What is the word equation for the reaction in a hydrogen fuel cell?

List 3 advantages of fuel cells compared to rechargeable cells and batteries.

Q1

Q2

What type of energy is released by hydrogen fuel cells?

List 2 advantages of rechargeable cells and batteries compared to fuel cells.

Q4

What is the balanced symbol equation for the reaction in a fuel cell?

What are 3 advantages and 3 disadvantages of hydrogen fuel cell cars?

Q6

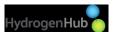
Write the half
equations for the
electrode reactions in
the hydrogen fuel cell?

Evaluate the strengths and weaknesses of fuel cells.

Q8







- Fuel cells can be used constantly with a fuel supply, whereas rechargeable batteries run out and take time to recharge
- 2. Water is the only product from a fuel cell, whereas rechargeable cells are hard to dispose of and non-biodegradable
- Hydrogen fuel cells do not get less efficient the longer they run, unlike rechargeable batteries

Hydrogen + Oxygen -> Water

A2

- No dangerous fuels are required with rechargeable batteries, whereas hydrogen is an explosive gas and difficult to store safely
- 2. Rechargeable batteries produce a greater potential difference than a hydrogen fuel cell

Electrical energy (+ thermal)

 $2H_2 + O_2 \rightarrow 2H_2O$

A3

A1

Advantages:

- 1. Water is the only emission
- 2. Good range
- 3. Quick refuelling

Disadvantages:

- 1. Expensive to make and build infrastructure
- 2. Production of hydrogen can cause carbon emissions
- 3. Can be difficult to store hydrogen

*A*6

A4

A5

Strengths:

- 1. Produce only water as waste
- Keep producing fuel if fuel keeps being supplied

Weaknesses:

- Difficult to transport/store hydrogen
- 2. Expensive to make and build necessary infrastructure

Negative electrode:

$$H_2(g) \to 2e^- + 2H^+(aq)$$

Positive electrode:

$$4H^{+}(aq) + O_{2}(g) + 4e^{-} \rightarrow 2H_{2}O(g)$$

A8

A7





