2.2 water.

3.1 B. It produces only water, not pollutants.

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