

Solutions

2.1 The type of electrode (metal); the electrolyte.

2.2 The chemical reactions are reversed by an external electrical current on recharging.

2.3 Water.

3.1 Two different metals connected in contact with an electrolyte; the more reactive metal is oxidised, releasing electrons that flow through the wire; the bigger the difference in reactivity between the metals, the higher the voltage; so swapping one metal changes the reactivity difference and the voltage.

3.2 Advantages: only water is produced – no polluting exhaust; refuelling is quick and continuous, unlike long recharge times. Disadvantages: hydrogen is difficult and dangerous to store; most hydrogen is made using energy from fossil fuels, and fuel cells are expensive.

3.3 Negative electrode: $2 \text{H}_2 \rightarrow 4 \text{H}^+ + 4\text{e}^-$. Positive electrode: $\text{O}_2 + 4 \text{H}^+ + 4\text{e}^- \rightarrow 2 \text{H}_2\text{O}$. Overall: $2 \text{H}_2 + \text{O}_2 \rightarrow 2 \text{H}_2\text{O}$.