

# Identification of Common Gases

## Question Paper

Level	GCSE (9-1)
Subject	Combined Science: Trilogy - Chemistry
Exam Board	AQA
Topic	5.8 Chemical Analysis
Sub-Topic	Identification of Common Gases
Difficulty Level	Standard Level
Booklet	Question Paper

**Time Allowed:** 38 minutes

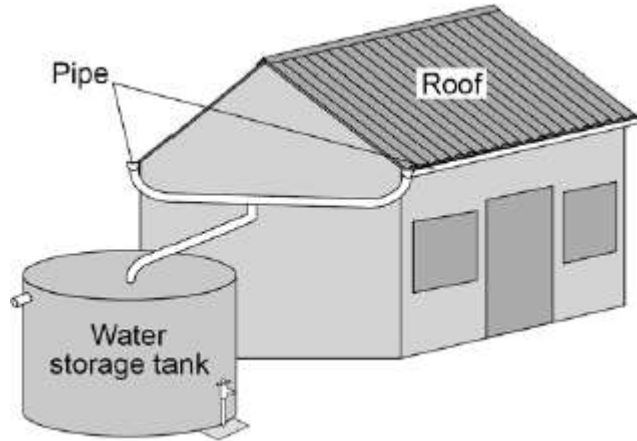
**Score:** /38

**Percentage:** /100

**Grade Boundaries:**

Q1. Rainwater is collected from the roofs of houses as shown in **Figure 1**.

**Figure 1**



(a) The water in the storage tank is **not** potable.

What does potable mean?

Tick **one** box.

- |                               |                          |
|-------------------------------|--------------------------|
| Contains dissolved substances | <input type="checkbox"/> |
| Pure                          | <input type="checkbox"/> |
| Safe to drink                 | <input type="checkbox"/> |
| Tastes nice                   | <input type="checkbox"/> |

(1)

(b) Why should the water in the tank be filtered to make it potable?

Tick **one** box.

- |                           |                          |
|---------------------------|--------------------------|
| To kill microbes          | <input type="checkbox"/> |
| To remove dissolved gases | <input type="checkbox"/> |

To remove dissolved solids

To remove undissolved solids

(1)

(c) A gas which bleaches litmus paper can be added to the water to make it potable.

Name this gas and explain why it is added.

.....

.....

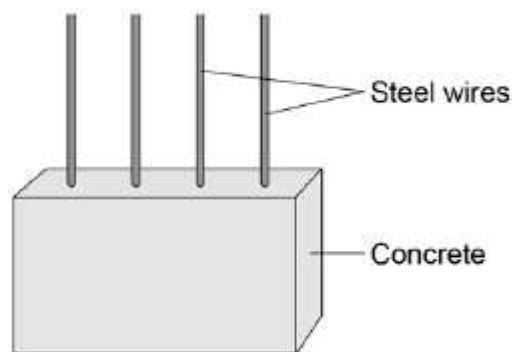
.....

.....

(2)

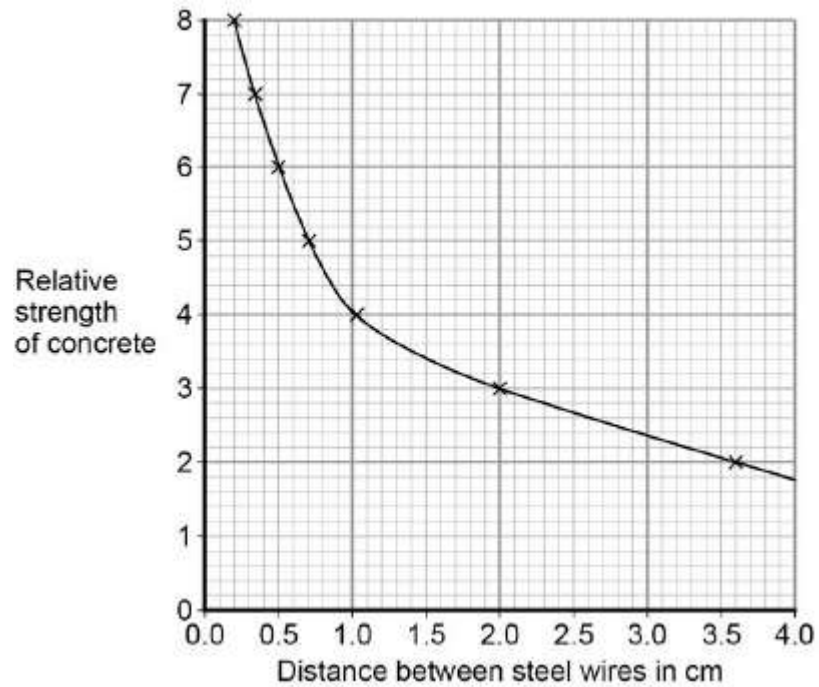
(d) The storage tank is made from concrete reinforced with steel wire, as shown in **Figure 2**.

**Figure 2.**



**Figure 3** shows how the distance between the steel wires affects the relative strength of the concrete.

**Figure 3**



Use values from **Figure 3** to describe the relationship shown by the graph.

.....

.....

.....

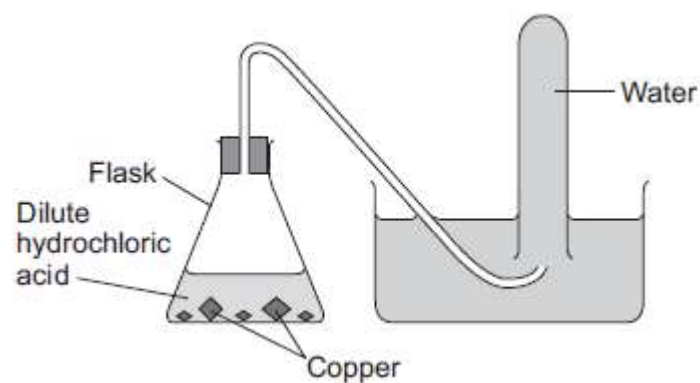
.....

(2)  
(Total 6 marks)

**Q2.**A student was trying to produce hydrogen gas.

**Figure 1** shows the apparatus she used.

**Figure 1**



- (a) No gas was produced.

The student's teacher said that this was because the substances in the flask did **not** react.

- (i) Suggest why the substances in the flask did **not** react.

.....  
.....  
.....

(1)

- (ii) Which two substances could the student have put in the flask to produce hydrogen safely?

Tick (✓) **one** box.

Gold and dilute hydrochloric acid

Potassium and dilute hydrochloric acid

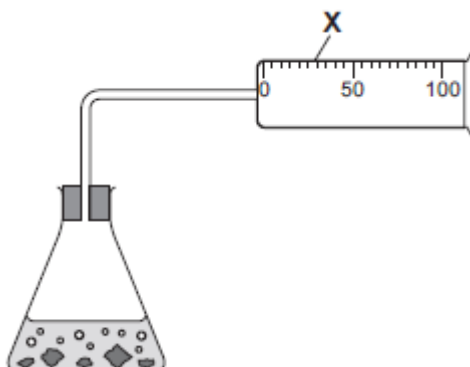
Zinc and dilute hydrochloric acid

(1)

- (b) Another student did produce hydrogen from two substances.

**Figure 2** shows the apparatus the student used to collect and measure the volume of the hydrogen gas.

**Figure 2**



Give the name of the apparatus labelled **X**.

.....

(1)

(c) The student did the experiment four times. Her results are shown in the table below.

Experiment	Volume of hydrogen collected in one minute in cm <sup>3</sup>
1	49
2	50
3	35
4	48

(i) One of the results is anomalous.

Which result is anomalous? Write your answer in the box.

Give a reason for your choice.

.....

(2)

(ii) Calculate the mean volume of hydrogen collected in one minute.

.....

.....

Mean volume = ..... cm<sup>3</sup>

(2)

(iii) Give a reason why the experiment should be repeated several times.

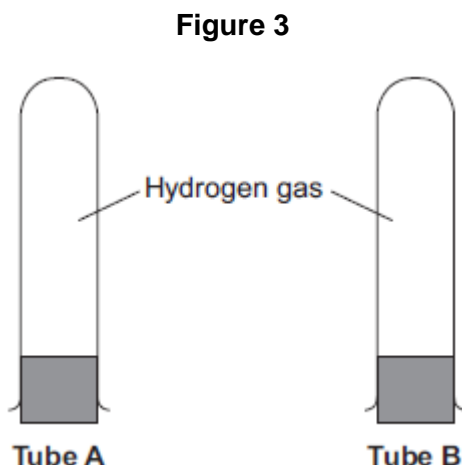
.....

.....

.....

(1)

- (d) A teacher collected two tubes full of hydrogen gas, as shown in **Figure 3**.



She tested tube **A** with a lighted splint as soon as she took the bung out.

She tested tube **B** with a lighted splint a few seconds after taking the bung out.

- (i) Suggest why tube **B** gave a much louder pop than tube **A**.

.....

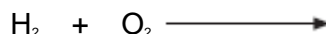
.....

.....

.....

(1)

- (ii) Complete and balance the chemical equation for the reaction that takes place when the hydrogen reacts in this test.



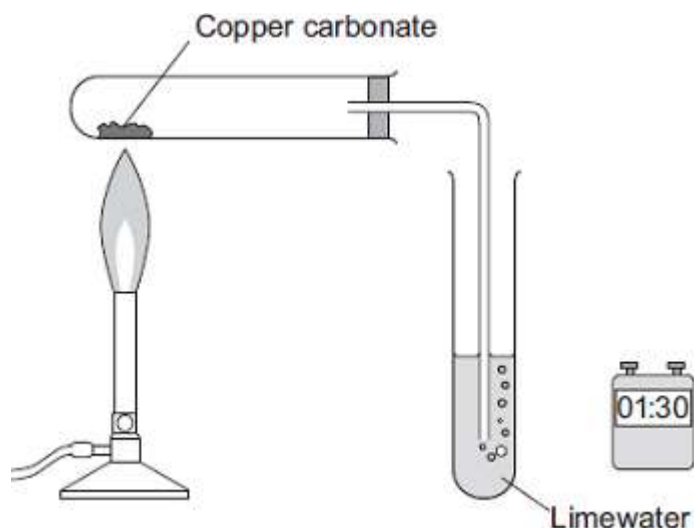
(2)  
(Total 11 marks)

**Q3.**Carbon dioxide is produced when copper carbonate is heated.

A student investigated heating copper carbonate.

The student used the apparatus to measure how long it took for carbon dioxide to be produced.

The student also noted what happened during each minute for three minutes.



- (a) The student used changes to the limewater to measure how long it took for carbon dioxide to be produced.

Describe how.

.....

.....

.....

.....

(2)

- (b) The student wrote down her observations.

Time interval in minutes	Observations
Between 0 and 1	A slow release of gas bubbles. The limewater did not change. The solid in the test tube was green.
Between 1 and 2	A fast release of gas bubbles. The limewater changed at 1 minute 10 seconds.
Between 2 and 3	No release of gas bubbles. The solid in the test tube was black.

- (i) Suggest the reason for the student's observations between 0 and 1 minute.

.....

.....



.....  
.....  
.....

(2)

(ii) Explain the student's observations between 1 and 2 minutes.

.....  
.....  
.....  
.....

(2)

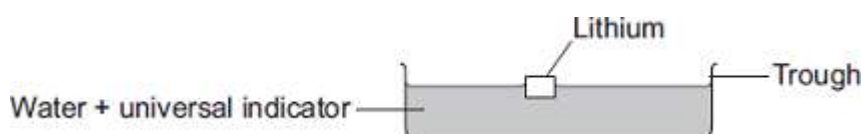
(iii) Explain the student's observations between 2 and 3 minutes.

.....  
.....  
.....  
.....

(2)

**Q4.A** A student was investigating the reaction of lithium and water.

She added a few drops of universal indicator to water in a trough and added a piece of lithium.



The word equation for the reaction is:



(a) (i) The lithium floated on the water.

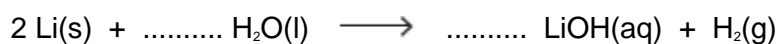
State **two** other observations that the student would **see** during the reaction.

1 .....

2 .....

(2)

(ii) Balance the symbol equation for the reaction of lithium and water.



(2)

(iii) Describe a simple test and the result that would show the gas was hydrogen.

.....  
.....

(1)

(iv) All Group 1 metals have similar reactions with water.

State why, in terms of electronic structure.

.....  
.....

(1)

(b) Lithium and other Group 1 metals have different properties from the transition metals.

Tick (✓) **two** properties that are properties of Group 1 metals.

They react with oxygen.

They form coloured compounds.

They are strong and hard.

They have low melting points.

(2)

- (c) The electronic structure of a potassium atom is 2, 8, 8, 1
- (i) Draw a diagram to show the electronic structure of a potassium ion.  
Show the charge on the potassium ion.

(2)

- (ii) Potassium is more reactive than sodium.  
Explain why, in terms of electronic structure.

.....

.....

.....

.....

.....

.....

.....

.....

.....

(3)  
(Total 13 marks)