AQA GCSE Chemistry | 8462

SPECIFICATION POINT 4.8.2.1

Test for hydrogen

Past-paper questions

Tier	**Foundation**
Question groups	**3**
Available paper years	**2010–2023**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

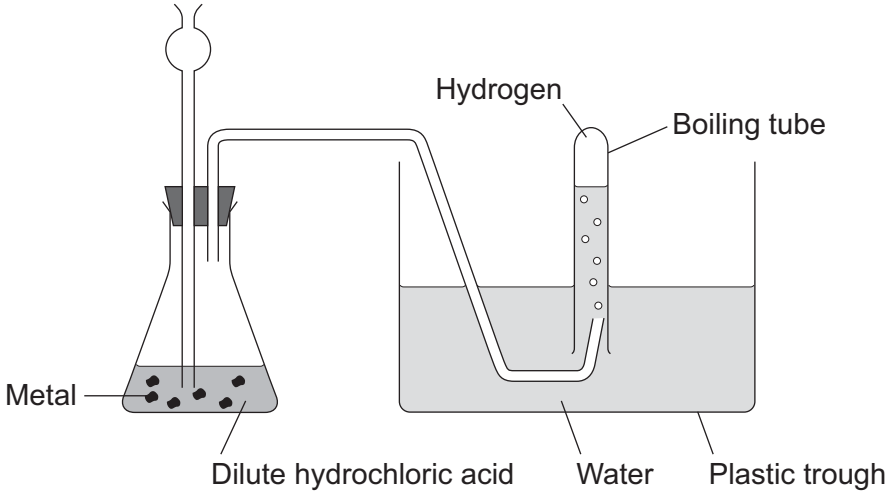
4.8.2.1 Test for hydrogen

Question 01

June 2010 | CHY1AP | Original Q6 | Legacy

QUESTION SIX

Some students were trying to decide which one of the metals, **K**, **L**, **M** or **N**, was the most reactive. They set up the apparatus shown in the diagram.



Dilute hydrochloric acid was added to the metal **K**. Hydrogen was given off. The students recorded how long it took to fill the boiling tube with the hydrogen. They did the experiment twice more under exactly the same conditions.

They repeated the experiment, using equal-sized pieces of metals **L**, **M** and **N**.

The results are shown in the table.

	Time taken to fill the boiling tube with hydrogen in seconds		
Metal	**Experiment 1**	**Experiment 2**	**Experiment 3**
K	600	479	649
L	189	220	178
M	81	82	78
N	125	132	143

4.8.2.1 Test for hydrogen

Question 01 · continued June 2010 | CHY1AP | Original Q6 | Legacy

6A To make it a fair test, the students made sure that the boiling tube was always completely filled with hydrogen before they recorded the time.

What else should they do to make it a fair test?

1 use a different acid for each metal

2 use the same volume of the acid for each test

3 replace the water in the plastic trough for each test

4 use different temperatures for each metal

6B Which metal was the most reactive?

1 metal **K**

2 metal **L**

3 metal **M**

4 metal **N**

6C Why did the students take more than one reading for each metal?

1 to make an error less likely

2 so that they could plot a graph

3 to make it easier to see the relationship between the two variables

4 to make it a fair test

6D Some of their results were anomalous.

Which of the following experiments should the students repeat?

1 metal **K**, experiment 2

2 metal **L**, experiment 3

3 metal **M**, experiment 3

4 metal **N**, experiment 1

4.8.2.1 Test for hydrogen

Question 02

0 1 This question is about oxygen.

Scientists think that there was little or no oxygen in the Earth's early atmosphere.

0 1 . 1 Which planet today has an atmosphere that is similar to the Earth's early atmosphere?

[1 mark]

Tick (✓) **one** box.

Jupiter ☐

Mars ☐

Neptune ☐

Saturn ☐

0 1 . 2 Which is the approximate percentage of oxygen in the Earth's atmosphere today?

[1 mark]

Tick (✓) **one** box.

20% ☐

50% ☐

80% ☐

100% ☐

Question 1 continues on the next page

4.8.2.1 Test for hydrogen

Question 02 · continued

0 1 . 3 Which **two** of the following increased the percentage of oxygen in the Earth's atmosphere?

[2 marks]

Tick (✓) **two** boxes.

- Active volcanoes emitted gases ☐
- Algae and plants evolved ☐
- Animals evolved ☐
- Carbonate sediments formed in oceans ☐
- Photosynthesis took place ☐

4.8.2.1 Test for hydrogen

Question 02 · continued

0 1 . 4 Some scientists think that 1100 million years ago the Earth's atmosphere contained:

- 16% oxygen
- 4% carbon dioxide.

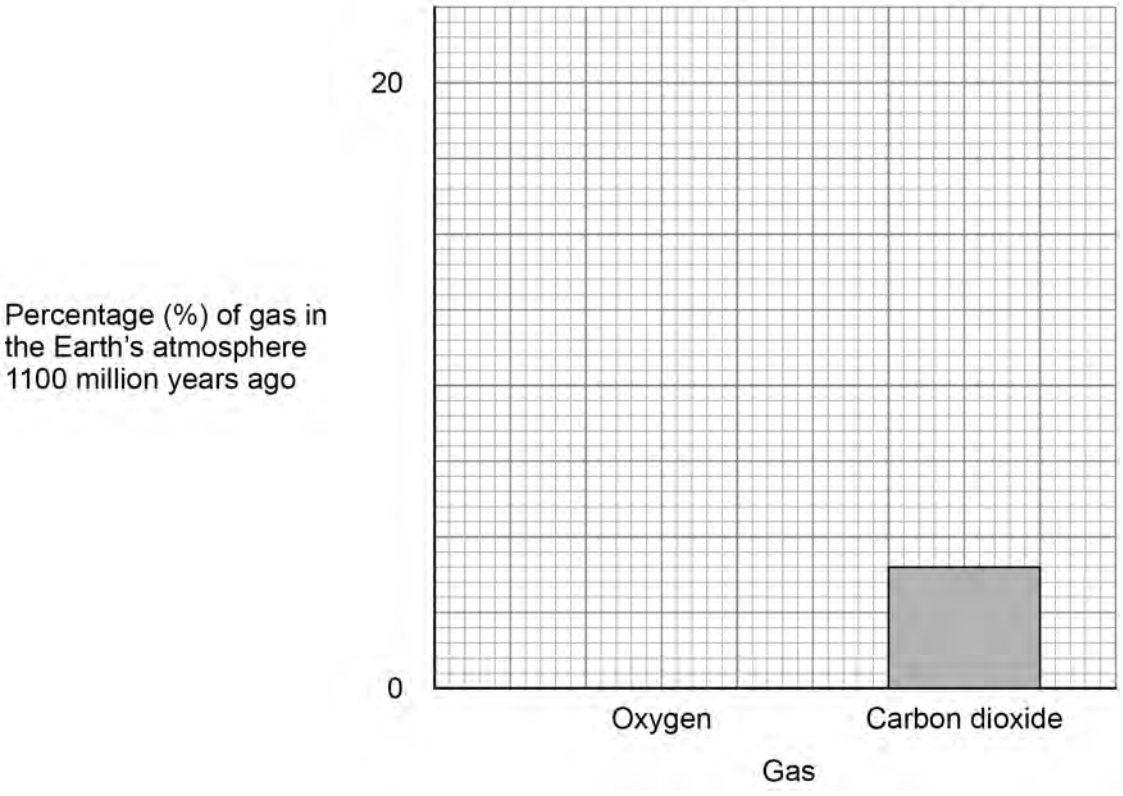
Complete **Figure 1**.

You should:

- complete the *y*-axis scale
- plot the percentage of oxygen in the Earth's atmosphere 1100 million years ago.

[2 marks]

Figure 1



Question 1 continues on the next page

4.8.2.1 Test for hydrogen

Question 02 · continued

Oxygen is produced when manganese dioxide is added to hydrogen peroxide solution.

The equation for the reaction is:

hydrogen peroxide → water + oxygen

A student investigated the effect of changing the temperature on the decomposition of hydrogen peroxide.

This is the method used.

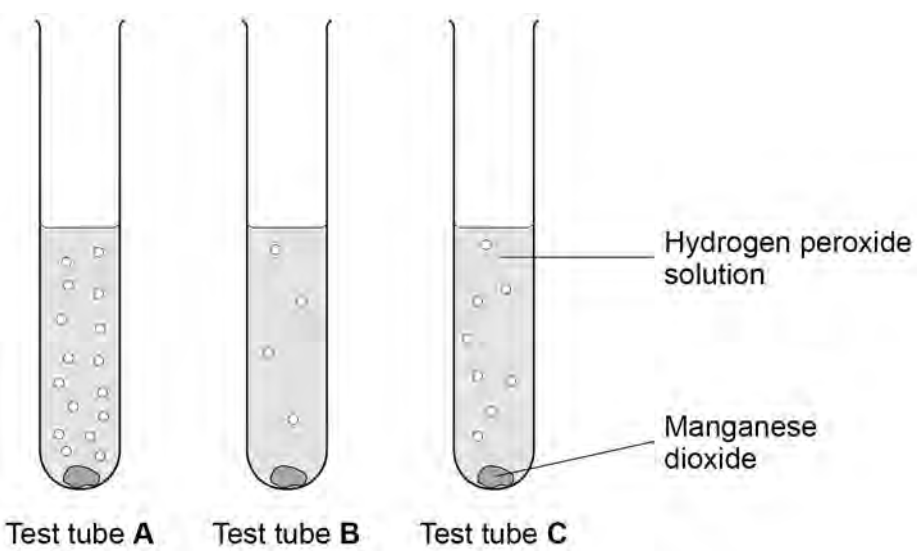
1. Add 5 cm^3 of hydrogen peroxide solution to three test tubes labelled **A**, **B** and **C**.

2. Place each test tube in a water bath at a different temperature.

3. Add 0.2 g of manganese dioxide to each test tube.

Figure 2 shows the results.

Figure 2



4.8.2.1 Test for hydrogen

Question 02 · continued

0 1 . 5 Which test tube contained hydrogen peroxide solution at the highest temperature?

[1 mark]

Tick (✓) **one** box.

Test tube **A** ☐

Test tube **B** ☐

Test tube **C** ☐

0 1 . 6 The student tested the gas produced.

What is used to prove that the gas is oxygen?

[1 mark]

Tick (✓) **one** box.

A glowing splint ☐

Bromine water ☐

Damp litmus paper ☐

0 1 . 7 Manganese dioxide does not appear in the chemical equation for this reaction.

Which is a correct statement about manganese dioxide in this reaction?

[1 mark]

Tick (✓) **one** box.

Manganese dioxide increases the activation energy in this reaction. ☐

Manganese dioxide is a catalyst in this reaction. ☐

Manganese dioxide is used up during this reaction. ☐

Manganese dioxide reduces the rate of this reaction. ☐

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4.8.2.1 Test for hydrogen

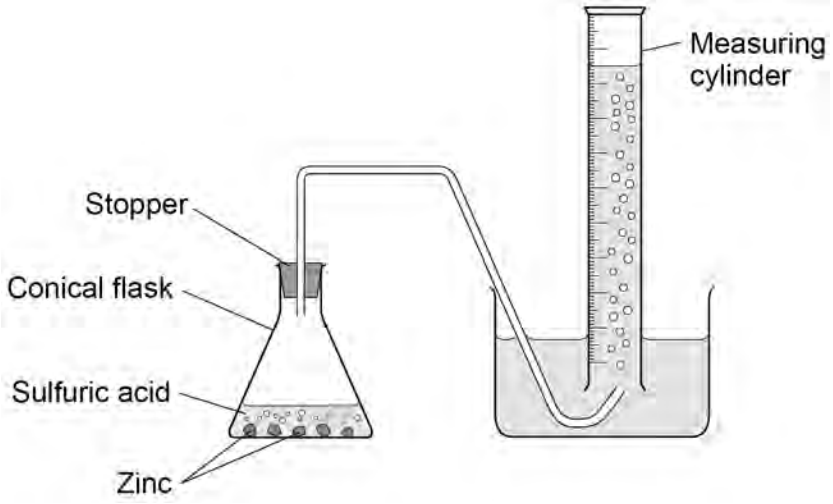
Question 03

0 8 A student investigated the rate of the reaction between zinc and sulfuric acid.

Hydrogen gas is produced during this reaction.

Figure 7 shows the apparatus.

Figure 7



This is the method used.

1. Add 50 cm^3 of sulfuric acid to a conical flask.

2. Add 2.0 g of zinc to the conical flask.

3. Quickly put a stopper in the conical flask and start a timer.

4. Measure the time taken to collect 20 cm^3 of gas.

5. Repeat steps 1 to 4 three more times.

0 8 . 1 Suggest why the stopper must be put in the conical flask as quickly as possible in **step 3**.

[1 mark]

4.8.2.1 Test for hydrogen

0 8 . 2 The student calculated the rate of the reaction for each trial.

Table 7 shows the results of the calculations.

Table 7

	Trial 1	Trial 2	Trial 3	Trial 4
Rate of reaction in cm^3/s	0.78	0.81	0.68	0.81

Determine the mean time taken to collect 20 cm^3 of gas.

Do **not** include any anomalous results.

Use the equation:

$$\text{mean rate of reaction} = \frac{\text{volume of gas collected}}{\text{mean time taken}}$$

[5 marks]

Mean time taken = _____ s

Question 8 continues on the next page

4.8.2.1 Test for hydrogen

Question 03 · continued

0 8 . 3 The student changed the investigation so that the mean time taken to collect 20 cm^3 of gas was greater.

Which **two** changes would increase the mean time taken to collect 20 cm^3 of gas?

[2 marks]

Tick (✓) **two** boxes.

- Use a catalyst ☐
- Use a larger conical flask ☐
- Use a lower temperature ☐
- Use smaller pieces of zinc ☐
- Use sulfuric acid of a lower concentration ☐

0 8 . 4 Hydrogen gas is produced during this reaction.

Describe the test for hydrogen gas.

Give the result of the test.

[2 marks]

Test _____

_____

Result _____

_____

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