

Future fuels

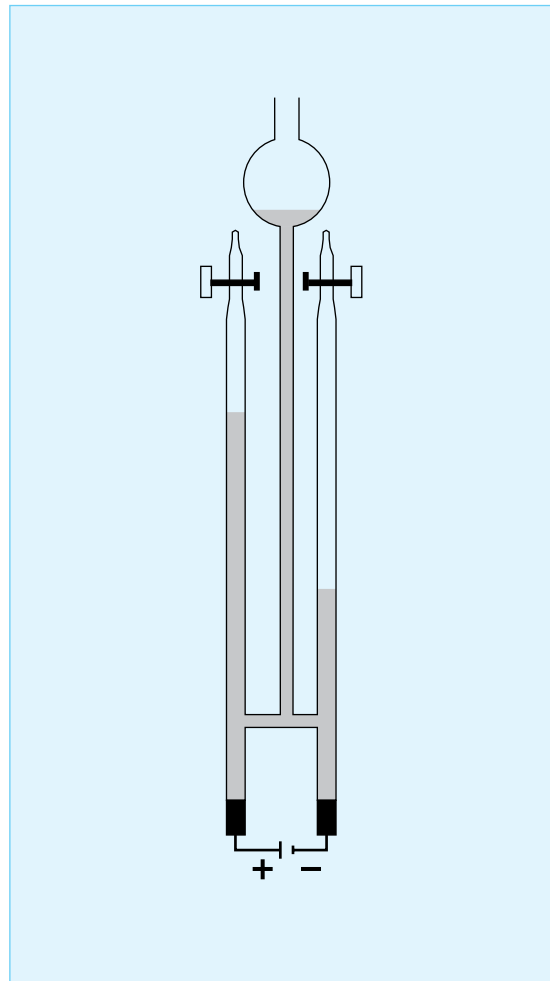
Splitting water - making hydrogen and oxygen

Demonstration

Hydrogen is needed to power most fuel cells. Some fuel cells can work using other substances, but hydrogen will be the main fuel for cars. To drive hydrogen fuel cell cars, we would need to buy hydrogen, not petrol, at the garage. A supply of hydrogen is therefore required, otherwise we would not be able to use the cars. Where can the hydrogen come from? This demonstration shows one answer.

Water can be split into hydrogen and oxygen using electricity (look up **electrolysis** in **Key Words**).

To split water, a special piece of equipment called a 'Hoffmann voltameter' or 'Hoffmann apparatus' is used. This allows the gases to be produced separately and the amounts to be measured.



Hoffmann apparatus

What you do

- While the demonstration is going, label the picture of the Hoffmann apparatus using the words below:
bulb, electrodes, stopcocks, central tube, anode, cathode
- Write down observations about:
 - the amounts of gas produced at the positive and negative terminals;
 - the colours produced as the electrolysis happens; and
 - what happened when the gases were tested.

Observations

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Questions

- Name the gas produced at (a) the negative terminal (cathode) and (b) the positive terminal (anode).
a)
b)
- At which terminal was there the most gas?

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3. Write a word equation for the reaction to split water into gases.

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4. How could splitting water be used to make hydrogen cars work?

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Alternative Questions

1. Explain why the ratio of hydrogen gas to oxygen gas is 2:1.

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2. Write the equations for the reactions at the two terminals. Remember that acid and alkali are also produced.

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3. Write an overall equation for the reaction.

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4. Compare the equation for this reaction to that for the 'rocket' demonstration. What do you notice?

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5. How can electrolysis of water help in fuel cells?

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