CCEA GCSE SCIENCE: SINGLE AWARD (MODULAR)

SCIENCE



EXAM QUESTION PACK

MODULE 3 FOUNDATION TIER GSC31 PAPERS

STEMUP

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Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2012

Science: Single Award (Modular)

Chemical Patterns and our Environment
Module 3
Foundation Tier

[GSC31]

GSC31

TUESDAY 13 NOVEMBER 2012, MORNING

TIME

45 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all eight** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 45.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
A Data Leaflet is provided for use with this paper.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
Total Marks	

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Examiner Only	
Marks	Remark

1 **(a)** Common household substances contain chemicals. Using lines, link each household substance to one chemical it contains.

Household substance	Chemical
vinegar	sodium chloride
oven cleaner	citric acid
baking soda	ethanoic acid
lemon juice	sodium hydroxide
	sodium hydrogencarbonate

[4]

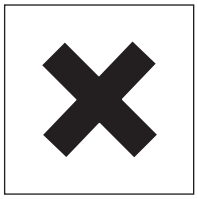
(b) Shown below are five hazard symbols and examples of chemicals that use them.



ammonium dichromate



ethanol



sodium hydroxide



hydrochloric acid



barium chloride

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(i) Name the chemical shown which uses a toxic (poisonous) symbol.

_____ [1]

(ii) Name the chemical shown which is explosive.

_____ [1]

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(iii) What is the name of the hazard symbol which is put on containers of hydrochloric acid?

_____ [1]

(iv) Why should ethanol not be stored near a gas cooker?

_____ [1]

Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

2 The picture below shows a farmer spraying lime on the soil.



© Department of Agriculture and Rural Development

(a) Complete the following sentence.

Choose from:

alkaline **neutral** **acidic**

Farmers add lime to soil because the soil is _____. [1]

(b) Universal Indicator solution was shaken with four soil samples **A**, **B**, **C** and **D**.

The colour of Universal Indicator at different pH values is given below.

Colour	**red**	**orange**	**yellow**	**light green**	**dark green**	**dark blue**	**purple**
pH	1	3	5	7	9	11	13

Use this information to complete the table below.

soil sample	**colour**	**pH**	**acidic, alkaline or neutral**
A		3	
B	dark blue		alkaline
C		7	
D	yellow		acidic

[3]

(c) Which soil sample (**A**, **B**, **C** or **D**) would be best for growing garlic which needs soil with a pH of 5?

_____ [1]

Examiner Only

Marks	Remark

3 Many sweets contain sherbet.

Examiner Only	
Marks	Remark



© Cordelia Molloy / Science Photo Library

Complete the following sentences.

Choose from:

citric acid : oxygen : fizzing : hot

icing sugar : carbon dioxide : salt

Sherbet can be made by mixing together baking soda,

_____ and _____ .

A gas called _____ is produced when sherbet

mixes with water in the mouth.

This gas produces a pleasant _____ sensation.

[4]

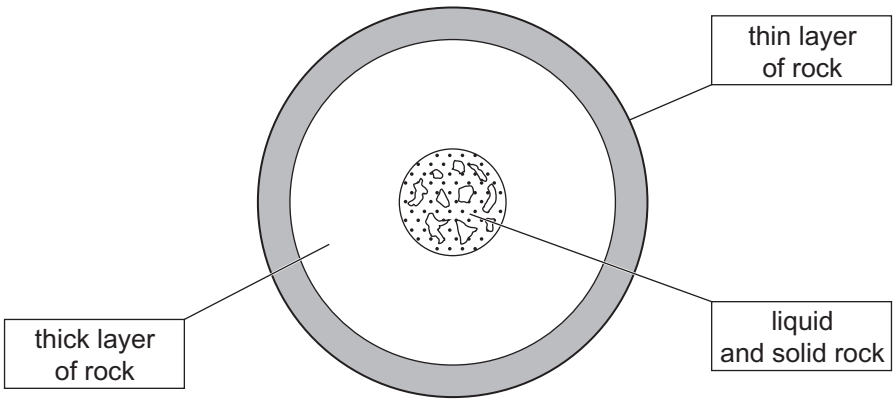
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4 The diagram below shows the structure of the Earth.



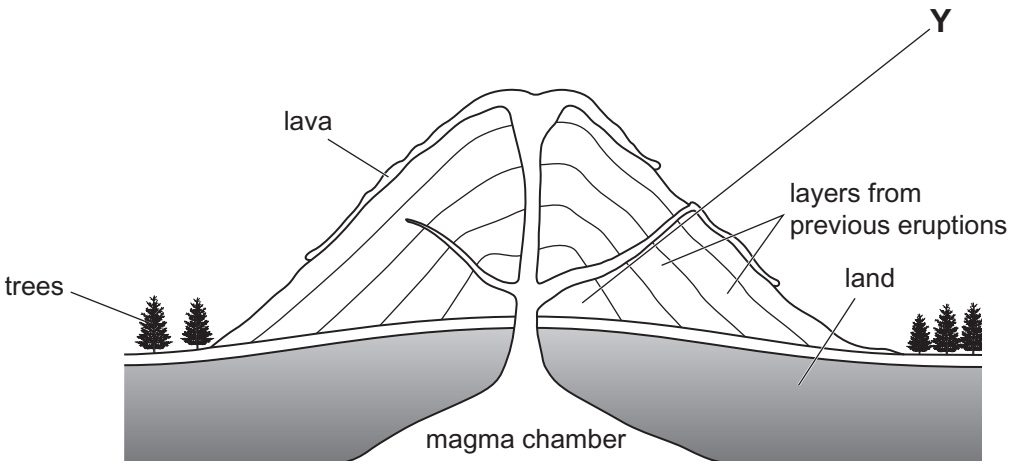
(a) Use the diagram to describe what the mantle is made from.

_____ [1]

(b) What name is given to the outer layer?

_____ [1]

(c) The following diagram shows a section through a volcano.



The line from **Y** shows the first eruption. How many eruptions has this volcano had?

_____ [1]

Examiner Only

Marks	Remark

(d) Describe fully what happens during an eruption and give **one** effect this will have on the surrounding area.

_____

_____

_____

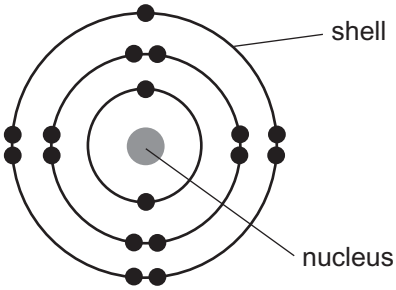
_____

_____ [3]

Examiner Only	
Marks	Remark

5 The diagram below shows the structure of an atom with three shells.

(You may find your Data Leaflet useful in this question.)



(a) Name the particles found in the shells.

_____ [1]

(b) Name the element to which this atom belongs.

_____ [1]

(c) How many protons will be in the nucleus of this atom?

_____ [1]

(d) The mass number of this atom is 35. Calculate how many neutrons the nucleus will contain.

_____ [1]

(e) Name the particles in an atom which have no charge.

_____ [1]

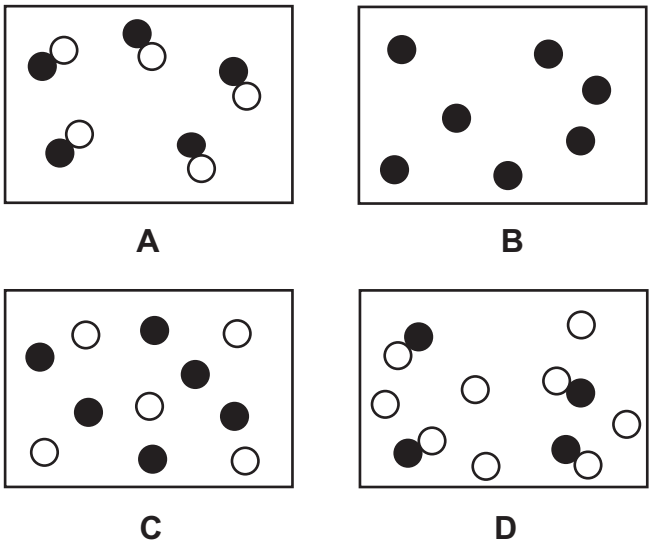
(f) To which Group of the Periodic Table does this element belong?

_____ [1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

6 The following diagrams represent the arrangement of particles in some substances.



(a) Which diagram **A**, **B**, **C** or **D** represents a compound on its own?

_____ [1]

(b) Which diagram **A**, **B**, **C** or **D** represents a mixture of elements?

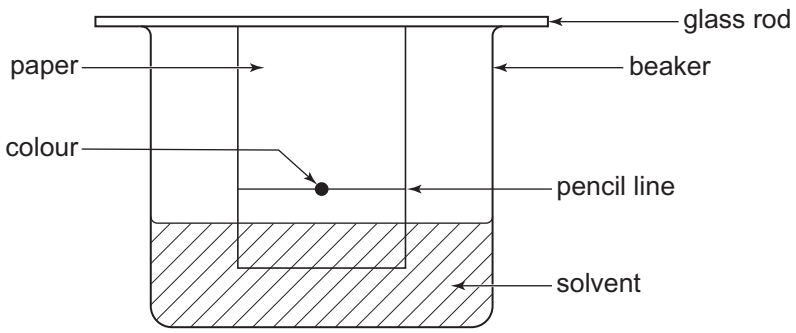
_____ [1]

(c) Which diagram **A**, **B**, **C** or **D** represents one element on its own?

_____ [1]

Examiner Only	
Marks	Remark

7 The method shown below can separate the dyes used to colour sweets.



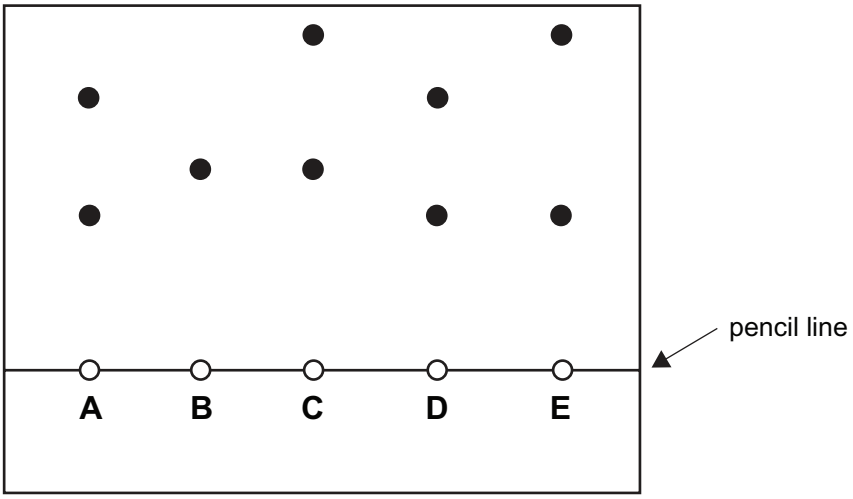
(a) Name this method of separating dyes.

_____ [1]

(b) Why is it important to draw the line in pencil and not in ink?

_____ [1]

The diagram below shows the result of an experiment in which five colours were tested.



(c) Which two colours **A**, **B**, **C**, **D** or **E** contain only the same two dyes?

_____ and _____ [1]

(d) Three of the colours tested contain the same dye.
Using the letters **A**, **B**, **C**, **D** or **E**, give these three colours.

_____ _____ _____ [1]

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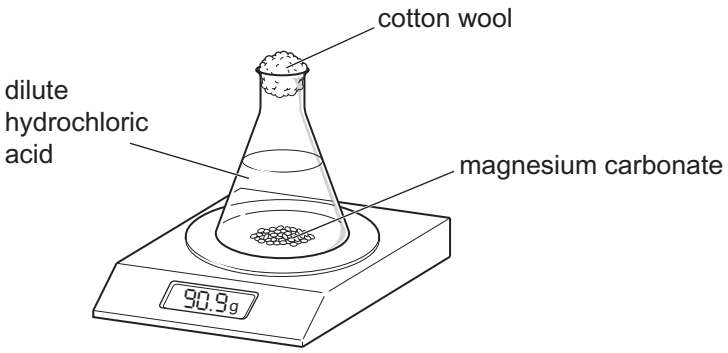
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Marks	Remark

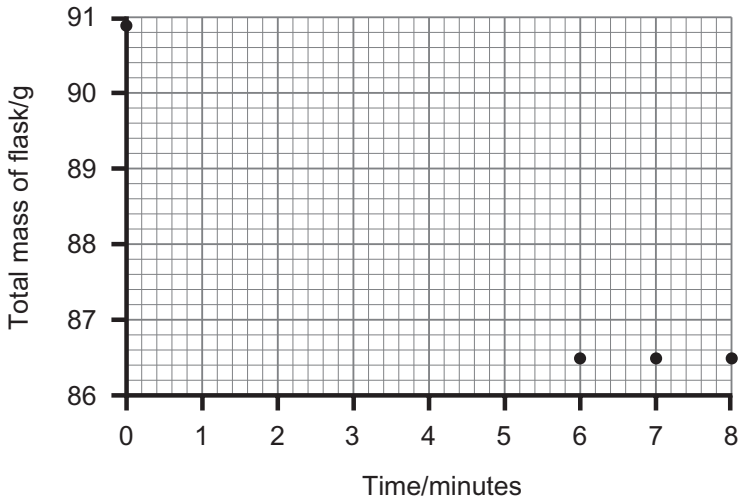
8 John investigated the reaction between hydrochloric acid and **excess** magnesium carbonate.



He measured the mass of the flask and its contents (total mass) every minute. His results are shown below.

Time/minutes	0	1	2	3	4	5	6	7	8
Total mass of flask/g	90.9	89.2	87.8	87.1	86.8	86.6	86.5	86.5	86.5

(a) Complete the graph by plotting the remaining points and draw a line of best fit.



[3]

(b) Describe fully the trend shown by these results.

_____

_____ [2]

(c) How do you know that all the acid was used up in this reaction?

_____

_____ [1]

Given below is the word equation for this reaction.

$$\text{magnesium carbonate} + \text{hydrochloric acid} \rightarrow \text{magnesium chloride} + \text{water} + \text{carbon dioxide}$$

(d) Use this information and your knowledge to explain fully why the total mass decreased during this experiment.

_____

_____ [2]

(e) Cotton wool was used instead of a rubber bung to plug the flask. Suggest a reason why.

_____

_____ [1]

THIS IS THE END OF THE QUESTION PAPER

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Rewarding Learning

General Certificate of Secondary Education
2012

Science: Single Award (Modular)

Chemical Patterns and our Environment
Module 3
Foundation Tier

[GSC31]

TUESDAY 13 NOVEMBER 2012
9.15 am–10.00 am

MARK SCHEME

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			AVAILABLE MARKS
1	**(a)**	vinegar – ethanoic acid oven cleaner – sodium hydroxide baking soda – sodium hydrogencarbonate lemon juice – citric acid [4]	
	(b)	**(i)** barium chloride [1]	
		(ii) ammonium dichromate [1]	
		(iii) corrosive [1]	
		(iv) flammable [1]	8
2	**(a)**	acidic [1]	
	(b)		

soil sample	colour	pH	acidic, alkaline or neutral
A	orange		acidic
B		11	
C	light green		neutral
D		5	

½ mark each
round down [3]

	(c)	D [1]	5
3		citric acid, icing sugar (any order) carbon dioxide, fizzing [4]	4
4	**(a)**	thick layer of rock [1]	
	(b)	crust [1]	
	(c)	6 or 7 [1]	
	(d)	dust cloud, lava flowing down, trees killed, buildings destroyed, lives lost (2 marks for description) (1 mark for effect) [3]	6

				AVAILABLE MARKS
5	**(a)**	electrons	[1]	
	(b)	chlorine	[1]	
	(c)	17	[1]	
	(d)	18	[1]	
	(e)	neutrons	[1]	
	(f)	7 accept halogens	[1]	6
6	**(a)**	A	[1]	
	(b)	C	[1]	
	(c)	B	[1]	3
7	**(a)**	chromatography	[1]	
	(b)	ink would run/pencil will not run	[1]	
	(c)	A and D both required	[1]	
	(d)	A, D and E	[1]	4
8	**(a)**	5 points correct 2 marks 3,4 points correct 1 mark line of best fit 1 mark	[3]	
	(b)	mass decreases with time graph levels off	[2]	
	(c)	magnesium carbonate is in excess	[1]	
	(d)	carbon dioxide is a gas it escapes or leaves the flask	[2]	
	(e)	bung would allow pressure to build up/ danger of explosion	[1]	9
			Total	**45**

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Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
2011–2012

Science: Single Award (Modular)

Chemical Patterns and our Environment Module 3

Foundation Tier

[GSC31]

GSC31

MONDAY 21 MAY 2012, MORNING

TIME

45 minutes.

INSTRUCTIONS TO CANDIDATES

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Total Marks	

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Examiner Only	
Marks	Remark

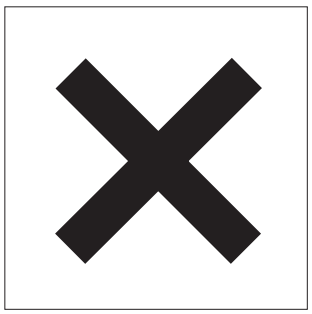
1 The diagrams below show the names of five chemicals and their hazard symbols.



Ammonium dichromate



Ethanol



Sodium hydroxide



Hydrochloric acid



Barium chloride

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(a) From the information above:

(i) name a chemical that is **toxic**.

_____ [1]

(ii) name a chemical that is **corrosive**.

_____ [1]

(iii) what is the hazard symbol shown for ethanol?

_____ [1]

(b) Give two reasons why hazard symbols rather than words are used on bottles of chemicals.

1. _____

2. _____ [2]

Examiner Only	
Marks	Remark

2 **(a)** Shown below are some well known foods and methods of preserving them. Using lines, link each food to the most suitable method of preservation.

Food	Method of Preservation
fish fingers	drying
tea leaves	canning
baby onions	pickling in vinegar
	freezing

[3]

(b) Name **two** types of organism which can cause food to go bad.

Choose from:

flu : bacteria : salt : fungi : sugar

_____ and _____ [2]

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Examiner Only	
Marks	Remark

3 **(a)** The Periodic Table is a way of classifying the chemical elements.

(i) Place a tick **(✓)** beside the correct statement about the Periodic Table.

The vertical columns are called periods ☐

The Noble gases are very unreactive ☐

The horizontal rows are called groups ☐

[1]

(ii) Use your Data Leaflet to name two Noble gases.

_____ and _____ [2]

(b) **(i)** Name the element which catches fire and burns with a lilac flame when it is placed in water.

Choose from:

lithium : potassium : calcium

_____ [1]

(ii) Name the gas produced when this element reacts with water.

Choose from:

carbon dioxide : oxygen : hydrogen

_____ [1]

Examiner Only	
Marks	Remark

4 The picture shows the remains of an ammonite, an animal that lived in the sea millions of years ago.



© Junior Geo Ltd

(a) (i) What name is given to animal remains found in rocks?

_____ [1]

(ii) Name the **type** of rock in which animal remains are found.

_____ [1]

(iii) When this type of rock is affected by pressure over long periods of time it can be changed into another type of rock. Name this new **type** of rock.

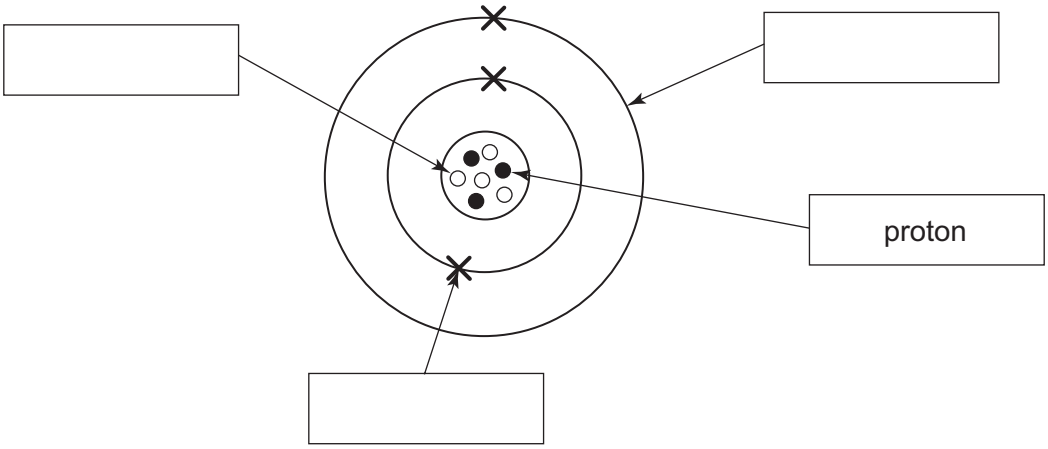
_____ [1]

(b) Complete the table below.

Type of rock	Example 1	Example 2
metamorphic		marble
	mudstone	limestone
igneous		granite

[3]

5 The diagram shows the structure of an atom.



(a) Label the diagram above.

Choose from:

shell : core : neutron : electron : cell [3]

(b) What is the **atomic number** for this atom?

Circle the correct answer.

3 **4** **7** **10** [1]

(c) Complete the sentence below.

The **mass number** can be worked out by adding the numbers of

_____ and _____ [1]

(d) Use your Data Leaflet to find the name and symbol for the element in the diagram above.

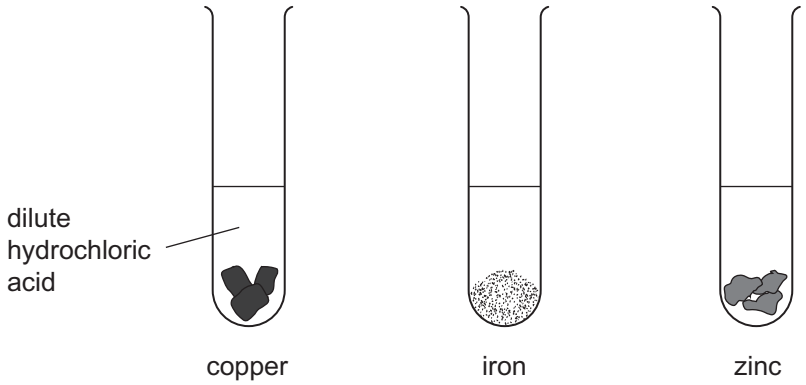
Name _____ Symbol _____ [2]

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Marks	Remark

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Examiner Only	
Marks	Remark

6 Sarah wanted to investigate the reactivity of some metals. She added samples of copper, iron and zinc to dilute hydrochloric acid and heated them using a Bunsen burner.



(a) **(i)** Suggest which one of these metals did not react with the acid and give a reason why.

_____

_____ [2]

(ii) Give the name of the gas produced when the other two metals were heated in the acid.

_____ [1]

(b) Sodium metal also reacts with hydrochloric acid to give off a gas. Sarah was advised by her teacher not to use it. Explain fully why she was advised not to use sodium.

_____

_____

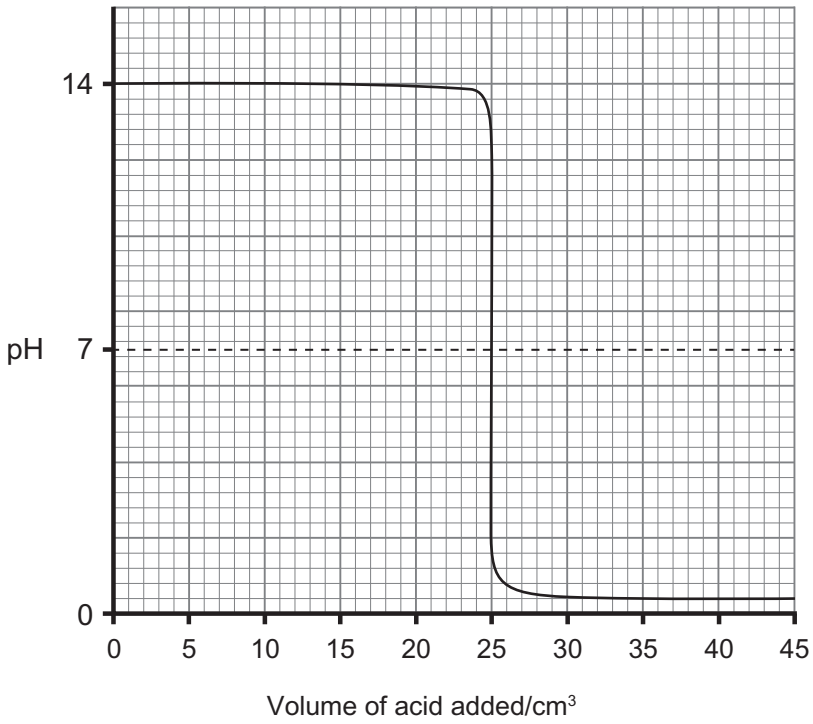
_____

_____ [2]

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Examiner Only	
Marks	Remark

7 Jane measured the pH changes during a reaction using a pH probe. The following graph was produced.



She measured 25cm^3 of sodium hydroxide into a conical flask and then slowly added hydrochloric acid.

(a) Name a piece of apparatus that she could have used to add the hydrochloric acid.

_____ [1]

(b) What was the pH value of the liquid in the flask at the start of the experiment?

_____ [1]

(c) What volume of acid was needed to cause a sharp fall in the pH value?

_____ cm^3 [1]

(d) What name is given to reactions in which acids react with alkalis?

_____ [1]

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(e) Complete the word equation for this reaction.

sodium hydroxide	+	hydrochloric acid	→		+	

[2]

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Marks	Remark

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Examiner Only	
Marks	Remark

8 Tartrazine is a yellow colouring which is added to some foods. In Europe all food additives have to be tested many times before they can be used. Some scientists have linked tartrazine to hyperactivity in children. It has also been linked to allergies, migraines and even cancer.

The British Nutrition Foundation (BNF) believes that more research is needed before any link is proved between additives and allergies.

One scientist said, "The public should not be worried because the additives have been tested before they were added to food." Another scientist said, "Many additives should be avoided on health grounds".

(a) Why is tartrazine added to food?

_____ [1]

(b) Give **two** health problems which have been linked to tartrazine.

1. _____

2. _____ [2]

(c) Explain fully why the public may be confused about the safety of food additives.

_____

_____

_____

_____

_____ [3]

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Rewarding Learning

General Certificate of Secondary Education
2011–2012

Science: Single Award (Modular)

Chemical Patterns and our Environment
Module 3
Foundation Tier

[GSC31]

MONDAY 21 MAY 2012
9.15 am–10.00 am

MARK SCHEME

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					AVAILABLE MARKS
1	**(a)**	**(i)**	barium chloride	[1]	
		(ii)	hydrochloric acid	[1]	
		(iii)	flammable	[1]	
	(b)		easier to see/understand internationally recognised some people cannot read *any two*	[2]	5
2	**(a)**		fish fingers – freezing tea leaves – drying baby onions – pickling in vinegar	[3]	
	(b)		bacteria, fungi	[2]	5
3	**(a)**	**(i)**	the noble gases are very unreactive	[1]	
		(ii)	helium, neon or any other	[2]	
	(b)	**(i)**	potassium	[1]	
		(ii)	hydrogen	[1]	5
4	**(a)**	**(i)**	fossil	[1]	
		(ii)	sedimentary	[1]	
		(iii)	metamorphic	[1]	
	(b)		slate sedimentary basalt	[3]	6
5	**(a)**		shell, electron, neutron	[3]	
	(b)		3	[1]	
	(c)		protons and neutrons (either order)	[1]	
	(d)		lithium Li	[2]	7
6	**(a)**	**(i)**	copper, unreactive must have copper for 2nd mark	[2]	
		(ii)	hydrogen	[1]	
	(b)		too reactive, safety reason	[2]	5

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				AVAILABLE MARKS
7	**(a)**	burette, pipette (**not** teat), syringe	[1]	
	(b)	14	[1]	
	(c)	25 (cm^3)	[1]	
	(d)	neutralisation	[1]	
	(e)	sodium chloride, water (either order)	[2]	6
8	**(a)**	to improve appearance/more attractive/appealing	[1]	
	(b)	hyperactivity, allergies, migraines, cancer *any two*	[2]	
	(c)	difference of opinion one for use one for avoiding	[1] [1] [1]	6
			Total	**45**

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General Certificate of Secondary Education
2011–2012

Science: Single Award (Modular)

Chemical Patterns and our Environment
Module 3
Foundation Tier

[GSC31]

GSC31

TUESDAY 28 FEBRUARY 2012
11.00 am–11.45 am

TIME

45 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all seven** questions.

INFORMATION FOR CANDIDATES

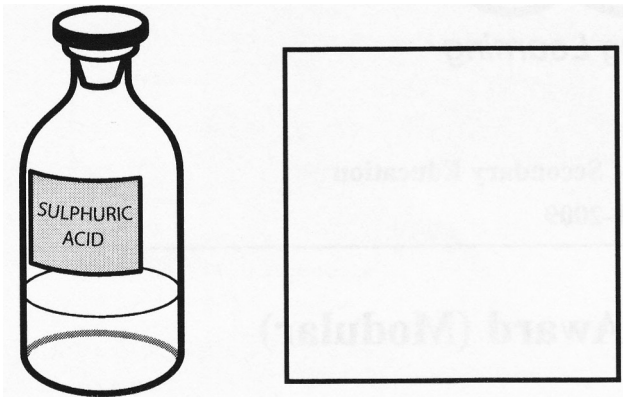
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Examiner Only	
Marks	Remark

1 **(a)** Sulphuric acid is a **corrosive** liquid and should be labelled with a hazard symbol.



(i) In the box above draw the hazard symbol which should be placed on the bottle of sulphuric acid. [1]

(ii) What kind of substance would be found in a bottle with the hazard symbol below?



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_____ [1]

(iii) Apart from warning of danger give **two other** reasons why hazard symbols, rather than words, are placed on bottles of chemicals.

1. _____

2. _____ [2]

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(b) Milk of Magnesia is a very useful household substance.

Examiner Only	
Marks	Remark

(i) What is the chemical name for Milk of Magnesia?

Circle the correct answer.

sodium hydrogencarbonate : magnesium chloride : magnesium hydroxide [1]

(ii) Complete the following sentence.

Choose from:

alkaline : neutral : acidic

Milk of Magnesia is an _____ substance and can be used to cure acid indigestion in the stomach. [1]

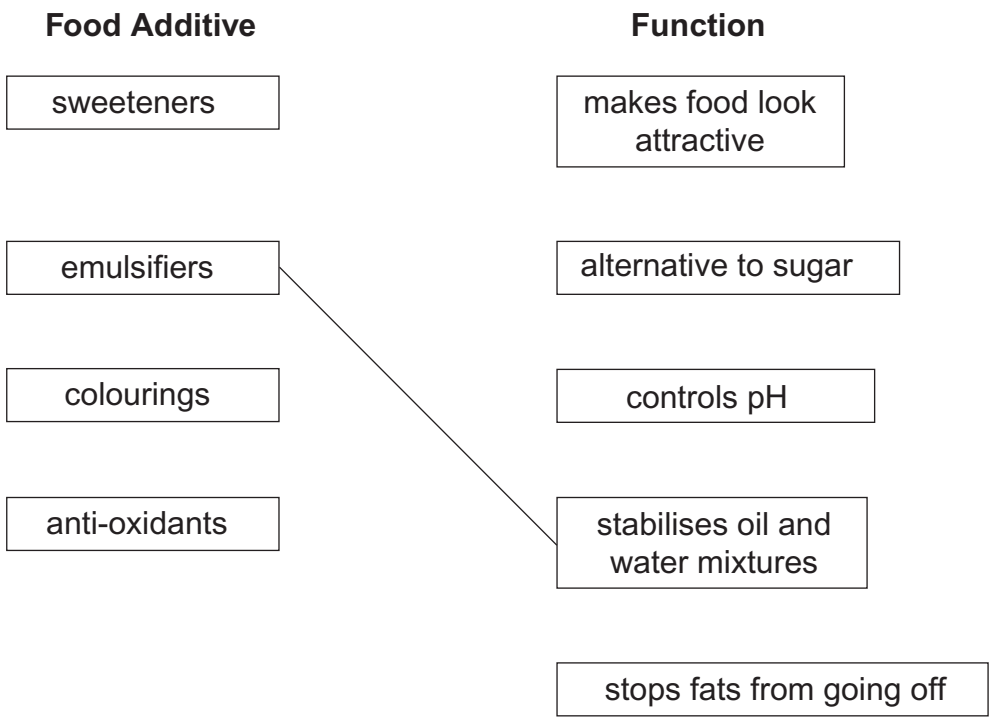
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Examiner Only	
Marks	Remark

2 **(a)** Below are some food additives and their functions.

Match each food additive to its function by drawing straight lines.

One has been done for you.



[3]

(b) All additives have a number which starts with a letter of the alphabet.

What is this letter?

_____ [1]

(c) Give **two** problems with putting additives in food.

_____

_____ [2]

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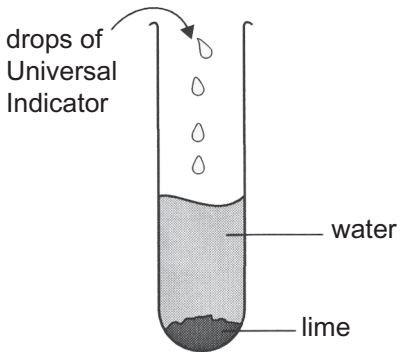
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(Questions continue overleaf)

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Examiner Only	
Marks	Remark

3 Lime is a substance that farmers add to soil.
When Universal Indicator and water are added to a sample of lime, there is a change in colour.



(a) What colour would the indicator be?

Circle the correct answer.

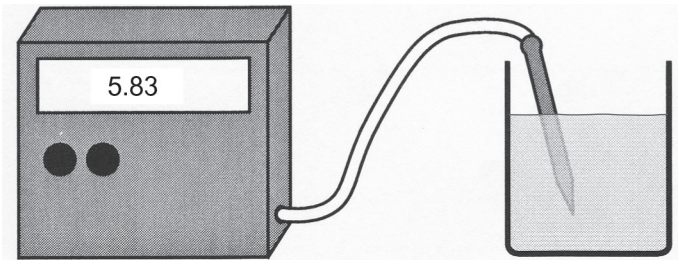
red : green : purple [1]

(b) Complete the sentence below.

Red cabbage is a plant that contains a dye which changes colour in acid and alkaline solutions.

This type of dye is called an _____. [1]

(c) The diagram below shows another way of testing if a soil sample is acidic.



(i) What name is given to this type of apparatus?

_____ [1]

(ii) Suggest **one** advantage of using this apparatus.

_____ [1]

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(d) Explain fully why farmers sometimes add lime to the soil.

_____

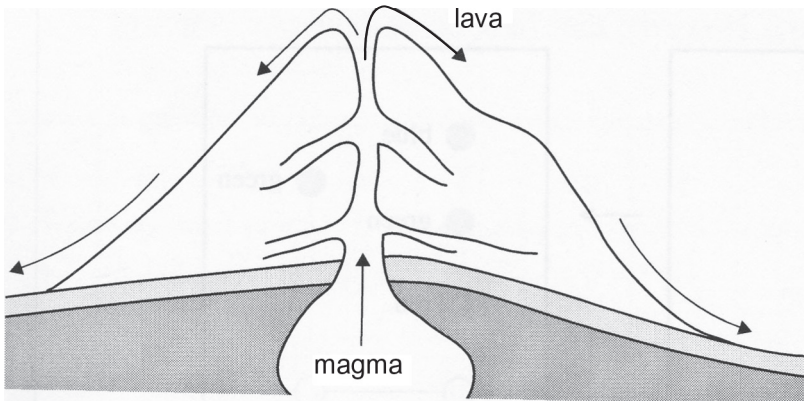
_____ [2]

Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

4 The diagram below shows an active volcano.



(a) Use the diagram to explain fully what happens when a volcano erupts.

_____

_____

_____ [2]

(b) In March 2011 an earthquake off the coast of Japan caused a tsunami. State what a tsunami is and give **two** problems it can cause.

_____

_____

_____

_____

_____ [3]

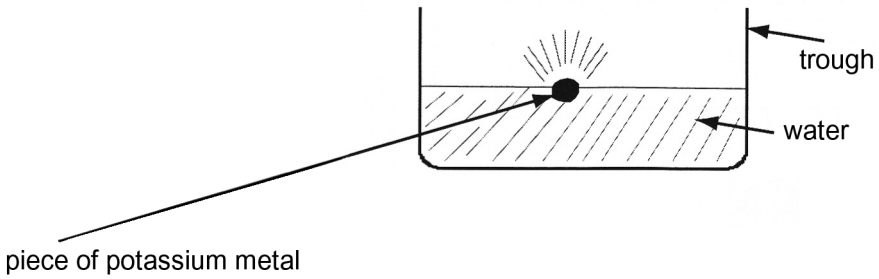
(c) The earthquake in March 2011 in Japan measured 9.5 on a scale. What is the name of the scale used to measure earthquakes?

_____ [1]

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Examiner Only	
Marks	Remark

5 Jack watched his teacher do an experiment with potassium metal and water.



Jack recorded his observations as follows:

- the potassium caught fire immediately
- it had a lilac flame
- it melted to form a shiny ball
- it moved quickly across the water surface
- a gas was given off
- a colourless solution was formed

The word equation for this reaction is:

potassium + water ⟶ potassium hydroxide + hydrogen

Use the information above to answer the following questions.

(a) Give **one** piece of evidence that shows potassium is lighter than water.

_____ [1]

(b) What is the name of the gas produced in this experiment?

_____ [1]

(c) Give **one** piece of evidence that this reaction produces heat.

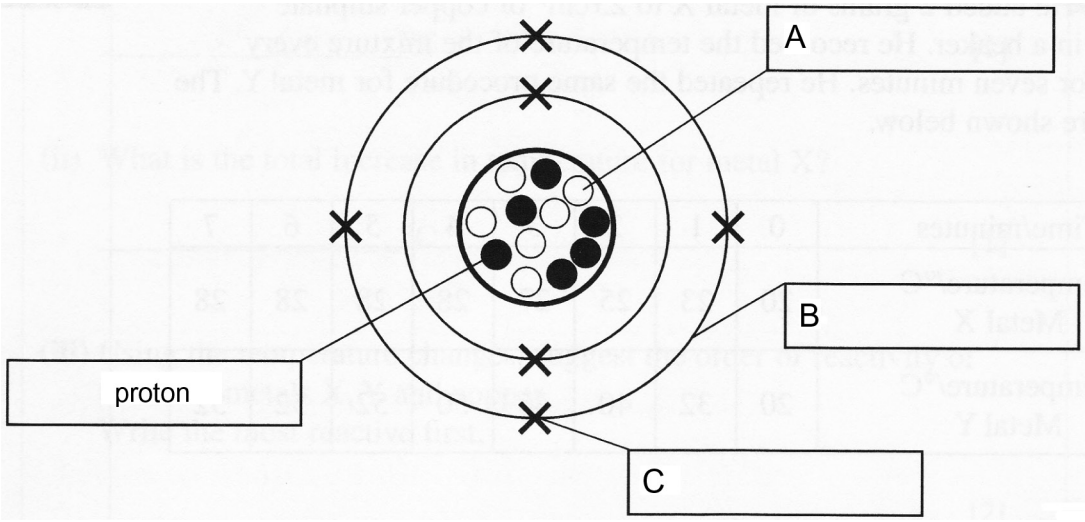
_____ [1]

(d) Name the substance produced which is an alkali.

_____ [1]

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6 The diagram shows an atom of carbon.



(a) Name the parts labelled A, B and C on the diagram above. [3]

(b) Complete the sentence below.

The number of _____ plus the number of _____

in an atom is called the **mass number** of that element. [2]

(c) An oxygen atom has eight electrons.

In the space below, draw a diagram to show how these eight electrons are arranged in an atom of oxygen.

[2]

Examiner Only	
Marks	Remark

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(d) Magnesium metal burns in air to produce the compound magnesium oxide.

The formula for magnesium oxide is MgO.

Calculate the **total number** of particles in magnesium oxide.

You may find your Data Leaflet helpful.

protons _____

electrons _____

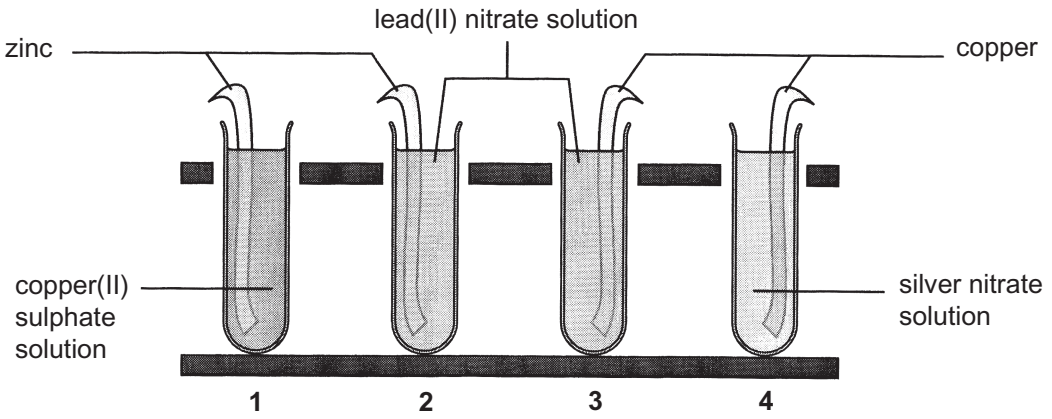
neutrons _____ [3]

Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

7 David did an experiment to investigate which metals are the most reactive. He set up the apparatus as shown in the diagram below.



He recorded his results in a table as follows:

Test tube	Appearance of solution at start	Appearance of metal at start	Appearance of solution after 2 hours	Appearance of metal after 2 hours
1	blue	silvery colour	colourless	reddish brown deposit
2	colourless	silvery colour	colourless	greyish white deposit
3	colourless	reddish brown colour	colourless	silvery colour no deposit
4	colourless	reddish brown colour	blue	greyish deposit

Use this information to answer the following questions.

(a) What name is given to a reaction in which one metal takes the place of another metal?

_____ [1]

(b) In which test tube, 1, 2, 3, or 4, was there no chemical reaction?

_____ [1]

(c) Name the reddish brown deposit on the zinc metal in test tube 1.

_____ [1]

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(d) The solution in test tube 1 lost its blue colour. Explain how this happened.

_____ [1]

(e) Which of the metals involved is the most reactive?

Circle the correct answer.

copper **silver** **zinc** **lead** [1]

(f) Explain fully what has happened in test tube 4.

_____

_____

_____ [2]

Examiner Only	
Marks	Remark

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112841

Rewarding Learning

General Certificate of Secondary Education
2011– 2012

Science: Single Award (Modular)

Chemical Patterns and our Environment
Module 3
Foundation Tier

[GSC31]

TUESDAY 28 FEBRUARY 2012
11.00 am–11.45 am

MARK SCHEME

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					AVAILABLE MARKS
1	**(a)**	**(i)**	corrosive sign drawn	[1]	
		(ii)	radioactive/radiation/nuclear/named source	[1]	
		(iii)	greater visual impact understood internationally	[2]	
	(b)	**(i)**	magnesium hydroxide	[1]	
		(ii)	alkaline	[1]	6
2	**(a)**		sweeteners – alternative to sugar colourings – makes food look attractive anti-oxidants – stops fats from going off	[3]	
	(b)		E	[1]	
	(c)		hyperactivity/migraines/allergies	[2]	6
3	**(a)**		purple	[1]	
	(b)		indicator	[1]	
	(c)	**(i)**	pH probe/meter	[1]	
		(ii)	more accurate	[1]	
	(d)		lime is alkaline/a base/basic/soil is acidic lime neutralises the soil/removes acid	[2]	6
4	**(a)**		magma moves up from the centre it comes out of the crater it flows down the sides as lava it can cause loss of life any 2	[2]	
	(b)		giant wave destroys buildings causes destruction of habitats loss of life any 2	[1] [2]	
	(c)		Richter scale	[1]	6

				AVAILABLE MARKS
5	**(a)**	moved on water surface	[1]	
	(b)	hydrogen	[1]	
	(c)	it melted/potassium caught fire immediately	[1]	
	(d)	potassium hydroxide	[1]	4
6	**(a)**	A – neutron B – shell C – electron	[1] [1] [1]	
	(b)	protons/neutrons either order	[2]	
	(c)	2, 6 arrangement – 1 mark for each correct shell	[2]	
	(d)	protons: 20, electrons: 20, neutrons: 20	[3]	10
7	**(a)**	displacement	[1]	
	(b)	3/none	[1]	
	(c)	copper metal	[1]	
	(d)	copper came out of the solution	[1]	
	(e)	zinc	[1]	
	(f)	copper displaced the silver the silver was deposited on the strip	[2]	7
			Total	**45**

Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2011–2012

Science: Single Award (Modular)

Chemical Patterns and our Environment
Module 3
Foundation Tier

[GSC31]

GSC31

WEDNESDAY 9 NOVEMBER 2011
9.15 am–10.00 am

TIME

45 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all seven** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 45.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
A Data Leaflet is provided for use with this paper.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
Total Marks	

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Examiner Only	
Marks	Remark

1 **(a)** Some chemicals are dangerous and they have **symbols** on their containers.

What name is given to these symbols?

Circle the correct answer.

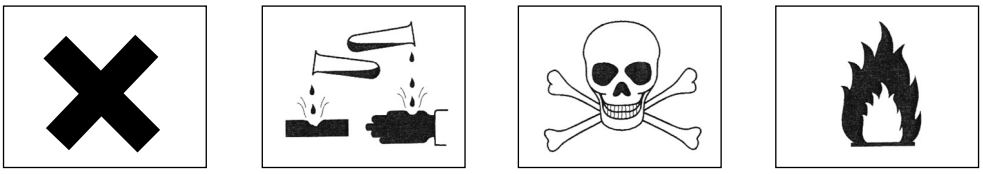
universal **security** **hazard** **safety** [1]

(b) Why are symbols better than words?

_____

_____ [1]

(c) Below are four symbols.



A **B** **C** **D**

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(i) Which symbol **A**, **B**, **C** or **D** should be put on a bottle of toxic weedkiller?

_____ [1]

(ii) Oven cleaner is corrosive. Which symbol **A**, **B**, **C** or **D** should be put on a bottle of oven cleaner?

_____ [1]

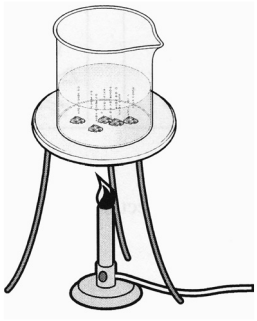
(iii) Give the name of a substance on which you could put symbol **D**.

_____ [1]

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Examiner Only	
Marks	Remark

2 Red cabbage leaves can be used to make a coloured liquid which changes colour in acids and alkaline solutions.



(a) What name is given to a substance which changes colour in acids and alkalis?

_____ [1]

(b) Give the name of another plant which can be used for this type of experiment.

_____ [1]

(c) The colours of pH paper in different liquids are given below.

colour	red	orange	yellow	light green	dark green	light blue	dark blue
pH	1	3	5	7	9	11	13

(i) Use the information given above to complete the table below.

Name	pH	Colour
lemon juice		orange
sodium carbonate		dark green
calcium hydroxide	13	

[3]

(ii) Name the strongest alkali from the chemicals listed in the table.

_____ [1]

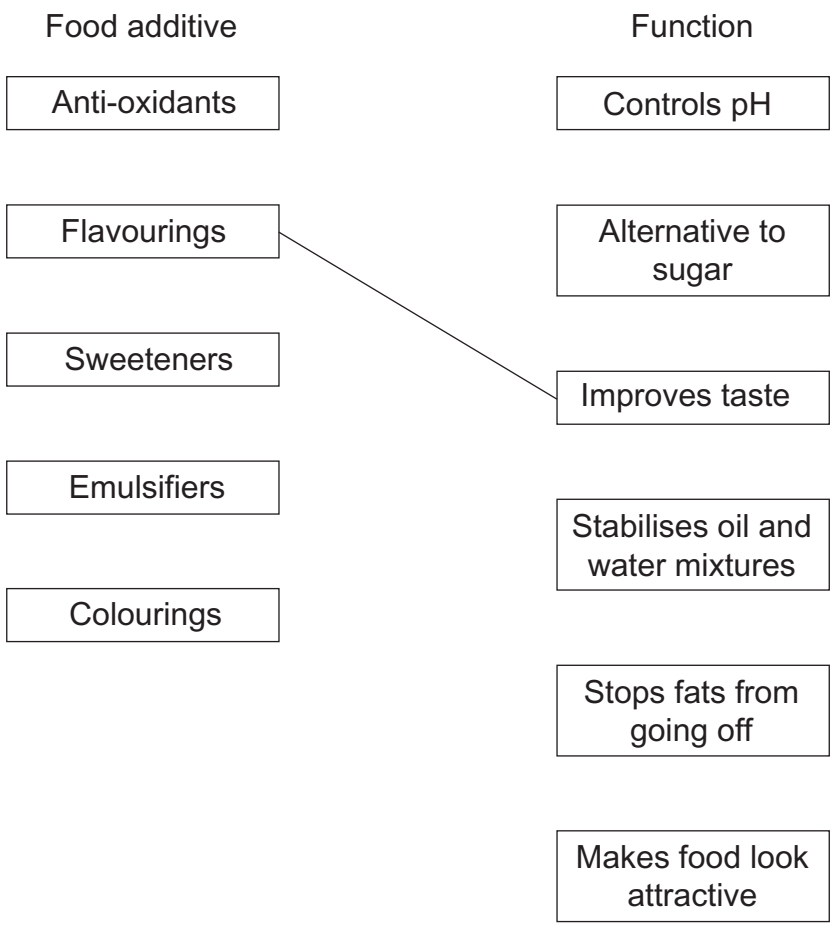
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Examiner Only	
Marks	Remark

3 Given below are five types of food additives and their functions.

(a) Match the food additive to its function by drawing straight lines.

One has been done for you.



[4]

(b) All additives have a number which starts with a letter of the alphabet.

What is this letter?

_____ [1]

(c) Give two problems which are often linked to putting additives in food.

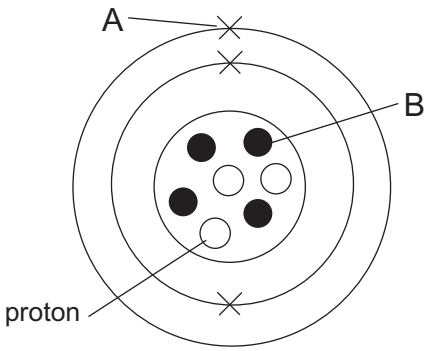
1. _____

2. _____ [2]

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Examiner Only	
Marks	Remark

4 The diagram shows the structure of an atom.



(a) Name the particles labelled A and B.

A _____ B _____ [2]

(b) What is the **atomic mass** of the atom shown above?

_____ [1]

(c) Complete the following sentences.

Choose from:

sodium : metal : electrons : core

nucleus : protons : lithium : neutrons

The part of the atom where the protons are found is called

the _____ .

In an atom, the number of electrons is always equal to the number

of _____ .

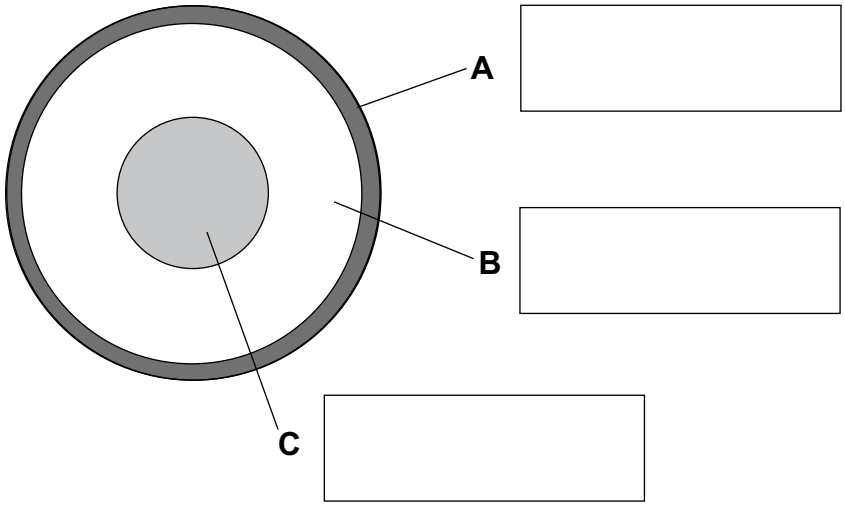
The atom shown above has three protons. This element is

called _____ . [3]

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Examiner Only	
Marks	Remark

5 The diagram below shows the structure of the Earth.



(a) Complete the diagram by naming the parts labelled **A**, **B** and **C**. [3]

(b) Complete the following sentences.

Choose from:

Richter **tsunamis** **lava** **tectonic** **magma**

The intensity of earthquakes is measured on the _____ scale.

When a volcano erupts under the sea large waves called _____ can be formed.

Earthquakes are formed when _____ plates rub against each other.

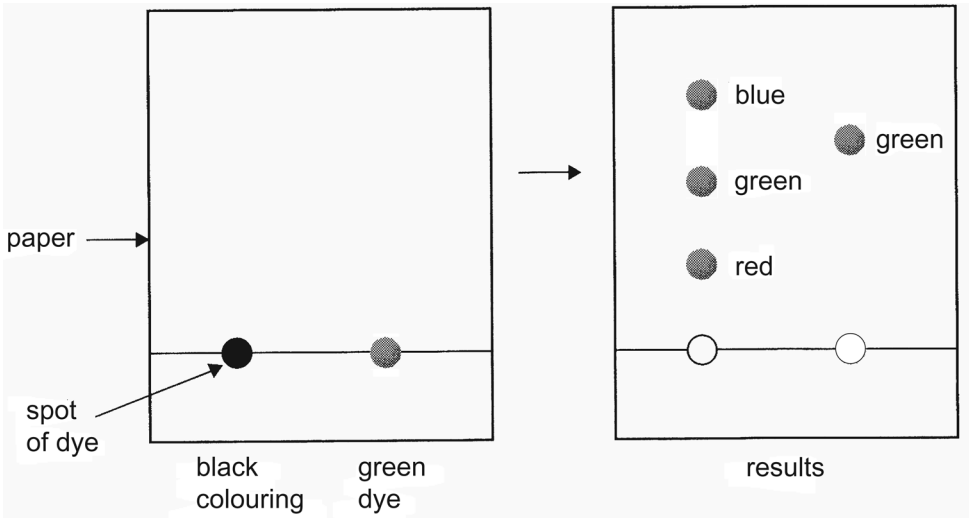
Deep inside a volcano there is a liquid called _____. [4]

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Examiner Only	
Marks	Remark

6 Emma investigated if a green dye was used in making a black colouring used in baking.

She carried out an experiment and obtained the following results.



(a) What name is given to this type of experiment?

_____ [1]

(b) Which dye from the black colouring was the most soluble in this experiment?

_____ [1]

(c) Explain fully what Emma has found out from her results.

_____

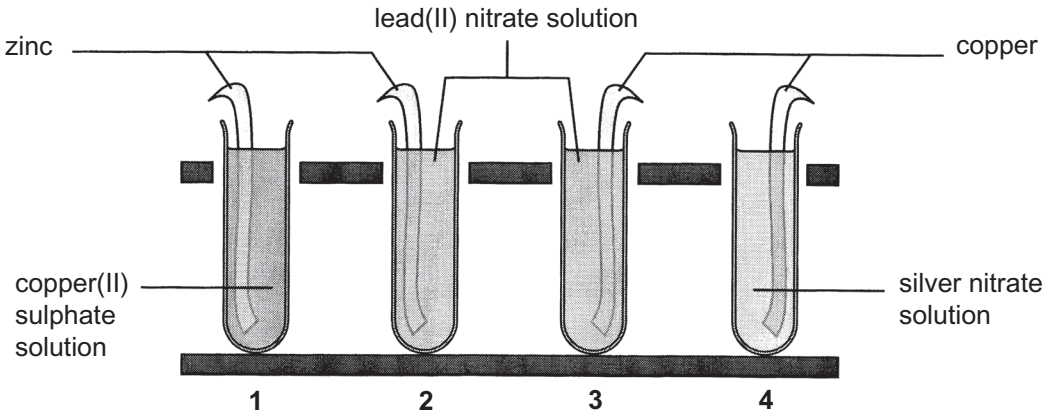
_____

_____ [2]

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Examiner Only	
Marks	Remark

7 The diagram below shows four solutions into which strips of metal were placed.



After several hours the following results were obtained.

Test tube 1: solution lost its blue colour and a reddish brown deposit was seen on the metal strip.

Test tube 2: solution remained colourless and a greyish white deposit was seen on the metal strip.

Test tube 3: solution remained colourless and the metal strip remained shiny with no deposit.

Test tube 4: solution turned blue and a deposit was seen on the metal strip.

Use this information to answer the following questions.

(a) Why are reactions like these described as displacement reactions?

_____ [1]

(b) Name the reddish brown deposit formed on the zinc in test tube 1.

_____ [1]

(c) Why did the solution lose its blue colour in test tube 1?

_____ [1]

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(d) Explain fully the result for test tube 3.

_____

_____ [2]

(e) Two products were formed in test tube 4. Name these two products.

_____ and _____ [2]

(f) Which of the metals involved is the least reactive?

Circle the correct answer.

copper **zinc** **lead** **silver** [1]

(g) Explain fully why sodium would not be a suitable metal for this experiment.

_____

_____ [2]

Examiner Only

Marks	Remark

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Rewarding Learning

General Certificate of Secondary Education
2011–2012

Science: Single Award (Modular)

Chemical Patterns and our Environment

Module 3
Foundation Tier

[GSC31]

WEDNESDAY 9 NOVEMBER 2011
9.15 am–10.00 am

MARK SCHEME

STEMUP.CO.UK

				AVAILABLE MARKS
1	**(a)**	Hazard	[1]	
	(b)	Understood internationally/greater visual impact/some people cannot read	[1]	
	(c)	**(i)** C	[1]	
		(ii) B	[1]	
		(iii) Petrol/lighter fuel/matches/hairspray/deodorant spray	[1]	5
2	**(a)**	Indicator	[1]	
	(b)	Beetroot/blackcurrant/any dark coloured fruit or flower/ red rose/red onion	[1]	
	(c)	**(i)** Lemon juice – pH 3 [1] sodium carbonate – pH 9 [1] Calcium hydroxide – dark blue [1]	[3]	
		(ii) calcium hydroxide	[1]	6
3	**(a)**	Anti-oxidants – Stop fat from going off Sweeteners – Alternative to sugar Emulsifiers – Stabilises oil and water mixture Colouring – Makes food look attractive	[4]	
	(b)	E	[1]	
	(c)	Hyperactivity/headaches/may cause cancer	[2]	7
4	**(a)**	A = electron B = neutron	[2]	
	(b)	7	[1]	
	(c)	nucleus – protons – lithium	[3]	6
5	**(a)**	A = crust B = mantle C = Core	[3]	
	(b)	Richter – tsunamis – tectonic – magma	[4]	7

				AVAILABLE MARKS
6	**(a)**	chromatography	[1]	
	(b)	blue	[1]	
	(c)	black colouring is made of 3 dyes [1] The green dye in black colouring is not the same as the green dye tested [1]	[2]	4
7	**(a)**	because one metal has replaced another metal from a solution	[1]	
	(b)	copper	[1]	
	(c)	all the copper had left the solution	[1]	
	(d)	No chemical reaction took place because copper is less reactive or unable to displace the lead	[2]	
	(e)	copper nitrate and silver	[2]	
	(f)	silver	[1]	
	(g)	Sodium is too reactive [1] It would react violently with the water [1]	[2]	10
			Total	**45**

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Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2010–2011

Science: Single Award (Modular)

Chemical Patterns and our Environment
Module 3

Foundation Tier

[GSC31]

GSC31

THURSDAY 19 MAY 2011, MORNING

TIME

45 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all seven** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 45.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
A Data Leaflet is provided for use with this paper.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
Total Marks	

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Examiner Only	
Marks	Remark

1 (a) Common household substances contain chemicals. Use lines to link each household substance to the chemical it contains.

Household substance	Name of chemical
 Lemon Juice *© Linda Stradley http://whatscookinginamerica.net*	magnesium hydroxide
 Oven cleaner © iStockphoto / Thinkstock	sodium hydroxide
	ethanoic acid
 Milk of Magnesia *© Charles D. Winters / Science Photo Library*	citric acid

Examiner Only	
Marks	Remark

(b) The symbols below can be seen on bottles of chemicals in the laboratory.



A B C D

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(i) What are these symbols called?

Circle the correct answer.

chemical symbols : danger symbols : hazard symbols [1]

(ii) What danger is shown by **symbol A**?

_____ [1]

(iii) Which symbol, **A**, **B**, **C** or **D** should be seen on a chemical that is explosive?

_____ [1]

(c) Give **one** reason why these symbols are used on bottles of chemicals.

_____

_____ [1]

(d) In the box below draw the symbol for a substance which is an irritant.

[1]

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2 Some sweets contain sherbet.



© Tangerine Confectionery Ltd

Complete the following sentences.

Choose from:

salt : citric acid : oxygen : hot

fizzing : carbon dioxide : hydrogen : icing sugar

When sherbet is made, baking soda, _____ and

_____ are mixed together.

When the sherbet mixes with moisture in the mouth, it produces a gas

called _____.

This gas gives a pleasant _____ sensation in the mouth.

[4]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

3 The diagram below shows the position of electrons, protons and neutrons in an atom.

(a) Complete the diagram by drawing lines from the names to label an electron, a proton and a neutron.

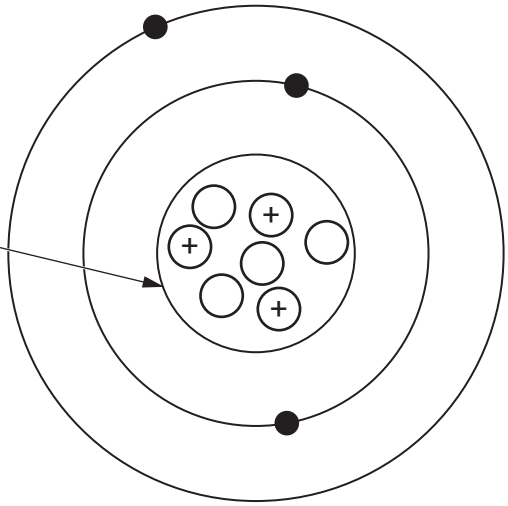
Names

proton

nucleus

neutron

electron



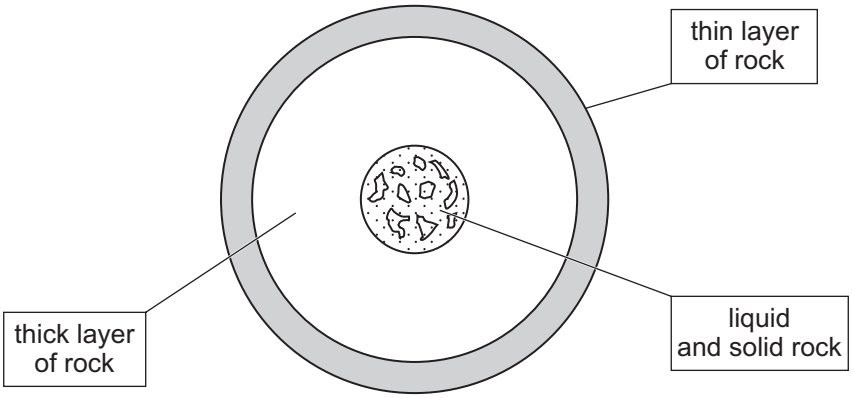
[3]

(b) Name the particle in the atom that has the smallest mass.

_____ [1]

Examiner Only	
Marks	Remark

4 The diagram below shows the structure of the Earth.



(a) Use the diagram to describe:

(i) the crust of the Earth.

_____ [1]

(ii) what the core is made from.

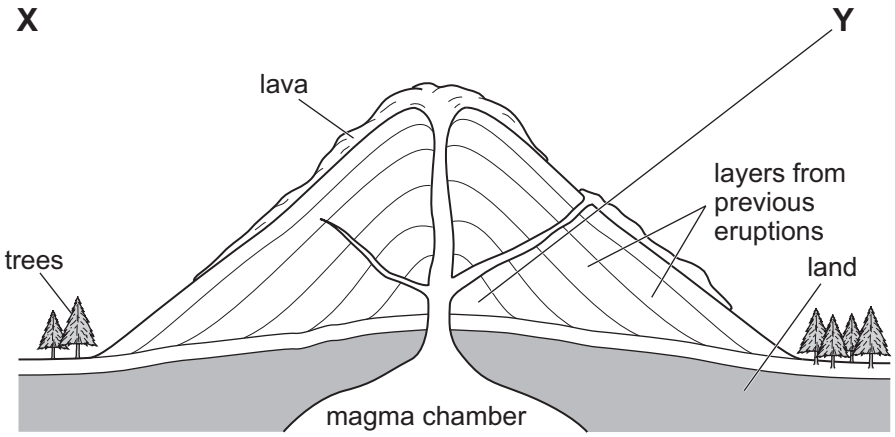
_____ [1]

(b) Complete the sentence below.

Radioactive decay produces _____ which causes rocks to melt. [1]

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(c) The diagram shows a section through a volcano.



(i) Draw a line from **X** to any part of the volcano which is liquid. [1]

(ii) The label **Y** shows the first eruption of this volcano. Including the current eruption, how many eruptions have there been?

_____ [1]

(iii) Sometimes a volcano can cause a huge sea wave to form. What name is given to this type of wave?

_____ [1]

(d) A large volcano erupted in Iceland in May 2010. It caused problems for many people travelling by air. Draw a diagram, in the space below, to show what came out of the volcano causing the problem.

[1]

Examiner Only

Marks	Remark

STEMUP.CO.UK

5 The table below gives five lists of elements.

A	B	C	D	E
lithium	beryllium	helium	sodium	fluorine
sodium	magnesium	neon	magnesium	chlorine
potassium	calcium	argon	aluminium	bromine

Use the information above and your Data Leaflet to answer the following questions.

(a) Which list, **A**, **B**, **C**, **D** or **E** contains alkali metals only?

_____ [1]

(b) Give the name of an element which would have similar properties to chlorine.

_____ [1]

(c) Which list, **A**, **B**, **C**, **D** or **E** contains chemically inert elements?

_____ [1]

(d) Give the symbol of an element belonging to the alkaline earth metals.

_____ [1]

(e) Which list, **A**, **B**, **C**, **D** or **E** does not represent a **Group** from the Periodic Table? Give a reason for your answer.

_____

_____ [2]

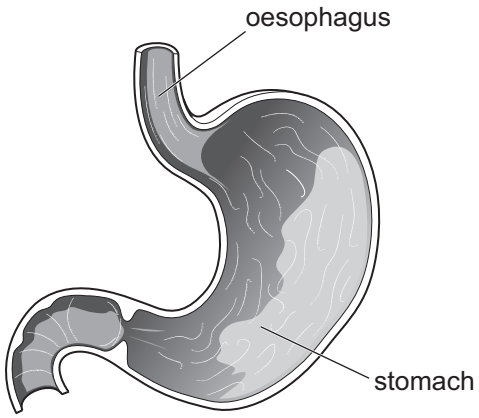
Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

6 The diagram below shows the human stomach.



Sometimes too much acid collects in the stomach and this causes pain.

(a) What is the name of the condition caused by too much acid in the stomach?

_____ [1]

(b) One of the cures for this condition is to take baking soda. Describe how baking soda can help.

_____

_____

_____ [2]

(c) Explain why sometimes people burp after they have taken baking soda to cure excess acid in the stomach.

_____

_____ [2]

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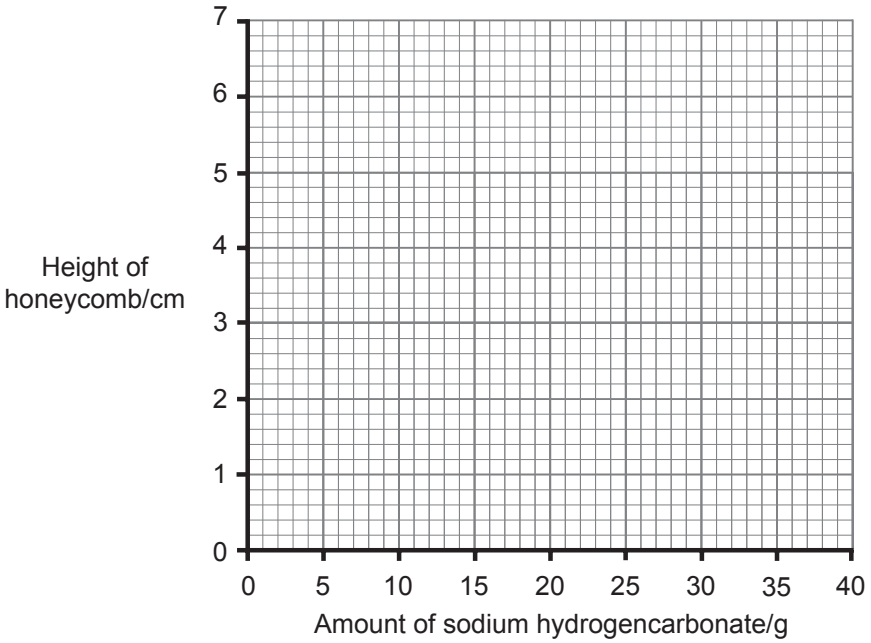
Examiner Only	
Marks	Remark

7 John investigated how the amount of sodium hydrogencarbonate affects the height of honeycomb toffee. His results are shown below.
One of his results is **not** correct.

Amount of sodium hydrogencarbonate/g	4	8	12	16	20	24	28	32	36
Height of honeycomb/ cm	2.0	3.0	4.0	4.2	6.0	6.4	6.6	6.6	6.6

(a) (i) Plot the points and draw a line graph on the grid below.

NB: When drawing the line take into account that **one** result is not correct.



[3]

(ii) From the graph, predict what is the correct height for the anomalous result.

_____ cm [1]

Examiner Only	
Marks	Remark

(b) From the results describe how the amount of sodium hydrogencarbonate affects the height of the honeycomb.

_____

_____ [2]

(c) The teacher decided to make more honeycomb. What is the least amount of sodium hydrogencarbonate she should use to get the maximum height?

_____ g [1]

(d) John asked if he could add a few drops of vinegar to the mixture to try and get an even greater height. Explain fully why adding vinegar could make a difference.

_____

_____ [2]

(e) Complete the word equation for the reaction of vinegar with sodium hydrogencarbonate.

sodium hydrogencarbonate + ⟶ sodium ethanoate + carbon dioxide +

[2]

THIS IS THE END OF THE QUESTION PAPER

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Rewarding Learning

General Certificate of Secondary Education
2010–2011

Science: Single Award (Modular)

Chemical Patterns and our Environment
Module 3

Foundation Tier

[GSC31]

THURSDAY 19 MAY 2011, MORNING

MARK SCHEME

STEMUP.CO.UK

				AVAILABLE MARKS
1	**(a)**	Lemon juice – citric acid Oven cleaner – sodium hydroxide Milk of magnesia – magnesium hydroxide	[3]	
	(b)	**(i)** hazard symbols	[1]	
		(ii) toxic/poisonous	[1]	
		(iii) B	[1]	
	(c)	as a warning of danger greater visual impact/than words/easier to understand understood internationally (any one)	[1]	
	(d)	✖	[1]	8
2		citric acid, icing sugar, carbon dioxide, fizzing	[4]	4
3	**(a)**	proton + electron – outer dots neutron – open circle	[3]	
	(b)	electron	[1]	4
4	**(a)**	**(i)** thin layer of rock	[1]	
		(ii) liquid + solid rock (accept iron and nickel **not** iron on its own)	[1]	
	(b)	heat	[1]	
	(c)	**(i)** line from X to centre or any suitable point	[1]	
		(ii) 7	[1]	
		(iii) Tsunami	[1]	
	(d)	diagram showing cloud of dust/ash labelled	[1]	7
5	**(a)**	A	[1]	
	(b)	fluorine/bromine/iodine/astatine	[1]	
	(c)	group C	[1]	
	(d)	Be/Mg/Ca/Ba/Sr	[1]	
	(e)	List D [1] because all the elements are from different groups [1]	[2]	6

				AVAILABLE MARKS
6	**(a)**	heartburn (accept Indigestion)	[1]	
	(b)	it reacts with the acid in the stomach/baking soda is an alkali/ to form water neutralisation worth [2]	[1] [1]	
	(c)	the baking soda produces CO_2 as a product this builds up escapes produces a gas causing the burp	[1] [1]	5
7	**(a)**	**(i)** 8, 9 points correctly plotted [2] 7, 6 points [1] less than 6 [0] joined correctly	 [2] [1]	
		(ii) 5 cm $\pm$ 0.1 must agree with graph	[1]	
	(b)	the greater the amount, the higher the honeycomb [1] it stops at 28 g [1]	[2]	
	(c)	28 g	[1]	
	(d)	vinegar is an acid/reacts with baking soda [1] it will react to produce (more) CO_2 [1]	[2]	
	(e)	ethanoic acid/water	[2]	11
			Total	**45**

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Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2010–2011

Science: Single Award (Modular)

Chemical Patterns and our Environment Module 3

Foundation Tier

[GSC31]

GSC31

WEDNESDAY 23 FEBRUARY 2011, MORNING

TIME

45 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all eight** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 45.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
A Data Leaflet is provided for use with this paper.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
Total Marks	

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Examiner Only	
Marks	Remark

1 **(a)** The list below shows some well known foods and methods of preserving them. Using lines, link each food to the most suitable method of preservation.



[3]

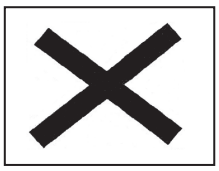
(b) Name two types of organisms which can cause food to go bad.

Choose from:

bacteria **sugar** **flu** **fungi** **salt**

_____ and _____ [2]

2 The list below shows five chemicals and the hazard symbols on their container.

Ammonia solution	
Ammonia	
Ammonium dichromate	
Ammonium nickel sulphate	
Ammonium nitrate	

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(a) From the **information given**:

(i) name a chemical which is explosive.

_____ [1]

(ii) name a chemical which is corrosive.

_____ [1]

(b) What type of hazard is shown for ammonium nickel sulphate?

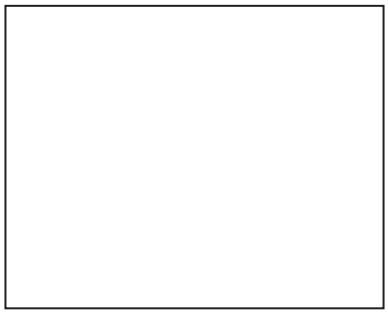
_____ [1]

Examiner Only

Marks	Remark

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(c) In the space below draw the hazard symbol you would find on a radioactive substance.



[1]

(d) Many lorries carrying chemicals travel throughout Europe. Suggest why hazard symbols are used instead of words on these lorries.

_____

_____ [1]

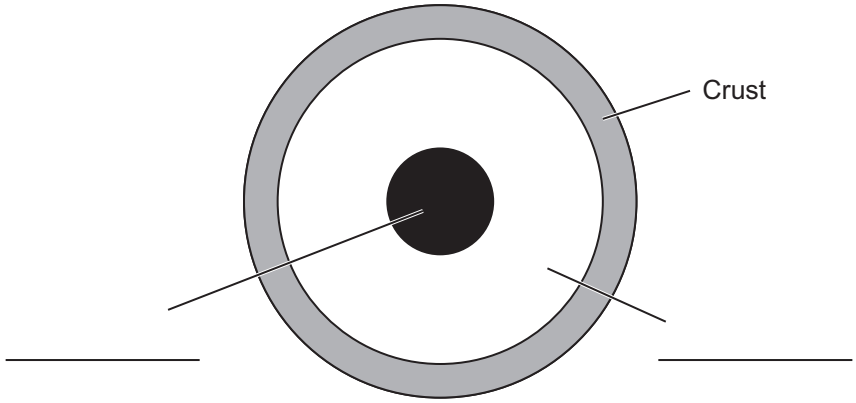
Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

3 **(a)** The Earth can be divided into three main layers.

Complete the labels on the diagram below.



[2]

(b) The Giant's Causeway is a famous tourist attraction in Northern Ireland. It is made up of columns of a rock called basalt, which was formed by volcanic activity.

Name the type of rock to which basalt belongs.

_____ [1]

(c) The White Rocks in County Antrim are made of limestone.

Name the type of rock to which limestone belongs.

_____ [1]

(d) The picture below shows a fossil in a piece of limestone.



É Junior Geo Limited

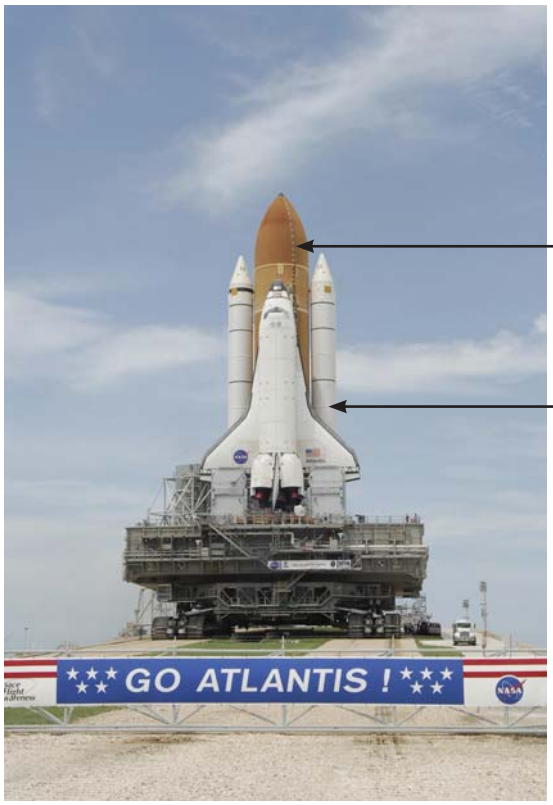
What is a fossil?

_____ [1]

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4 The passage below has been taken from a newspaper article.

Examiner Only	
Marks	Remark



Space Shuttle

© NASA/Jack Pfaller

The fuel to launch the space shuttle into space is placed in two tanks. One tank is filled with oxygen and the other is filled with hydrogen. When the fuel burns energy is released and water is formed.

The nose cone of the rocket is coated with a non-stick substance, which is made from fluorine.

(a) Name the **three** elements mentioned in the newspaper article.

_____ _____ _____ [3]

The non-stick substance is a compound.

(b) What is meant by the term **compound**?

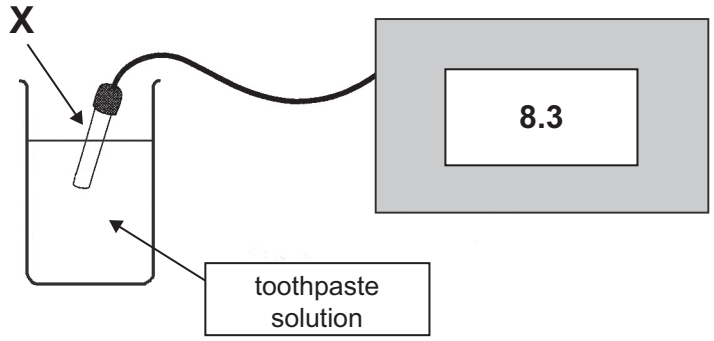
_____

_____ [2]

(c) What is the chemical formula for water? _____ [1]

Examiner Only	
Marks	Remark

5 The diagram below shows the apparatus used for measuring the pH of toothpaste.



(a) Name the piece of apparatus labelled **X**.

_____ [1]

(b) The reading on the meter shows a pH of 8.3.

What type of substance does this show toothpaste to be?

Circle the correct answer.

alkaline **sweet** **acidic** **neutral** [1]

(c) Complete the following sentence.

Toothpaste is used to neutralise _____ in the mouth. [1]

(d) Some plants contain dyes which change colour depending on the pH.

What general name is given to these types of dye?

_____ [1]

(e) Describe the steps you would take to extract the dye from some red cabbage leaves.

_____

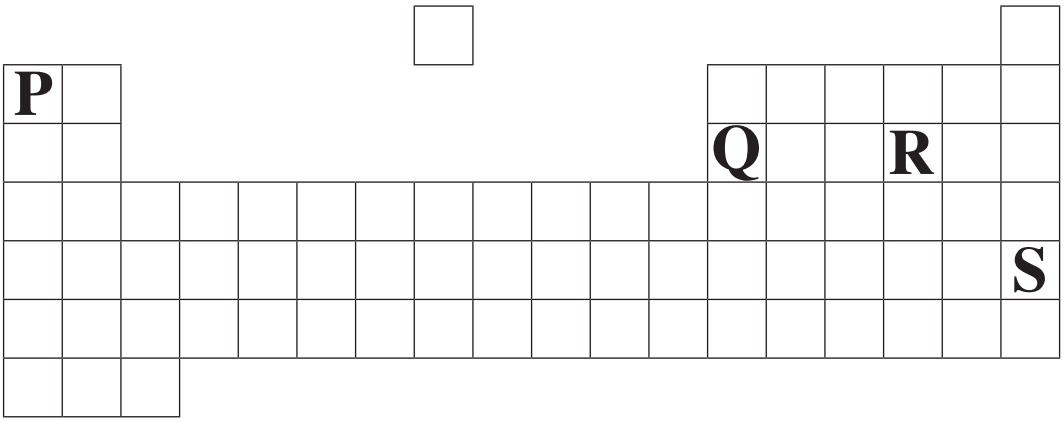
_____

_____

_____ [3]

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6 The diagram below represents the Periodic Table.



P, Q, R and S represent the positions of four elements.
(These letters are **not** their chemical symbols.)
You may find your Data Leaflet helpful to answer the following questions.

(a) Give the **name** of an element which has similar chemical properties as element P.

_____ [1]

(b) Which element (P, Q, R or S) is in the same **Group** as oxygen?

_____ [1]

(c) Which element (P, Q, R or S) would you expect to be the least reactive?

_____ [1]

(d) What name is given to the horizontal rows in the Periodic Table?

_____ [1]

Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

7 Paul set up an experiment to investigate the reactions of metals with solutions of their salts.

In beaker A he put zinc into a solution of copper sulphate.

In beaker B he put iron into a solution of zinc sulphate.

He left the beakers to stand for 30 minutes.

Beaker	Colour at start	Colour after 30 minutes.
A	Solution – blue Metal – grey	Solution – _____ Metal – _____
B	Solution – colourless Metal – grey	Solution – _____ Metal – _____

(a) Complete the table above to show the colours Paul observed after 30 minutes. [4]

(b) What is the name given to this type of reaction?

Circle the correct answer.

Decomposition **Displacement** **Combustion** [1]

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Examiner Only	
Marks	Remark

8 Mary carried out an experiment to find out how much magnesium oxide could be produced by heating 8.4 g of magnesium carbonate.

She heated the magnesium carbonate in a test tube with a Bunsen burner.

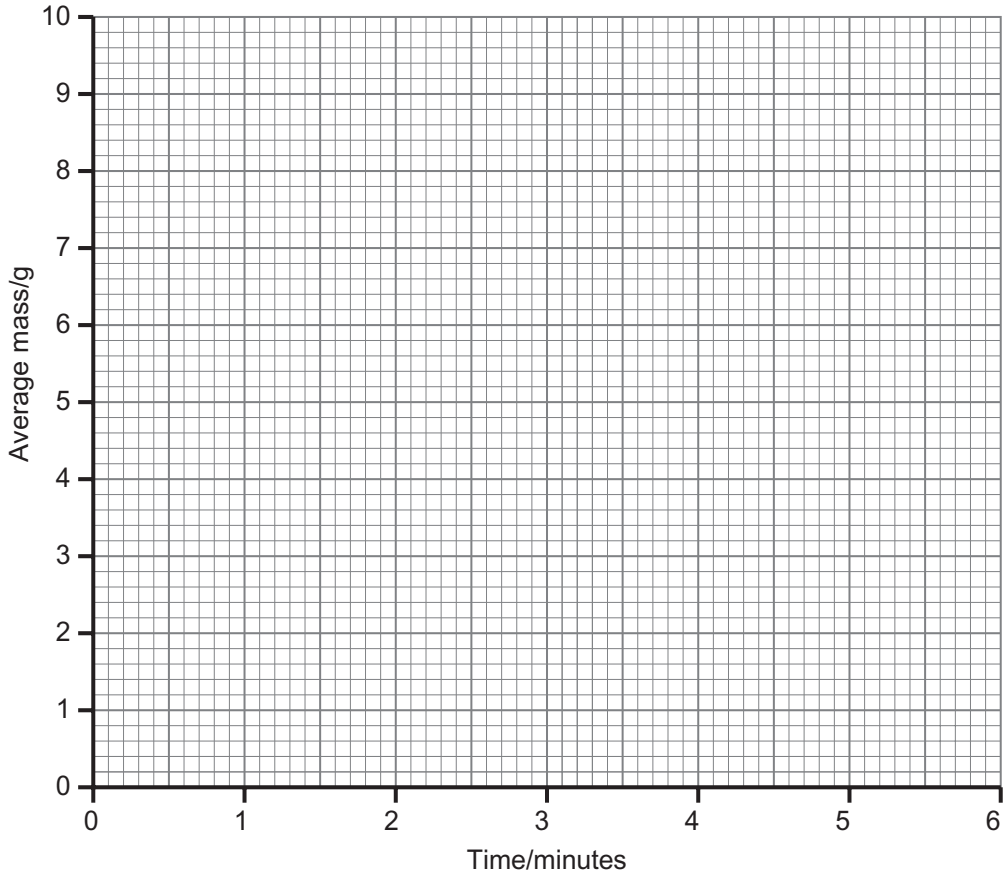
Mary then recorded the mass of the solid remaining in the test tube every minute.

She repeated the experiment with another 8.4 g of magnesium carbonate.

Her results are shown in the table below.

Time/ minutes	**0**	**1**	**2**	**3**	**4**	**5**	**6**
Mass/g (test 1)	8.4	7.1	6.3	5.3	4.3	3.9	3.9
Mass/g (test 2)	8.4	6.9	5.9	4.7	4.1	4.1	4.1
Average mass/g	8.4	7.0	6.1	5.0	4.2	4.0	4.0

(a) On the grid below plot and draw a line graph of average mass against time.



[3]

(b) Why did Mary do the experiment twice and calculate an average?

_____ [1]

(c) Give one safety precaution Mary would have taken.

_____ [1]

(d) The word equation for this reaction is given below.

magnesium carbonate ⟶ magnesium oxide + carbon dioxide

(i) What name is given to this type of chemical reaction?

_____ [2]

(ii) When 8.4 g of magnesium carbonate is heated, 4.0 g of magnesium oxide is left.

Calculate how much carbon dioxide has been given off.

Answer _____ g [1]

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Marks	Remark

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2010–2011

Science: Single Award (Modular)

Chemical Patterns and our Environment Module 3

Foundation Tier

[GSC31]

WEDNESDAY 23 FEBRUARY 2011, MORNING

MARK SCHEME

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				AVAILABLE MARKS
1	**(a)**	fish fingers – freezing tea leaves – drying baby onions – pickling any **three**	[3]	
	(b)	bacteria, fungi	[2]	5
2	**(a)**	**(i)** ammonium dichromate	[1]	
		(ii) ammonia solution	[1]	
	(b)	toxic/poisonous	[1]	
	(c)	radioactivity symbol	[1]	
	(d)	internationally understood	[1]	5
3	**(a)**	core, mantle	[2]	
	(b)	igneous	[1]	
	(c)	sedimentary	[1]	
	(d)	remains of living organisms	[1]	5
4	**(a)**	oxygen, hydrogen, fluorine	[3]	
	(b)	two or more elements [1] chemically joined together [1] cannot be broken down [1]	[2]	
	(c)	H_2O	[1]	6
5	**(a)**	pH probe/sensor	[1]	
	(b)	alkaline	[1]	
	(c)	acids (if acid given for **(b)** accept alkaline)	[1]	
	(d)	indicators	[1]	
	(e)	cut up leaves [1] grind/crush [1] mix with water/solvent [1] heat, [1] filter, [1] collect solution [1] any **three**	[3]	7

				AVAILABLE MARKS
6	**(a)**	sodium/potassium **or** other appropriate answer	[1]	
	(b)	R **or** sulphur	[1]	
	(c)	S – xenon	[1]	
	(d)	periods	[1]	4
7	**(a)**	A: solution – colourless/pale blue [1] metal – reddish brown [1]		
		B: solution – colourless [1] metal – grey [1]	[4]	
	(b)	Displacement	[1]	5
8	**(a)**	all points plotted correctly [2] 5, 6 correct [1] line joining points [1]	[3]	
	(b)	to get more reliable results	[1]	
	(c)	safety glasses/using tongs – test tube holder	[1]	
	(d)	**(i)** thermal [1] decomposition [1]	[2]	
		(ii) 4.4 g	[1]	8
			Total	**45**

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Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2010–2011

Science: Single Award (Modular)

Chemical Patterns and our Environment Module 3

Foundation Tier

[GSC31]

GSC31

TUESDAY 9 NOVEMBER 2010, AFTERNOON

TIME

45 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all seven** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 45.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
A Data Leaflet is provided for use with this paper.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
Total Marks	

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Examiner Only	
Marks	Remark

1 **(a)** The pictures below show substances found in the home. Draw one line from each substance to the chemical it contains.

Household substance	Chemical name
Image of a bottle of Milk of Magnesia	Magnesium hydroxide
Image of lemon slices and a lemon	Ethanoic acid
Image of a bottle of vinegar	Citric acid
	Sodium hydroxide

[3]

(b) What name is given to a substance which can change colour in acids and alkalis?

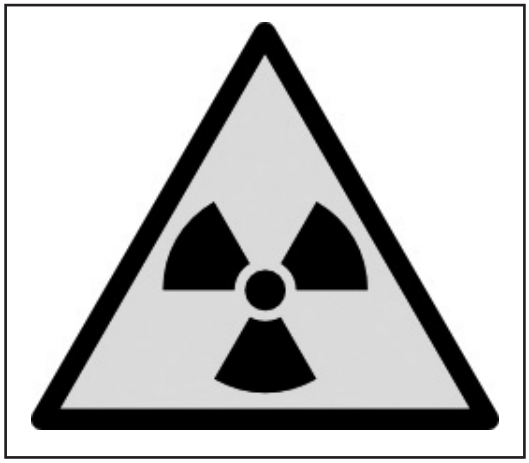
Choose from:

neutraliser **base** **indicator** **medicine**

_____ [1]

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(c) Smoke alarms have the hazard symbol shown below.



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(i) What type of hazardous material is found in smoke alarms?

_____ [1]

(ii) In the space below draw the hazard symbol which should be put on a can of petrol.

[1]

(iii) What name is given to this hazard symbol?

_____ [1]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

2 **(a)** The pH scale is shown below.

1	2	3	4	5	6	7	8	9	10	11	12	13	14

(i) What is the pH number of pure water? _____ [1]

(ii) Which of the following could have a pH of 1?

Circle the correct answer.

lemon juice : sodium hydroxide : hydrochloric acid [1]

(iii) How would you describe a liquid with a pH of 10?

Circle the correct answer.

strong acid : weak alkali : strong alkali [1]

The picture below shows a farmer putting lime on the soil.



© N Herendeen

(b) Explain fully why farmers sometimes put lime on the soil.

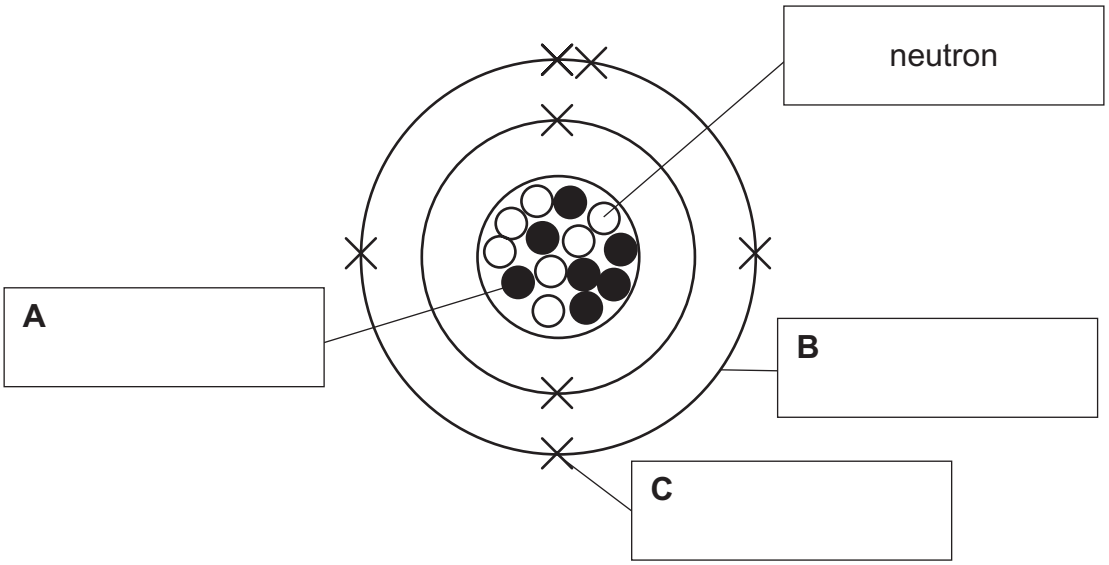
_____

_____

_____

_____ [2]

3 The diagram shows an atom of nitrogen.



(a) Name the parts labelled **A**, **B**, and **C** on the diagram above. [3]

(b) Complete the following sentence.

Choose from:

7 **14** **21**

The atomic number of nitrogen is _____ . [1]

(c) An oxygen atom has eight electrons.

In the space below draw a diagram to show how these eight electrons are arranged in an atom of oxygen.

[1]

Examiner Only

Marks	Remark

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4 Yellow Man is a thick, sweet toffee, which can also be called honeycomb.

Examiner Only	
Marks	Remark



© Ruth Wilson - Scotproof

The instructions for making Yellow Man are given below. They are not in the correct order.

A Heat the mixture until it boils.
B Pour the mixture onto a tray.
C Add the baking soda and stir.
D When it is cool enough, cut into chunks.
E Mix the sugar with the golden syrup and vinegar.

(a) Put these stages in the correct order using the letters **A**, **B**, **C**, **D** and **E**.

The first one is done for you.

E _____ _____ _____ _____ [2]

(b) What would you see after the baking soda was added at stage **C**?

_____ [1]

(c) Name the gas that causes the bubbles to form in the toffee.

_____ [1]

(d) This recipe includes vinegar. When vinegar is added the baking soda undergoes two different types of chemical reaction during the cooking process.
Circle the **two** correct reaction types.

neutralisation : displacement : thermal decomposition

combustion : oxidation [2]

Examiner Only

Marks	Remark

5 The table below gives some elements from four different groups of the Periodic Table.

A	B	C	D
carbon	helium	chlorine	lithium
silicon	neon	bromine	sodium
lead	argon	iodine	potassium

Use the information in the table and your Data Leaflet to answer the following questions.

(a) (i) Which group **A**, **B**, **C** or **D** belong to the halogens?

_____ [1]

(ii) Which group **A**, **B**, **C** or **D** is described as being chemically inert?

_____ [1]

(iii) Give the name for this group of inert elements.

_____ [1]

(iv) What name is given to the type of elements in group **D**?

_____ [1]

(b) State three things that would happen if a small piece of lithium was dropped into a trough of cold water.

1 _____

2 _____

3 _____ [3]

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Examiner Only	
Marks	Remark

6 **(a)** In February 2008 there was a small earthquake in the south of England. It happened at one o'clock in the morning.

Suggest **two** reasons why it could injure more people so early in the morning.

_____

_____

_____ [2]

(b) The table below shows the effects of different strengths of earthquakes.

Number on Richter Scale	Effect of earthquake
2	Trees sway, ponds ripple, doors swing slowly. People cannot tell that it is an earthquake.
4	Buildings shake, dishes rattle, windows rattle.
6	Furniture moves, plaster can fall, walls may crack.
8	Buildings fall down, bridges collapse, lives are lost.

Earthquakes are quite common in the UK, but most are less than 2 on the Richter Scale.
Suggest one reason why most are not reported and explain your answer.

_____

_____

_____ [2]

(c) Given below are some comments from BBC reporters just after the 2008 earthquake.

"Everything started wobbling. The windows were rattling and the blinds were moving."

"I went outside in my dressing gown to see if the roof had collapsed."

"Cracks appeared in the ceiling and some plaster fell. All the cupboard doors flew open."

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Using this information and the table opposite suggest what number on the Richter Scale best describes the 2008 earthquake.

Circle the correct answer.

1 **3** **5** **7** **9** [1]

(d) In January 2010 there was a major earthquake in Haiti which measured 7 on the Richter Scale. Describe what causes an earthquake, and explain why it is not possible to warn people.

_____

_____

_____

_____ [3]

(e) Give **one** reason why it would be important to be able to warn people that an earthquake is about to happen.

_____

_____ [1]

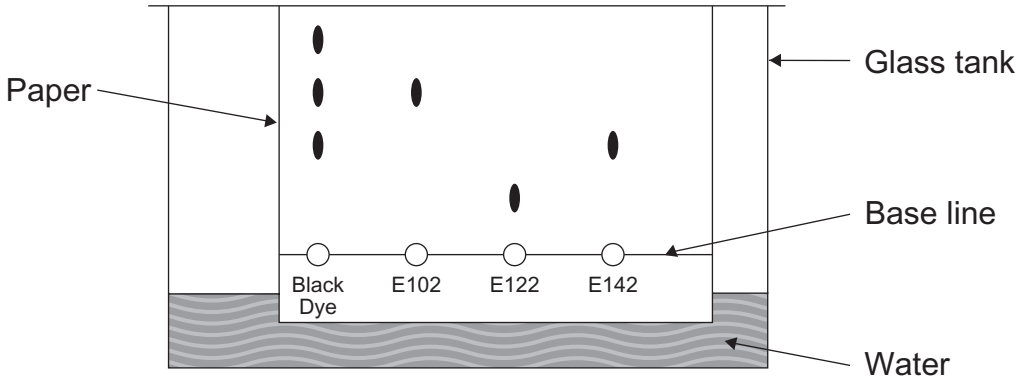
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Marks	Remark

7 A student set up an experiment to investigate the dyes in a black food colouring.

He wanted to compare the dyes with the permitted colours E102, E122 and E142 and to find out if any other dyes were present.
His results are shown below.



(a) Name this method of separation.

_____ [1]

(b) Describe fully what the student discovered as a result of this experiment.

_____

_____

_____

_____ [3]

(c) Food colourings are tested on animals.

Give one advantage and one disadvantage of animal testing.

_____

_____

_____

_____ [2]

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110956

Rewarding Learning

General Certificate of Secondary Education
2010–2011

Science: Single Award (Modular)

Chemical Patterns and our Environment
Module 3

Foundation Tier

[GSC31]

TUESDAY 9 NOVEMBER 2010, AFTERNOON

MARK SCHEME

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			AVAILABLE MARKS
1	**(a)** Milk of magnesia – Magnesium hydroxide [1] Lemon juice – Citric acid [1] Vinegar – Ethanoic acid [1]	[3]	
	(b) Indicator	[1]	
	(c) **(i)** Radioactive	[1]	
	(ii) Flame	[1]	
	(iii) Flammable	[1]	7
2	**(a)** **(i)** 7	[1]	
	(ii) hydrochloric acid	[1]	
	(iii) weak alkali	[1]	
	(b) Any **two** from Lime is an alkali [1] Lower acidity/it neutralises [1] the *acid* in the soil [1]/ Soil is acidic/it takes away the acid [1]	[2]	5
3	**(a)** A proton B shell C electron	[1] [1] [1]	
	(b) 7	[1]	
	(c) Diagram showing 2,6 for electrons	[1]	5
4	**(a)** A C B D Any two in correct order [1]	[2]	
	(b) Mixture rises/bubbles up	[1]	
	(c) Carbon dioxide [1]	[1]	
	(d) Thermal decomposition [1] neutralisation [1]	[2]	6
5	**(a)** **(i)** C	[1]	

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			AVAILABLE MARKS
	(ii) B	[1]	
	(iii) noble gases	[1]	
	(iv) alkali metals	[1]	
	(b) It would float Move around surface quickly Give off gas/hissing sound Disappear/dissolve Any **three** Do **not** accept catch fire or burn	[3]	7
6	**(a)** More people indoors [1] **or** implied People asleep/slow to react [1] Any **two**	[2]	
	(b) Effects are too weak [1] Small, not much damage [1] Not recognised as an earthquake [1] Any **two**	[2]	
	(c) 5	[1]	
	(d) Earth is made up of plates which move [1] When they rub past each other (they cause friction) [1] It happens below the ground/no advanced warning/cannot detect stresses set up [1]	[3]	
	(e) It could save lives **or** implied	[1]	9
7	**(a)** Chromatography	[1]	
	(b) The black dye contains E102 and E142 [1] It does not contain E122 [1] It does contain an illegal dye [1] Black dye contains 3 dyes [1] Any **three**	[3]	
	(c) Animals may suffer Animals cannot say no It avoids harming humans It helps to find out if the dye is safe Any **two** Answer must include at least one advantage and one disadvantage	[2]	6
	Total		**45**

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Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
2009–2010

Science: Single Award (Modular)

Chemical Patterns and our Environment
Module 3

Foundation Tier

[GSC31]

GSC31

THURSDAY 20 MAY 2010, MORNING

TIME

45 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all eight** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 45.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
A Data Leaflet is provided for use with this paper.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
Total Marks	

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Examiner Only	
Marks	Remark

1 **(a)** Dangerous chemicals have symbols on their containers. What name is given to these symbols?

Circle the correct answer.

safety **hazard** **security**

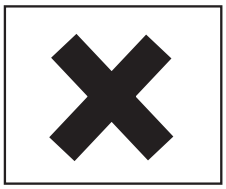
[1]

(b) Why are these symbols used instead of words?

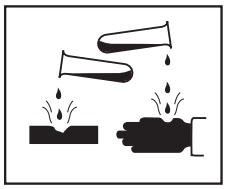
_____

_____ [1]

(c) Shown below are four of these symbols.



A



B



C



D

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(i) Which symbol **A**, **B**, **C** or **D** should be put on a can of petrol?

_____ [1]

(ii) Nitric acid is corrosive. Which symbol **A**, **B**, **C** or **D** should be put on a bottle of nitric acid?

_____ [1]

(iii) Complete the following sentence.

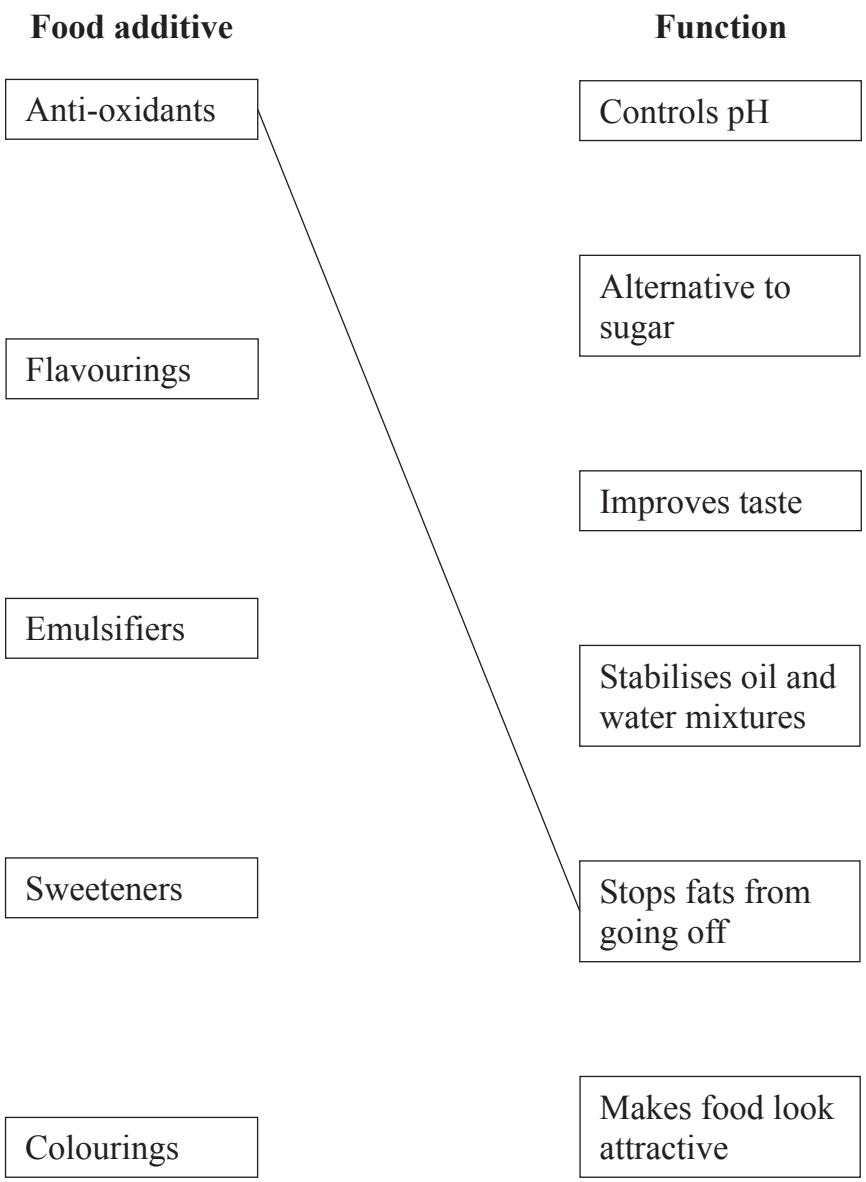
A bottle with symbol **C** contains a _____ substance. [1]

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Examiner Only	
Marks	Remark

2 **(a)** Match each food additive to its function by drawing straight lines.

The first has been done for you.



[4]

(b) All additives have a number which starts with a letter of the alphabet. What is this letter?

_____ [1]

(c) Give **one** problem with putting additives in food.

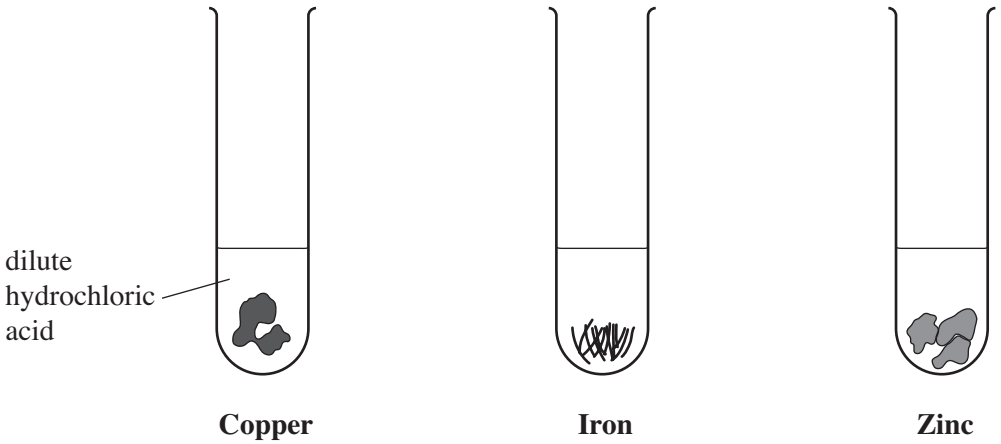
_____

_____ [1]

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Examiner Only	
Marks	Remark

3 Jack wanted to investigate the reactivity of some metals. He added samples of iron, zinc and copper to dilute hydrochloric acid and heated them using a Bunsen burner.



(a) (i) Which two of the metals gave off a gas when heated in the acid?

_____ and _____ [1]

(ii) Give the name of the gas produced.

_____ [1]

(iii) Which of the three metals is the most reactive?

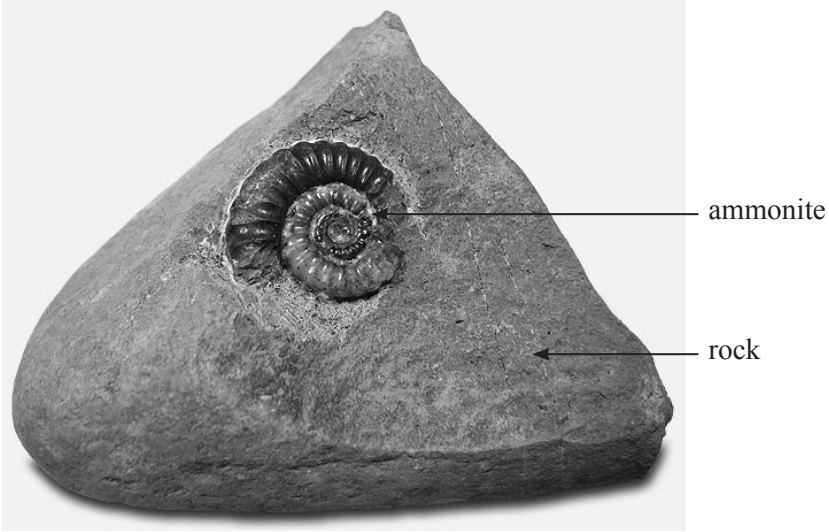
_____ [1]

(b) Give **one** safety precaution needed for this investigation.

_____ [1]

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4 The picture shows an ammonite, an animal which lived in the sea millions of years ago.



© Junior Geo Ltd https://www.juniorgeo.co.uk/shop/index.php?category=2&shop_category_id=3

(a) (i) What name is given to animal remains found in rocks?

_____ [1]

(ii) Name the **type** of rock in which animal remains are found?

_____ [1]

(iii) When this type of rock is affected by pressure over long periods of time it can be changed into another type of rock. Name this new **type** of rock.

_____ [1]

(b) Complete the table.

Type of rock	Example 1	Example 2
igneous		basalt
	sandstone	mudstone
metamorphic		slate

[3]

Examiner Only

Marks	Remark

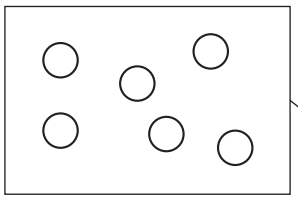
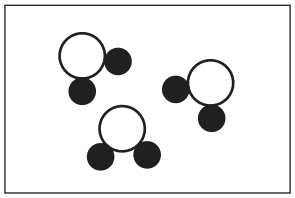
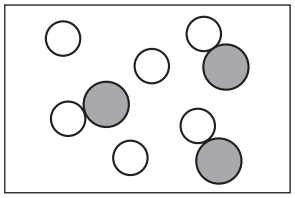
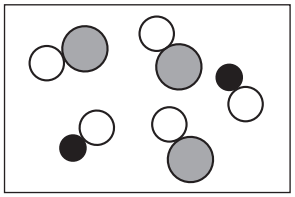
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5 In the diagrams below different atoms are represented by symbols.



Draw **one** line from each diagram to the description which best describes it.

The first has been done for you.

Diagram	Description
	A mixture of two elements
	An element
	A mixture of two compounds
	A compound
	A mixture of an element and a compound
	

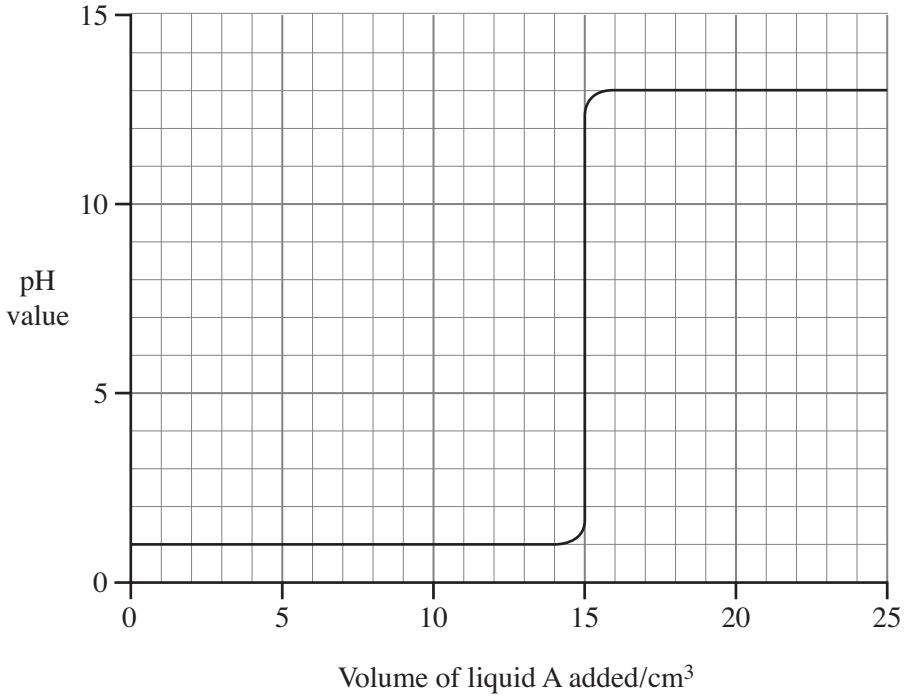
[3]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

6 The pH changes during a reaction were measured in the laboratory using a pH probe. The following graph was produced.



In the experiment 15 cm^3 of liquid X was measured into a conical flask. Liquid A was then added slowly.

(a) What was the pH value of liquid X at the start of the experiment?

_____ [1]

(b) Give the name of a suitable piece of apparatus for adding liquid A.

_____ [1]

(c) What volume of liquid A was needed to cause a sharp change in the pH value?

_____ cm^3 [1]

(d) What name is given to a reaction in which acids react with alkalis?

_____ [1]

(e) Using the pH values suggest names for liquid X and liquid A.

liquid X _____

liquid A _____ [2]

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7 The table below gives information about the numbers of electrons in an atom of each of the elements A, B, C, D and E.

Element	No. of electrons in 1st shell	No. of electrons in 2nd shell	No. of electrons in 3rd shell
A	2	1	
B	2	4	
C	2	8	
D	2	8	1
E	2	6	

Use this information and your Data Leaflet to answer the following questions.

(a) Which element A, B, C, D or E has an atomic number of 6?

_____ [1]

(b) Which element A, B, C, D or E is a Noble gas?

_____ [1]

(c) Which two elements A, B, C, D or E are in the same Group of the Periodic Table?

_____ and _____ [1]

(d) Give the name of element D.

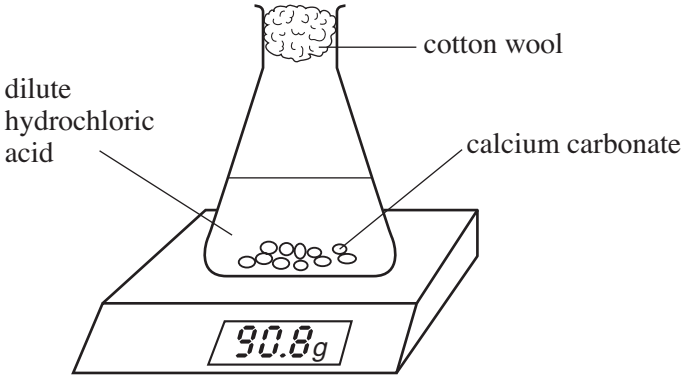
_____ [1]

Examiner Only

Marks	Remark

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8 Mary investigated the reaction between hydrochloric acid and excess calcium carbonate.

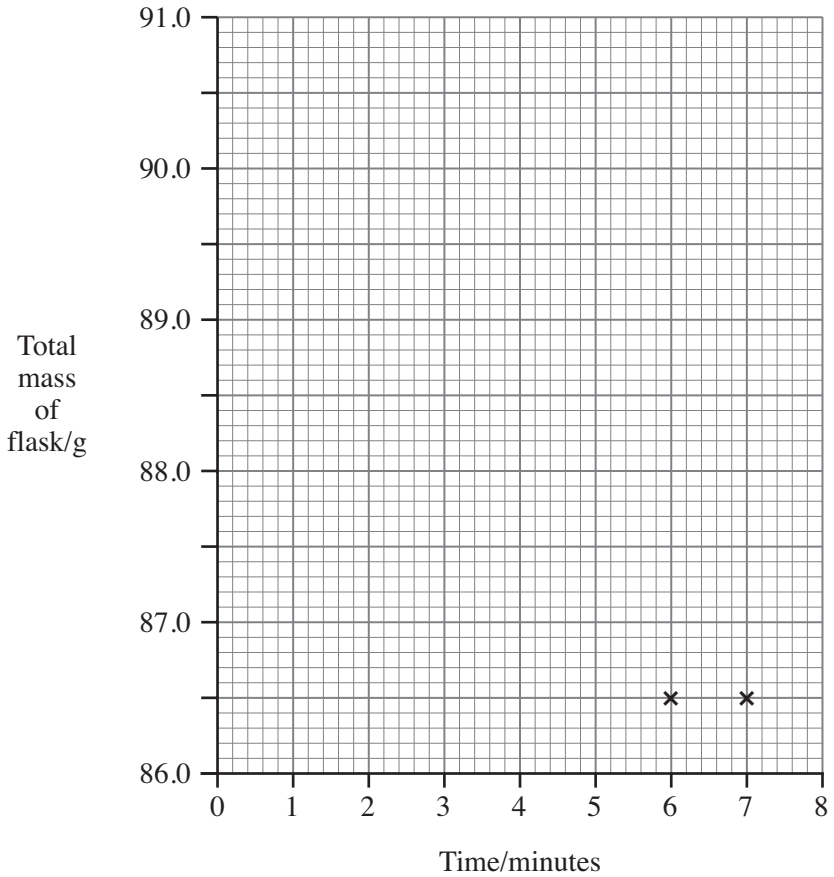


She measured the mass of the flask and its contents every minute.

(a) Complete the graph by plotting the remaining points and draw a line of best fit.

Time/ minutes	0	1	2	3	4	5	6	7
Total mass of flask/g	90.8	88.9	87.5	87.0	86.7	86.6	86.5	86.5

[3]



Examiner Only
Marks | Remark

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(b) What is the trend shown by these results?

_____

_____ [2]

(c) Which reactant was completely used up during the reaction?

_____ [1]

(d) The equation for this reaction is shown below.

Calcium Carbonate + Hydrochloric Acid ⟶ Calcium Chloride + Water + Carbon Dioxide

Use the equation to fully explain why there was a decrease in the mass of the flask and its contents.

_____

_____ [2]

(e) Give two reasons why cotton wool was used to plug the flask instead of using a rubber bung.

1. _____

2. _____ [2]

(f) How could Mary ensure that her results were reliable?

_____ [1]

Examiner Only	
Marks	Remark

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GCSE

Science: Single Award (Modular)

End of Module Tests

May 2010

Mark Schemes

Issued: October 2010

Rewarding Learning

General Certificate of Secondary Education
2009–2010

Science: Single Award (Modular)

Chemical Patterns and our Environment
Module 3

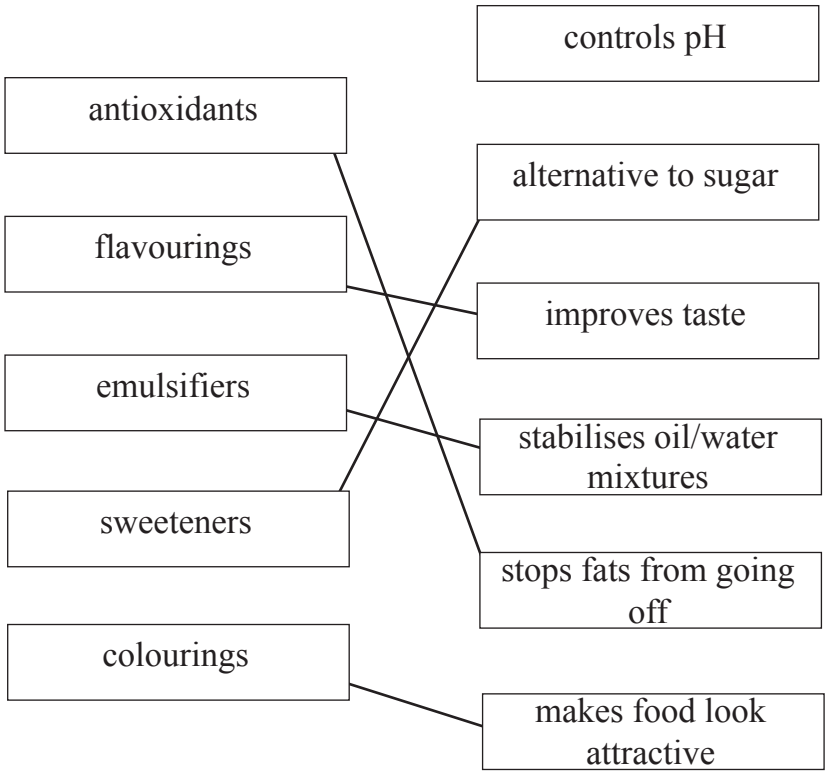
Foundation Tier

[GSC31]

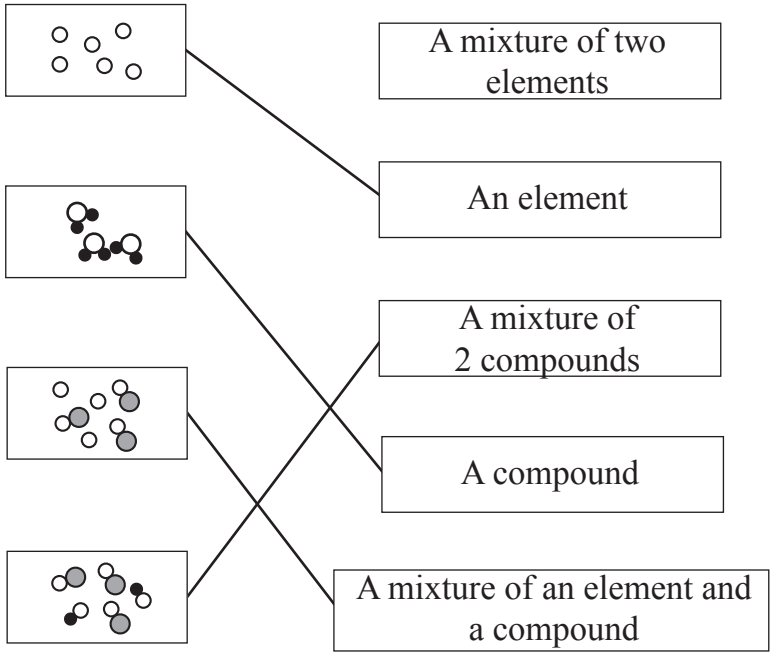
THURSDAY 20 MAY 2010, MORNING

MARK SCHEME

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				AVAILABLE MARKS
1	**(a)**	hazard	[1]	
	(b)	Greater visual impact Understood internationally Easier to understand than reading — Any **one**	[1]	
	(c)	**(i)** D	[1]	
		(ii) B	[1]	
		(iii) Toxic/poisonous	[1]	5
2	**(a)**		[4]	
	(b)	E	[1]	
	(c)	hyperactivity/allergies/headaches (any)/cancer	[1]	6
3	**(a)**	**(i)** iron, zinc (must have both)	[1]	
		(ii) hydrogen	[1]	
		(iii) zinc	[1]	
	(b)	safety goggles/face masks/**not** gloves/**not** glasses alone	[1]	4

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				AVAILABLE MARKS
4	**(a)** **(i)** Fossils		[1]	
	(ii) Sedimentary/Limestone	any named sedimentary rock e.g. mudstone, sandstone	[1]	
	(iii) Metamorphic		[1]	
	(b) granite		[1]	
	sedimentary		[1]	
	marble		[1]	6
5			[3]	3
6	**(a)** pH = 1		[1]	
	(b) burette, syringe, graduated pipette	**not** measuring cylinder **not** dropper	[1]	
	(c) 15 cm^3		[1]	
	(d) neutralisation		[1]	
	(e) liquid X – hydrochloric acid/or any suitable		[1]	
	liquid A – sodium hydroxide/or any suitable		[1]	6

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				AVAILABLE MARKS
7	**(a)**	B accept carbon	[1]	
	(b)	C accept neon	[1]	
	(c)	A, D	[1]	
	(d)	Sodium	[1]	4
8	**(a)**	All 6 points correct [2] 5/4 points correct [1] < 4 points [0] line of best fit [1]	[3]	
	(b)	decreases [1] then levels off [1]	[2]	
	(c)	hydrochloric acid	[1]	
	(d)	CO_2 produced/gas given off/escapes	[2]	
	(e)	to stop acid spray escaping (soak up liquid) to let gas escape/prevent explosion idea of free movement of gas	[1] [1]	
	(f)	repeat the experiment/take more readings	[1]	11
			Total	**45**

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Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2009–2010

Science: Single Award (Modular)

Chemical Patterns and our Environment
Module 3

Foundation Tier

[GSC31]

GSC31

WEDNESDAY 24 FEBRUARY 2010, MORNING

TIME

45 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all seven** questions.

INFORMATION FOR CANDIDATES

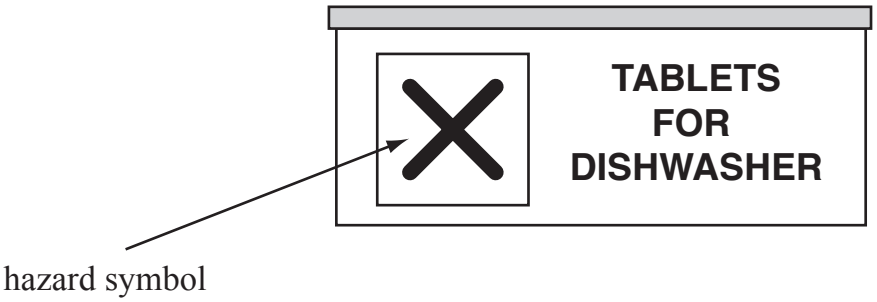
The total mark for this paper is 45.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
A Data Leaflet is provided for use with this paper.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
Total Marks	

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Examiner Only	
Marks	Remark

1 The picture below shows a box of dishwasher tablets.



(**a**) What does the hazard symbol shown tell you about the chemical used to make dishwasher tablets?

_____ [1]

(**b**) In the spaces below draw two more hazard symbols and write the name of the symbol underneath.

_____ _____ [4]

(**c**) Give two reasons why hazard **symbols** and not just words are put on boxes of chemicals.

Reason 1 _____

_____

Reason 2 _____

_____ [2]

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2 A bottle of soft drink had this label on it.

Amazing
Cola!
Great flavour

Ingredients
Carbonated water
Sugar
Phosphoric acid
Colouring
Preservative
Flavouring

This drink has a pH of 3.2.

(**a**) Which ingredient in the drink causes it to have a low pH value?

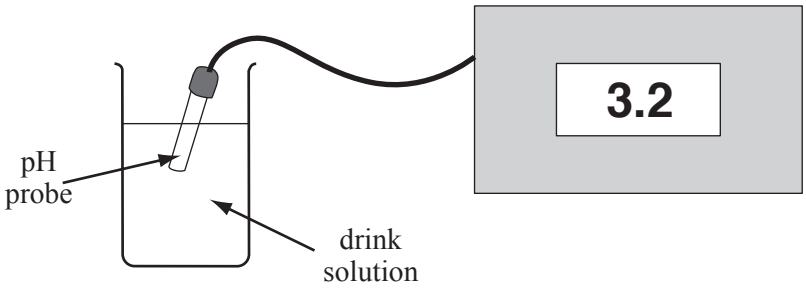
_____ [1]

(**b**) What colour would you expect it to give with universal indicator paper?

Circle the correct answer.

red **green** **orange** **blue** **purple** [1]

(**c**) The diagram shows a pH probe.



Suggest why a pH probe is better for measuring pH than using universal indicator paper.

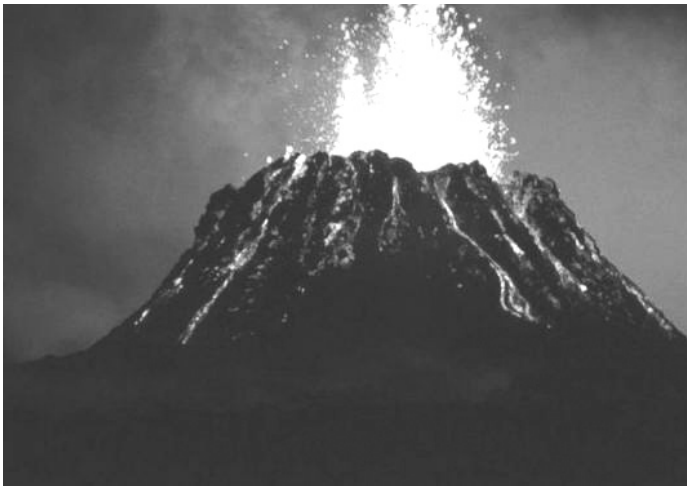
_____ [1]

(**d**) What word describes a solution which has a pH **greater** than 7?

_____ [1]

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3 The photograph shows an active volcano.



© U.S. Geological Survey/photo by George Urlich

(**a**) Choose words from the list to complete the sentences which follow.

magma : **seismograph** : **lava** : **tsunami**

crater : **earthquake** : **nucleus**

When two tectonic plates are pulled apart a liquid

called _____ can reach the surface of the earth.

This liquid runs down the outside of the mountain and is now called

_____.

The large gap in the centre of a volcano is called a _____ .

When a volcano erupts under the sea it can cause a giant wave called a

_____.

[4]

(**b**) Describe what can happen when a giant wave hits a coastal town.

_____

_____

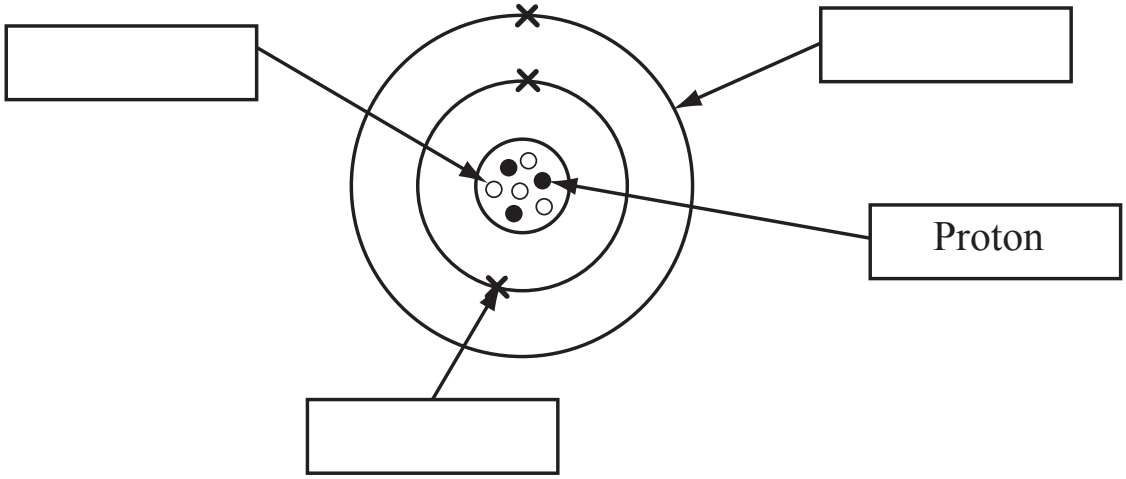
_____ [2]

Examiner Only

Marks	Remark

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4 The diagram shows the structure of an atom.



(a) Use words from the list below to label the diagram.

electron : **shell** : **core** : **neutron** : **cell** [3]

(b) What is the **atomic number** for this atom?

Circle the correct answer.

3 4 7 10 [1]

(c) What is meant by the term **mass number**?

Choose from:

Number of protons + neutrons

Number of protons + electrons

Number of electrons + neutrons

_____ [1]

(d) Use your Data Leaflet to find the name and symbol for the element in the diagram.

Name _____ Symbol _____ [2]

Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

5 **(a)** The list below gives four types of food additives. Choose the correct additive to complete the sentences which follow.

antioxidants : **sweeteners** : **flavourings** : **emulsifiers**

(i) To keep the oil from separating in salad cream we would

add _____. [1]

(ii) To make sure the fats in potato crisps do not go rancid we

would add _____. [1]

Many foods like milk are marked with a 'use by' date.



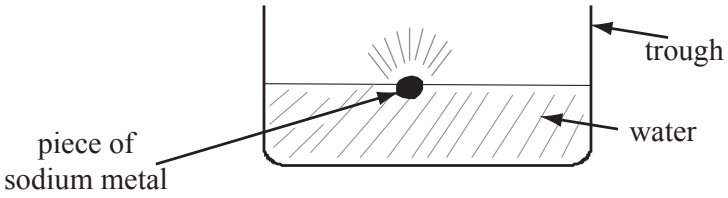
(b) Explain fully why 'use by' dates are needed.

_____

_____

_____ [3]

6 Mary watched her teacher do an experiment with sodium metal and water.



She wrote the following observations.

The sodium gave off a yellow spark.
It melted to form a ball.
It moved quickly across the water surface.
A gas was given off.
A colourless solution was formed.

Word equation for the reaction is:

sodium + water → sodium hydroxide + hydrogen

(a) Use the information above to answer the following questions.

(i) How do you know that this reaction produces heat?

_____ [1]

(ii) Which information shows that sodium is lighter than water?

_____ [1]

(iii) What is the name of the gas produced?

_____ [1]

(iv) Name the substance formed which is an alkali.

_____ [1]

(b) Give the name of another Group 1 element which is more reactive than sodium.

_____ [1]

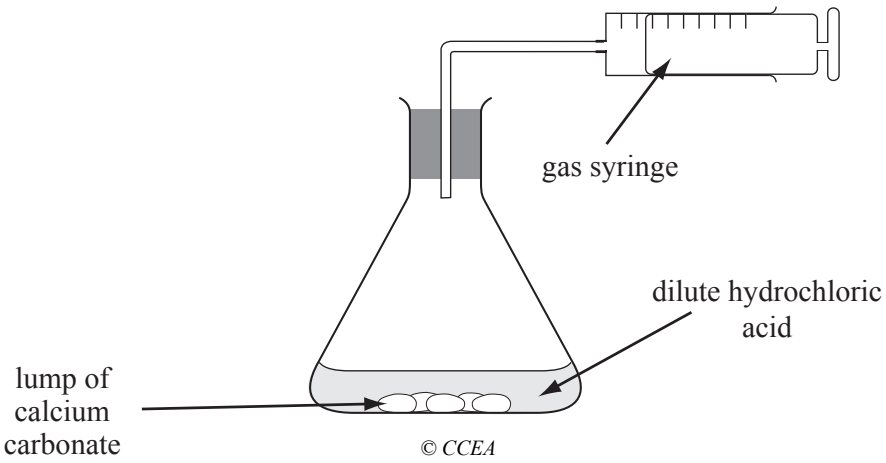
Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

7 The diagram shows the apparatus used to investigate the reaction between a piece of calcium carbonate and dilute hydrochloric acid.



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John recorded the total volume of carbon dioxide collected at intervals over 15 minutes.

At the end of the reaction there was some calcium carbonate left in the flask.

John obtained the following results:

Time/minutes	0	1	2	3	5	7	9	11	1	3
Carbon dioxide/cm^3 collected	0	20	38	46	62	72	78	82	82	82

5

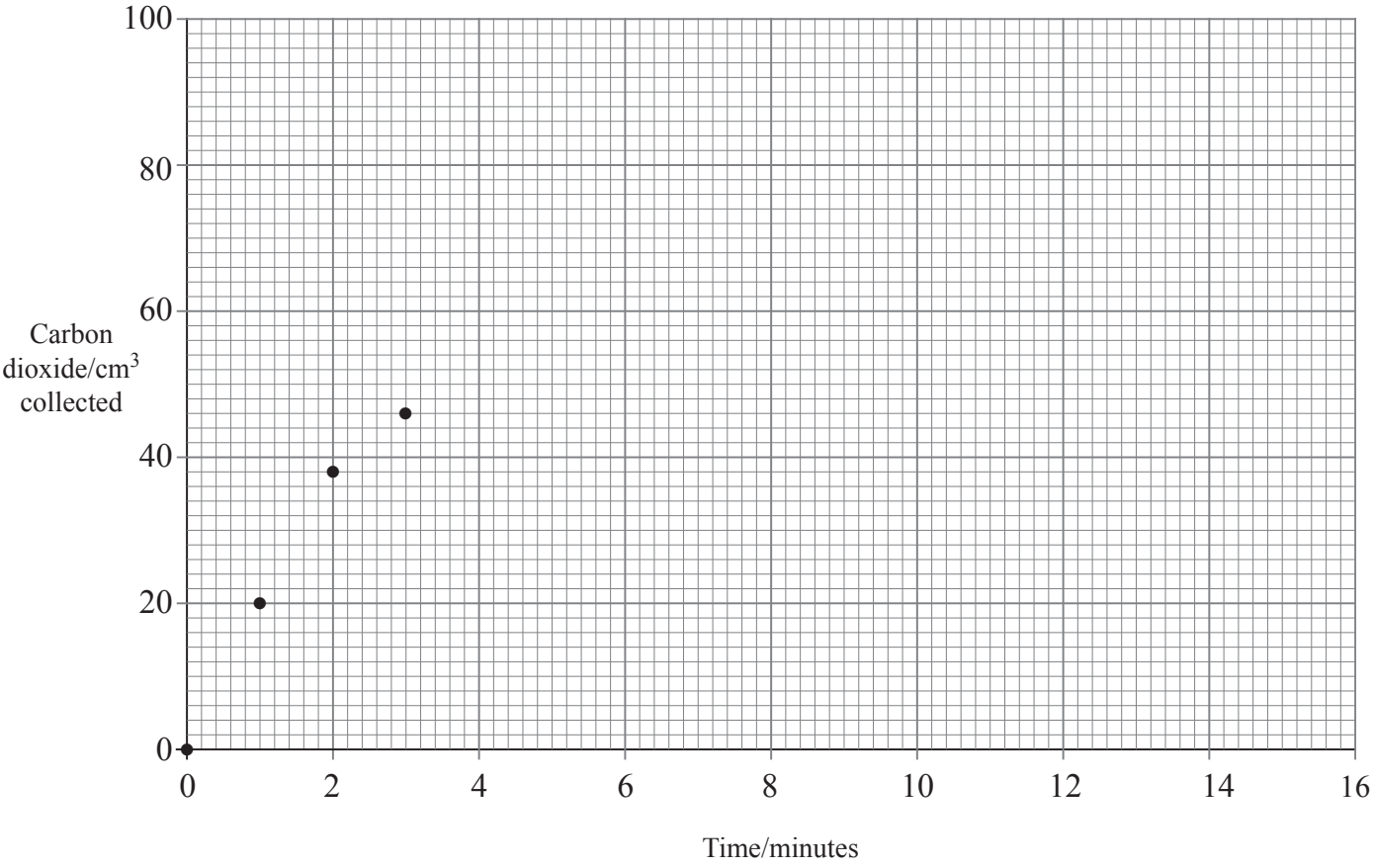
(a) Complete the graph on the page opposite by plotting the remaining points and join these points to form a smooth curve. [3]

(b) Describe and explain the shape of the graph over the first two minutes.

_____

_____ [2]

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Marks	Remark

(c) **(i)** At what time did the reaction finish?

_____ [1]

(ii) How do you know that calcium carbonate was in excess?

_____ [1]

(d) Which one of the following would give a more accurate result? Tick the correct box.

Use a digital clock ☐

Use more acid ☐

Measure the volume of gas every 30 seconds ☐ [1]

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(e) To improve the reliability of the results John should do which of the following?
Tick the correct box.

Do the experiment for a longer period ☐

Use stronger acid ☐

Repeat the experiment at least once ☐ [1]

(f) Complete the word equation for this reaction.

calcium carbonate + hydrochloric acid → ☐ + ☐ + carbon dioxide

[2]

Examiner Only

Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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GCSE

Science: Single Award (Modular)

March 2010

Mark Schemes

Issued: May 2010

Rewarding Learning

General Certificate of Secondary Education
2009–2010

Science: Single Award (Modular)

Chemical Patterns & Environment
Module 3

Foundation Tier

[GSC31]

WEDNESDAY 24 FEBRUARY 2010, MORNING

MARK SCHEME

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				AVAILABLE MARKS
1	**(a)**	They are harmful/irritant	[1]	
	(b)	Any suitable (name must match symbol)	[4]	
	(c)	Easier to see/Greater visual impact Internationally understood Easier to understand than words *(any 2)*	[2]	7
2	**(a)**	Phosphoric acid (not acid on its own)	[1]	
	(b)	Orange	[1]	
	(c)	More accurate/specific/quicker	[1]	
	(d)	Alkaline/base	[1]	4
3	**(a)**	Magma – lava – crater – tsunami	[4]	
	(b)	Houses swept away/people killed Idea of destruction	[2]	6
4	**(a)**	Shell, electron, neutron	[3]	
	(b)	3	[1]	
	(c)	Protons + neutrons	[1]	
	(d)	Lithium Li	[2]	7
5	**(a)**	**(i)** Emulsifiers	[1]	
		(ii) Antioxidants	[1]	
	(b)	Foods can go bad/off [1] Bacteria/fungus/mould/microbes [1] Health and safety [1]	[3]	5

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				AVAILABLE MARKS
6	**(a)**	**(i)** Sodium melted to form a ball/yellow spark	[1]	
		(ii) It floats on water surface/moves across water surface	[1]	
		(iii) Hydrogen gas	[1]	
		(iv) Sodium hydroxide	[1]	
	(b)	Potassium or any correct	[1]	5
7	**(a)**	All 6 points correct [2] 4, 5 correct [1] <4 [0]	[2]	
		Joining points correctly	[1]	
	(b)	increases/goes up/CO_2 given off goes up [1] idea of speed/faster/quicker/vigorous reaction [1]	[2]	
	(c)	**(i)** 10/11 minutes [1]		
		(ii) Some calcium carbonate left [1]	[2]	
	(d)	Measure volume every 30 s.	[1]	
	(e)	Repeat information	[1]	
	(f)	Calcium + Water Chloride [1] [1]	[2]	11
			Total	45

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