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F

GENERAL CERTIFICATE OF SECONDARY EDUCATION

GATEWAY SCIENCE

B641/01

CHEMISTRY B

Unit 1 Modules C1 C2 C3 (Foundation Tier)

OCE/17680

Candidates answer on the Question Paper
A calculator may be used for this paper

OCR Supplied Materials:
None

Other Materials Required:
- Pencil
- Ruler (cm/mm)

Wednesday 26 May 2010
Morning

Duration: 1 hour

B641 01

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your Candidate Number, Centre Number and question number(s).

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- The total number of marks for this paper is **60**.
- The Periodic Table is printed on the back page.
- This document consists of **24** pages. Any blank pages are indicated.

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Answer **all** the questions.

Section A – Module C1

1 This question is about foods and food additives.

Look at the table. It gives some information about E numbers.

type of food additive	E number range
food colour	E101 to E199
preservative	E200 to E299
antioxidant	E300 to E321
emulsifier	E400 to E499
sweetener	E950 to E967

Look at the food label found on a packet of cake mix.

Ingredients:
Sugar, wheat flour, vegetable oil, baking powder, E341, dried whey, E477, E471, salt and E415.

(a) What type of food additive is E477?

..... **[1]**

(b) Which ingredient is present in the **smallest** amount?

..... **[1]**

(c) One of the ingredients in the cake mixture is baking powder.

Write down **one** reason why baking powder is used for baking cakes.

..... **[1]**

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(d) Baking powder contains sodium hydrogencarbonate.

When sodium hydrogencarbonate is heated it breaks down.

Look at the word equation for the breakdown of sodium hydrogencarbonate.

sodium hydrogencarbonate $\longrightarrow$ sodium carbonate + water + carbon dioxide

Write down the name of one **product** of this reaction.

..... **[1]**

(e) How can you test for **carbon dioxide** gas?

name of the chemical used .....

result you would expect to see ..... **[2]**

[Total: 6]

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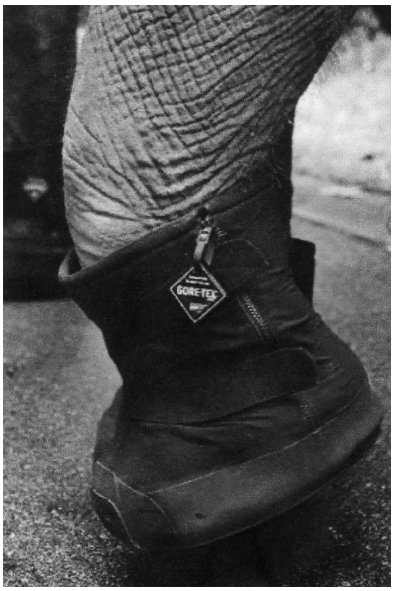
2 An elephant in a zoo has an injured foot. A vet makes a shoe for the elephant.



The shoe is made out of Gore-Tex®.

The shoe is hard-wearing and waterproof. It is also breathable.

(a) Suggest **one** reason why the elephant's shoe was **not** made out of nylon.

..... **[1]**

(b) Gore-Tex® and nylon are both polymers.

It can be difficult to dispose of some polymers.

Look at the list of sentences about the disposal of polymers.

Which sentences are correct?

Put ticks (✓) in the **two** boxes next to the correct sentences.

Most polymers break down quickly in landfill sites.	☐
Some polymers release toxic fumes when burned.	☐
Microbes decompose biodegradable polymers.	☐
Recycling polymers wastes valuable resources.	☐
Polymers are easy to sort for recycling.	☐

[2]

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(c) Polymers are very large molecules.

They are made from small molecules called monomers.

This is shown in the equation.

$$\text{monomers} \xrightarrow{\text{process } \mathbf{A}} \text{polymers}$$

(i) What is the name of process **A**?

..... **[1]**

(ii) Polystyrene is made from styrene.

Ethene is used to make a polymer.

Write down the **name** of this polymer.

..... **[1]**

(d) Polystyrene is a polymer.

Write down **one** use of polystyrene.

..... **[1]**

[Total: 6]

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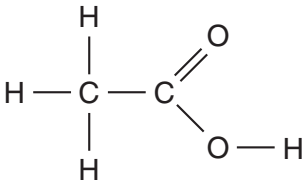
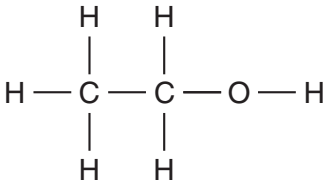
3 This question is about compounds that contain carbon.

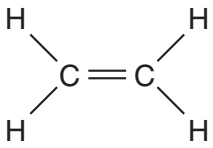
Look at the displayed formulas of some compounds.



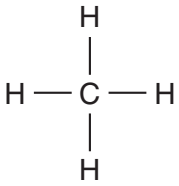
ethanoic acid



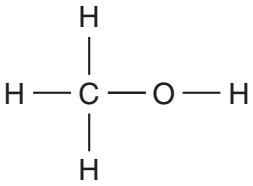
ethanol



ethene



methane



methanol

(a) Write down the **name** of a compound that is a hydrocarbon.

Choose from the compounds shown.

..... **[1]**

(b) Write down the **name** of a compound that is an alkane.

Choose from the compounds shown.

..... **[1]**

(c) Look at the displayed formula for ethanol.

How many **atoms** are shown in the displayed formula?

..... **[1]**

[Total: 3]

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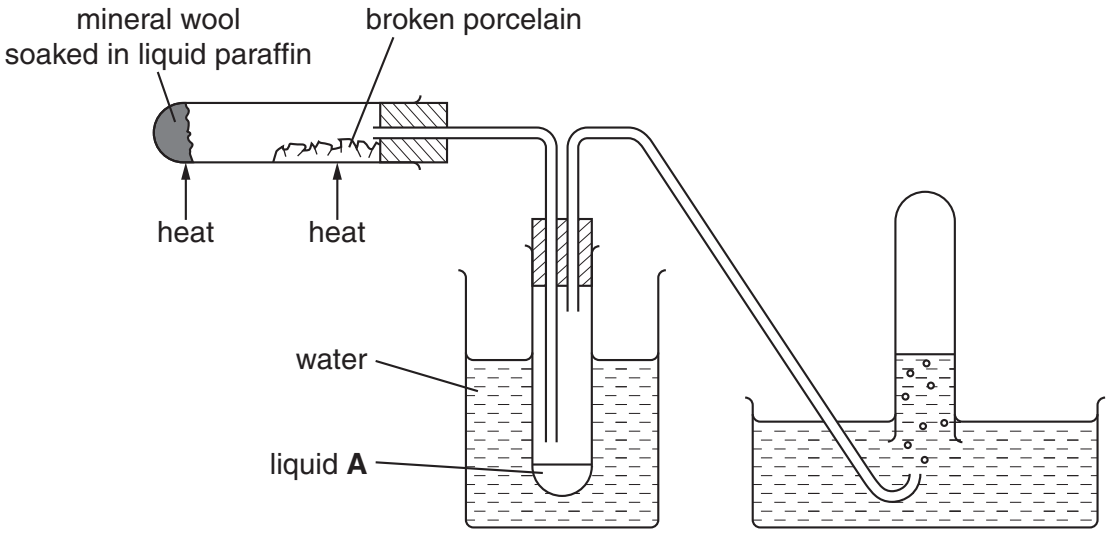
4 This question is about cracking.

Cracking is an important reaction used in the oil industry.

Look at the diagram. It shows the apparatus that can be used in a laboratory to crack liquid paraffin.



(a) What is the name of liquid **A**?

Choose from the list.

bitumen

petrol

water

answer ..... **[1]**

(b) Cracking is used to make ethene.

On the diagram put the letter **X** to show where ethene is collected. **[1]**

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(c) Write about cracking.

Your answer should include

- the conditions needed for cracking
- what happens to hydrocarbon molecules during cracking
- why cracking is a useful reaction.

.....

.....

.....

.....

.....

..... **[3]**

[Total: 5]

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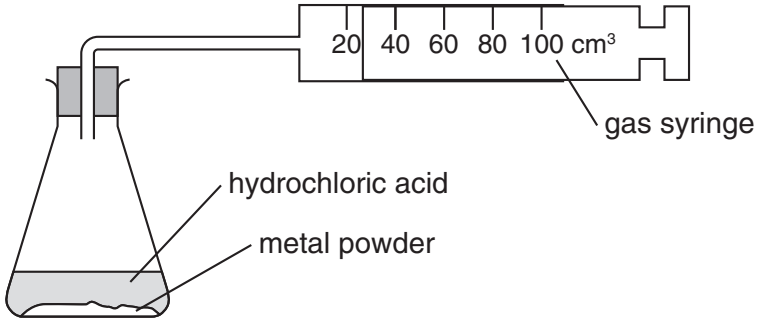
Section B – Module C2

5 Cameron investigates the reaction of metal powders with dilute hydrochloric acid.

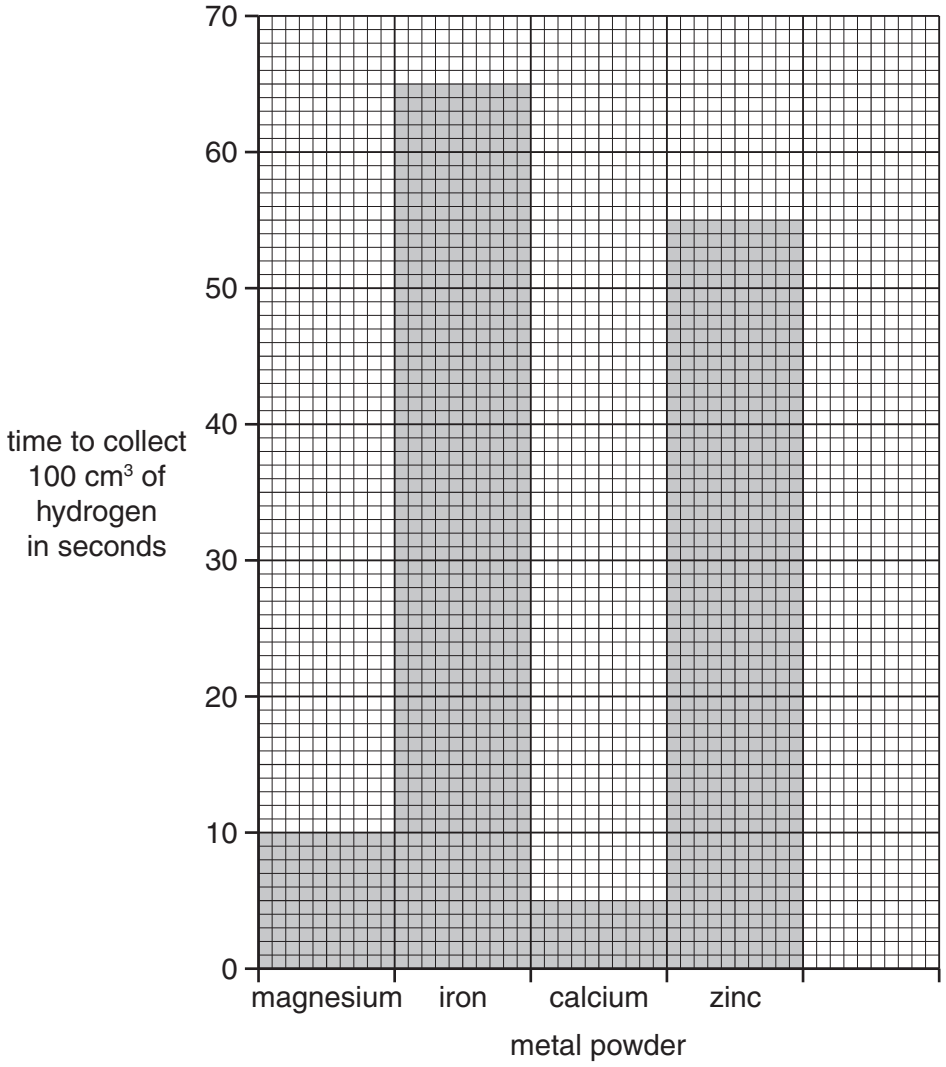
Look at the apparatus he uses.



Cameron measures the time it takes to collect 100 cm^3 of hydrogen in the gas syringe.

He makes sure that all of his experiments are fair.

Look at the bar chart of Cameron's results.



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(a) Look at the bar for **magnesium**.

How long does it take to collect 100 cm^3 of hydrogen?

..... seconds **[1]**

(b) Which metal takes the **longest** time to collect 100 cm^3 of hydrogen?

..... **[1]**

(c) Cameron repeats the experiment with zinc.

This time he uses a **more** concentrated solution of hydrochloric acid.

What happens to the time it takes for the zinc to make 100 cm^3 of hydrogen?

.....

Explain your answer.

.....

..... **[2]**

(d) Cameron does the experiment with zinc again.

This time he uses acid at a **higher** temperature.

The reaction is much **faster**.

Explain why.

Use ideas about particles.

.....

.....

..... **[2]**

(e) Cameron does the experiment with zinc again.

This time he uses a **lump** of zinc rather than zinc **powder**.

What happens to the rate of reaction?

.....

Explain your answer.

.....

.....

..... **[2]**

[Total: 8]

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6 This question is about air.

Air contains oxygen, carbon dioxide and water vapour.

Air also contains pollutants such as carbon monoxide, oxides of nitrogen and sulfur dioxide.

(a) Write down the name of **one other** gas found in air.

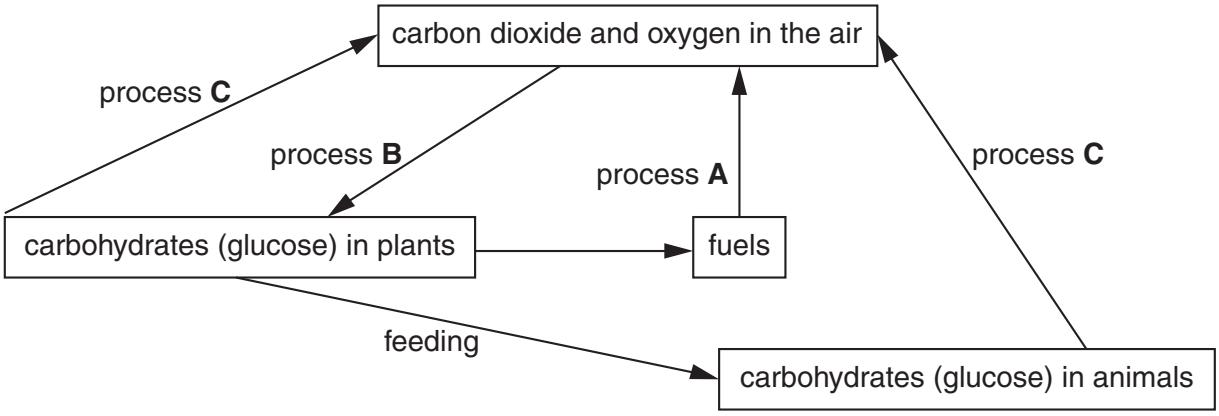
..... **[1]**

(b) The levels of oxygen and carbon dioxide in the air are almost constant.

The carbon cycle helps to keep these levels constant.

Look at the diagram.

It shows a simple carbon cycle.



(i) Find process **A** on the diagram.

It increases the level of carbon dioxide and decreases the level of oxygen in the air.

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

..... **[1]**

(ii) Find process **B** on the diagram.

It decreases levels of carbon dioxide and increases levels of oxygen in the air.

What is the name of process **B**?

..... **[1]**

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(iii) Find process **C** on the diagram.

It increases the level of carbon dioxide and decreases the level of oxygen in the air.

What is the name of process **C**?

..... **[1]**

(c) Oxides of nitrogen are pollutants in the air.

Write down one problem caused by oxides of nitrogen in the air.

..... **[1]**

[Total: 5]

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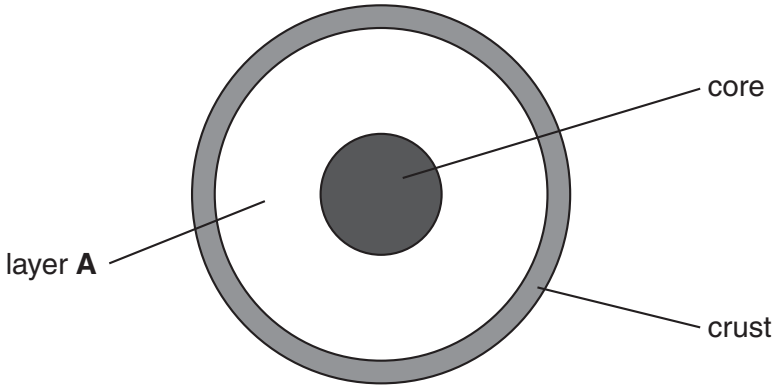
7 The Earth is made of several layers.

Look at the diagram. It shows the structure of the Earth.



(a) What is the name of layer **A**?

..... **[1]**

(b) What is the name of the main element that makes up the core?

Choose from

calcium

carbon

hydrogen

iron

silicon

answer ..... **[1]**

(c) The crust consists of tectonic plates.

The tectonic plates move very slowly.

Finish the sentence.

The movement of tectonic plates can cause volcanoes and ..... . **[1]**

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(d) Lava is liquid (molten) rock that erupts from a volcano.

(i) What **type** of rock is made when lava cools down?

Choose from

igneous

magma

metamorphic

sedimentary

answer ..... **[1]**

(ii) Lava often cools down very rapidly.

Describe how the rate of cooling affects the size of crystals in the rock.

.....

..... **[1]**

(e) Construction materials are used to make buildings.

Brick and glass are construction materials.

Brick and glass are made from rocks from the Earth's crust.

(i) Look at the table about brick and glass.

Finish the table.

construction material	**rock from which the construction material is made**
brick	clay
glass	.....

[1]

(ii) Write down the name of **one other** construction material.

..... **[1]**

[Total: 7]

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Section C – Module C3

8 This question is about the elements in the Periodic Table.

Look at the list of elements.

aluminium	**oxygen**
argon	**phosphorus**
chlorine	**potassium**
helium	**sodium**
iodine	**sulfur**

Answer the questions.

Choose **all** your answers from the list.

Each element can be used **once**, **more than once** or **not at all**.

The Periodic Table on the back page may help you.

(a) Write down the **name** of an element in Group 1 (an alkali metal).

..... **[1]**

(b) Write down the **name** of the element used for sterilising cuts and wounds.

..... **[1]**

(c) Write down the **name** of the element with atomic number 16.

..... **[1]**

(d) Write down the **name** of the element with 8 electrons in its outer shell.

..... **[1]**

(e) Write down the **name** of an element that forms a positive ion.

..... **[1]**

[Total: 5]

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9 The Group 7 elements are called the halogens.

Look at the table.

It shows some information about the halogens.

element	molecular formula	colour	state at room temperature
fluorine	F_2	pale yellow	gas
chlorine	Cl_2	pale green	gas
bromine	Br_2	.....	liquid
iodine	I_2	dark grey	.....
astatine	At_2	black	solid

(a) Complete the table to show

- the **colour** of bromine
- the **state** of iodine at room temperature. **[2]**

(b) Which is the most reactive halogen?

..... **[1]**

(c) Sodium reacts with chlorine.

Sodium chloride is made.

Write down a **use** for sodium chloride.

..... **[1]**

[Total: 4]

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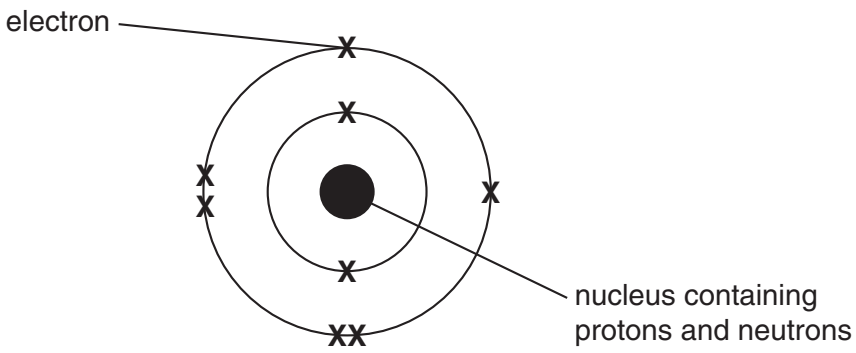
10 This question is about atoms.

Look at the diagram. It shows an oxygen atom.



(a) (i) How many electrons are there in an oxygen atom?

..... **[1]**

(ii) What is the electrical charge on an electron?

Choose from the list.

negative

neutral

positive

answer ..... **[1]**

(b) What is the electrical charge on the nucleus?

Choose from the list.

negative

neutral

positive

answer ..... **[1]**

(c) Oxygen is in period 2 of the Periodic Table.

Use the diagram of the oxygen atom to explain why oxygen is in period 2.

..... **[1]**

[Total: 4]

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11 A company has created a new toy car that uses hydrogen and oxygen.

(a) Hydrogen and oxygen react to make water.

Write a **word equation** for this reaction.

..... **[1]**

(b) What is the test for **hydrogen** gas?

Your answer should include

- what you would do
- the result of the test.

.....

..... **[2]**

(c) The hydrogen and oxygen can both be made by **electrolysis**.

Draw a straight line between each **word** and its correct **description**.

You should draw only three lines.

word	description
anode	a negative electrode
cathode	a liquid that conducts electricity during electrolysis
electrolyte	a positive electrode

[2]

[Total: 5]

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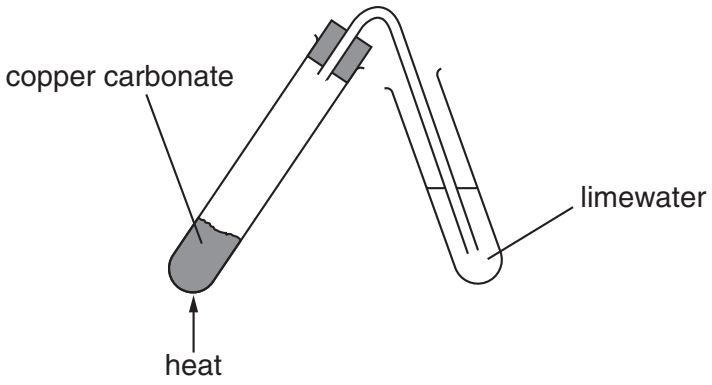
12 Helen and Brian heat copper carbonate.

Look at the diagram. It shows the apparatus they use.



(a) The word equation for the reaction is

copper carbonate $\longrightarrow$ copper oxide + carbon dioxide

This is an example of **thermal decomposition**.

What is meant by thermal decomposition?

.....

..... **[1]**

(b) The formula of copper carbonate is $CuCO_3$.

How many different **elements** are combined together in copper carbonate?

..... **[1]**

[Total: 2]

END OF QUESTION PAPER

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The Periodic Table of the Elements

1	2											3	4	5	6	7	0
							1 **H** hydrogen 1										4 **He** helium 2
7 **Li** lithium 3	9 **Be** beryllium 4											11 **B** boron 5	12 **C** carbon 6	14 **N** nitrogen 7	16 **O** oxygen 8	19 **F** fluorine 9	20 **Ne** neon 10
23 **Na** sodium 11	24 **Mg** magnesium 12											27 **Al** aluminium 13	28 **Si** silicon 14	31 **P** phosphorus 15	32 **S** sulfur 16	35.5 **Cl** chlorine 17	40 **Ar** argon 18
39 **K** potassium 19	40 **Ca** calcium 20	45 **Sc** scandium 21	48 **Ti** titanium 22	51 **V** vanadium 23	52 **Cr** chromium 24	55 **Mn** manganese 25	56 **Fe** iron 26	59 **Co** cobalt 27	59 **Ni** nickel 28	63.5 **Cu** copper 29	65 **Zn** zinc 30	70 **Ga** gallium 31	73 **Ge** germanium 32	75 **As** arsenic 33	79 **Se** selenium 34	80 **Br** bromine 35	84 **Kr** krypton 36
85 **Rb** rubidium 37	88 **Sr** strontium 38	89 **Y** yttrium 39	91 **Zr** zirconium 40	93 **Nb** niobium 41	96 **Mo** molybdenum 42	[98] **Tc** technetium 43	101 **Ru** ruthenium 44	103 **Rh** rhodium 45	106 **Pd** palladium 46	108 **Ag** silver 47	112 **Cd** cadmium 48	115 **In** indium 49	119 **Sn** tin 50	122 **Sb** antimony 51	128 **Te** tellurium 52	127 **I** iodine 53	131 **Xe** xenon 54
133 **Cs** caesium 55	137 **Ba** barium 56	139 **La*** lanthanum 57	178 **Hf** hafnium 72	181 **Ta** tantalum 73	184 **W** tungsten 74	186 **Re** rhenium 75	190 **Os** osmium 76	192 **Ir** iridium 77	195 **Pt** platinum 78	197 **Au** gold 79	201 **Hg** mercury 80	204 **Tl** thallium 81	207 **Pb** lead 82	209 **Bi** bismuth 83	[209] **Po** polonium 84	[210] **At** astatine 85	[222] **Rn** radon 86
[223] **Fr** francium 87	[226] **Ra** radium 88	[227] **Ac*** actinium 89	[261] **Rf** rutherfordium 104	[262] **Db** dubnium 105	[266] **Sg** seaborgium 106	[264] **Bh** bohrium 107	[277] **Hs** hassium 108	[268] **Mt** meitnerium 109	[271] **Ds** darmstadtium 110	[272] **Rg** roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

**** The lanthanoids (atomic numbers 58-71) and the actinoids (atomic numbers 90-103) have been omitted.***

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.