

# GCSE Combined Science: Trilogy

## Worksheet: Test for hydrogen

|                       |                          |                              |                                   |
|-----------------------|--------------------------|------------------------------|-----------------------------------|
| TIME<br><b>30 min</b> | TOTAL<br><b>28 marks</b> | CALCULATOR<br><b>Allowed</b> | DIFFICULTY<br><b>Easy, Medium</b> |
|-----------------------|--------------------------|------------------------------|-----------------------------------|

**Topics:** Test for hydrogen

|             |              |             |
|-------------|--------------|-------------|
| <b>NAME</b> | <b>CLASS</b> | <b>DATE</b> |
|-------------|--------------|-------------|

- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

0 1 . 1 Which test result shows that a gas is hydrogen?

Tick (✓) **one** box.

A glowing splint relights

☐

A lit splint gives a squeaky pop

☐

Limewater turns milky

☐

Damp litmus paper is bleached

☐

[1 mark]

0 1 . 2 The squeaky pop happens because hydrogen reacts very quickly with oxygen in the air.

Name the product of this reaction.

.....

.....

.....

[1 mark]

0 2

A student adds zinc to dilute hydrochloric acid. The mixture fizzes as a gas is given off.

0 2 . 1

Complete the word equation for the reaction.

zinc + hydrochloric acid → ..... + hydrogen

.....

.....

.....

.....

[1 mark]

0 2 . 2

Describe the test that shows that the gas is hydrogen, and give the result.

.....

.....

.....

.....

[2 marks]

---

0 3

A student added magnesium ribbon to dilute hydrochloric acid in a test tube. A gas was produced.

0 3 . 1

Give **one** observation that would show a gas is being produced.

.....

.....

[1 mark]

0 3 . 2

The gas was hydrogen.

Describe the test for hydrogen and give the result.

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[2 marks]

0 4

A student is about to test a gas to see if it is hydrogen, using a lit splint.

0 4 . 1

Give **one** safety precaution the student should take.

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[1 mark]

0 4 . 2

Explain why this precaution is necessary.

---

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[1 mark]

0 5

A student reacted zinc with dilute sulfuric acid. The student collected the gas in a test tube held upside down. The student kept the test tube upside down while carrying out a test on the gas.

0 5 . 1

Suggest why the test tube was kept upside down.

---

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[1 mark]

0 5 . 2

Describe how the student should test the gas to show that it is hydrogen. Give the result.

.....

.....

.....

.....

[2 marks]

0 5 . 3

The student repeated the experiment using copper instead of zinc. There was no pop when the test was done. Suggest why.

.....

.....

[1 mark]

0 6

Hydrogen can react rapidly with oxygen from the air. The reaction makes a squeaky pop.

0 6 . 1

Name the product of the reaction between hydrogen and oxygen.

.....

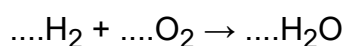
.....

.....

[1 mark]

0 6 . 2

Balance the equation for the reaction.



.....

.....

[1 mark]

0 6 . 3

A student collected a test tube of an unknown gas and put a glowing splint into it. The splint did not relight.  
The student concluded that the gas was hydrogen.  
Explain why the student's conclusion is **not** valid.

.....

.....

.....

.....

[2 marks]

0 7

A student adds excess magnesium ribbon to dilute sulfuric acid in a conical flask fitted with a delivery tube, and collects the gas produced over water in an upturned test tube.

0 7 . 1

Name the salt produced in this reaction.

.....

.....

.....

.....  
[1 mark]

0 7 . 2

Explain why hydrogen gas can be collected over water.

.....

.....

[1 mark]

0 7 . 3

Describe how the student could test a sample of the gas to confirm it is hydrogen, and state the expected result.

.....

.....

.....

.....

[2 marks]

0 8

A student has three test tubes of unknown gases, D, E and F. The student holds a lit splint at the mouth of each tube.  
Table 1 shows the results.

Table 1

| Gas | Result                           |
|-----|----------------------------------|
| D   | the gas burns with a squeaky pop |
| E   | the splint burns more brightly   |
| F   | the splint goes out              |

0 8 . 1

Which gas, D, E or F, is hydrogen?  
Give a reason for your answer.

.....

.....

.....

.....

[2 marks]

0 8 . 2

Write a word equation for the reaction that causes the squeaky pop.

.....

.....

.....

.....

[2 marks]

0 8 . 3

Suggest which gas E could be.

Describe the test that would confirm this, and give the result.

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**[2 marks]**

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## END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

# Mark scheme

## GCSE Combined Science: Trilogy · Worksheet: Test for hydrogen · 28 marks

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### Question 1 (2 marks)

01.1 [1 mark]

**Correct:** A lit splint gives a squeaky pop

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01.2 [1 mark]

**Answer:** water

- water / water vapour / steam (allow H<sub>2</sub>O) (1)
- 

### Question 2 (3 marks)

02.1 [1 mark]

**Answer:** zinc chloride

- zinc chloride (1)
- 

02.2 [2 marks]

- hold a lit / burning splint at the mouth of a test tube of the gas (1)
  - the gas burns with a squeaky pop (1)
- 

### Question 3 (3 marks)

03.1 [1 mark]

- bubbles / fizzing / effervescence (1)
- 

03.2 [2 marks]

- (hold a) burning / lit splint at the open end of the test tube (1)
- (the hydrogen burns rapidly with a) (squeaky) pop (1)

**Notes:** Do not accept 'glowing splint'. Ignore 'in the test tube' for the position of the splint.

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## Question 4 (2 marks)

### 04.1 [1 mark]

- test only a small volume of the gas, e.g. one test tube (allow: wear eye protection / hold the tube pointing away from people / keep other flammable materials away) (1)

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### 04.2 [1 mark]

- hydrogen mixed with air is flammable / explosive, so the precaution reduces the harm if it ignites (e.g. a small volume limits the size of the explosion; eye protection protects the eyes if the tube breaks) (1)

**Notes:** The explanation must match the precaution given.

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## Question 5 (4 marks)

### 05.1 [1 mark]

- hydrogen is less dense than air / would rise out of the test tube if it was the right way up (1)

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### 05.2 [2 marks]

- hold a burning / lit splint at the open end of the test tube (1)
- (squeaky) pop (1)

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### 05.3 [1 mark]

- no hydrogen was produced because copper does not react with dilute sulfuric acid / copper is less reactive than hydrogen (1)
-

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## Question 6 (4 marks)

06.1 [1 mark]

**Answer:** water

- water / water vapour / steam (1)

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06.2 [1 mark]

**Answer:**  $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$

- $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$  (1)

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06.3 [2 marks]

- a glowing splint is the test for oxygen / only shows that the gas is not oxygen (1)
- to show the gas is hydrogen, hold a burning splint at the mouth of the tube and listen for a (squeaky) pop (1)

**Notes:** The second mark needs a burning (lit) splint and the (squeaky) pop. Allow 'many other gases, e.g. nitrogen or carbon dioxide, would also not relight the splint' for the second mark.

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## Question 7 (4 marks)

07.1 [1 mark]

**Answer:** magnesium sulfate

- magnesium sulfate (1)

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07.2 [1 mark]

- hydrogen is (very nearly) insoluble in water (1)

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07.3 [2 marks]

- hold a lit / burning splint at the open end of the tube of gas (1)
  - a squeaky pop is heard (1)
-

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## Question 8 (6 marks)

### 08.1 [2 marks]

**Answer:** D

- D (1)
- D burns with a squeaky pop when a lit splint is held at the mouth of the tube, which is the positive test for hydrogen (1)

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### 08.2 [2 marks]

**Answer:** hydrogen + oxygen  $\rightarrow$  water

- hydrogen + oxygen (as the reactants) (1)
- water (as the only product) (1)

**Notes:** Allow a correct balanced symbol equation:  $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$ . Allow steam / water vapour.

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### 08.3 [2 marks]

**Answer:** oxygen

- oxygen (1)
  - put a glowing splint into a tube of E: the splint relights (1)
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