What is the word equation for the reaction in a hydrogen fuel cell? Q1	List 3 advantages of fuel cells compared with rechargeable cells and batteries. Q2
What type of energy is released by hydrogen fuel cells? Q3	List 2 advantages of rechargeable cells and batteries compared with fuel cells. Q4
What is the balanced symbol equation for the reaction in a fuel cell? Q5	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? Q7	Evaluate the strengths and weaknesses of fuel cells. Q8

1. 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
3. Hydrogen fuel cells do not get less efficient the longer they run, unlike rechargeable batteries

A2

Hydrogen + Oxygen -> Water

A1

1. 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

A4

Electrical energy
(+ thermal)

A3

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

A6

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

A5

Strengths:

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

Weaknesses:

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

A8

Negative electrode:

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

Positive electrode:

$$4H^+(aq) + O_2(g) + 4e^- \rightarrow 2H_2O(g)$$

A7