AQA GCSE CHEMISTRY (HIGHER) · 8462

CHEMISTRY



EXAM QUESTION PACK

4.8.2 IDENTIFICATION OF COMMON GASES (PACK 1)

SCORE	PERCENTAGE
/61	%

STEMUP

These questions belong to AQA, not to us.

The examination questions, mark schemes and examiner comments in this pack were written and published by AQA. They are past assessment materials, reproduced here so that students can revise from them.

What we do not own

STEMUP is not affiliated with AQA and does not own, and makes no claim to own, any of the question, mark scheme or examiner report material in this pack. AQA has not endorsed, approved or been involved in the production of it. AQA and the qualification titles used here belong to their respective owners and appear for identification only.

Where to find the originals

AQA publishes its past papers, mark schemes and examiner reports. Always check the current specification at aqa.org.uk before you revise, because content and wording can change between series.

If you hold the rights to any material in this pack and would like it amended or removed, contact admin@stemup.co.uk and we will act on it.

Q1.

Bleach is a solution of sodium hypochlorite (NaClO).

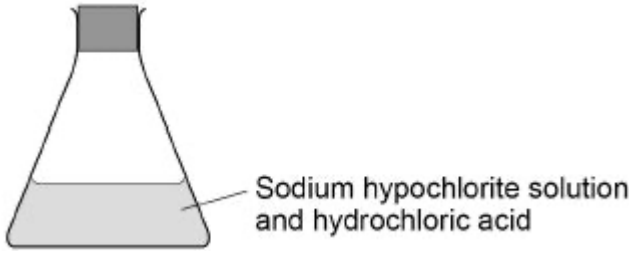
Chlorine gas is produced when bleach reacts with hydrochloric acid.

$$NaClO(aq) + 2HCl\ (aq) \rightleftharpoons NaCl(aq) + H_2O(l) + Cl_2(g)$$

(a) Give the test and result for chlorine gas.

(2)

The diagram below shows a sealed flask of sodium hypochlorite and hydrochloric acid at equilibrium.



(b) Explain why equilibrium is reached in this reaction.

(2)

(c) The stopper in the diagram above is removed and hydrochloric acid is added.

The stopper is replaced.

Explain what happens to the equilibrium.

STEMUP.CO.UK

_____

_____

_____

(4)

Chlorine gas is also produced when hydrogen chloride decomposes.

$$2HCl(g) \rightleftharpoons H_2(g) + Cl_2(g)$$

The forward reaction is endothermic.

(d) Predict the effect of increasing the temperature on the amount of chlorine gas produced at equilibrium.

Explain your answer using Le Chatelier's Principle.

_____

_____

_____

_____

(2)

(e) Explain the effect of increasing the pressure on this equilibrium.

_____

_____

_____

_____

(2)

(Total 12 marks)

Q2.

When a metal carbonate reacts with an acid, a salt, carbon dioxide and water are produced.

(a) Describe how you would test for carbon dioxide gas.

Test _____

_____

Result _____

_____

(2)

(b) Describe how to make pure dry crystals of magnesium chloride from magnesium carbonate and a dilute acid.

STEMUP.CO.UK

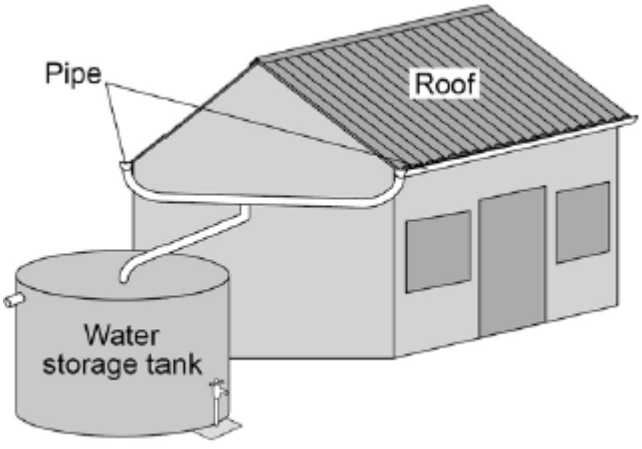
In your method you should name the apparatus and reagents you plan to use.

(6)
(Total 8 marks)

Q3.

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.

STEMUP.CO.UK

Contains dissolved substances ☐

Pure ☐

Safe to drink ☐

Tastes nice ☐

(1)

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

Tick **one** box.

To kill microbes ☐

To remove dissolved gases ☐

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.

STEMUP.CO.UK

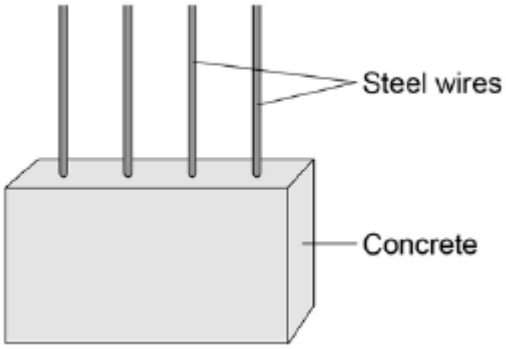
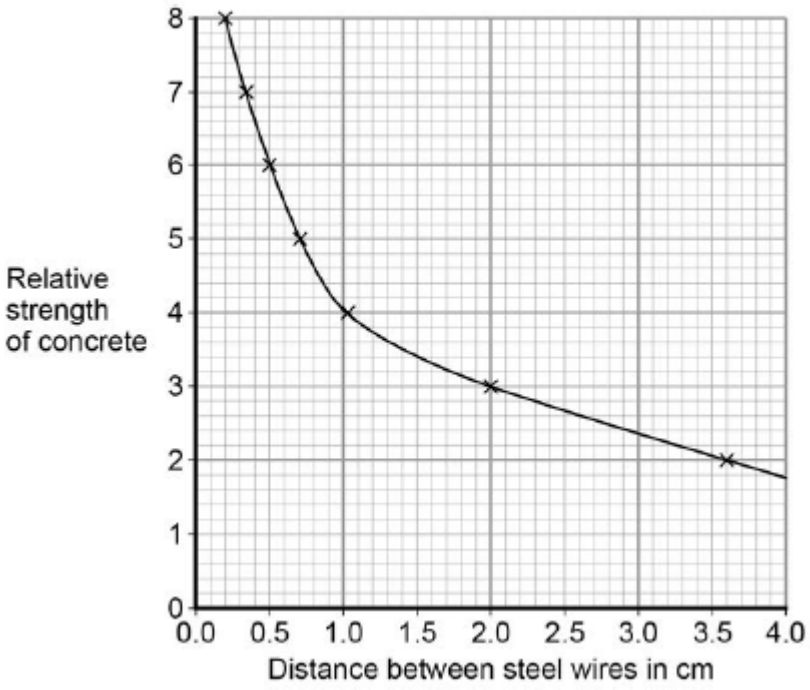


Figure 3 shows how the distance between the steel wires affects the relative strength of the concrete.

Figure 3



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

_____

_____

_____

_____

(2)

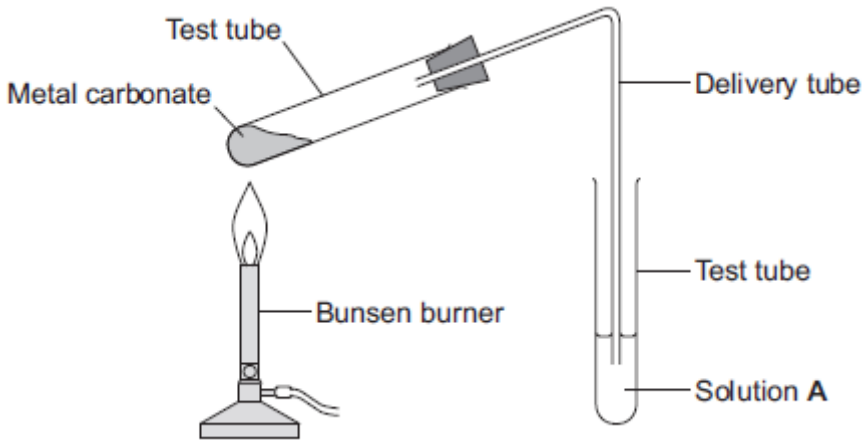
(Total 6 marks)

Q18.

A student investigated heating metal carbonates.

The student used the apparatus in the figure below.

STEMUP.CO.UK



The student's results are shown in the table below.

Metal carbonate	Colour before heating	Colour after heating	Mass before heating in g	Mass after heating in g	Solution A
Copper carbonate	Green	Black	12.4	8.0	Turns cloudy
Potassium carbonate	White	White	13.8	13.8	Stays colourless
Zinc carbonate	White	White	12.5	8.1	Turns cloudy

(a) Use the correct answer from the box to complete the sentence.

black **green** **white**

The colour of copper oxide is _____ .

(1)

(b) Solution **A** is used to test for carbon dioxide.

Carbon dioxide turns Solution **A** cloudy.

What is the name of Solution **A**?

_____

(1)

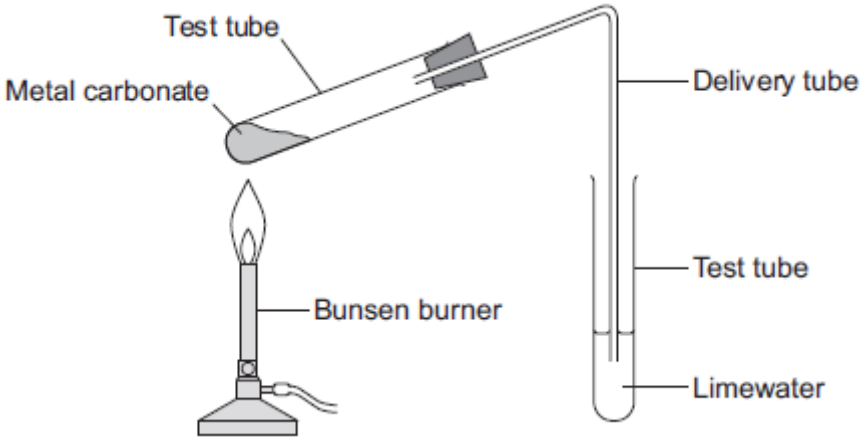
(Total 2 marks)

Q19.

A student investigated heating metal carbonates.

The student used the apparatus in the figure below.

STEMUP.CO.UK



The student's results are shown in the table below.

Metal carbonate	**Colour before heating**	**Colour after heating**	**Mass before heating in g**	**Mass after heating in g**	**Limewater**
Copper carbonate	Green	Black	12.4	8.0	Turns cloudy
Potassium carbonate	White	White	13.8		
Zinc carbonate	White	White	12.5	8.1	

(a) Explain the observations seen when heating copper carbonate.

Include the names of the substances produced.

_____

_____

_____

_____

_____

_____

(3)

(b) (i) Potassium carbonate did **not** decompose when heated.

State why.

_____

_____

(1)

(ii) Complete the table above to show the results you would expect the student

STEMUP.CO.UK

to obtain.

(3)
(Total 7 marks)

Q20.

Fire dancers use firesticks to make flame patterns.



One end of the firestick is soaked in kerosene.
The kerosene is lit and burns with a yellow flame.

Kerosene is a mixture of hydrocarbons.

(a) Complete the following sentence.

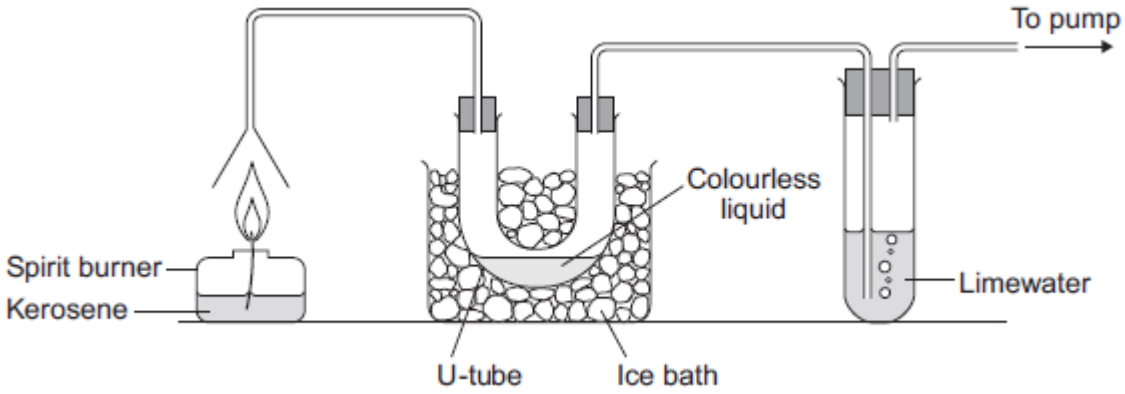
A hydrocarbon is made up of only two elements, _____ and carbon.

(1)

(b) A student investigated the products formed when kerosene burned.

Diagram 1 shows the apparatus the student used.

Diagram 1



(i) The limewater turns cloudy.

Name the gas that turns limewater cloudy.

_____

(1)

STEMUP.CO.UK

(ii) Name the colourless liquid collected in the U–tube.

_____

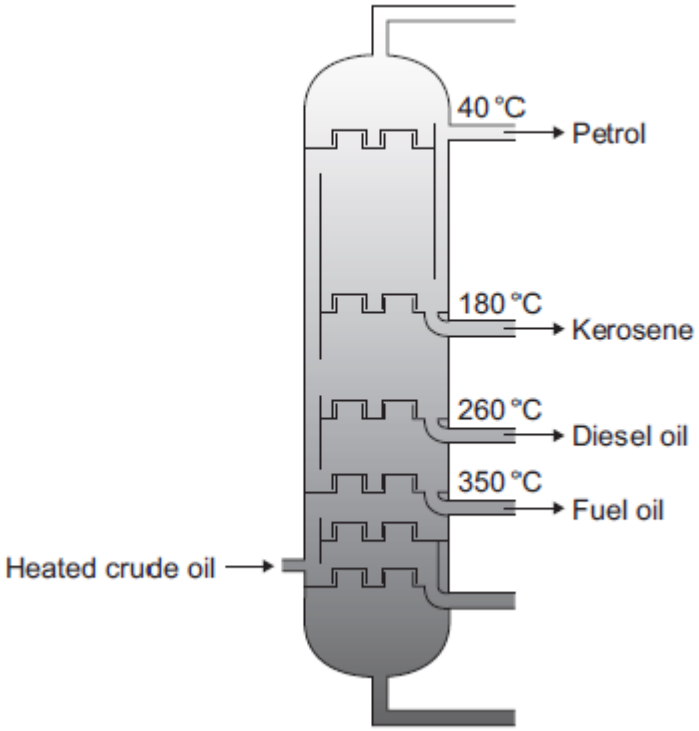
(1)

(c) Kerosene is obtained from crude oil.

Crude oil is separated into fractions.

The process is called fractional distillation.

Diagram 2



Use **only** information from **Diagram 2** to help you to answer these questions.

(i) Which of the named fractions has the lowest boiling point?

_____

(1)

(ii) Which of the named fractions is the most viscous (thickest)?

_____

(1)

(iii) Use the correct word from the box to complete the sentence.

fuels	**metals**	**plastics**

All the fractions listed in **Diagram 2** can be used as _____ .

(1)

STEMUP.CO.UK

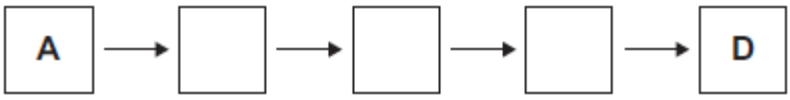
(d) Crude oil is separated by fractional distillation.

The statements, **A**, **B**, **C**, **D** and **E**, describe how different fractions are obtained from crude oil.

A crude oil is heated
B hydrocarbons condense
C hydrocarbon vapours enter the fractionating column
D hydrocarbons with higher boiling points condense near the bottom of the column
E crude oil vaporises

Complete the sequence below. Put the statements, **A**, **B**, **C**, **D** and **E**, in the correct order to show how crude oil is separated into fractions.

The first and last boxes have been completed for you.



(2)

(Total 8 marks)

Q21.

Fire dancers use firesticks to make flame patterns.



One end of the firestick is soaked in kerosene.
The kerosene is lit and burns with a yellow flame.

(a) Kerosene is a mixture of hydrocarbons.

Which elements are present in a hydrocarbon?

_____

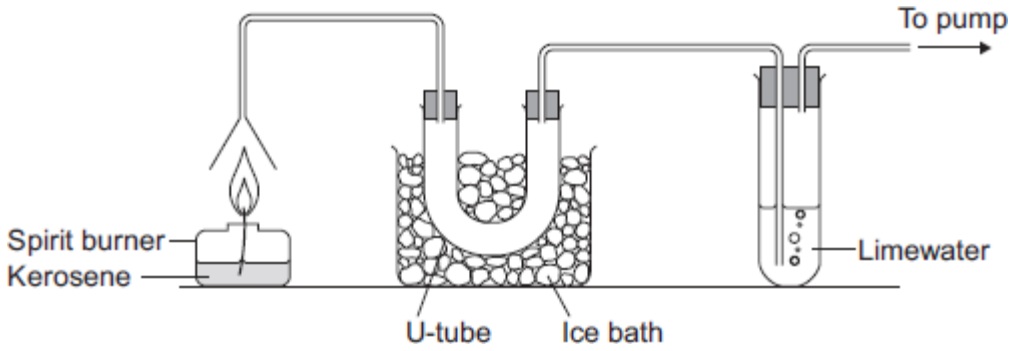
_____

(1)

(b) A student investigated the products formed when kerosene burned.

The diagram shows the apparatus the student used.

STEMUP.CO.UK



Describe and explain the observations you would expect the student to make.

(4)

(Total 5 marks)

Q22.

Many sea creatures have shells containing calcium carbonate.

STEMUP.CO.UK

Crab



© twobluedogs/iStock

Whelk



© Edward Westmacott

Scallop



© BobWes/iStock

(a) The seas are becoming more acidic.

Suggest and explain how acids affect the shells of sea creatures.

_____

_____

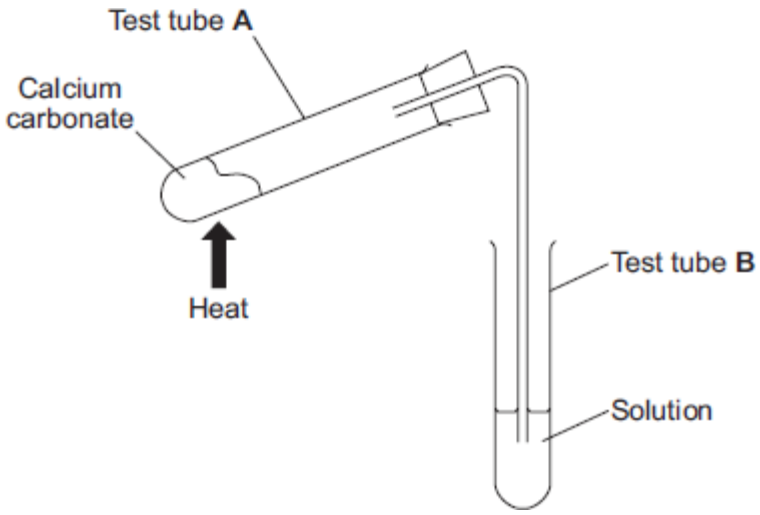
_____

_____

(2)

(b) A student investigated the effect of heating calcium carbonate.

STEMUP.CO.UK



(i) The symbol equation for the chemical reaction that occurs when calcium carbonate is heated is:

$$CaCO_3 \rightarrow CaO + CO_2$$

Complete the word equation for the reaction.

_____ → _____ + carbon dioxide

(1)

(ii) 50 g of $CaCO_3$ produced 28 g of CaO.

What mass of CO_2 was produced?

_____

_____ g

(1)

(iii) When carbon dioxide passed through the solution in test tube **B**, the solution became cloudy.

Name the solution.

_____

(1)

(Total 5 marks)

Q23.

The picture shows a limestone quarry.

STEMUP.CO.UK



By Thomas Bjørkan (Own work) [CC-BY-SA-3.0], via Wikimedia Commons

(a) Local residents were against the opening of a new limestone quarry. The quarry was estimated to have a 10-year operating period.

The quarry company gave reasons to show how the quarry could benefit local residents over the next 10 to 15 years.

Suggest **one** economic and **one** environmental reason the quarry company could give.

Economic reason _____

_____

Environmental reason _____

_____

(2)

(b) What happens when limestone (calcium carbonate) is heated?

Include in your answer:

- the chemical names of the substances produced
- the name of the process.

_____

_____

_____

_____

(2)

STEMUP.CO.UK

(c) (i) Lime is calcium oxide. Calcium oxide reacts with water to form calcium hydroxide, $Ca(OH)_2$

Write the symbol equation for this reaction.

_____ + _____ → _____

(2)

(ii) Name the gas that a solution of calcium hydroxide in water is used to test for.

Give the result that you would see if the gas was present.

_____

_____

_____

_____

(2)

(Total 8 marks)

STEMUP.CO.UK