OCR
RECOGNISING ACHIEVEMENT

F

GENERAL CERTIFICATE OF SECONDARY EDUCATION

GATEWAY SCIENCE

B641/01

CHEMISTRY B

Unit 1 Modules C1 C2 C3
(Foundation Tier)

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)

Thursday 4 June 2009
Morning

Duration: 1 hour

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, however additional paper may be used if necessary.

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 **20** pages. Any blank pages are indicated.

Answer **all** the questions.

Section A – Module C1

1 This question is about food additives.

Food additives are given E numbers to identify them.

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

E number range	type of food additive
E 100 to E 199	food colourings
E 200 to E 299	preservatives
E 300 to E 399	antioxidants
E 400 to E 600	flavour enhancers and emulsifiers

Look at part of the food label on a packet of sausages.

Ingredients:
Pork, Water, Pork Fat, E 412, E 450, E 223, E 300, E 307, E 120

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

Choose from the food label.

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

(b) What type of additive is **E 450**?

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

(c) The sausages contain the **antioxidant** E 300.

Explain why antioxidants are added to foods.

.....

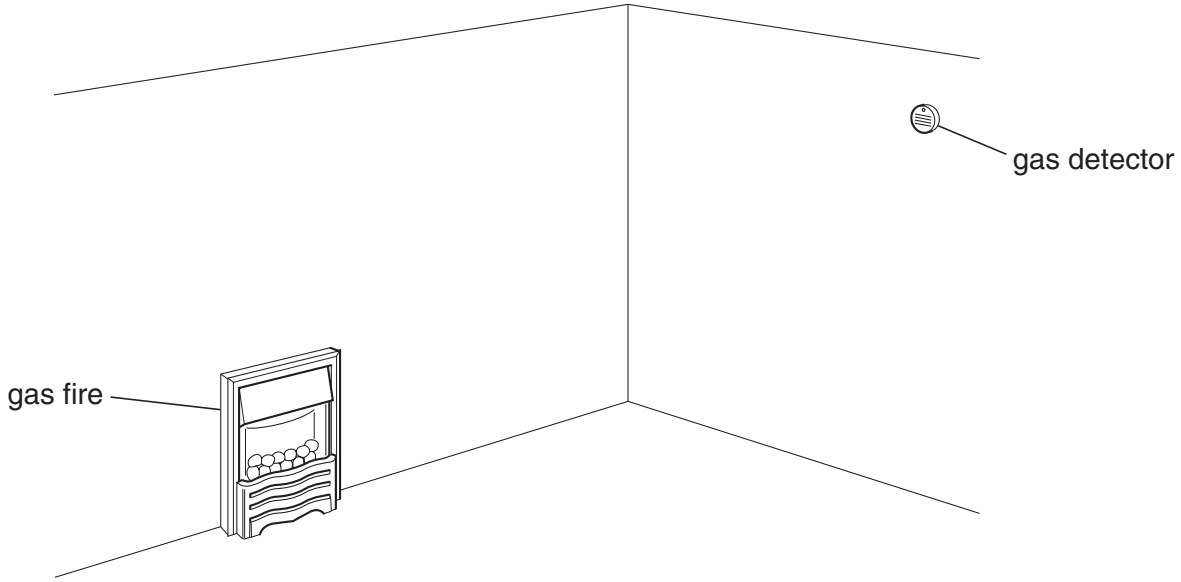
..... **[1]**

[Total: 3]

2 This question is about the burning of fuels.

James and Anita move into a flat.

Look at the diagram of a room in the flat.



Look at the list of gases.

carbon dioxide

carbon monoxide

nitrogen

oxygen

water vapour

(a) The fire uses a fuel. The fuel reacts with a gas in the air.

Which gas?

Choose from the list.

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

(b) The gas detector shows if a poisonous gas is being made.

Write down the name of this **poisonous** gas.

Choose from the list.

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

[Total: 2]

3 Look at the picture of a rose.

The rose has a very pleasant smell.

A perfume can be made from the oil in the rose.

The same perfume can be made in a laboratory. The perfume contains an ester.

(a) Colin makes this ester in a laboratory.

He adds an acid to an alcohol. Water is also made in this reaction.

(i) Write down the **word** equation for the making of this ester.

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

(ii) What is the name given to perfumes made in a laboratory?

Put a (ring) around the correct answer.

active

natural

neutral

synthetic

[1]

(b) We can smell perfumes easily.

(i) Perfumes have a property that makes them easy to smell.

Which property?

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

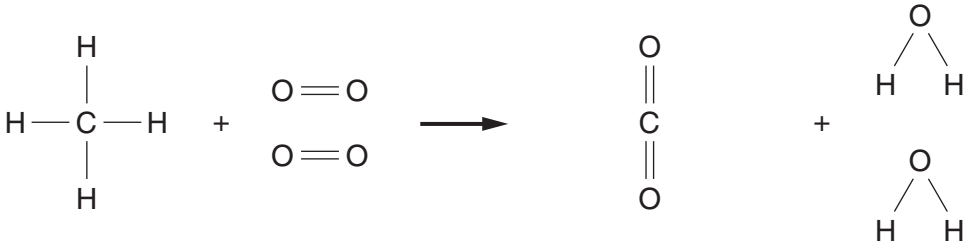
(ii) Some cells in our nose detect the smell of perfume.

What type of cell detects smells?

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

[Total: 4]

4 **(a)** Look at the equations. They show what happens when methane burns.



methane + oxygen ⟶ carbon dioxide + water

(i) Write down the name of one of the **reactants** in the equation.

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

(ii) Look at the displayed formula of methane in the equation.

Write down the **total** number of **atoms** in one molecule of methane.

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

(iii) Look at the displayed formula of carbon dioxide in the equation.

Write down the number of different **types** of atoms in carbon dioxide.

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

(b) Complete the sentence.

The burning of methane is an exothermic reaction.

Energy is …… the surroundings.

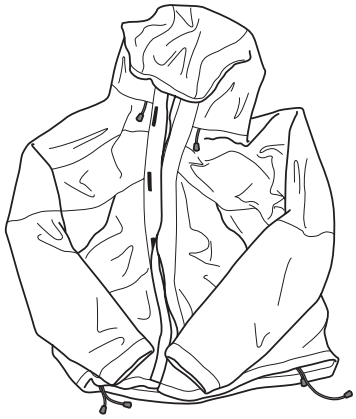
[1]

[Total: 4]

5 A special material called Gore-Tex® is used to make many outdoor clothes.

Jill buys a coat made of Gore-Tex®.

Look at the picture. It shows her coat.



Gore-Tex® has a number of useful properties.

Two of these properties are:

- it is waterproof
- it is breathable.

(a) Why do people wear **waterproof** clothing?

.....

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

(b) Jill wears her Gore-Tex® coat when she goes climbing.

Gore-Tex® is breathable.

Describe one **advantage** of Gore-Tex® being breathable.

.....

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

(c) Gore-Tex® is waterproof and breathable.

Describe **one other** useful property of Gore-Tex®.

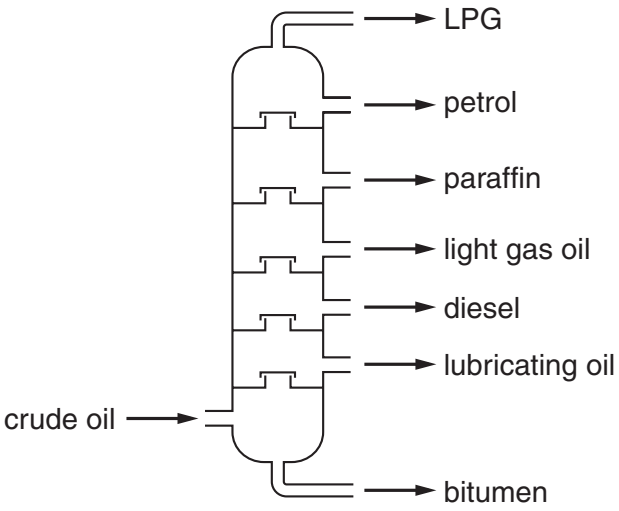
.....

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

[Total: 3]

6 Crude oil is separated into useful substances by fractional distillation.

Look at the diagram. It shows a fractionating column.



(a) The LPG exits from the top of the fractionating column.

Explain why.

Use ideas about boiling points.

.....

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

(b) The petrol fraction contains octane, C_8H_{18}.

Octane is a **hydrocarbon**.

Explain why.

.....

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

(c) Describe **one** use for petrol.

.....

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

[Total: 4]

Section B – Module C2

7 **(a)** Many materials are used to build houses.

Two of these are concrete and glass.

Write down two **other** materials used to build houses.

1 .....

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

(b) Concrete is made by mixing cement, water and one other substance.

(i) Which other substance is added?

Choose from the list.

limestone

marble

salt

sand

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

(ii) Concrete can be reinforced. This makes it stronger.

How is concrete reinforced?

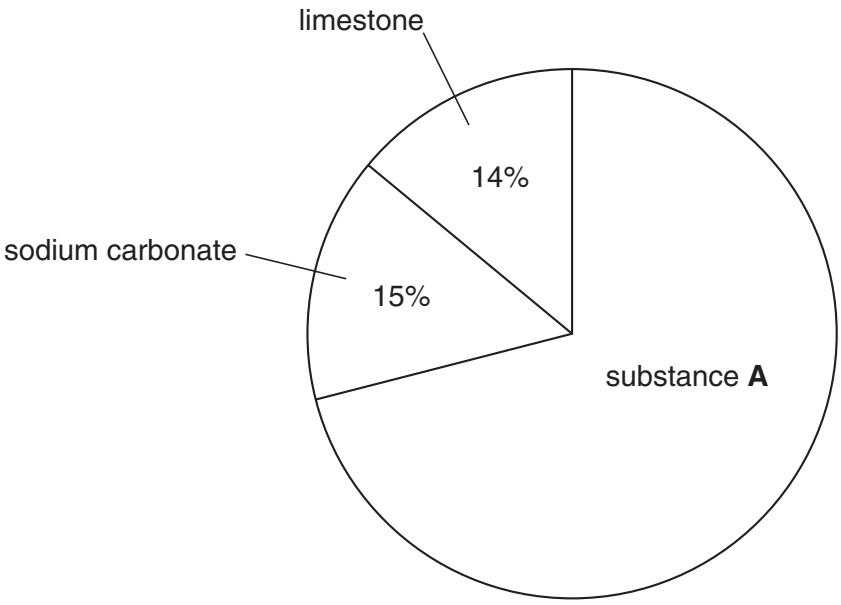
..... **[1]**

(c) Glass is made by mixing and heating three materials.

Two of them are sodium carbonate and limestone.

Look at the pie chart.

It shows the percentages of different materials used to make one type of glass.



(i) Write down the name of substance **A**.

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

(ii) Calculate the percentage of substance **A**.

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

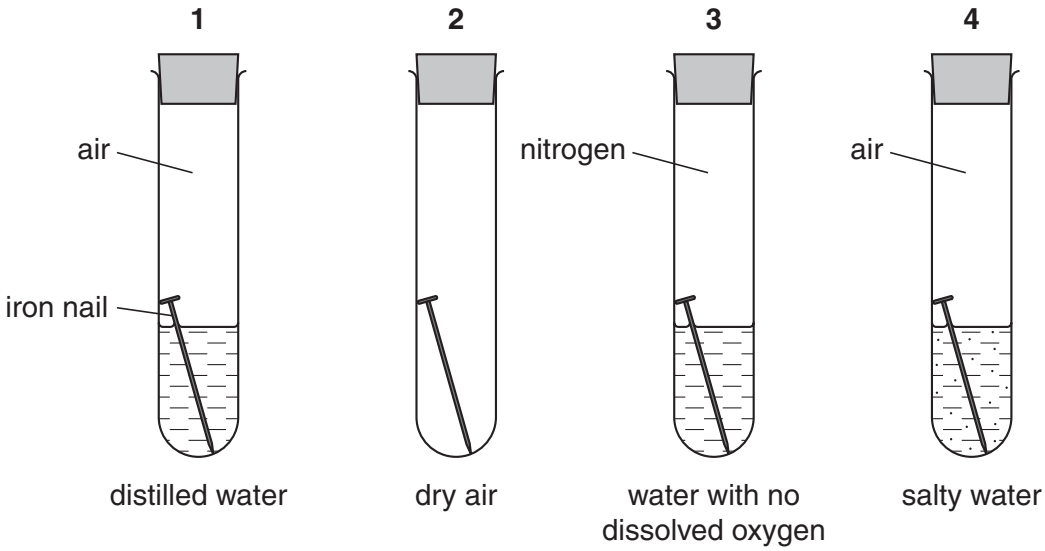
[Total: 6]

8 Nigel investigates the rusting of iron.

Look at the diagram.

It shows how he sets up his investigation.

Each test tube contains an iron nail.



After 2 weeks the nail in tube **1** was a bit rusty.

The nails in tubes **2** and **3** were not rusty.

The nail in tube **4** was very rusty.

(a) Two substances are needed for iron to rust.

Which **two** substances?

1 .....

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

(b) What substance speeds up rusting?

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

(c) Nigel repeats the investigation using aluminium instead of iron.

Aluminium does not corrode in any of the experiments.

Explain why.

.....

.....

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

[Total: 5]

9 Look at the table.

It shows the concentration of some gases found in the atmosphere over the last 100 years.

year	concentration of oxides of nitrogen in parts per million	concentration of carbon dioxide in parts per million
1900	18	300
1920	18	305
1940	20	310
1960	25	320
1980	30	340
2000	35	370

(a) (i) How does the concentration of **oxides of nitrogen** change from 1900 to 2000?

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

(ii) Suggest what the concentration of **carbon dioxide** might be in the atmosphere in the year 2020.

concentration ..... parts per million

Explain your answer.

.....

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

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

Where do the oxides of nitrogen come from?

.....

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

(c) Sulfur dioxide is another gas that pollutes the air.

It is made when sulfur impurities in fossil fuels burn.

What environmental problem can sulfur dioxide cause?

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

[Total: 4]

10 John reacts calcium carbonate with hydrochloric acid.

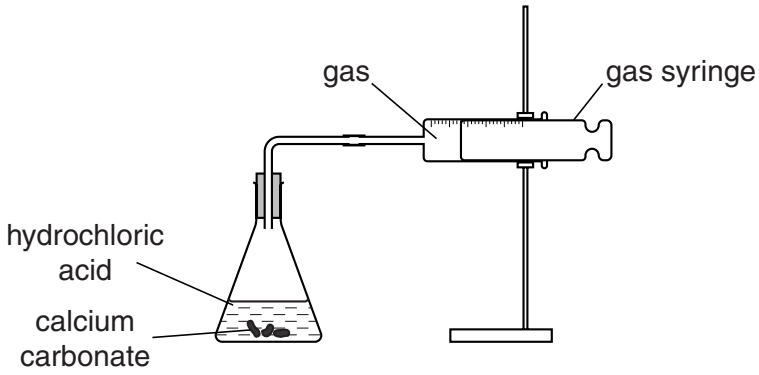
Carbon dioxide gas is made and collected.

He does the experiment twice.

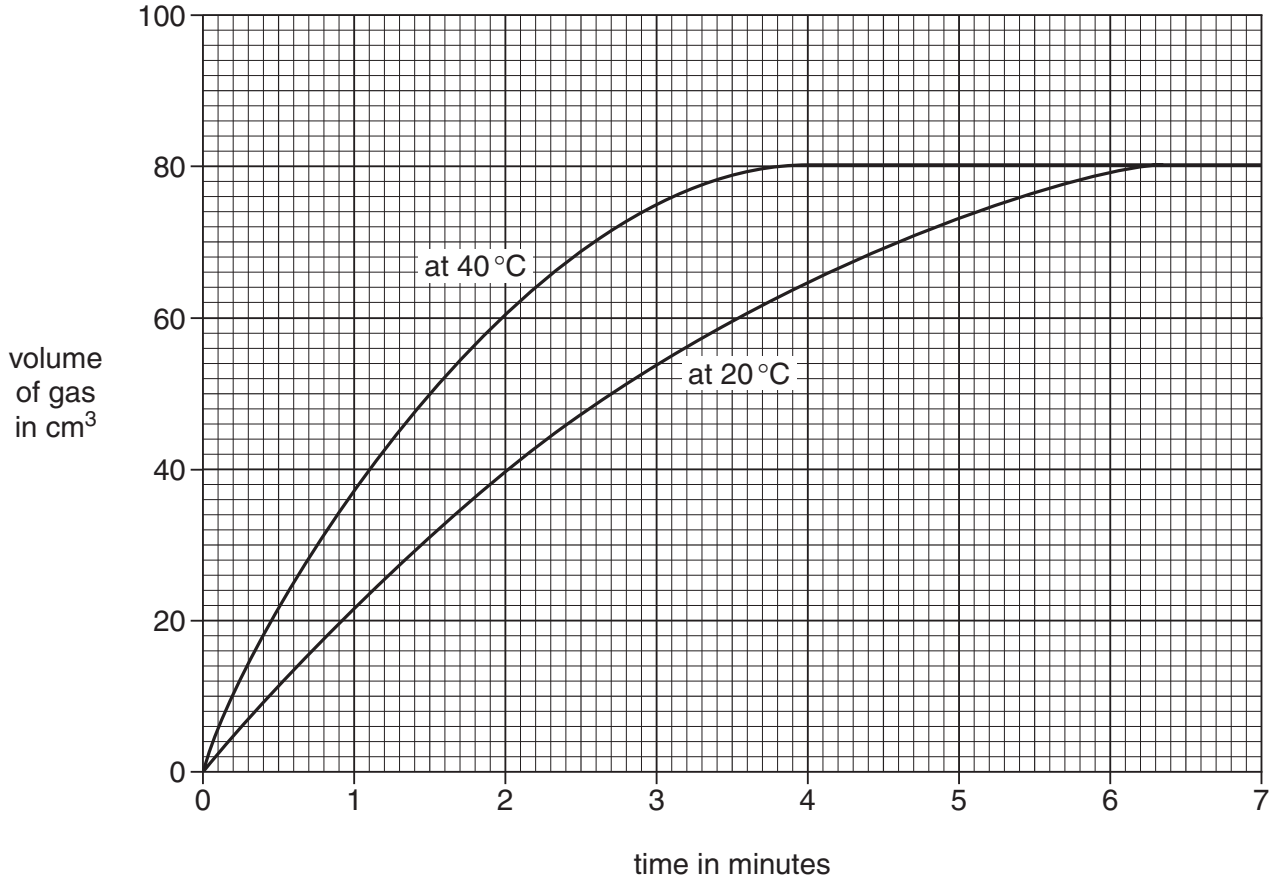
He uses the same amount of each chemical.

In the first experiment the acid is at 20 °C.

In the second experiment the acid is at 40 °C.



(a) Look at the graph. It shows his results.



(i) Both reactions give the same final volume of gas.

What is the final volume of gas?

..... cm^3 **[1]**

(ii) Complete the sentence.

At 2 minutes the reaction at 40 °C has made 60 cm^3 of gas.

At 2 minutes the reaction at **20 °C** has made …… cm^3 of gas. **[1]**

(iii) Which reaction is faster, the one at 20 °C or at 40 °C?

……

Use the **graph** to explain your answer.

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

(b) Suggest why the reaction stops.

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

(c) One way of speeding up a reaction is to increase the temperature.

Write down one **other** way of speeding up a reaction.

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

[Total: 5]

Section C – Module C3

11 This question is about the uses of different elements.

Draw a straight line to join each **element** to its **use**.

element	use
chlorine	building bridges
copper	sterilising cuts and wounds
iodine	making electrical wires
iron	making pesticides and plastics

[3]

[Total: 3]

12 Copper and iron are transition elements.

All the transition elements are metals.

(a) Write down the name or symbol of **one other** transition element.

Use the Periodic Table on the back page to help.

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

(b) One physical property of metals is that they have high tensile strength.

Write about **other** physical properties of metals.

.....

.....

.....

.....

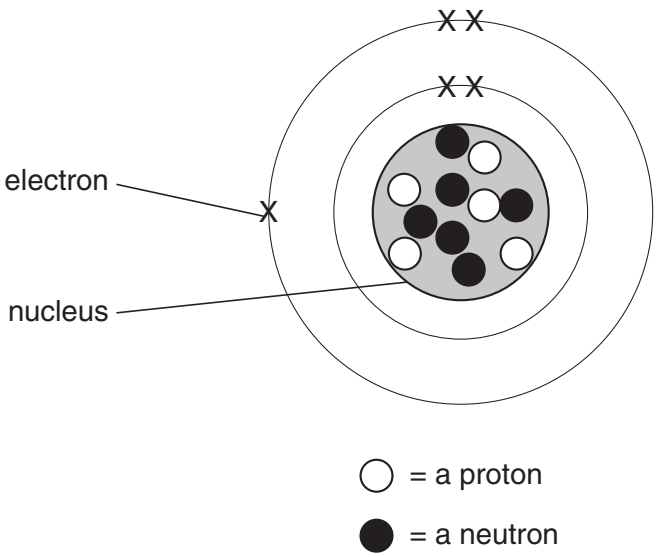
..... **[3]**

[Total: 4]

13 This question is about atomic structure.

Look at the diagram.

It shows the structure of an atom.



(a) What is the **atomic** number of this atom?

.....

[1]

(b) What is the **mass** number of this atom?

.....

[1]

(c) An element is made up of these atoms.

(i) Which **group** of the Periodic Table is this element in?

.....

[1]

(ii) Which **period** of the Periodic Table is this element in?

.....

[1]

[Total: 4]

14 Sodium is an alkali metal.

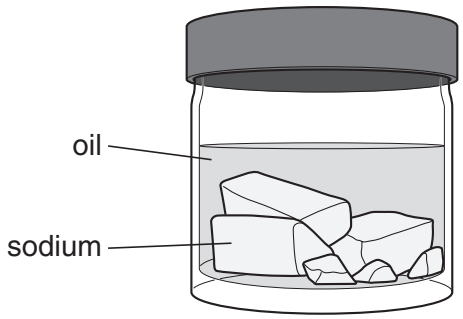
It is in Group 1 of the Periodic Table.

(a) Write down the name or symbol of **one other** alkali metal.

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

(b) Look at the diagram.

It shows how sodium is stored in a bottle.



The sodium is covered with oil. The oil stops sodium reacting with water.

Write down one **other** reason why sodium must be stored under oil.

.....

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

(c) Sodium reacts with cold water.

A colourless gas and an alkaline solution are made.

Look at the balanced symbol equation for this reaction.

$$2Na + 2H_2O \rightarrow 2NaOH + H_2$$

(i) What is the **name** of the colourless gas made?

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

(ii) What is the **name** of the alkaline solution made?

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

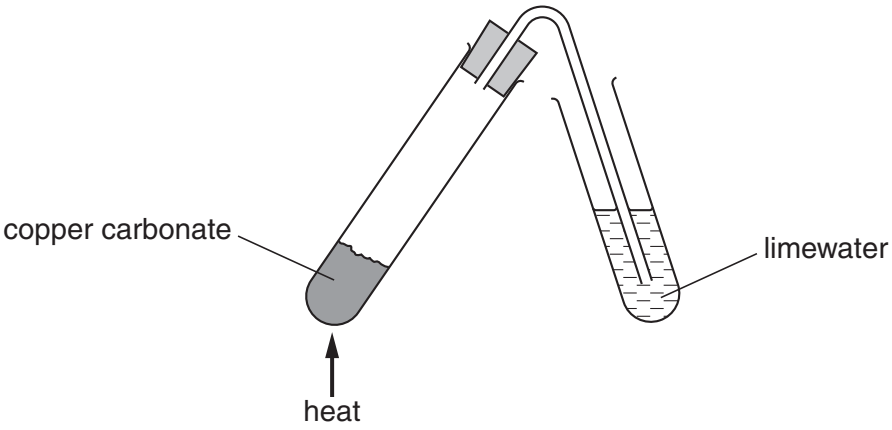
[Total: 4]

15 Beth investigates the thermal decomposition of copper carbonate.

Look at the word equation for this decomposition.

copper carbonate $\longrightarrow$ copper oxide + carbon dioxide

Look at the diagram. It shows the apparatus she uses.



She measures the mass of the copper carbonate before heating.

She also measures the mass of the copper oxide after heating.

Look at her results.

	mass in grams
copper carbonate before heating	2.21
copper oxide after heating	1.43

(a) What is the mass of carbon dioxide made?

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

(b) The carbon dioxide is bubbled through the limewater.

Describe what happens to the limewater.

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

(c) What is meant by **thermal decomposition**?

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

(d) Beth uses the internet to find out about other metal carbonates.

She finds out the temperature needed to decompose different carbonates.

Look at the table. It shows these temperatures.

carbonate	temperature needed to decompose carbonate in °C
copper carbonate	375
iron(III) carbonate	–25
manganese carbonate	500
zinc carbonate	400

(i) Which carbonate needs the **highest** temperature to decompose?

Choose from the carbonates in the table.

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

(ii) Most carbonates need to be heated before they will decompose.

Which carbonate will decompose **without** being heated by a Bunsen burner?

Choose from the carbonates in the table.

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

[Total: 5]

END OF QUESTION PAPER

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.