Test for hydrogen

4.8.2.1 · Chemical analysis · revision notes

How to show that a gas is hydrogen: a burning splint held at the mouth of the tube gives a squeaky pop. Usually a 2-mark 'describe a test and give the result' question, sometimes linked to reactions that make hydrogen.

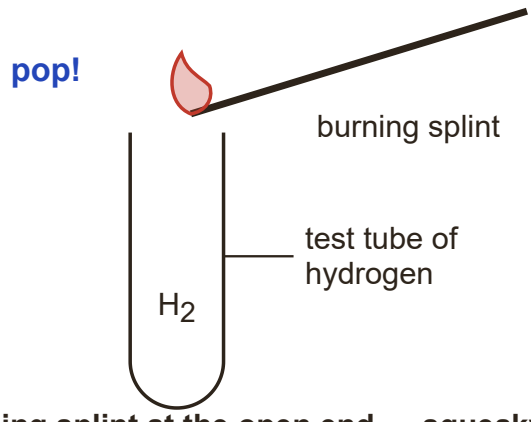
Key facts

- Test: burning splint held at the open end of a test tube of the gas
- Result: hydrogen burns rapidly with a (squeaky) pop
- Grade 6+ only $2H_2 + O_2 \rightarrow 2H_2O$ (the reaction that makes the pop)
- metal + acid → salt + hydrogen
- reactive metal + water → metal hydroxide + hydrogen
- Burning splint = hydrogen test; glowing splint = oxygen test

Notes

The test

- Collect the gas in a test tube.
- Hold a **burning splint** at the open end (mouth) of the test tube.
- If the gas is hydrogen, it burns rapidly with a **pop** sound (a 'squeaky pop').



Burning splint at the open end → squeaky pop

Hydrogen: burning splint held at the mouth of the tube, squeaky pop.

- Hydrogen is much less dense than air and escapes quickly, so keep the tube stoppered until you test it.
- The pop happens because hydrogen reacts rapidly with oxygen from the air to form water: $2H_2 + O_2 \rightarrow 2H_2O$. Grade 6+ only

Where hydrogen comes from

- Metals such as magnesium and zinc react with dilute acids to form a salt and hydrogen, e.g. magnesium + hydrochloric acid → magnesium chloride + hydrogen.
- Very reactive metals, such as sodium and lithium, react with water to form a metal hydroxide and hydrogen.
- In the electrolysis of many solutions, such as sodium chloride solution, hydrogen forms at the negative electrode (cathode).

Don't mix it up

- Hydrogen: **burning** splint → **pop**. Oxygen: **glowing** splint → **relights**.
- A burning splint going out does not identify a gas: many gases put out a flame.

How to answer each type of question

Describe the test for hydrogen and give the result 2 marks **Grade 3**

1. Test (1 mark): a burning splint held at the open end of the tube.
2. Result (1 mark): a (squeaky) pop.

Example. A student adds zinc to dilute sulfuric acid. Bubbles of gas are produced.
Describe a test to show that the gas is hydrogen. Give the result of the test.

Model answer. Hold a burning splint at the open end of a test tube of the gas (1). The gas burns with a (squeaky) pop (1).

Identify the gas and complete an equation 1 to 3 marks **Grade 5**

1. Look at the reactants: a metal with an acid, or a reactive metal with water, gives hydrogen.
2. Use the test result given: a pop with a burning splint means hydrogen.
3. For metal + water, the other product is the metal hydroxide; for metal + acid, it is a salt.

Example. A small piece of lithium is added to water. It fizzes. A burning splint held at the mouth of a tube of the gas gives a squeaky pop.
(a) Name the gas.
(b) Complete the word equation:
lithium + water → ..... + ...

Model answer.

(a) hydrogen (1)
(b) lithium hydroxide (1) + hydrogen (1)

Explain the result, with an equation

2 to 3 marks | **Grade 6**

1. Say that hydrogen reacts (burns) rapidly with oxygen in the air.
2. This rapid reaction makes the pop sound.
3. Write the balanced equation: $2H_2 + O_2 \rightarrow 2H_2O$.

Example. Explain why hydrogen makes a pop sound when it is tested with a burning splint. Include a balanced equation for the reaction.

Model answer.

Hydrogen reacts rapidly with oxygen in the air, which makes the pop (1).

$2H_2 + O_2 \rightarrow 2H_2O$: correct formulae (1); correctly balanced (1).

Don't lose marks

- Using a glowing splint: that is the test for oxygen.
- Putting the splint into the liquid. Hold it at the open end of a test tube of the gas.
- Writing 'it makes a noise' or 'it explodes'. Write 'pop' or 'squeaky pop'.
- Giving 'the splint goes out' as the result for hydrogen.
- Writing H instead of H_2 for hydrogen gas in an equation.

More tips

Memory tricks

- Hydrogen is the gas that burns, so it gets the burning splint. Oxygen helps things burn, so it brings a glowing splint back to life.
- 'H for Hydrogen, P for Pop': hydrogen pops.
- 'MASH': Metal + Acid → Salt + Hydrogen.

Exam technique

- Two marks = test + result: 'burning splint' and 'pop'.
- Learn the four gas tests as a set, because questions often ask you to choose between them.
- If a question asks how you know a gas is hydrogen, give the test result, not just the reaction that made it.

What each grade needs

What you need to be able to do, from the first marks up to the top grade.

Grade 3 — **Describe the test for hydrogen**
Hold a burning splint at the open end of a test tube of the gas.

Grade 3 — **State the positive result for hydrogen**
Hydrogen burns rapidly with a pop sound (a 'squeaky pop').

Grade 4 — **Tell the hydrogen and oxygen tests apart**
Hydrogen: burning splint gives a pop. Oxygen: glowing splint relights.

Grade 5

Name reactions that produce hydrogen

Metals with acids, very reactive metals with water, and electrolysis of many solutions (at the negative electrode).

Grade 6

Explain the pop with an equation

Hydrogen reacts rapidly with oxygen in the air: $2H_2 + O_2 \rightarrow 2H_2O$.

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