PEARSON EDEXCEL GCSE COMBINED SCIENCE (HIGHER) · 1SC0

CHEMISTRY



EXAM QUESTION PACK

TOPIC 3: CHEMICAL CHANGES: ACIDS (PAPER 1)

SCORE	PERCENTAGE
/139	%

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Q1.

State the colour of Universal indicator in a solution of ethanoic acid.

(1)

.....

(**Q38 1SC0/1CF, June 2013**)

Q2.

(a) An acid can be reacted with a base in a titration experiment.

(i) State the name of the type of reaction when an acid reacts with a base.

(1)

.....

(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

The general equation for the reaction of an acid with a base is

(1)

☒ **A** acid + base → alkali + water

☒ **B** acid + base → salt + carbon dioxide

☒ **C** acid + base → salt + water + hydrogen

☒ **D** acid + base → salt + water

(b) A solution of sodium hydroxide is prepared.

The mass of a container with solid sodium hydroxide is determined.
The sodium hydroxide is transferred to a flask.
The mass of the empty container is determined.
The sodium hydroxide is dissolved in water and the volume made up to 2 dm^3.

The results are
mass of container + solid sodium hydroxide = 17.12g
mass of empty container = 7.02g

The results are used to calculate the concentration of the sodium hydroxide solution.

(i) Calculate the mass of solid sodium hydroxide transferred to the flask.

(1)

.....

mass of solid sodium hydroxide = ... g

(ii) Calculate the concentration of the sodium hydroxide solution in g dm^{-3}.

(1)

.....

.....

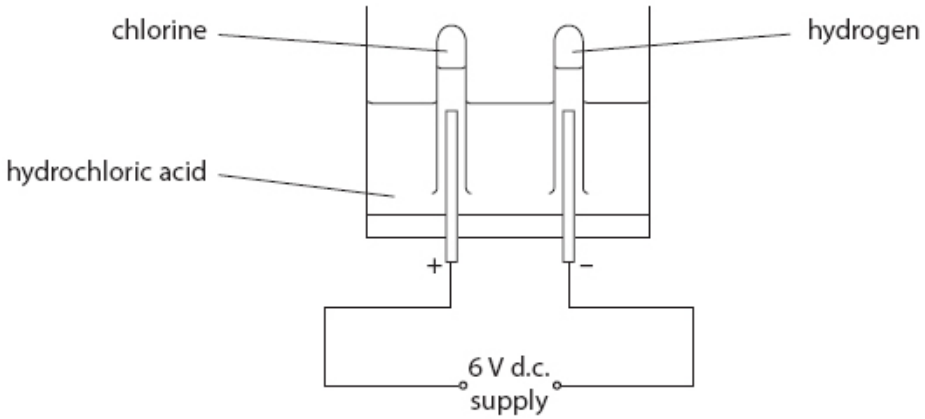
concentration of sodium hydroxide solution = ... g dm^{-3}

(**Q07 1SC0/1CF, June 2015**)

Q3.

(a) In this apparatus hydrochloric acid is decomposed by passing a direct electric current through it.

Chlorine and hydrogen are formed.



(i) Give the name of this process in which substances, such as hydrochloric acid, are decomposed by a direct electric current.

(1)

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(ii) Describe what happens when a burning splint is applied to a mixture of hydrogen and air in a test tube.

(2)

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.....

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(b) (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

An acid is present in the stomach of humans.

This acid is

(1)

☒ **A** ethanoic acid

☒ **B** hydrochloric acid

☒ **C** nitric acid

☒ **D** sulfuric acid

(ii) Some people suffer from indigestion and take indigestion remedies.

Which of these could cure indigestion caused by excess acid?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** sodium chloride

☒ **B** carbon dioxide

☒ **C** calcium carbonate

☒ **D** hydrogen chloride

(iii) Explain how an indigestion remedy works when it cures acid indigestion.

(2)

.....

.....

.....

.....

(c) Metal oxides react with acids to form a salt and water.

Complete the word equation for the reaction of magnesium oxide with nitric acid.

(2)

magnesium oxide + nitric acid → ..... + ...

(Total for Question = 9 marks)

(**Q01 1SC0/1CF, June 2013**)

Q4.

Acids

(a) Magnesium carbonate reacts with dilute nitric acid.

Give the names of the products formed in this reaction.

(2)

.....

(b) Zinc oxide, ZnO, reacts with dilute hydrochloric acid to form zinc chloride, $ZnCl_2$, and water.

(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

This reaction is an example of

(1)

☒ **A** combustion

☒ **B** thermal decomposition

☒ **C** neutralisation

☒ **D** oxidation

(ii) Write the balanced equation for the reaction between zinc oxide and dilute hydrochloric acid.

(3)

.....

*(c) Electrolysis of hydrochloric acid can produce hydrogen and chlorine.

The apparatus for the electrolysis is

hydrochloric acid

two carbon rods

a suitable container for the electrolysis reaction

a suitable source of electricity

test tubes

Describe how the apparatus can be used to electrolyse hydrochloric acid and how the gases produced can be tested to show that they are hydrogen and chlorine.

You may use a diagram to help your answer.

(6)

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(Total for question = 12 marks)

(**Q01 1SC0/1CH, June 2014**)

Q5.

(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

Acids are neutralised by metal hydroxides to form

(1)

☒ **A** salt only

☒ **B** salt and hydrogen only

☒ **C** salt and oxygen only

☒ **D** salt and water only

(ii) Acids can also be neutralised by metal carbonates.

Dilute sulfuric acid is neutralised by copper carbonate as shown in the word equation.

$$\text{copper carbonate} + \text{sulfuric acid} \rightarrow \text{copper sulfate} + \text{carbon dioxide} + \text{water}$$

Copper carbonate is a green powder.

Describe what you would **see** when copper carbonate powder is added to dilute sulfuric acid.

(2)

.....

.....

.....

.....

(**Q02 5CH1H/01, June 2015**)

Q6.

In the Haber process nitrogen and hydrogen are reacted together to form ammonia.

(a) Complete the sentence by putting a cross (☒) in the box next to your answer.

The nitrogen used in the Haber process is obtained from

(1)

☒ **A** air

☒ **B** coal

☒ **C** crude oil

☒ **D** sea water

(b) The balanced equation for the reaction forming ammonia is

$$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$$

(i) All substances in this reaction are in the same physical state.

Give the name of this physical state.

(1)

.....

(ii) State the meaning of the symbol $\rightleftharpoons$ in the equation.

(1)

.....

.....

(c) Some ammonia is reacted with sulfuric acid to make ammonium sulfate.

Write the word equation for this reaction.

(2)

.....

(d) Ammonium sulfate is used as a fertiliser.

State why farmers use fertilisers on their fields.

(1)

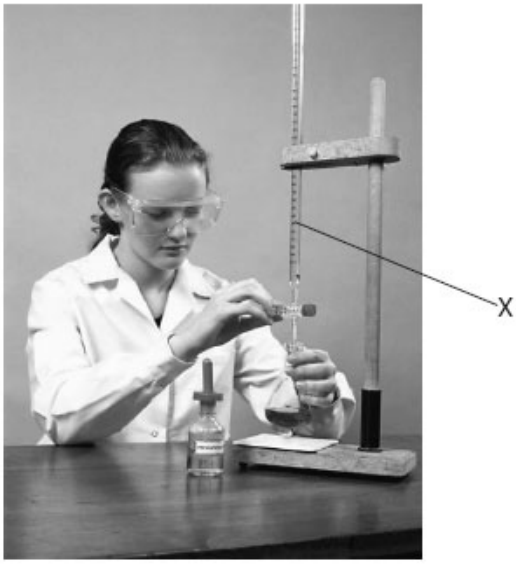
.....

.....

(e) Titration can be used to determine the exact volume of ammonia solution that reacts with 25.0 cm^3 of sulfuric acid.

The photograph shows a student carrying out a titration.

(1)



(i) Give the name of the piece of apparatus labelled X.

.....

(ii) State what is added to the sulfuric acid to show when it has been neutralised by the ammonia solution.

(1)

.....

(Total for Question = 8 marks)

(**Q28 1SC0/1CF, June 2013**)

Q7.

An excess of magnesium is added to some dilute hydrochloric acid of pH 2.
The mass of hydrogen gas produced is measured.

The experiment is repeated with excess magnesium but with the same volume of dilute hydrochloric acid of pH 1.

(i) State how many times greater the concentration of hydrogen ions is in the acid of pH 1 than in the acid of pH 2.

(1)

.....

.....

(ii) With the acid of pH 2, the mass of hydrogen gas produced when the reaction is complete is

0.005 g.

Predict the mass of hydrogen gas produced in the reaction with acid of pH 1.

(1)

.....

.....

mass = ... g

(Total for question = 2 marks)

(**QU02c 1SC0/1CH, June 2023**)

Q8.

An investigation was carried out on the reactivity of four metals, **D**, **E**, **F** and **G**.

Equal sized pieces of these metals were placed in excess dilute hydrochloric acid and left for three minutes.

Figure 9 shows the observations of the reactions for metals **D**, **E** and **F**.

metal	observations with dilute hydrochloric acid
D	Bubbles formed quickly. After three minutes all the metal had reacted.
E	Bubbles formed very quickly. No metal remaining after three minutes.
F	A few bubbles were seen to form. The metal looked unchanged after three minutes.
G	

Figure 6

The order of reactivity for these metals is shown in Figure 10.

E	D	G	F
most reactive			least reactive

Figure 7

(i) Use the information in Figure 9 and Figure 10 to suggest the observations that would be made for metal **G**.

(2)

.....

.....

.....

.....

(ii) The dilute hydrochloric acid used in this reaction is a strong acid.

Explain the meaning of the terms **dilute** and **strong acid**.

(4)

dilute

.....

.....

.....

.....

strong acid

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.....

.....

(Total for question = 6 marks)

(**QU06a 1SC0/1CH, June 2024**)

Q9.

Barium hydroxide reacts with dilute hydrochloric acid to form barium chloride solution and water.

A student investigated how the pH of the mixture changed as barium hydroxide was added to dilute hydrochloric acid.

The student used this method.

step 1 measure out 50 cm^3 of dilute hydrochloric acid into a beaker using a measuring cylinder

step 2 use a glass rod to place a drop of the acid onto a piece of universal indicator paper and record the pH

step 3 add one spatula measure of barium hydroxide to the acid in the beaker and stir

step 4 use the glass rod to place a drop of the mixture onto a new piece of universal indicator paper and record the pH again

step 5 repeat steps 3 and 4 until there is no further change in the pH.

(i) Name a piece of equipment that could be used to measure the pH of a substance more accurately than universal indicator paper.

(1)

.....

(ii) Explain why, in step 3, the mixture was stirred after adding the barium hydroxide.

(2)

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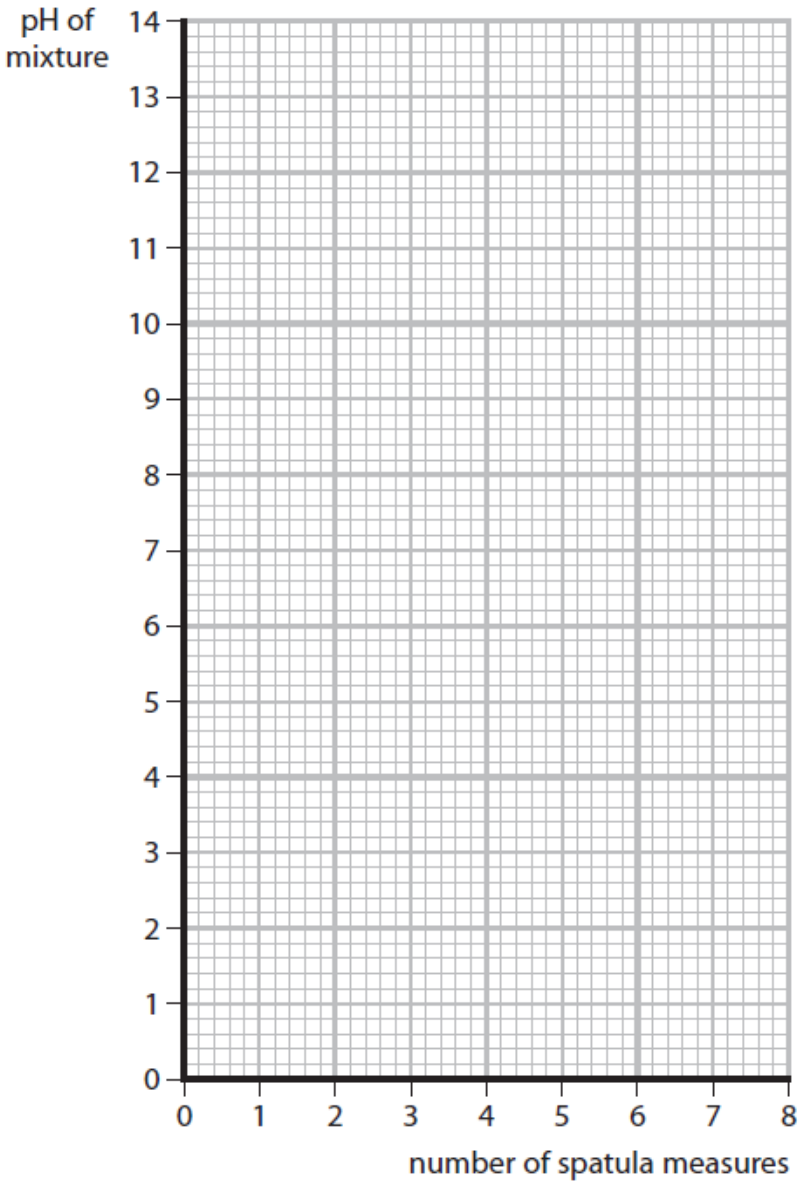
(iii) Figure 1 shows the student's results.

number of spatula measures of barium hydroxide	pH of mixture
0	1
1	1
2	1
3	1
4	3
5	8
6	12
7	13
8	13

Figure 1

Plot a graph of the pH of the mixture against the number of spatula measures of barium hydroxide.

(3)



(iv) Use the graph to find the pH of the mixture when 4.5 spatula measures of barium hydroxide are added.

(1)

pH of the mixture = ...

(Total for question = 7 marks)

(**QU01b 1SC0/1CH, June 2024**)

Q10.

A student put 5 cm^3 of potassium carbonate solution into a test tube and added 2 cm^3 of calcium nitrate solution.

A precipitate formed and was allowed to settle as shown in Figure 4.

The height of the precipitate was measured.

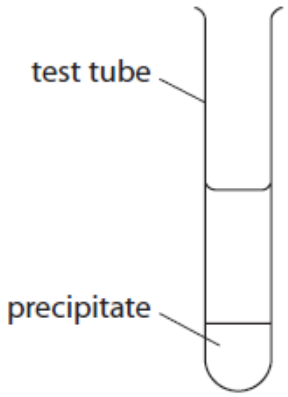


Figure 4

(i) Give the name of the piece of apparatus the student should use to find the volume of the potassium carbonate solution.

(1)

.....

(ii) The student repeated the experiment.

The results are shown in Figure 5.

experiment	height of precipitate in cm
1	2.4
2	2.7
3	2.4

Figure 5

Use the data in Figure 5 to calculate the mean height of the precipitate.

(2)

.....

.....

mean height of precipitate = ... cm

(iii) Describe how a pure, dry sample of the precipitate could be obtained from the mixture in the test tube.

(3)

.....

.....

.....

.....

.....

.....

(iv) The student investigated whether increasing the volume of calcium nitrate solution increased the height of the precipitate formed.

They repeated the experiment using different volumes of calcium nitrate.

State **one** variable that should be controlled in this investigation.

(1)

.....

(Total for question = 7 marks)

(**Q03b 1SC0/1CF, June 2023**)

Q11.

Barium hydroxide reacts with dilute hydrochloric acid to form barium chloride solution and water.

A student investigated how the pH of the mixture changed as barium hydroxide was added to dilute hydrochloric acid.

The student used this method.

step 1 measure out 50 cm^3 of dilute hydrochloric acid into a beaker using a measuring cylinder

step 2 use a glass rod to place a drop of the acid onto a piece of universal indicator paper and record the pH

step 3 add one spatula measure of barium hydroxide to the acid in the beaker and stir

step 4 use the glass rod to place a drop of the mixture onto a new piece of universal indicator paper and record the pH again

step 5 repeat steps 3 and 4 until there is no further change in the pH.

(i) Name a piece of equipment that could be used to measure the pH of a substance more

accurately than universal indicator paper.

(1)

.....

(ii) Explain why, in step 3, the mixture was stirred after adding the barium hydroxide.

(2)

.....

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.....

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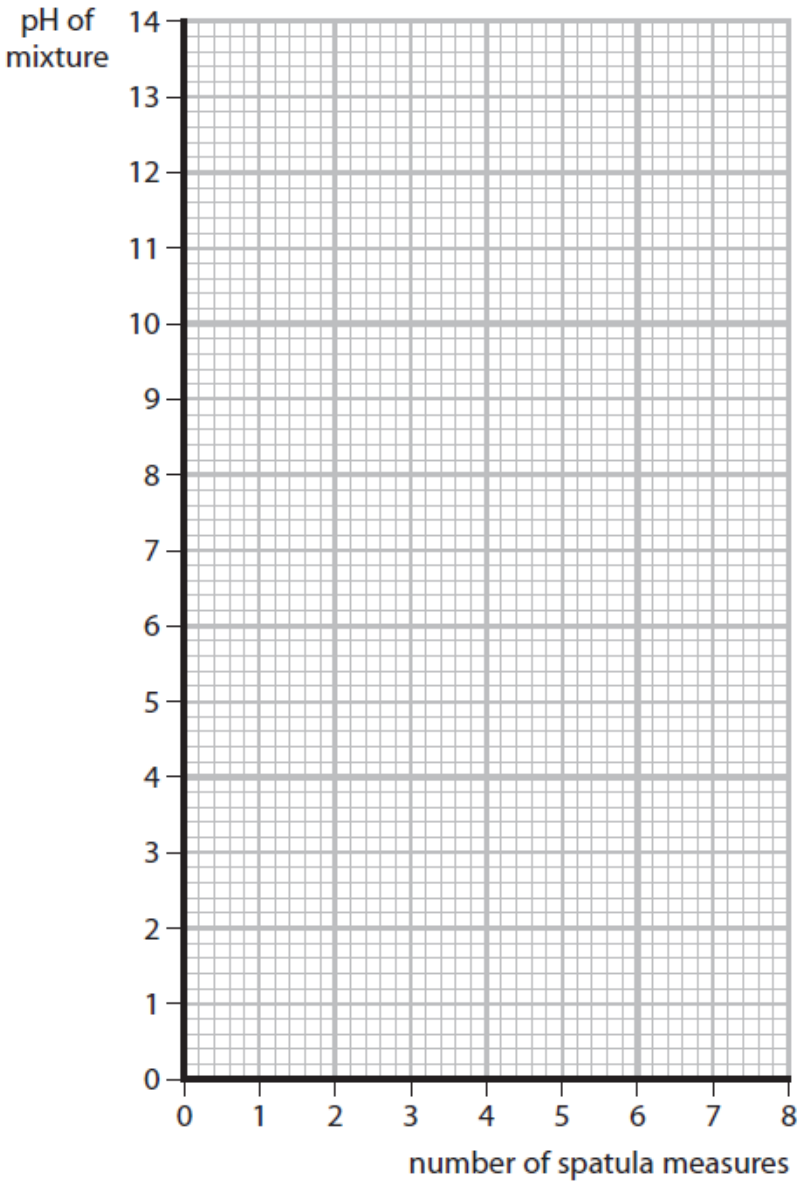
(iii) Figure 7 shows the student's results.

number of spatula measures of barium hydroxide	pH of mixture
0	1
1	1
2	1
3	1
4	3
5	8
6	12
7	13
8	13

Figure 7

Plot a graph of the pH of the mixture against the number of spatula measures of barium hydroxide.

(3)



(iv) Use the graph to find the pH of the mixture when 4.5 spatula measures of barium hydroxide are added.

(1)

pH of the mixture = ...

(Total for question = 7 marks)

(**Q05b 1SC0/1CF, June 2024**)

Q12.

Answer the question with a cross in the box you think is correct (☒). If you change your mind about an answer, put a line through the box (☒) and then mark your new

answer with a cross (☒).

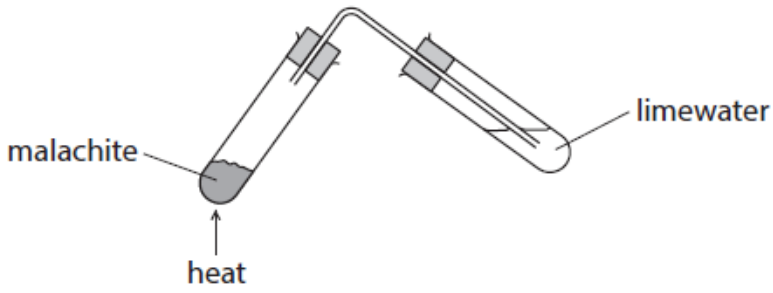
Malachite, $Cu_2CO_3(OH)_2$, is a mineral containing copper.

When heated, malachite decomposes to form copper oxide, carbon dioxide and water.

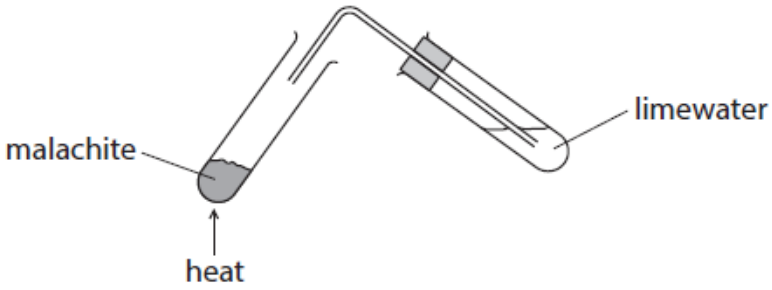
(i) Which apparatus should be used to heat the malachite and test for carbon dioxide?

(1)

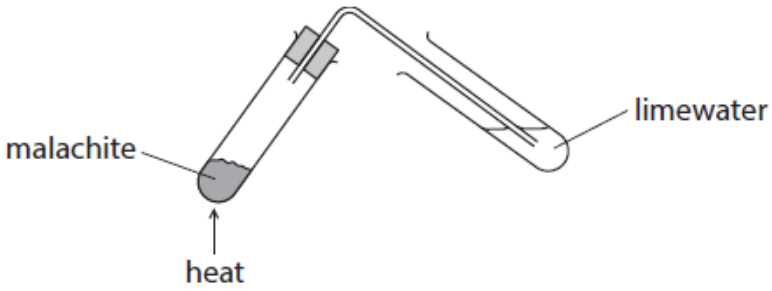
☒ **A**



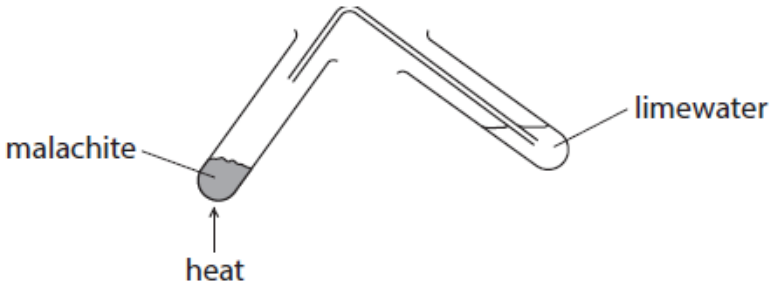
☒ **B**



☒ **C**



☒ **D**



(ii) When carbon dioxide is bubbled through limewater, a precipitate forms.

This precipitate solid makes the limewater cloudy.

Name the precipitate that makes the limewater cloudy.

(1)

.....

(iii) The equation for the decomposition of malachite when it is heated is

$$Cu_2CO_3(OH)_2 \rightarrow 2CuO + CO_2 + H_2O$$

Calculate the maximum mass of copper oxide that can be formed when 22.1 g of malachite is decomposed completely.

(relative atomic masses: Cu = 63.5, O = 16.0, C = 12.0, H = 1.0)

(4)

.....

.....

.....

.....

.....

maximum mass of CuO = ... g

(Total for question = 6 marks)

(**QU04a 1SC0/1CH, June 2025**)

Q13.

Sodium carbonate has the formula Na_2CO_3.

A student has three solids, **A**, **B** and **C**.

The solids are sodium carbonate, powdered zinc and copper oxide, but the student does not know which solid is which.

The student reacted each solid with dilute sulfuric acid.

Figure 9 shows the student's observations and the results of tests on any gases produced.

	observations and results		
	reaction with dilute sulfuric acid	**gas bubbled through limewater**	**gas tested with a lit splint**
solid **A**	bubbles seen colourless solution formed	no change	squeaky pop
solid **B**	blue solution formed some black solid remains at bottom of test tube	no gas produced	no gas produced
solid **C**	bubbles seen colourless solution formed	limewater turned cloudy	puts out lit splint

Figure 9

Use the observations and results in Figure 9 to identify which solid is which.

Your answer should include

- how each test result helps you to identify the solid
- word equations to support your answer.

(6)

(Total for question = 6 marks)

(**Q06c 1SC0/1CF, June 2024**)

Q14.

An experiment is planned to record the change in pH as a powdered base is added to 50 cm^3 dilute hydrochloric acid.

The method suggested is

step 1 add dilute hydrochloric acid up to the 50 cm^3 mark on a beaker

step 2 add one spatula of the base and stir

step 3 measure the pH of the mixture

step 4 repeat steps 2 and 3 until the pH stops changing.

(i) State how you could change the method so that the amounts of dilute

hydrochloric acid and of the base can be measured more accurately.

(2)

dilute hydrochloric acid

.....

.....

base

.....

.....

(ii) During the experiment the pH changes from 2 to 10.

If phenolphthalein indicator is added at the beginning of the experiment, a colour change occurs as the base is added.

State the colour change that occurs.

(1)

colour at start .....

colour at end .....

(iii) Explain, in terms of the particles present, why the pH increases during the experiment.

(2)

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.....

.....

.....

(Total for question = 5 marks)

(**Q06b 1SC0/1CH, June 2019**)

Q15.

The reactivity of copper, magnesium and zinc was investigated.
Each metal was placed separately in dilute hydrochloric acid.
The amount of effervescence was observed.

(i) The same mass of metal was used in each experiment.

Which piece of apparatus should be used to find the mass of metal used?

(1)

☒ **A** a balance

☒ **B** a pipette

☒ **C** a stopwatch

☒ **D** a thermometer

(ii) State **two** variables, apart from the mass of the metals, that should be controlled in this investigation.

(2)

1 .....

.....

2 .....

.....

(iii) Magnesium produces the most vigorous effervescence.

Copper does not produce any effervescence.

Give the reason why copper does not produce any effervescence.

(1)

.....

(iv) The magnesium reacts with dilute hydrochloric acid to form

magnesium chloride solution and hydrogen gas.

The equation for the reaction is

$$Mg(s) + 2HCl(aq) \rightarrow MgCl_2(\ldots\ldots) + H_2(\ldots\ldots)$$

Fill in the missing state symbols in the spaces provided.

(2)

(Total for question = 6 marks)

(**Q03a 1SC0/1CF, June 2019**)

Q16.

Silver nitrate and potassium chloride are ionic compounds that are soluble in water.

When potassium chloride solution is added to a solution of silver nitrate, a white precipitate forms.

(i) Complete the equation for this reaction, including the missing state symbol.

(2)

$AgNO_3(aq) + KCl(.....) \rightarrow AgCl(s) + ... (aq)$

(ii) Give the name of the white precipitate that forms.

(1)

.....

(iii) State and explain how the white precipitate can be separated from the reaction mixture.

(3)

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.....

(Total for question = 6 marks)

(**QU06a 1SC0/1CF, June 2025**)

Q17.

Silver nitrate and potassium chloride are ionic compounds that are soluble in water.

When potassium chloride solution is added to a solution of silver nitrate, a white precipitate forms.

(i) Complete the equation for this reaction, including the missing state symbol.

(2)

$AgNO_3(aq) + KCl(.....) \rightarrow AgCl(s) + ... (aq)$

(ii) Give the name of the white precipitate that forms.

(1)

.....

(iii) State and explain how the white precipitate can be separated from the reaction mixture.

(3)

.....

.....

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.....

(Total for question = 6 marks)

(**QU02a 1SC0/1CH, June 2025**)

Q18.

(a) Magnesium sulfate solution can be made by reacting magnesium oxide with dilute sulfuric acid.

The word equation for the reaction is

magnesium oxide + sulfuric acid → magnesium sulfate + water

Describe how solid magnesium oxide and dilute sulfuric acid are used to prepare a sample of pure magnesium sulfate solution.

(2)

.....

.....

.....

.....

(b) Magnesium carbonate, $MgCO_3$, can be reacted with dilute sulfuric acid, H_2SO_4, to form magnesium sulfate, water and carbon dioxide.

Write the balanced equation for this reaction.

(2)

.....

(c) Samples of tap water from city A and city B were investigated.

Each sample of water was treated as follows.
The mass of an empty evaporating basin was determined.
500 cm^3 of tap water was added and evaporated to dryness.
The mass of the evaporating basin and remaining solid was determined.

Here are the results.

	city A	city B
mass of evaporating basin / g	261.500	258.450
mass of evaporating basin + solid / g	261.611	258.515
mass of solid / g	0.111	
concentration of dissolved solid in tap water / g dm^{-3}	0.222	

Calculate the concentration, in g dm–3, of dissolved solid in the tap water from city B.

(2)

.....

.....

.....

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.....

.....

concentration of solid = ... g dm^{-3}

*(d) Some dissolved solids cause hardness in water.
Hard water can be softened.
Water hardness can be temporary hardness or permanent hardness.
Not all softening processes remove both types of hardness.

Describe and explain different methods of softening water, indicating the type of hardness each method removes.

(6)

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(Total for Question = 12 marks)

(**Q32 1SC0/1CF, June 2013**)

Q19.

Answer the question with a cross in the box you think is correct (☒). If you change

your mind about an answer, put a line through the box (☒) and then mark your new answer with a cross (☒).

This question is about metals and their reactions with acids.

Three equal sized pieces of the metals **E**, **F**, **G** and **H** are put into separate test tubes containing equal volumes of dilute sulfuric acid.

The results in Figure 6 show the test tubes after half a minute.

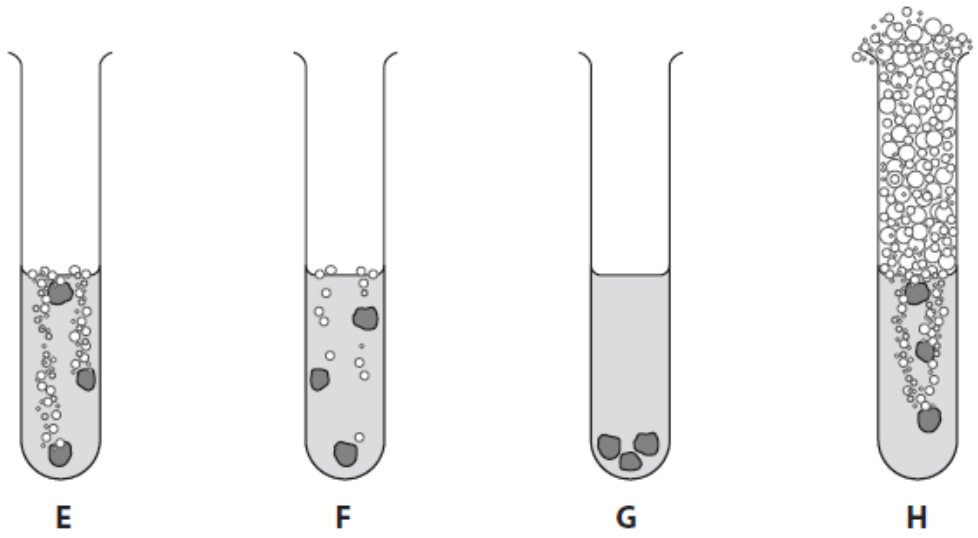


Figure 6

(i) Arrange the metals **E**, **F**, **G** and **H** in order of reactivity.

(2)

metal	
	most reactive
	least reactive

(ii) The bubbles that form are hydrogen.

Which row of the table shows the test and result that confirm the gas is hydrogen?

(1)

		test	result
☒	A	put a glowing splint into the gas	the splint relights
☒	B	put a lighted splint into the gas	the gas ignites with a squeaky pop
☒	C	test the gas with damp litmus paper	the litmus paper turns pink
☒	D	test the gas with damp litmus paper	the litmus paper turns white

(Total for question = 3 marks)

(**QU03b 1SC0/1CF, June 2025**)

Q20.

(a) Hydrogen chloride, HCl, can be formed by the reaction of hydrogen, H_2, with chlorine, Cl_2.

Write the balanced equation for this reaction.

(2)

.....

(b) The electronic configuration of hydrogen is 1.
The electronic configuration of chlorine is 2.8.7.

Draw a dot and cross diagram to show the arrangement of electrons in a molecule of hydrogen chloride, HCl.

Show outer electrons only.

(2)

(**Q17 1SC0/1CF, June 2015**)

Q21.

* Barium sulfate is prepared by reacting barium chloride with sodium sulfate.
The barium sulfate is formed as a precipitate.

Describe an experiment to prepare a pure, dry sample of barium sulfate, starting with barium chloride crystals and sodium sulfate crystals.

(6)

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(**Q25 1SC0/1CF, June 2013**)

Q22.

(a) Barium sulfate contains

barium ions, Ba^{2+}
sulfate ions, SO_4^{2-}

(i) Give the formula of barium sulfate.

(1)

.....

(ii) Give the meaning of the term **ion.**

(1)

.....

.....

(b) This is an X-ray photograph of part of a patient's body.

Before the photograph was taken a suspension of barium sulfate was introduced into his body to show the required part.



Source: andi-sheba.blogspot.com

Many barium salts are toxic.
Barium sulfate is insoluble in water.

Explain why it is safe for the patient to have barium sulfate in his body.

(2)

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.....

.....

*(c) Barium sulfate is prepared by reacting barium chloride with sodium sulfate.
The barium sulfate is formed as a precipitate.

Describe an experiment to prepare a pure, dry sample of barium sulfate, starting with barium chloride crystals and sodium sulfate crystals.

(6)

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.....

.....

.....

(d) Barium reacts with chlorine to produce barium chloride, $BaCl_2$.

Write the balanced equation for this reaction.

(2)

.....

(Total for Question = 12 marks)

(**Q11 1SC0/1CF, June 2013**)

Q23.

(a) Calcium nitrate solution reacts with sodium carbonate solution.
The products are calcium carbonate and another salt.

Write the word equation for this reaction.

(2)

.....

.....

(b) (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The colour produced in a flame test by calcium ions is

(1)

☒ **A** green

☒ **B** lilac

☒ **C** orange-red

☒ **D** yellow

(ii) Describe how a flame test is carried out on a solid.

(2)

.....

.....

.....

.....

(c) If calcium carbonate is heated strongly, it decomposes.

$$CaCO_3 \rightarrow CaO + CO_2$$

If 100 g of calcium carbonate is heated a calculation shows that 44 g carbon dioxide should be formed.

(i) In an experiment 100 g of calcium carbonate was heated and only 40 g carbon dioxide was formed.

Calculate the percentage yield of carbon dioxide in this reaction.

(2)

.....

.....

percentage yield of carbon dioxide =.....%

(ii) Suggest a reason why only 40 g of carbon dioxide was formed in the experiment.

(1)

.....

.....

.....

(d) Complete the sentence by putting a cross (☒) in the box next to your answer.

Ionic compounds

(1)

☒ **A** conduct electricity when solid

☒ **B** do not conduct electricity when molten

☒ **C** have low boiling points

☒ **D** have high melting points

(Total for Question = 9 marks)

(**Q10 1SC0/1CF, June 2013**)

Q24.

Calcium nitrate solution reacts with sodium carbonate solution.
The products are calcium carbonate and another salt.

Write the word equation for this reaction.

(2)

.....

.....

(**Q22 1SC0/1CF, June 2013**)

Q25.

This question is about metals and their reactions with acids.

When zinc reacts with very dilute nitric acid, zinc nitrate is formed.

(i) The formula of zinc nitrate is $Zn(NO_3)_2$

Calculate the relative formula mass of magnesium nitrate, $Zn(NO_3)_2$

(relative atomic masses: Zn = 65, N = 14, O = 16)

(2)

.....

.....

.....

relative formula mass = ...

(ii) A student investigates the reaction between a metal and a dilute acid using the apparatus shown in Figure 7.

Cotton wool is placed in the top of the apparatus as shown, to stop any acid from spraying out.

The total mass of the apparatus is shown at the start of the reaction and after the reaction has ended.

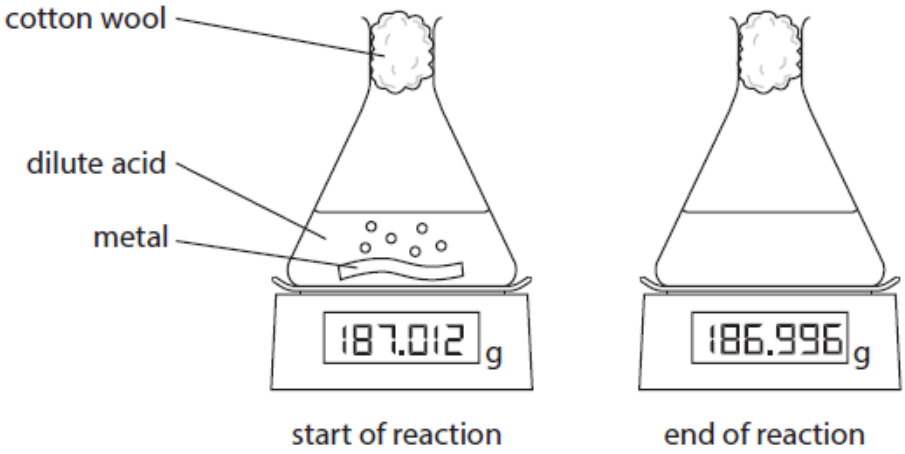


Figure 7

State **two** ways the student would know that the reaction has ended.

(2)

1 .....

.....

2 .....

.....

(Total for question = 4 marks)

(**QU03c 1SC0/1CF, June 2025**)

Q26.

When burnt completely in air, butene forms carbon dioxide and water.

(i) Balance the equation for this reaction by putting numbers in the spaces provided.

(2)

$$C_4H_8 + 6O_2 \rightarrow \text{.....} CO_2 + \text{.....} H_2O$$

(ii) Describe the test to show that a gas is carbon dioxide.

(2)

.....

.....

.....

.....

(Total for question = 4 marks)

(**Q06 1SC0/1CF, June 2018**)

Q27.

The scientist John Dalton lived over 200 years ago.

Another gas that Dalton investigated was chlorine.

Chlorine gas reacts with water.
The two products are a solution of hydrogen chloride and the substance HClO.

(i) Complete the balanced equation for this reaction, including the three missing state symbols.

(3)

.....(.....) + ... (.....) ↔ .....
(.....) + HClO (aq)

(ii) Hydrogen chloride solution is acidic.

The formulae of four ions are shown in Figure 6.

H^+	H^-	Cl^+	Cl^-

Figure 6

Give the formula of the ion in Figure 6 that causes the hydrogen chloride solution to be acidic.

(1)

formula .....

(iii) An acid reacts with an alkali.

Give the name of this type of reaction.

(1)

.....

(iv) Describe what you would **see** when some copper carbonate powder is added to a beaker of

dilute sulfuric acid.

(2)

.....

.....

.....

(Total for question = 7 marks)

(**Q05c 1SC0/1CF, Nov 2021**)

Q28.

The scientist John Dalton lived over 200 years ago.

Another gas that Dalton investigated was chlorine.

Chlorine gas reacts with water.
The two products are a solution of hydrogen chloride and the substance HClO.

(i) Complete the balanced equation for this reaction, including the three missing state symbols.

(3)

..... (.....) + ... (.....) ↔ .....
(.....) + HClO (aq)

(ii) Hydrogen chloride solution is acidic.

The formulae of four ions are shown in Figure 2.

H^+	H^-	Cl^+	Cl^-

Figure 2

Give the formula of the ion in Figure 2 that causes the hydrogen chloride solution to be acidic.

(1)

formula .....

(iii) An acid reacts with an alkali.

Give the name of this type of reaction.

(1)

.....

(Total for question = 5 marks)

(**Q01c 1SC0/1CH, Nov 2021**)

Q29.

Barium hydroxide reacts with dilute hydrochloric acid to form barium chloride solution and water.

(i) Complete the balanced equation for the reaction by adding a **number** in front of HCl(aq).

(1)

$$Ba(OH)_2(s) + ...HCl(aq) \rightarrow BaCl_2(aq) + 2H_2O(l)$$

(ii) State what you would **see** during the reaction.

(1)

.....

.....

(Total for question = 2 marks)

(**Q05a 1SC0/1CF, June 2024**)

Q30.

Barium hydroxide reacts with dilute hydrochloric acid to form barium chloride solution and water.

(i) Complete the balanced equation for the reaction by adding a **number** in front of HCl(aq).

(1)

$Ba(OH)_2(s)$ + ...$HCl(aq) \rightarrow BaCl_2(aq) + 2H_2O(l)$

(ii) State what you would **see** during the reaction.

(1)

.....

.....

(Total for question = 2 marks)

(**QU01a 1SC0/1CH, June 2024**)

Q31.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

The word equation for the reaction between copper carbonate and dilute sulfuric acid is

$$\text{copper carbonate} + \text{sulfuric acid} \rightarrow \text{copper sulfate} + \text{carbon dioxide} + \text{water}$$

(i) Complete the balanced equation for this reaction.

(2)

$CuCO_3$ + ... → ..... + CO_2 + H_2O

(ii) Calculate the relative formula mass of copper carbonate, $CuCO_3$.
(relative atomic masses: C = 12.0, O = 16.0, Cu = 63.5)

(2)

.....

.....

.....

relative formula mass of $CuCO_3$ = ...

(iii) What is the chemical test to show that a gas is carbon dioxide?

(1)

☒ **A** bubble the gas through limewater, limewater turns cloudy

☒ **B** put damp blue litmus paper in the gas, litmus paper turns red

☒ **C** put a lighted splint into the gas, splint is extinguished

☒ **D** measure the pH of the gas, pH = 4

(Total for question = 5 marks)

(**Q06a 1SC0/1CF, Nov 2020**)

Q32.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

The word equation for the reaction between copper carbonate and dilute sulfuric acid is

$$\text{copper carbonate} + \text{sulfuric acid} \rightarrow \text{copper sulfate} + \text{carbon dioxide} + \text{water}$$

(i) Complete the balanced equation for this reaction.

(2)

$$CuCO_3 + \text{.....} \rightarrow \text{.....} + CO_2 + H_2O$$

(ii) Calculate the relative formula mass of copper carbonate, CuCO3 .
(relative atomic masses: C = 12.0, O = 16.0, Cu = 63.5)

(2)

.....

.....

.....

relative formula mass of $CuCO_3$ = ...

(iii) What is the chemical test to show that a gas is carbon dioxide?

(1)

☒ **A** bubble the gas through limewater, limewater turns cloudy

☒ **B** put damp blue litmus paper in the gas, litmus paper turns red

☒ **C** put a lighted splint into the gas, the splint is extinguished

☒ **D** measure the pH of the gas, pH = 4

(Total for question = 5 marks)

(**Q02a 1SC0/1CH, Nov 2020**)

Q33.

Magnesium carbonate reacts with dilute hydrochloric acid.
Water and carbon dioxide are two of the products of the reaction.

Complete the balanced equation for this reaction.

(1)

$MgCO_3 + 2HCl \rightarrow$ ..... $+ H_2O + CO_2$

(Total for question = 1 mark)

(**QU02c 1SC0/1CH, June 2022**)

Q34.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

When lead nitrate solution and potassium chloride solution are mixed, potassium nitrate and a precipitate of lead chloride are formed.

(i) Complete the word equation for this reaction.

(1)

lead nitrate + ... → .....

..... + lead chloride

(ii) Lead nitrate is toxic.

Which hazard symbol should be on a container of lead nitrate?

(1)

☒ **A** 

☒ **B** 

☒ **C** 

☒ **D** 

(Total for question = 2 marks)

(**Q03a 1SC0/1CF, June 2023**)

Q35.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

In an experiment, powdered calcium hydroxide was added to dilute hydrochloric acid and the pH was measured.

The method used was

step 1 measure 200 cm^3 dilute hydrochloric acid into a beaker

step 2 add 0.1 g of powdered calcium hydroxide to the beaker

step 3 find the pH of the mixture

step 4 repeat steps 2 and 3 until the pH stops changing.

Complete the word equation for the reaction.

(2)

calcium hydroxide + hydrochloric acid →
.....

(Total for question = 2 marks)

(**Q05b 1SC0/1CF, June 2023**)

Q36.

Complete the word equation for the reaction.

(2)

calcium hydroxide + hydrochloric acid →
.....

(Total for question = 2 marks)

(**QU01b 1SC0/1CH, June 2023**)

Q37.

A sample of rock salt contains a mixture of sodium chloride and some insoluble substances.

The rock salt is added to water and the mixture stirred.

The mixture is then filtered to obtain a filtrate of sodium chloride solution.

(i) Draw a labelled diagram of the apparatus used to filter the mixture and collect the sodium chloride solution.

(2)

(ii) Describe how a sample of pure, dry sodium chloride crystals can be obtained from the filtrate.

(3)

.....

.....

.....

.....

.....

.....

(Total for question = 5 marks)

(**Q03a 1SC0/1CH, Nov 2020**)

Q38.

Using different reactants, a solution of copper sulfate was prepared.

Describe what should be done to obtain copper sulfate crystals from this copper sulfate solution.

(2)

.....

.....

.....

.....

.....

.....

(Total for question = 2 marks)

(**Q04b 1SC0/1CH, Nov 2021**)

Q39.

Sodium hydroxide solution and copper sulfate solution were reacted together completely.

The result was a mixture of a precipitate of copper hydroxide in a solution of sodium sulfate.

Describe how to obtain

- a pure sample of solid copper hydroxide from the mixture
- a pure sample of solid sodium sulfate from the mixture.

(4)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Total for question = 4 marks)

Q40.

Figure 7 shows a conical flask containing dilute sulfuric acid.
Copper carbonate is added to the acid in the flask.
The copper carbonate is added one spatula measure at a time until the reaction has finished.

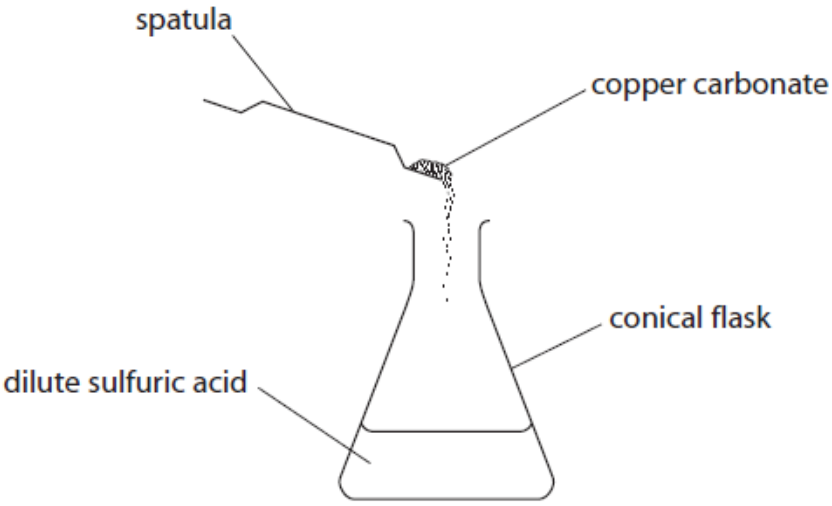


Figure 7

(i) State **two** observations that would show the reaction has finished.

(2)

1 .....

.....

2 .....

.....

(ii) Describe how you would obtain a solution of copper sulfate from the mixture and how you would obtain pure, dry copper sulfate crystals from this solution.

Your description should include the apparatus you would use.

You may wish to use diagrams in your answer.

(6)

(Total for question = 8 marks)