

**GENERAL CERTIFICATE OF SECONDARY EDUCATION  
GATEWAY SCIENCE  
CHEMISTRY B**

**B641/01**

Unit 1 Modules C1 C2 C3 (Foundation Tier)

**FRIDAY 18 JANUARY 2008**

Afternoon  
Time: 1 hour

Candidates answer on the question paper.

**Additional materials (enclosed):**

None

Calculators may be used.

**Additional materials:** Pencil  
Ruler (cm/mm)



Candidate  
Forename

Candidate  
Surname

Centre  
Number

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Candidate  
Number

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**INSTRUCTIONS TO CANDIDATES**

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or 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.
- Do **not** write outside the box bordering each page.
- Write your answer to each question in the space provided.

**INFORMATION FOR CANDIDATES**

- The number of marks for each question 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.

**FOR EXAMINER'S USE**

Section	Max.	Mark
A	20	
B	20	
C	20	
TOTAL	60	

This document consists of **20** printed pages.

Answer **all** the questions.

**Section A – Module C1**

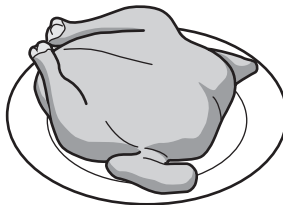
1 This question is about cooking.

(a) Look at the list of foods.

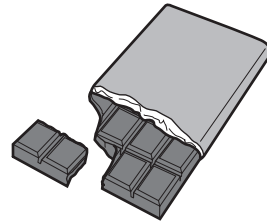
**apple**



**chicken**



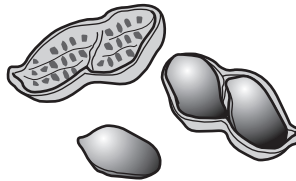
**chocolate bar**



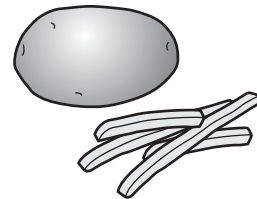
**crisps**



**peanut**



**potato**



Write down the **two** foods that need to be cooked before we can eat them.

Choose from the list.

answer ..... and ..... [2]

(b) (i) Eggs are usually cooked before they are eaten.

One method of cooking is frying.

Write down one **other** way of cooking an egg.

..... [1]

(ii) Write down **two** changes that happen when an egg is cooked.

1 .....  
 .....

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

[Total: 5]

- 2 Some perfumes contain smelly chemicals called esters.

Esters can be made by reacting two types of chemical together.

- (a) Complete this **word** equation about making esters.

alcohol + ..... → ester + ..... [2]

- (b) Cosmetics are tested before they are used on humans.

In some countries cosmetics are still tested on animals before they are used on humans.

Write about the testing of cosmetics.

Your answer should include

- why cosmetics need to be tested
- one advantage of testing on animals
- one disadvantage of testing on animals.

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

[Total: 5]

**3** Propane is a gas used in camping stoves.

The formula of propane is  $C_3H_8$ .

Propane reacts with oxygen to make carbon dioxide and water.



- (a) (i)** How many **elements** are there in propane,  $C_3H_8$ ?

.....

[1]

- (ii)** How many **atoms** are there in one molecule of propane,  $C_3H_8$ ?

.....

[1]

- (b)** Propane reacts with oxygen to make carbon dioxide and water.

Look at the word equation for this reaction.



One of the four substances in the equation is an **element**.

Which one?

Choose from the list.

**propane**

**oxygen**

**carbon dioxide**

**water**

answer ..... [1]

- (c)** The oxygen supply to the flame is not enough.

The flame changes colour from blue to yellow.

The flame now contains a black solid and carbon monoxide gas.

- (i)** What is the name of the black solid?

..... [1]

- (ii)** Why is carbon monoxide gas dangerous?

..... [1]

[Total: 5]

4 This question is about plastics.

(a) Look at the table.

It shows the properties of some plastics.

plastic	property			
	flexibility	hardness	ease of colouring	melting point in °C
<b>A</b>	very flexible	soft	easy	367
<b>B</b>	rigid	soft	not easy	200
<b>C</b>	rigid	hard	not easy	874
<b>D</b>	very flexible	soft	very easy	178

(i) A plastic part of an electric toaster must not melt.

Which plastic has the **highest** melting point?

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

answer ..... [1]

(ii) Plastic **B** is polystyrene.

Write down one use for polystyrene.

..... [1]

(b) Many plastics are **non-biodegradable**.

Write down what is meant by non-biodegradable.

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

(c) Disposal of waste plastics causes problems.

One of these problems is litter.

Write about **other** problems of disposing of plastics.

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

[Total: 5]

[Turn over

## Section B – Module C2

- 5 Stowmarket Synthetics make an oil paint.



This oil paint contains a pigment and a solvent.

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

..... [1]

- (b) The pigment gives the oil paint a colour.

What type of pigment changes colour when it is heated or cooled?

Choose from the list.

**colloid**

**natural**

**phosphorescent**

**synthetic**

**thermochromic**

answer ..... [1]

- (c) What type of pigment glows in the dark?

Choose from the list.

**colloid**

**natural**

**phosphorescent**

**synthetic**

**thermochromic**

answer ..... [1]

[Total: 3]

6 Air is a mixture of many gases.

Carbon monoxide, sulfur dioxide and oxides of nitrogen are pollutants sometimes found in air.

(a) Write down the name of one gas found in **non-polluted** air.

..... [1]

(b) Sulfur dioxide causes acid rain.

One environmental problem caused by acid rain is that it corrodes metals.

Write about **other** environmental problems caused by acid rain.

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

(c) Nitrogen monoxide is made in a car engine.

It can be removed from the exhaust gases of a car by a catalytic converter.

In a catalytic converter nitrogen monoxide reacts with carbon monoxide.

Carbon dioxide and nitrogen are made.

Write down the **word** equation for the reaction in the catalytic converter.

..... [1]

(d) The catalyst in a catalytic converter has a large surface area.

The reaction between nitrogen monoxide and carbon monoxide is very fast.

Explain why.

Use ideas about particles.

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

[Total: 5]

7 Metals are a very useful type of material.

Steel is an alloy. It is a mixture of iron and carbon.

(a) Look at this list of metals.

**brass**

**copper**

**lead**

**mercury**

**solder**

Two of the metals are alloys.

Which two?

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

(b) Look at the table.

It shows some information about four metals.

<b>metal</b>	<b>melting point in °C</b>	<b>density in g/cm<sup>3</sup></b>	<b>relative strength (1 is very weak)</b>	<b>relative hardness (1 is very soft)</b>
aluminium	660	2.7	11	2.8
copper	1085	8.9	33	3.0
iron	1538	7.9	20	4.5
titanium	1668	4.5	40	6.0

(i) Which metal is the **hardest**?

..... [1]

(ii) Which metal has the **lowest** density?

..... [1]



- (iii) Iron corrodes quickly in moist air.

This is called rusting.

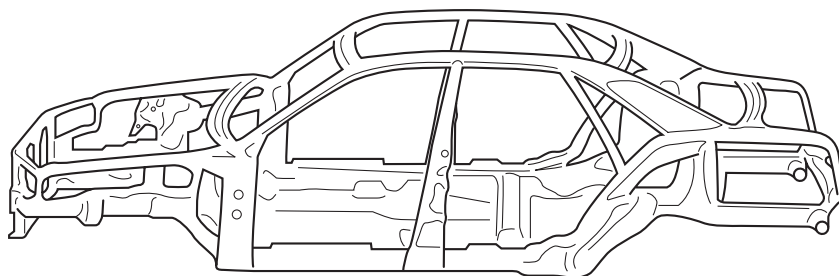
Aluminium does not corrode in moist air.

Explain why.

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

- (iv) Steel is an alloy that contains mostly iron.

Look at the diagram. It shows a car body.



Aluminium or steel can be used to make a car body.

One advantage of aluminium is that it will not corrode in moist air.

Describe **another** advantage and a disadvantage of using aluminium instead of steel to make a car body.

Information in the table may help you answer this question.

**advantage** of using aluminium .....

.....

**disadvantage** of using aluminium .....

..... [2]

- (c) Aluminium and steel are both recycled.

One reason is to save money.

Suggest **one** other reason for recycling.

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

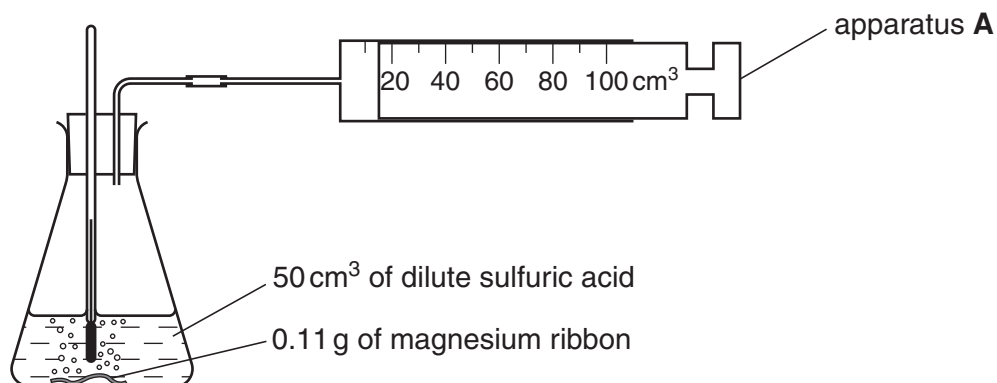
[Total: 9]

[Turn over]

- 8 Blessy and Anu investigate the reaction between magnesium and dilute sulfuric acid.

This reaction makes hydrogen and magnesium sulfate.

Look at the apparatus they use.



- (a) What is the name of apparatus A?

..... [1]

- (b) Blessy and Anu do four experiments.

They do each experiment using acid at a different temperature.

Each time they use

- 50 cm<sup>3</sup> of dilute sulfuric acid
- 0.11 g of magnesium.

They measure the time it takes to collect 100 cm<sup>3</sup> of hydrogen.

Look at their results.

temperature of acid in °C	time to collect 100 cm <sup>3</sup> of hydrogen in seconds
20	36
30	18
40	9
50	5

- (i) At what temperature was the time taken to collect 100 cm<sup>3</sup> of hydrogen the **longest**?

..... °C [1]

- (ii) What happens to the **rate** of reaction as the temperature **increases**?

..... [1]

[Total: 3]

- It shows the position of some elements in the Periodic Table.

								H									
															F		
Na									Ni								
K																	
										Ag							

- [1]

- [1]

- [1]

- (b) Compounds of transition elements are often coloured.

Iron(II) compounds are usually green.

Look at the list. It gives the colours of some transition metal compounds.

**blue**

**grey**

**orange**

**pink**

**purple**

- (i) What colour are most copper compounds?

Choose from the list.

answer ..... [1]

- (ii) What colour are most iron(III) compounds?

Choose from the list.

answer ..... [1]

[Total: 5]

10 This question is about the halogens and their reactions.

(a) Write down **two** uses of chlorine.

1 .....

2 ..... [2]

(b) Bromine, chlorine and iodine are halogens.

Put the halogens in order of reactivity.

Write the most reactive first.

**most reactive** .....

.....

**least reactive** .....

[1]

(c) Chlorine water is added to a solution of sodium iodide.

A brown solution is formed.

Similar experiments can be done with

- chlorine water and sodium bromide solution
- bromine water and sodium iodide solution
- iodine solution and sodium bromide solution.

Look at the table. It shows the results from these and other experiments.

	chlorine water	bromine water	iodine solution
sodium chloride solution		no reaction	no reaction
sodium bromide solution	orange solution		no reaction
sodium iodide solution	brown solution	.....	

Complete the table to show the missing result.

[1]

(d) Chlorine is a green gas.

Bromine is an orange liquid.

Iodine is a solid.

What colour is solid iodine?

..... [1]

(e) Chlorine, bromine and iodine are all in Group 7 of the Periodic Table.

They all react in a similar way.

Explain why.

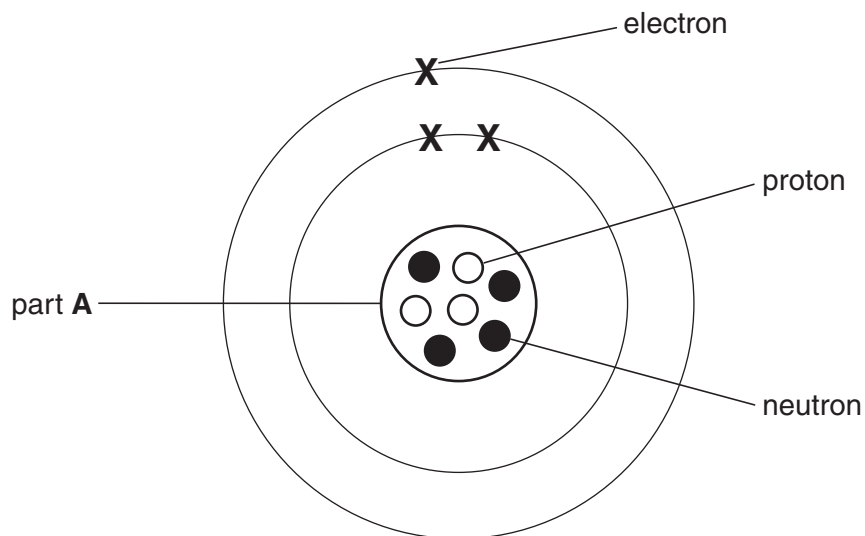
Use ideas about electronic structure.

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

[Total: 6]

11 This question is about atoms.

(a) Look at the diagram. It shows a lithium atom.



(i) Part **A** contains protons and neutrons.

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

..... [1]

(ii) What is the charge on an electron?

Choose from the list.

**negative**

**neutral**

**positive**

answer ..... [1]

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

Group ..... [1]



(iv) The outer electron is removed.

This forms a charged particle,  $\text{Li}^+$ .

What is a charged particle, such as  $\text{Li}^+$ , called?

..... [1]

(b) Look at the Periodic Table on the back page.

Find the element with the symbol Na.

What is the atomic number of this element?

..... [1]

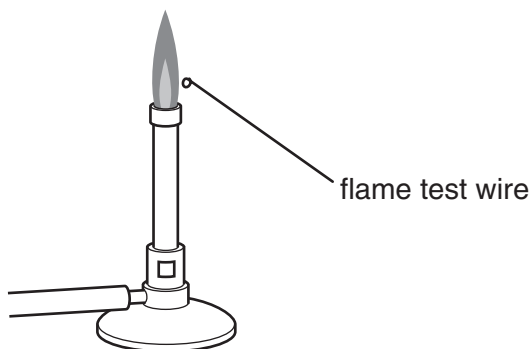
[Total: 5]

12 Lithium, sodium and potassium are known as the alkali metals.

(a) They are stored in oil. Explain why.

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

(b) Different flame colours are seen when compounds of the alkali metals are put into a Bunsen flame.



Draw straight lines to match the **metal** to its **flame colour**.

metal	flame colour
<div>lithium</div>	<div>orange</div>
<div>sodium</div>	<div>lilac</div>
<div>potassium</div>	<div>red</div>

[2]

[Total: 4]

END OF QUESTION PAPER

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# The Periodic Table of the Elements

20

1	2	Key										3	4	5	6	7	0			
7 Li lithium 3		9 Be beryllium 4		relative atomic mass atomic symbol name atomic (proton) number										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							

\* 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.