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Chemistry

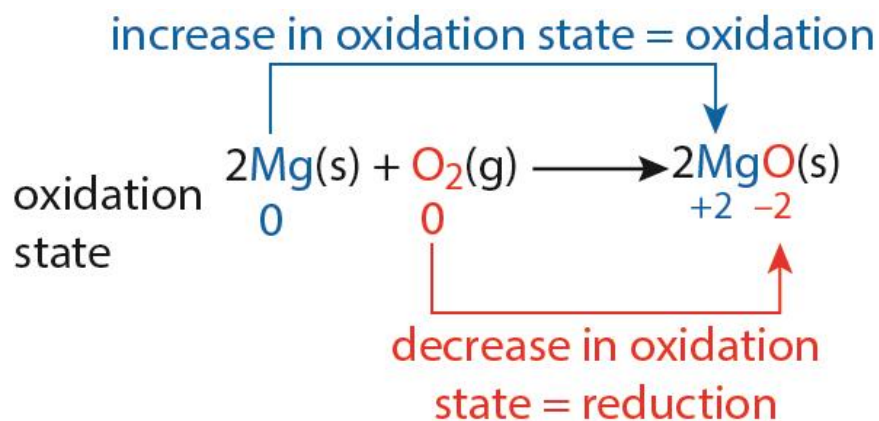
For the IB Diploma

> Chapter 14

Energy from fuels

> Definitions of oxidation and reduction

Oxidation	Reduction
Gain of oxygen (O)	Loss of oxygen (O)
Loss of hydrogen (H)	Gain of hydrogen (H)
Increase in oxidation state	Decrease in oxidation state
Loss of electrons	Gain of electrons



> Different types of combustion

Complete combustion

This occurs when there is a plentiful supply of oxygen.
The products of the reaction are carbon dioxide and water.

Incomplete combustion

This occurs when there is a limited supply of oxygen. The products of incomplete combustion are water, carbon monoxide (CO) and soot (C).

> Biofuels

- **Biomass** material of plant or animal origin that is used for fuel. The biomass can be burned directly (e.g., wood) or converted into biofuels.
- **Biofuel** a fuel produced from organic matter obtained from plants, or waste material of plant/animal origin, etc., e.g. ethanol (from the fermentation of sugar cane/corn starch), biogas (from decaying matter) and biodiesel (from vegetable oils).

> An alkaline hydrogen–oxygen fuel cell with KOH

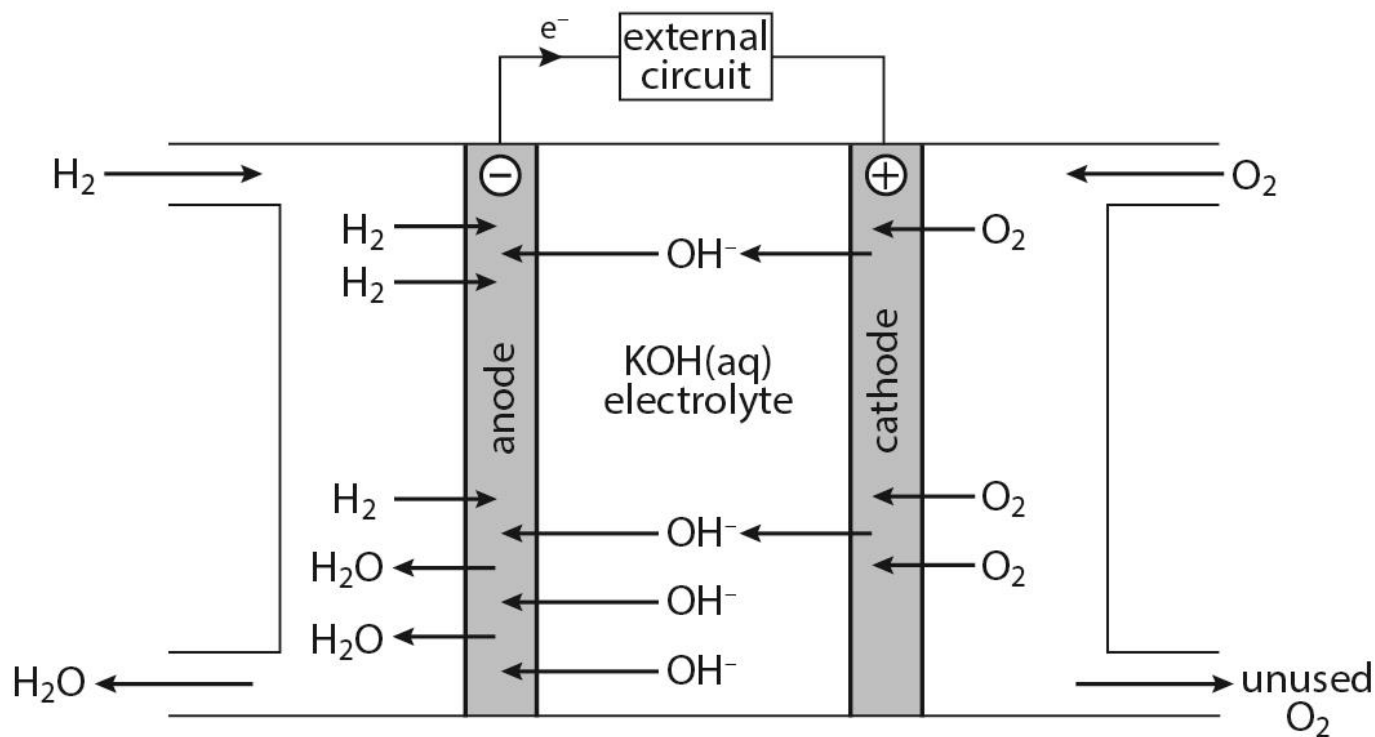


Figure 14.1: An alkaline hydrogen–oxygen fuel cell with a potassium hydroxide electrolyte.

> An acidic hydrogen–oxygen fuel cell using proton exchange

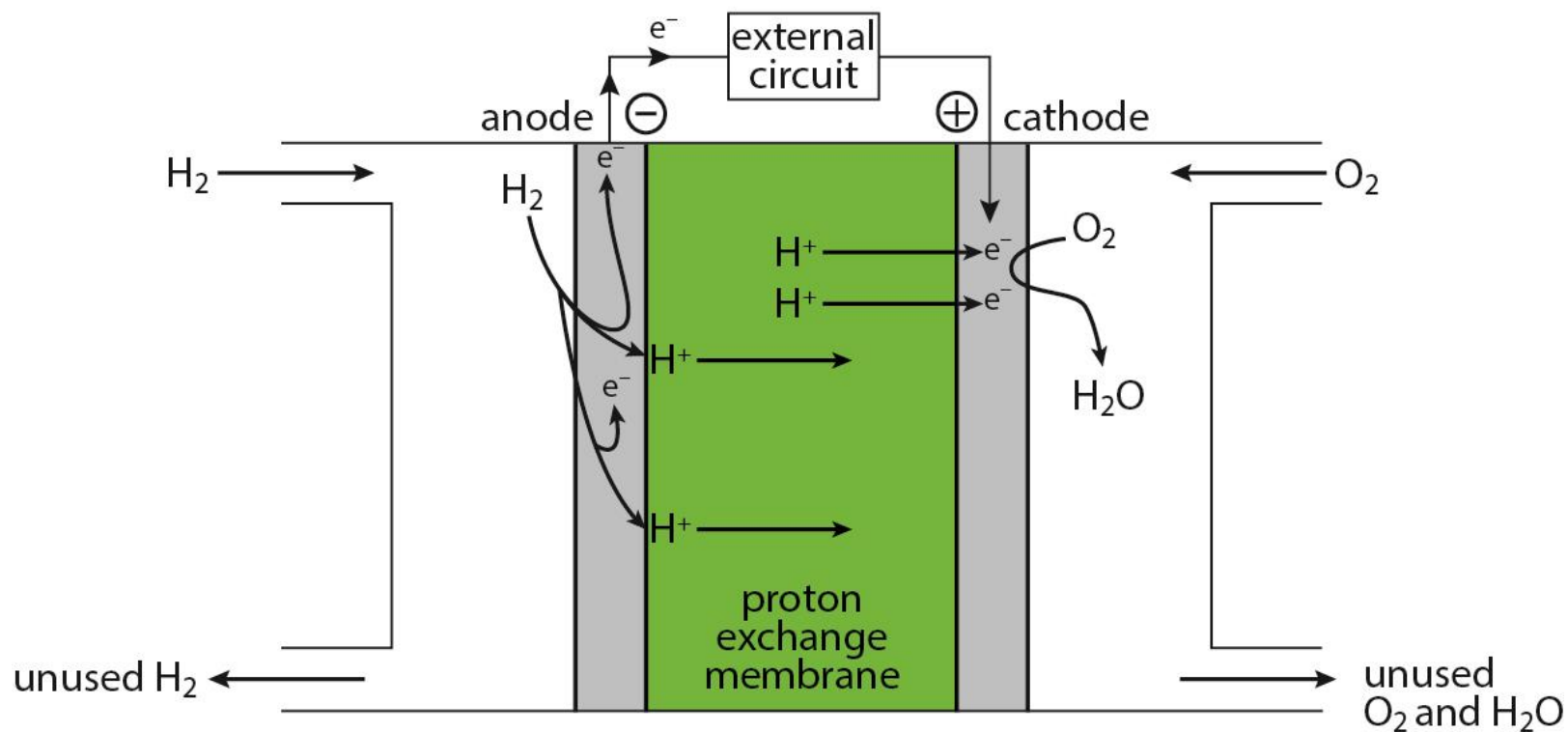


Figure 14.2: An acidic hydrogen–oxygen fuel cell using a proton exchange membrane.