Solutions

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

2.1

- overall: $2\mathbf{H_2} + \mathbf{O_2} \rightarrow 2\mathbf{H_2O}$
- the only product is **water**, so the cell releases no carbon dioxide

2.2

- the only chemical product is **water**

2.3

- **hydrogen** and **oxygen** (from the air)

2.4

- **electrical** energy

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 / $\mathbf{CO_2}$ elsewhere**

3.4

(a)

- hydrogen is a flammable gas with a very low density, so a large, strong, high-pressure tank is needed

(b)

- the fuel cell reacts hydrogen with oxygen, and the only product is water: there is no carbon in the fuel
- petrol is a hydrocarbon, so burning it produces carbon dioxide

3.5

- correct formulae and balancing: $2H_2 + O_2 \rightarrow 2H_2O$
- state symbols: $2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$