

Thursday 26 January 2012 – Morning

**GCSE GATEWAY SCIENCE
CHEMISTRY B**

B641/01 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)

Duration: 1 hour



Candidate forename		Candidate surname	
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Centre number						Candidate number				
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INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- 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).
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

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

Answer **all** the questions.

Section A – Module C1

1 This question is about polymers.

Polymers are made by polymerisation.

Small molecules join together to make a polymer.

(a) What are these small molecules called?

..... [1]

(b) Look at the table. It shows some information about polymers.

polymer	density in g/cm ³	melting point in °C	solubility in oil
A	0.92	85	insoluble below 80 °C, soluble above 80 °C
B	0.96	120	insoluble below 80 °C, soluble above 80 °C
C	1.05	65	soluble
D	1.39	60	soluble
E	0.90	150	insoluble

(i) Which polymer has the **lowest** density?

Choose **A, B, C, D** or **E**.

.....

[1]

(ii) Which polymer would be best for making a pipe to carry oil at 100 °C?

Choose **A, B, C, D** or **E**.

.....

Explain your answer.

.....

.....

..... [3]

(c) Polystyrene is a polymer.

Write down **one** use of polystyrene.

..... [1]

(d) Polystyrene is **non-biodegradable**.

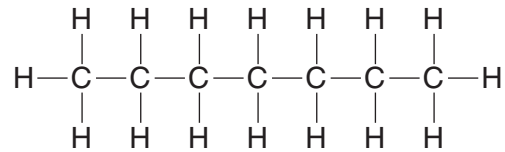
What is meant by non-biodegradable?

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

[Total: 7]

2 Heptane is a fuel.

Look at the displayed formula for heptane.



(a) Complete the table to show the number of carbon and hydrogen atoms in heptane.

element	number of atoms
carbon	
hydrogen	

[1]

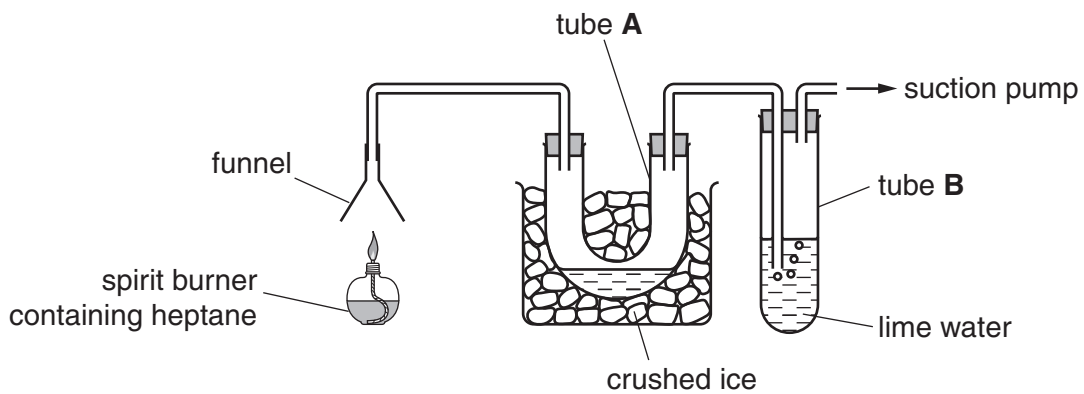
(b) When heptane burns, it reacts with a gas in the air.

Write down the name of this gas.

..... [1]

(c) Tim investigates the burning of heptane.

The diagram shows the apparatus he uses.



(i) Write down the name of the liquid which condenses in tube **A**.

..... [1]

(ii) What happens to the lime water in tube **B**? Explain your answer.

.....

 [2]

[Total: 5]

3 This question is about perfumes.



(a) Look at the following list. It shows some properties of perfumes.

Put a tick (✓) in the correct box for each property. One has been done for you.

	needed by perfume	not needed by perfume
toxic	<input type="checkbox"/>	<input type="checkbox"/>
does not react with water	<input type="checkbox"/>	<input type="checkbox"/>
irritates the skin	<input type="checkbox"/>	<input type="checkbox"/>
soluble in water	<input type="checkbox"/>	<input checked="" type="checkbox"/>

[2]

(b) New perfumes must be tested before they can be used.

Explain why.

.....

..... [1]

[Total: 3]

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4 This question is about cooking.

(a) Emily is frying an egg.

She notices that the egg changes from a liquid to a solid.

(i) Write down **one other** change that she would see.

..... [1]

(ii) Frying an egg is a chemical change.

Explain why.

Choose from this list.

A – the process is reversible

B – a new substance is made

C – there is no energy change

D – eggs are mainly protein

answer [1]

(b) Emily makes a cake.

She adds **baking powder** to the mixture.

When the cake is cooked, the baking powder gives off a gas.

(i) Write down the **name** of this gas.

..... [1]

(ii) Why is baking powder added to the cake mixture?

..... [1]

(c) Baking powder is a food additive.

An **antioxidant** is another type of food additive.

What is the job of an antioxidant?

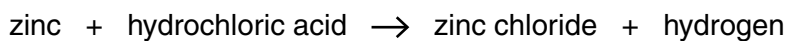
..... [1]

[Total: 5]

Section B – Module C2

5 Luke and Sophie investigate the reaction between zinc and hydrochloric acid.

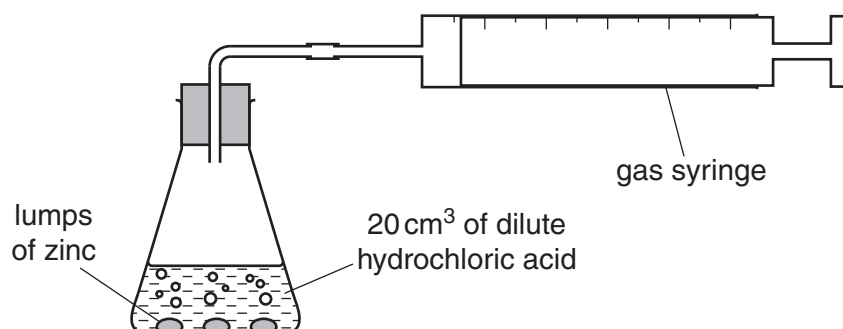
Look at the word equation for this reaction.



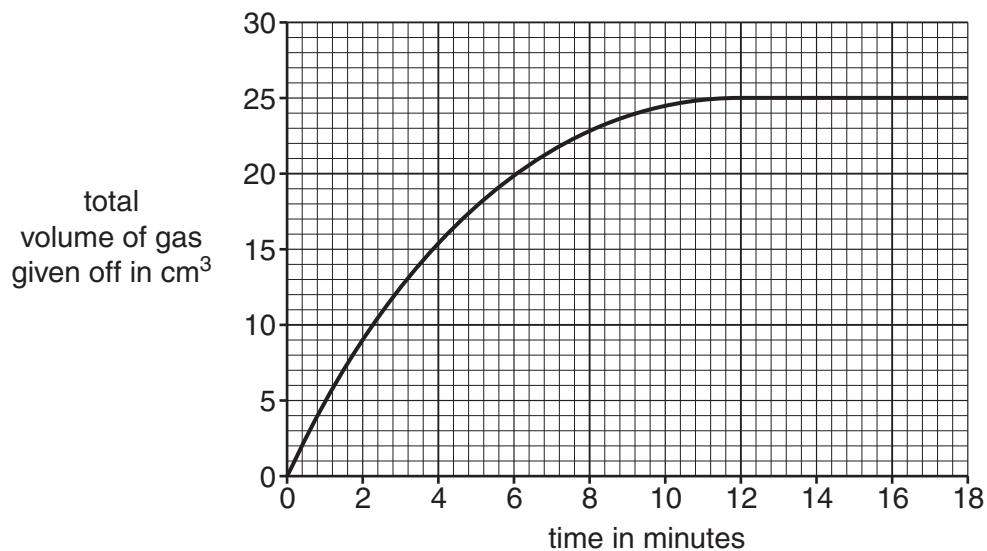
(a) Write down the name of one **product**.

..... [1]

(b) The diagram shows the apparatus they use.



Look at the graph of their results.



(i) How long does it take to make 20 cm³ of gas?

..... minutes

[1]

(ii) The reaction stops at 12 minutes.

Why does the reaction stop?

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

(c) Luke and Sophie do the experiment again.

This time they use **powdered** zinc.

They keep the volume of acid and mass of zinc the same.

Sketch on the **graph** what their new results will look like.

[2]

[Total: 5]

6 This question is about paints and dyes.

(a) Paint is made up of a binding material, a solvent and a pigment.

Link each **material** to its **job in the paint**.

Draw three straight lines.

material	job in the paint
solvent	helps to stick the paint to the surface
binding material	gives the paint its colour
pigment	thins the paint, making it easier to use

[2]

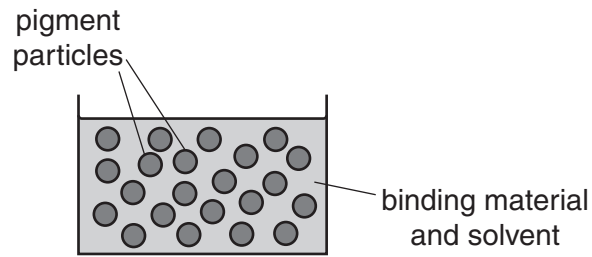
(b) Jane paints a wall with emulsion paint.

The paint dries slowly.

Describe how the paint dries.

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

(c) Look at the diagram of paint in a can.



Paint is a mixture.

What is the name of the type of **mixture** found in paint?

Choose from this list.

colloid

compound

dye

solution

answer [1]

(d) Bob boils some onion skins in water.

He extracts a yellow dye.

What is the name given to this type of dye?

Choose from this list.

natural

phosphorescent

synthetic

thermochromic

answer [1]

[Total: 5]

7 This question is about iron and aluminium.

(a) Look at the table.

It shows information about some properties of iron and aluminium.

property	aluminium	iron
density in g/cm ³	2.7	7.9
relative strength	1	2.7
effect of moist air	no corrosion	rusts quickly
electrical conductivity	good	good

Use the information in the table to answer the questions.

(i) Write down **one** way in which aluminium and iron are similar.

..... [1]

(ii) Write down **one** way in which aluminium is different to iron.

..... [1]

(b) The picture shows a scrap yard full of old cars.



The materials used to make these cars are recycled.

Write down **two** reasons, other than cost, why it is important to recycle these materials.

.....

 [2]

[Total: 4]

8 This question is about the air.

Look at the table. It shows some of the gases in clean air.

gas	percentage in clean air
nitrogen	
oxygen	21
other gases, including carbon dioxide	1

(a) Calculate the percentage of nitrogen in clean air from the data in the table.

answer% [1]

(b) The percentages of carbon dioxide and oxygen in the air remain fairly constant.

Photosynthesis and respiration help to keep these fairly constant.

Explain how.

photosynthesis

.....

respiration

..... [2]

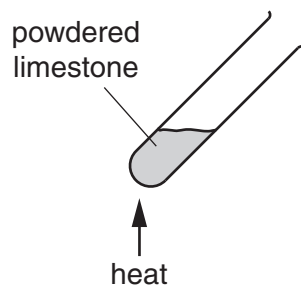
[Total: 3]

9 The chemical name for limestone is calcium carbonate, CaCO_3 .

(a) Write down the total number of atoms in the formula CaCO_3 .

..... [1]

(b) Jim heats some limestone.



Carbon dioxide, CO_2 , is made.

Calcium oxide, CaO , remains in the test tube.

Write down the **balanced symbol** equation for this reaction.

..... [1]

(c) Cement is made when limestone is heated with clay.

Concrete is made from cement.

Look at the picture. It shows a bridge made of reinforced concrete.



How is concrete reinforced?

.....
 [1]

[Total: 3]

Section C – Module C3

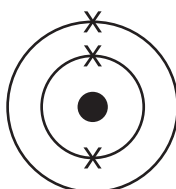
10 This question is about atoms.

Look at the diagrams. They show the atoms of some elements.

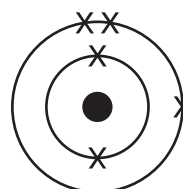
The letters do not represent the symbols for the elements.



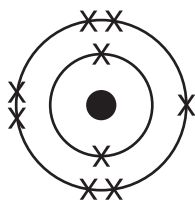
A



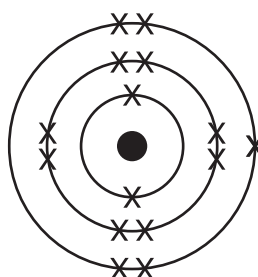
B



C



D



E

(a) (i) Element **B** is in Group 1.

How can you tell?

..... [1]

(ii) Element **E** is in Period 3.

How can you tell?

..... [1]

(iii) Which element forms an ion with a charge of -1 ?

Choose **A**, **B**, **C**, **D** or **E**.

..... [1]

(b) Element **D** has an atomic number of 9.

What is the **name** of the element with atomic number 9?

Use the Periodic Table on the back page to help you.

..... [1]

(c) The nucleus of an atom contains protons and neutrons.

Complete the table to show the **relative charge** and **relative mass** of a neutron.

	relative charge	relative mass
proton	+1	1
neutron

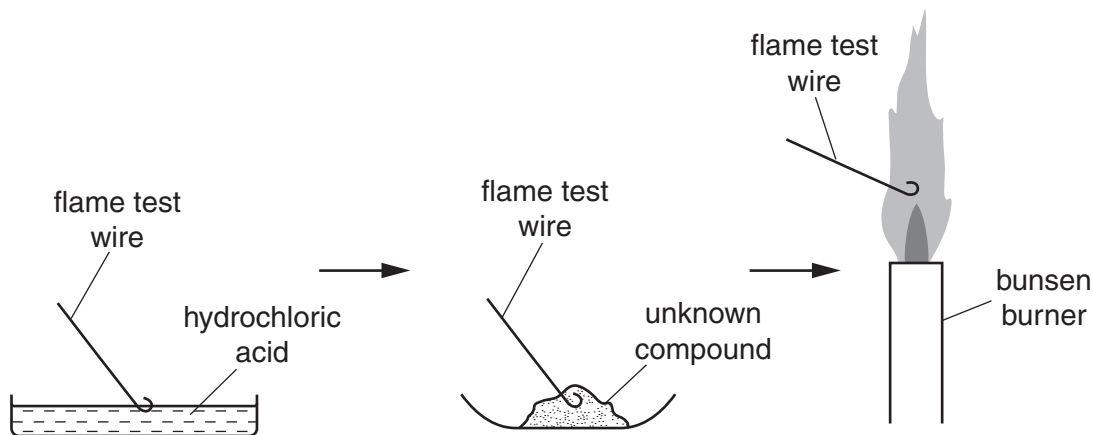
[1]

[Total: 5]

11 Irene and Bert have three unknown compounds **X**, **Y** and **Z**.

They want to identify the metals lithium, sodium and potassium in the compounds.

They use a flame test.



(a) Complete the table.

Choose your answers from **lithium**, **sodium** and **potassium**.

compound	flame colour	metal present
X	lilac
Y	red
Z	yellow

[2]

(b) Sodium metal is stored under oil.

Explain why.

.....

.....

..... [2]

(c) Potassium reacts with chlorine.

Write down the **name** of the compound made.

..... [1]

[Total: 5]

12 Copper is a **transition element**.

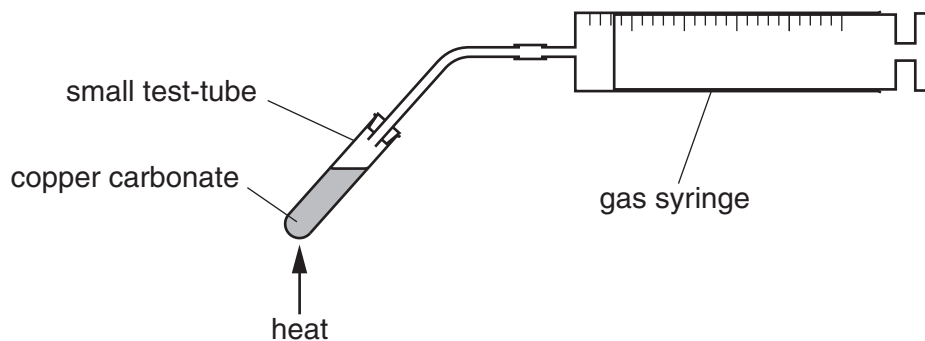
(a) Write down the name of another transition element.

Use the Periodic Table on the back page to help you.

..... [1]

(b) David investigates the heating of copper carbonate.

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



When copper carbonate is heated, carbon dioxide and copper oxide are made.

This reaction is a **thermal decomposition** reaction.

What is meant by thermal decomposition?

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

[Total: 3]

13 In the late 1800s, photographers burned magnesium to produce a magnesium flashlight.

This was used for indoor photography.



(a) Magnesium burns in oxygen to make magnesium oxide.

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

..... [1]

(b) Magnesium oxide contains Mg^{2+} and O^{2-} particles.

What type of particles are Mg^{2+} and O^{2-} ?

Choose from this list.

atoms

ions

isotopes

molecules

answer [1]

(c) Look at the statements about magnesium oxide.

Put a tick (✓) in the box next to the correct statement.

magnesium oxide is an element

magnesium oxide conducts electricity when solid

magnesium oxide has a very high melting point

[1]

[Total: 3]

Turn over

14 This question is about metals.

Look at the table.

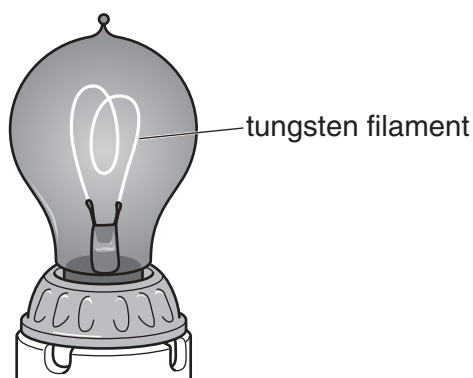
It shows some information about six metals.

metal	melting point in °C	density in g/cm ³	tensile strength	cost
aluminium	661	2.7	medium	medium
copper	1083	8.9	medium	medium
gold	1065	19.3	low	very high
lead	328	11.3	low	low
iron	1535	7.9	very high	low
tungsten	3407	19.4	high	high

(a) Which metal has a low tensile strength and a low cost?

..... [1]

(b) In an electric light bulb, the tungsten filament is heated until it glows white-hot.



The tungsten is at a temperature of over 2000 °C.

Explain why tungsten is chosen for this use.

Use the table to help you.

.....
 [1]

(c) This deep-sea diver wears a belt with weights on it to keep him on the sea bed.



Gold and tungsten both have a very high density, but are **not** used to make the weights.

(i) Explain why gold and tungsten are not used.

Use the table to help you.

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

(ii) Suggest a metal that could be used to make the diver's weights.

Choose from the table.

metal

Explain your answer.

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

[Total: 4]

END OF QUESTION PAPER

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The Periodic Table of the Elements

	1	2	3	4	5	6	7	0		
	7 Li lithium 3	9 Be beryllium 4	11 Na sodium 11	12 C carbon 6	13 Al aluminium 13	14 N nitrogen 7	15 P phosphorus 15	16 O oxygen 8	17 Cl chlorine 17	18 Ar argon 18
	19 K potassium 19	20 Ca calcium 20	23 V vanadium 23	24 Cr chromium 24	25 Mn manganese 25	26 Fe iron 26	27 Co cobalt 27	28 Ni nickel 28	29 Cu copper 29	30 Zn zinc 30
	37 Rb rubidium 37	38 Sr strontium 38	40 Y yttrium 39	41 Zr zirconium 40	42 Nb niobium 41	43 Tc technetium [98]	44 Ru ruthenium 44	45 Rh rhodium 45	46 Pd palladium 46	47 Cd cadmium 48
	55 Cs caesium 55	56 Ba barium 56	57 La* lanthanum 57	72 Hf hafnium 72	73 Ta tantalum 73	74 W tungsten 74	75 Re rhenium 75	76 Os osmium 76	77 Ir iridium 77	78 Pt platinum 78
	87 Fr francium 87	88 Ra radium 88	89 Ac* actinium 89	104 Rf rutherfordium 104	105 Db dubnium 105	106 Sg seaborgium 106	107 Bh bohrium 107	108 Hs hassium 108	109 Mt meitnerium 109	110 Ds darmstadtium 110
	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
	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
	119 Sn tin 50	120 Pb lead 82	121 Bi bismuth 83	122 Po polonium 84	123 At astatine 85	124 Rn radon 86	125 Fr francium 87	126 Ra radium 88	127 Ac actinium 89	128 Th thorium 90
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	108 Ag silver 47	109 Cd cadmium 48	110 In indium 49	111 Tl thallium 81	112 Po polonium 84	113 At astatine 85	114 Rn radon 86	115 Fr francium 87	116 Ra radium 88	117 Ac actinium 89
	65 Zn zinc 30	66 Ga gallium 31	67 Ge germanium 32	68 As arsenic 33	69 Se selenium 34	70 Br bromine 35	71 Kr krypton 36	72 Xe xenon 54	73 Rn radon 86	74 Fr francium 87
	59 Ni nickel 28	60 Cu copper 29	61 Zn zinc 30	62 Ga gallium 31	63 Ge germanium 32	64 As arsenic 33	65 Se selenium 34	66 Br bromine 35	67 Kr krypton 36	68 Xe xenon 54
	56 Fe iron 26	57 Co cobalt 27	58 Ni nickel 28	59 Cu copper 29	60 Zn zinc 30	61 Ga gallium 31	62 Ge germanium 32	63 As arsenic 33	64 Se selenium 34	65 Br bromine 35
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