

GENERAL CERTIFICATE OF SECONDARY EDUCATION
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)

Monday 18 January 2010
Morning

Duration: 1 hour



Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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MODIFIED LANGUAGE

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 Periodic Table is printed on the back page.
- The total number of marks for this paper is **60**.
- This document consists of **20** pages. Any blank pages are indicated.

Answer **all** the questions.

Section A – Module C1

1 This question is about fuels.

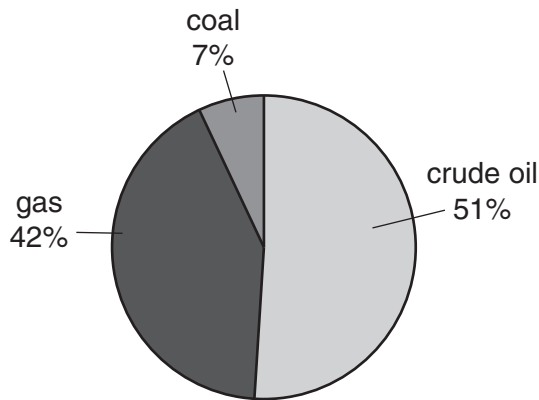
Coal, crude oil and gas are **non-renewable** fuels.

Supplies of these three fossil fuels will eventually run out.

(a) What is meant by a **non-renewable** fuel?

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

(b) Look at the information comparing the use of three fossil fuels in one year.



Which of the three fossil fuels was used the **most**?

..... [1]

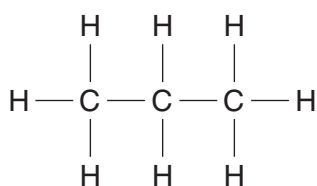
(c) Petrol and diesel are separated from crude oil.

What is the name of the process that separates crude oil into useful fractions?

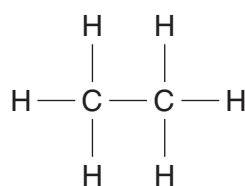
..... [1]

[Total: 3]

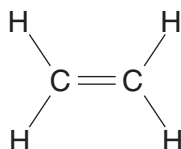
2 Look at the displayed formulas of some compounds of carbon.



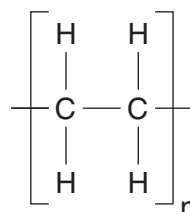
compound **A**



compound **B**



compound **C**



compound **D**

(a) Which one of the compounds has **8** atoms?

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

answer [1]

(b) Which one of the compounds is a **polymer**?

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

answer [1]

(c) Which one of the compounds is an **alkene**?

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

answer [1]

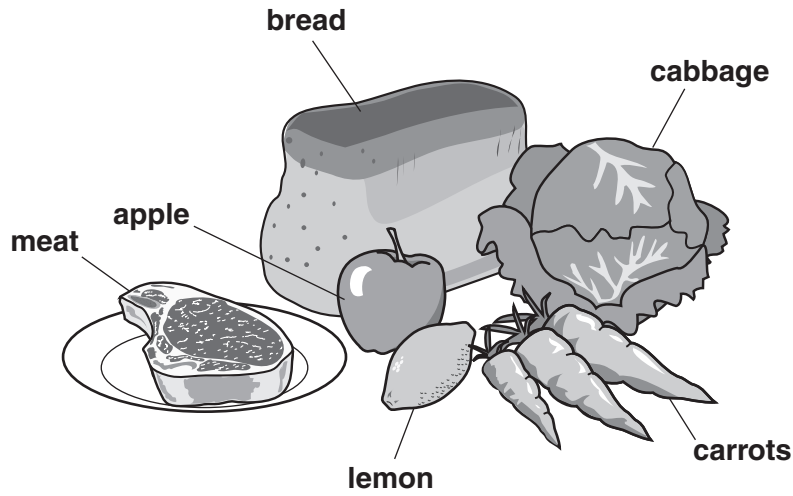
(d) How many **carbon** atoms has compound **A**?

answer [1]

[Total: 4]

3 This question is about cooking and foods.

Look at the picture of some foods.



(a) Write down the name of one food that contains a lot of **protein**.

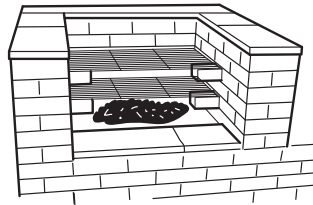
Choose from the foods in the picture.

..... [1]

(b) Some of the foods in the picture need to be cooked before eating them.

Look at the picture of a barbecue.

This is used to cook food at a high temperature.



(i) Write down **one** other way of **cooking** food.

..... [1]

(ii) Write down **one** reason why some foods need to be cooked.

.....

..... [1]

(iii) Cooking food is an example of a chemical change.

Explain why.

.....

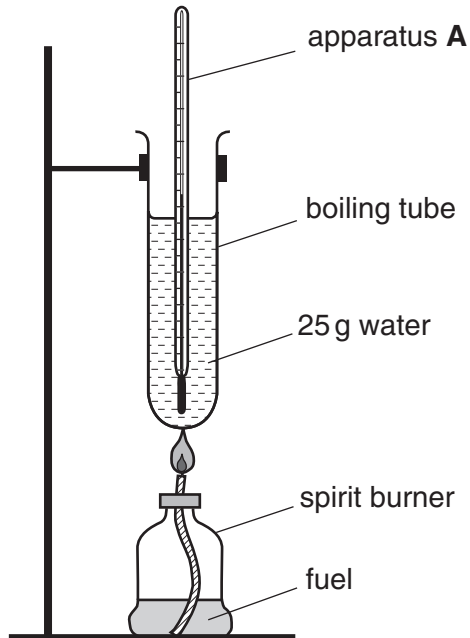
..... [1]

[Total: 4]

- 4 Luke and Sophie investigate the energy content of two fuels.

Look at the diagram.

It shows the apparatus they use.



- (a) Write down the name of apparatus A.

..... [1]

- (b) They burn 1.0 g of fuel each time.

Look at their table of results.

fuel	starting temperature of water in °C	final temperature of water in °C	temperature change in °C
ethanol	20	35	15
paraffin	20	50	

- (i) What is the temperature change for paraffin?

answer °C

[1]

- (ii) Burning fuels is an **exothermic** reaction.

What is meant by an exothermic reaction?

..... [1]

[Total: 3]

5 Look at the label on a jar of mayonnaise.



Ingredients:
Water; oil; egg yolk (an emulsifier); sugar;
flavour enhancers; food colouring; antioxidants

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

Choose from the food label.

..... [1]

(b) Egg yolk is one of the ingredients in the mayonnaise.

Egg yolk is an **emulsifier**.

Describe what an emulsifier does.

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

(c) The mayonnaise contains an **antioxidant**.

Antioxidants are added to foods.

Explain why.

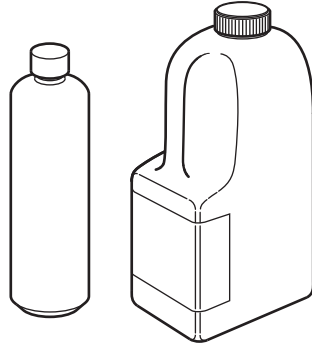
.....
..... [1]

[Total: 3]

6 This question is about polymers and plastics.

Look at the picture.

The milk container and bottle are **non-biodegradable**.



(a) What does non-biodegradable mean?

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

(b) Describe how some local councils dispose of these plastic containers.

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

[Total: 3]

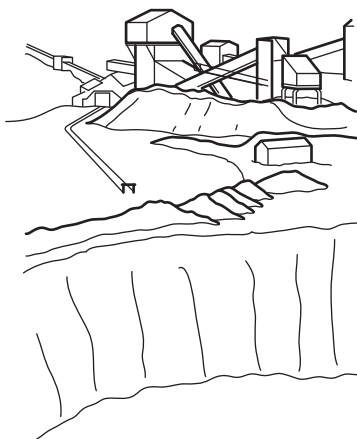
Section B – Module C2

7 Limestone is a rock used to make buildings.

Limestone is obtained from a quarry.

A quarry is a very large hole dug into rocks.

Look at the picture of a quarry.



(a) Quarries can cause environmental problems.

One of these problems is that they take up lots of land.

Write about **other** environmental problems caused by quarrying.

.....

.....

.....

..... [2]

(b) The chemical name for limestone is calcium carbonate.

When calcium carbonate is heated strongly it changes into calcium oxide.



This change is called **thermal decomposition**.

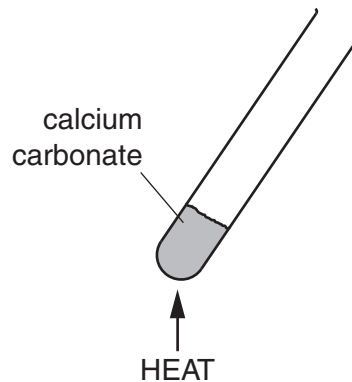
What is thermal decomposition?

.....

..... [1]

(c) Harry investigates the decomposition of calcium carbonate.

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



Harry measures the mass of the test tube and its contents before and after heating.

Look at his results table.

	mass in grams
mass of test tube and contents before heating	17.45
mass of test tube and contents after heating	16.96

(i) The mass of the test tube and its contents decreases.

Suggest why.

..... [1]

(ii) What is the change in mass of the test tube and its contents?

change in mass = g [1]

[Total: 5]

8 Iron reacts very slowly with dilute sulfuric acid.

The reaction makes iron sulfate and hydrogen.

(a) Write down the **word** equation for this reaction.

..... [1]

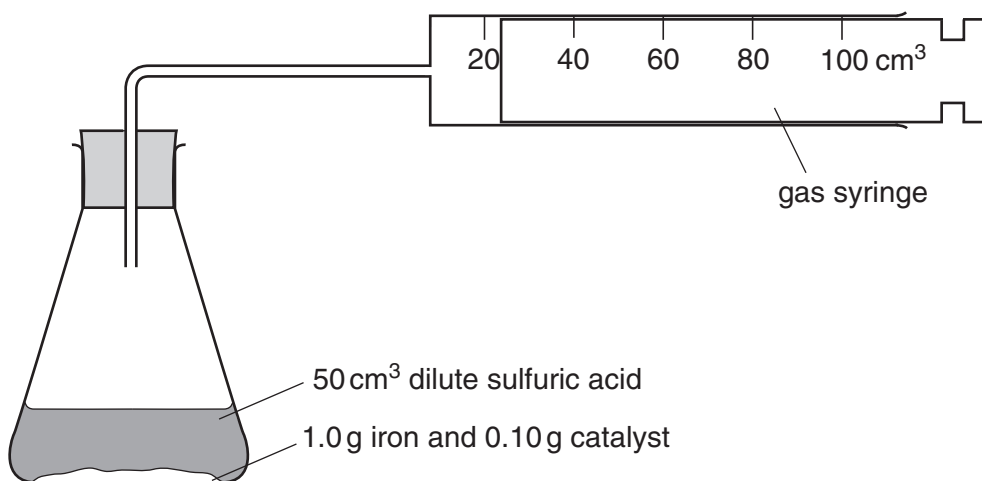
(b) Milly wants to make the reaction faster.

She knows that catalysts make reactions faster.

She tries to find a catalyst for this reaction.

Look at the diagram.

It shows the apparatus she uses.



She measures the time it takes to collect 100 cm³ of hydrogen in the gas syringe.

In experiment 1 she does not use a catalyst.

In experiments 2 to 5 she uses 0.10 g of catalyst each time.

Look at the results table.

Experiment number	name of catalyst	colour of catalyst at start of reaction	colour of catalyst at end of reaction	mass of catalyst at the start of reaction in grams	mass of catalyst left at the end of reaction in grams	time to collect 100 cm ³ of hydrogen in seconds
1	no catalyst added					130
2	copper powder	pink	pink	0.10	0.10	20
3	copper sulfate powder	blue	pink	0.10	0.04	15
4	calcium sulfate powder	white	white	0.10	0.10	130
5	zinc powder	silver	silver	0.10	0.05	10

- (i) Milly did **not** use a catalyst in experiment 1.

Suggest why.

.....
 [1]

- (ii) In which experiment was the reaction the **fastest**?

Choose from experiment 1, 2, 3, 4 or 5.

..... [1]

- (iii) Milly thinks that copper powder is a catalyst for this reaction.

Explain how Milly made this conclusion from her results.

.....

 [2]

[Total: 5]

9 Steel is an alloy that contains iron and carbon.

Iron rusts much more easily than steel.

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

Which **two**?

..... and [2]

(b) Which **one** of the following is an alloy?

Choose from:

lead

solder

tin

zinc

answer [1]

(c) Fizzy drinks cans are made from metal.

Look at the diagram. It shows a can of fizzy drink.



The metal used to make the can must be malleable.

This is a property of the metal.

Write down two **other** properties that the metal used to make this fizzy drinks can must have.

1

2 [2]

[Total: 5]

10 This question is about paints.

Look at the table. It shows the ingredients of a paint.

ingredient	percentage
binder	47
pigment	21
solvent	27
additives	5

(a) Which ingredient is in the **greatest** amount?

..... [1]

(b) What is the job of the **pigment** in a paint?

..... [1]

(c) What is the job of the **solvent** in a paint?

..... [1]

(d) Draw a straight line to join each **type of paint** to its best **description**.

You should only draw three straight lines.

type of paint

description

oil paint

a paint that changes colour when heated

phosphorescent paint

a paint that glows in the dark

thermochromic paint

a paint that has a pigment dispersed in water

a paint that has a pigment dispersed in oil

[2]

[Total: 5]

Turn over

Section C – Module C3

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

Look at the diagram. It shows part of the Periodic Table.

		H					He	
Li	Be		B	C	N	O	F	Ne
Na	Mg		Al	Si	P	S	Cl	Ar
K	Ca							

Answer the questions.

Choose your answers from the symbols shown on this Periodic Table.

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

(a) Write the symbols of **two** elements in the same **period**.

..... and [1]

(b) Write the symbols of **two** elements in the same **group**.

..... and [1]

(c) Write the symbol for an element with an atom with **seven** electrons in its outer shell.

..... [1]

[Total: 3]

12 Transition elements, such as iron and copper, are metals.

Two of the properties of these metals are that they are malleable and ductile.

(a) Write about some of the **other** properties of metals.

.....

.....

.....

..... [3]

(b) Brahim adds a small volume of sodium hydroxide solution to five different solutions.

An insoluble solid called a precipitate is made each time.

Look at the results table. It is not finished.

solution	formula	colour of precipitate made
copper chloride	CuCl_2	blue
copper nitrate	$\text{Cu}(\text{NO}_3)_2$
iron(II) chloride	FeCl_2	green
iron(II) sulfate	FeSO_4	green
iron(III) nitrate	$\text{Fe}(\text{NO}_3)_3$

(i) Finish the table. [2]

(ii) Look at the formulas in the table.

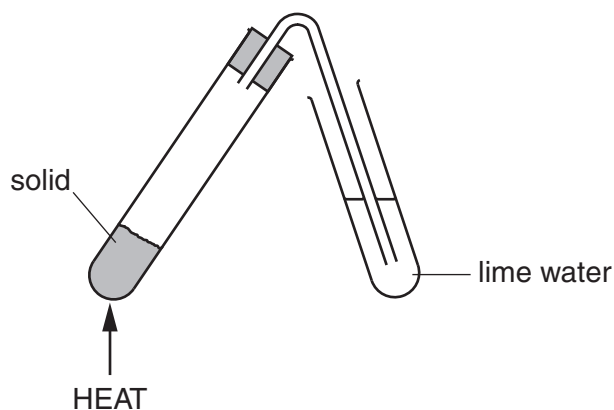
Which formula contains **six** oxygen atoms?

Choose from the table.

..... [1]

(c) Brahim investigates what happens when he heats some solids.

Look at the apparatus he uses.



Look at the results table.

solid	colour change of solid	effect on lime water
copper carbonate	green to black	goes milky
iron(II) sulfate	green to brown	stays colourless
potassium carbonate	stays white	stays colourless
zinc carbonate	white to yellow and back to white	goes milky

Two solids make carbon dioxide when heated.

Which two?

..... and [1]

[Total: 7]

13 This question is about the elements in Group 7.

These elements are called the halogens.

(a) Look at the table. It shows information about some of the halogens.

element	atomic number	density in g/dm ³	melting point in °C	atomic radius in pm
chlorine	17	1.56	-101	99
bromine	35	2.93	-7	114
iodine	53	4.93	114	133

(i) Write the name of one **other** element that is a halogen.

..... [1]

(ii) Look at the table.

How does the density change as the atomic number increases?

..... [1]

(b) Chlorine is used to make pesticides.

Write down one **other** use of chlorine.

..... [1]

(c) The reactivity of the halogens changes as the atomic number increases.

Describe how.

..... [1]

(d) Look at the table. It shows information about two isotopes of chlorine.

	isotope 1	isotope 2
atomic number	17	17
mass number	35	37
number of protons	17	17
number of neutrons	18	20

What is an isotope? Use information from the table to help you.

.....
 [1]

[Total: 5]

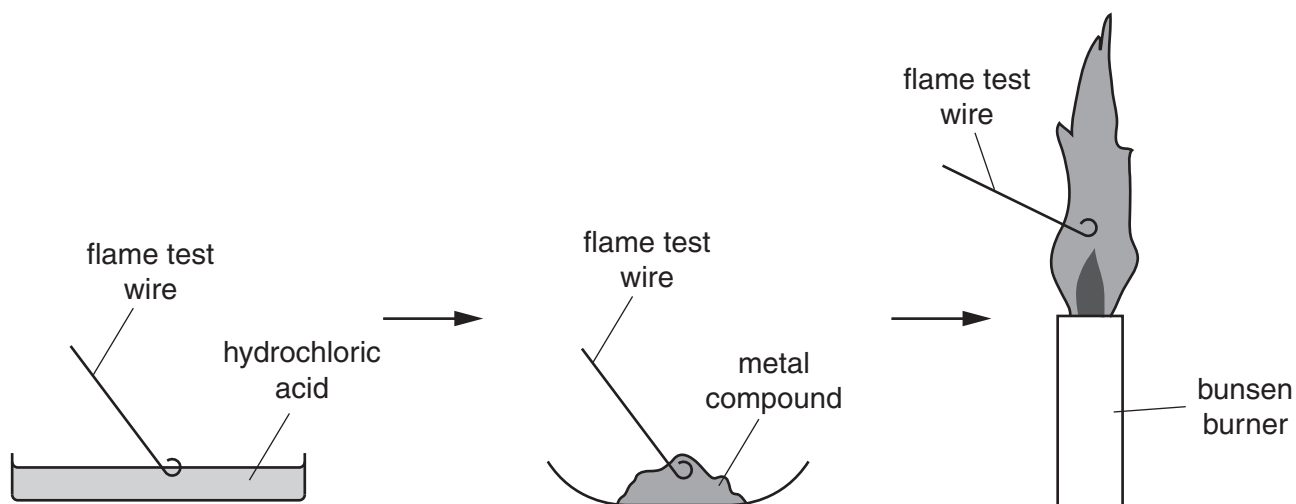
Turn over

14 This question is about alkali metals and their compounds.

(a) Hannah decides to test some metal compounds.

She uses a flame test.

Look at the diagram. It shows how Hannah does a flame test.



Look at Hannah's results.

metal compound	colour of flame
potassium chloride	lilac
sodium chloride
compound A	red

(i) Sodium chloride contains sodium.

What is the colour of the flame when Hannah tests sodium chloride?

Write your answer in the table.

[1]

(ii) Compound **A** contains a metal.

Which metal?

..... [1]

(b) Potassium chloride is made of particles.

One particle has the formula K^+ and the other Cl^- .

Which of these particles is a cation? Explain why.

..... [1]

(c) Potassium reacts with water to make a colourless gas.

Donna thinks the gas is hydrogen.

Describe how Donna can test this gas to see if it is hydrogen.

test

result

..... [2]

[Total: 5]

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 O oxygen 8	16 F fluorine 9	17 Ne neon 10
19 K potassium 19	20 Ca calcium 20	23 Sc scandium 21	24 Ti titanium 22	25 V vanadium 23	26 Cr chromium 24	27 Mn manganese 25	28 Fe iron 26	29 Co cobalt 27
37 Rb rubidium 37	38 Sr strontium 38	39 Y yttrium 39	40 Zr zirconium 40	41 Nb niobium 41	42 Mo molybdenum 42	43 Tc technetium [98]	44 Ru ruthenium 44	45 Rh rhodium 45
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
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
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
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
131 Xe xenon 54	127 I iodine 53	128 Te tellurium 52	119 Sn tin 50	122 Sb antimony 51	125 Te tellurium 52	128 Bi bismuth 83	131 Po polonium 84	135 At astatine 85
84 Kr krypton 36	80 Br bromine 35	79 Se selenium 34	73 Ge germanium 32	75 As arsenic 33	78 Sr strontium 38	80 Zn zinc 30	84 Kr krypton 36	86 Rn radon 86
40 Ar argon 18	35.5 Cl chlorine 17	32 S sulfur 16	28 Si silicon 14	31 P phosphorus 15	32 S sulfur 16	35.5 Cl chlorine 17	40 Ar argon 18	40 Ar argon 18
27 Al aluminium 13	28 Si silicon 14	27 Al aluminium 13	27 Al aluminium 13	27 Al aluminium 13	27 Al aluminium 13	27 Al aluminium 13	27 Al aluminium 13	27 Al aluminium 13
11 B boron 5	12 C carbon 6	13 Al aluminium 13	14 N nitrogen 7	15 O oxygen 8	16 F fluorine 9	17 Ne neon 10	18 Ar argon 18	18 Ar argon 18
4 He helium 2	4 He helium 2	4 He helium 2	4 He helium 2	4 He helium 2	4 He helium 2	4 He helium 2	4 He helium 2	4 He helium 2

1 H hydrogen 1

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.