

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

B641/01

Unit 1 Modules C1 C2 C3 (Foundation Tier)

THURSDAY 5 JUNE 2008

Morning
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.
- 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 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
emulsifiers	E400 to E499
sweeteners	E950 to E967

Look at the food label found on a jar of mayonnaise.

<p>Ingredients: Vegetable oil, water, egg yolk, sugar, vinegar, salt, E202, E472 and E953.</p>

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

.....[1]

- (b) What type of additive is E202?

.....[1]

- (c) What is the job of an antioxidant?

.....[1]

- (d) What is the job of an emulsifier?

.....[1]

[Total: 4]

2 This question is about cosmetics.

(a) Onions and roses both have strong smells.

Roses are used to make perfumes.

Onions are **not** used to make perfumes.

Suggest why.

.....[1]

(b) Perfumes need certain properties if they are to work well.

Look at the list of properties.

Put ticks (✓) in the boxes next to **two** properties needed by a perfume.

- does not react with water
- evaporates easily
- irritates skin
- soluble in water
- toxic

[2]

(c) Nail varnish remover dissolves nail varnish.

Look at the list.

- insoluble**
- soluble**
- solute**
- solution**
- solvent**

Use words from the list to complete these sentences.

(i) A substance that does not dissolve is [1]

(ii) A liquid that dissolves something is called a [1]

[Total: 5]

3 This question is about crude oil and cracking.

(a) Distillation is used to separate crude oil into fractions.

Look at the table.

It compares the amounts of each fraction **produced** by distillation with the amounts needed (**demand**).

fraction	amount produced in tonnes	demand in tonnes
gases	2	4
petrol	18	27
diesel	14	8
lubricating oils	23	23
heating oil and tar	47	38

(i) For one fraction, the amount produced exactly matches the demand.

Which fraction?

.....[1]

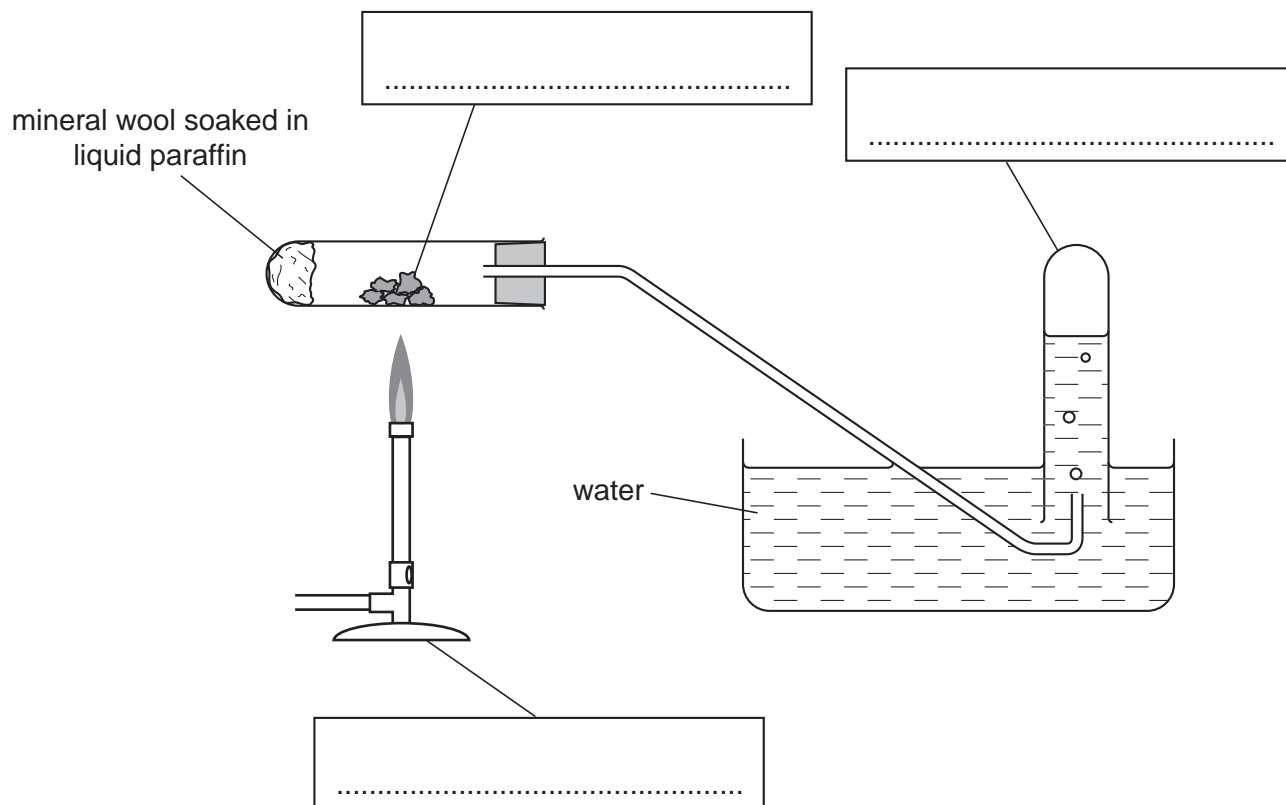
(ii) For **two** fractions, the demand is greater than the amount produced.

Which two fractions?

..... and[1]

(b) Look at the diagram.

It shows apparatus that could be used to crack liquid paraffin.



Complete the diagram using labels from the list.

Bunsen burner
catalyst
delivery tube
test tube
trough

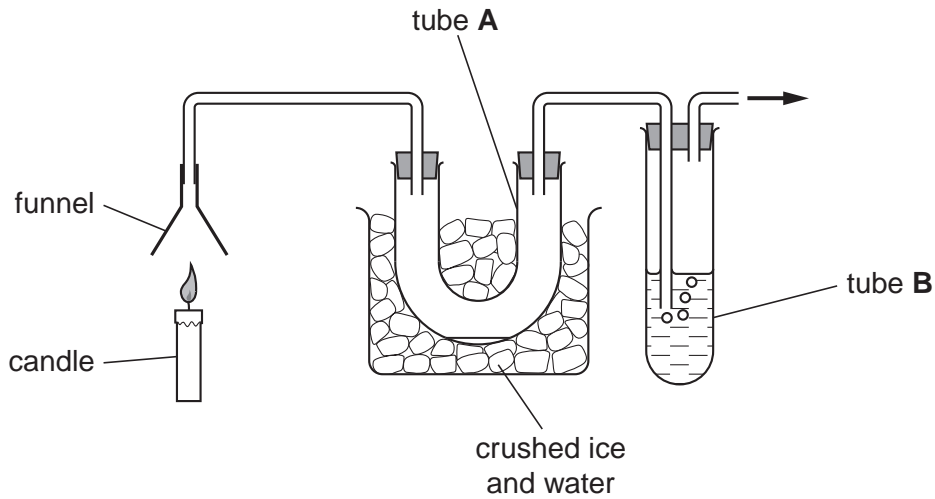
[2]

[Total: 4]

4 Look at the diagram.

It shows a hydrocarbon fuel burning.

The chemicals made when the fuel burns go through the apparatus.



(a) (i) Tube **A** is surrounded by ice.

A colourless liquid slowly collects in tube **A**.

Write down the name of this liquid.

.....[1]

(ii) The liquid in tube **B** is used to test for carbon dioxide.

Write down the name of the liquid used to test for carbon dioxide.

.....[1]

(b) The complete combustion of a hydrocarbon is **better** and **safer** than incomplete combustion.

Write down **two** reasons why.

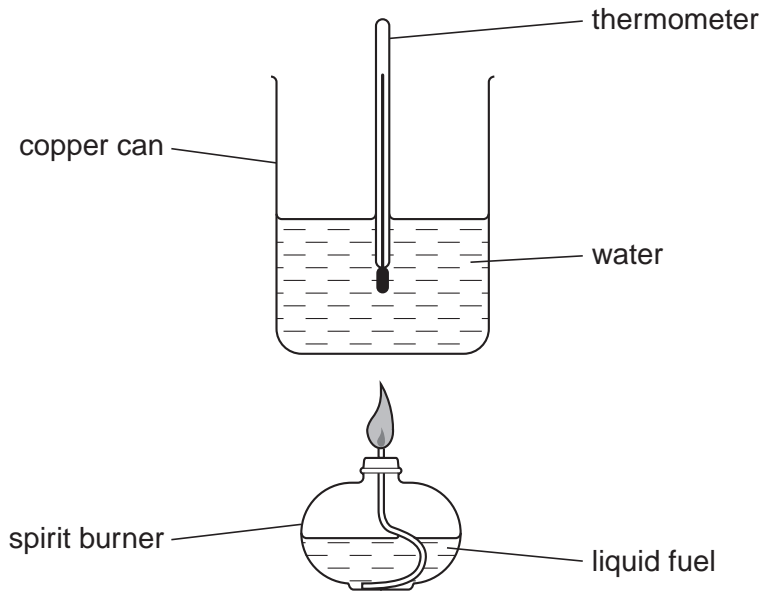
.....

[2]

[Total: 4]

5 Look at the diagram.

It shows the apparatus used to measure the temperature change when a fuel is burned.



(a) Look at the table.

It shows some temperature changes when equal amounts of 3 fuels are burned.

fuel	temperature at start in °C	final temperature in °C	temperature change in °C
A	18	25	7
B	17	32	15
C	22	33

(i) What is the temperature change for fuel **C**? °C [1]

(ii) Which fuel releases the most energy? Choose from **A**, **B** or **C**.

answer [1]

(b) When a fuel burns, it releases heat energy.

Look at the list.

degrees centigrade

grams

joules

metres

Complete the sentence. Choose from the list.

Heat energy is measured in [1]

[Total: 3]

Section B – Module C2

6 **Granite, limestone and marble** are three rocks used to construct buildings.

These rocks are taken from big holes in the ground called quarries.

(a) Getting these rocks causes environmental problems.

One problem is that there is increased noise for people living nearby.

Write about one **other** problem caused by quarrying for rocks.

.....
[1]

(b) Limestone and marble are two forms of calcium carbonate.

Calcium carbonate has the formula CaCO_3 .

How many **elements** are chemically joined in calcium carbonate, CaCO_3 ?

.....[1]

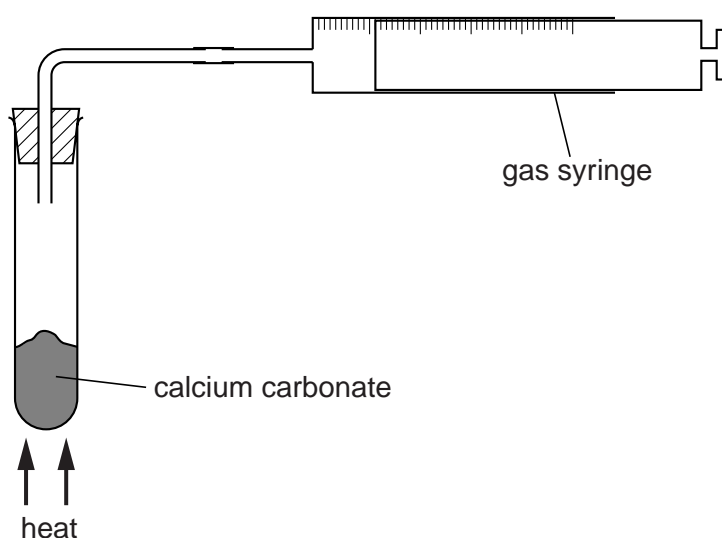
(c) When heated, calcium carbonate makes calcium oxide and carbon dioxide.

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

.....[1]

(d) Georgia heats a sample of calcium carbonate.

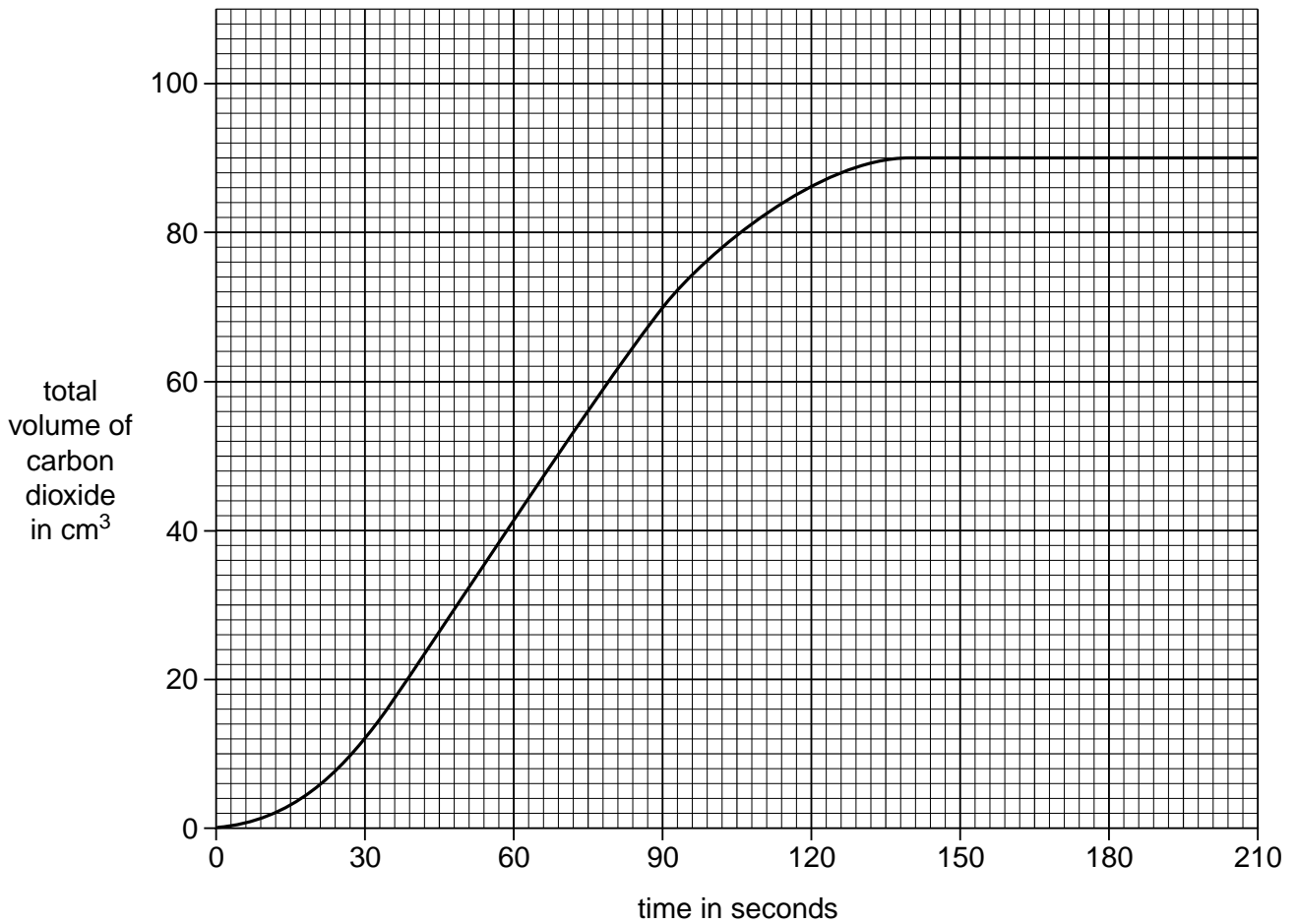
Look at the apparatus she uses.



The carbon dioxide made is collected in a gas syringe.

Every 30 seconds, she measures the total volume of carbon dioxide in the gas syringe.

Look at the graph of Georgia's results.



(i) What is the total volume of carbon dioxide collected in the gas syringe in the first 90 seconds?

..... cm³ [1]

(ii) At which time is the reaction the **fastest**?

Choose from the list.

0 – 30 seconds

60 – 90 seconds

120 – 150 seconds

180 – 210 seconds

answer [1]

(e) Cement is made by heating a mixture of limestone and another substance.

What is the name of the other substance?

Choose from the list.

aluminium

clay

marble

sand

answer [1]

[Total: 6]

7 This question is about molten rock and volcanoes.

(a) Complete the sentences.

Choose the missing words from the list.

- crust
- igneous
- lava
- magma
- metamorphic
- sedimentary

Molten rock under the surface of the Earth is called

Molten rock that erupts from a volcano is called

Molten rock cools down to make rock. [3]

(b) Some people live near volcanoes because the soil is fertile.

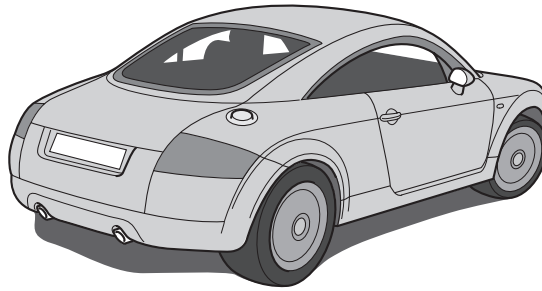
Geologists study these volcanoes.

Suggest why geologists study these volcanoes.

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

[Total: 4]

8 Motor cars are made from a large number of materials including iron and steel.



(a) Write down the names of **two** other materials used to build a car.

..... and[2]

(b) New laws mean that almost all the materials in a car should be able to be recycled.

Describe one advantage, other than cost, of recycling a material such as iron.

.....[1]

(c) The parts of a car made from iron will rust.

Rusting happens when iron reacts with water and oxygen.

Rusting is very slow in cold and dry conditions.

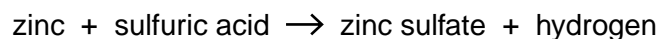
Write about a condition that will speed up rusting.

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

[Total: 4]

9 Zinc reacts with dilute sulfuric acid.

Look at the word equation for this reaction.



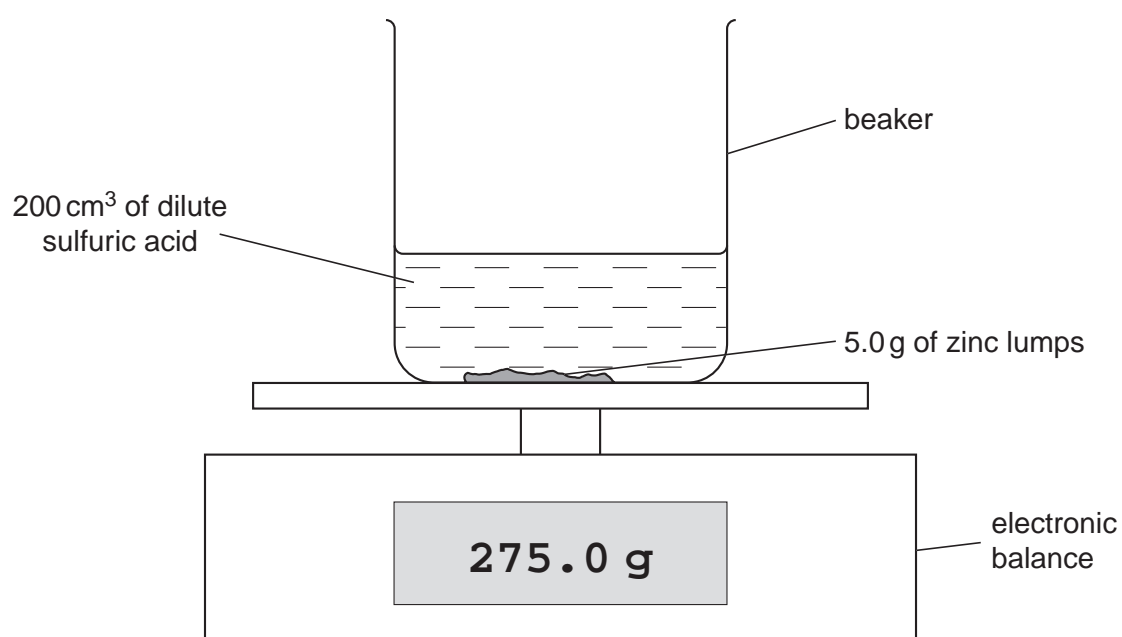
(a) One of the products of this reaction is a gas.

Which one?

.....[1]

(b) Mike and Ellis investigate the reaction between zinc and dilute sulfuric acid.

Look at the apparatus they use.



Mike and Ellis do four experiments.

They do each experiment using acid at a different concentration.

Each time they use

- 200 cm³ of sulfuric acid
- 5.0 g of zinc lumps
- a temperature of 20 °C.

They measure the time it takes for the mass on the balance to decrease by 0.1 g.

Look at their results.

concentration of acid in mol/dm ³	time to make 0.1 g of gas in seconds
0.5	900
1.0	450
1.5	250
2.0	140

(i) At what concentration was the time taken to collect 0.1 g of gas the **shortest**?

..... mol/dm³ [1]

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

.....[1]

(iii) Changing the concentration can change the rate of reaction.

Write about **other** ways in which Mike and Ellis can change the rate of reaction.

.....

.....

.....

.....[3]

[Total: 6]

Section C – Module C3

10 This question is about bonding and the Periodic Table.

(a) Oxygen, O_2 , hydrogen, H_2 , and water, H_2O , are all molecules.

What is a **molecule**?

.....
[1]

(b) Ethanol, C_2H_5OH , is another molecule.

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

.....[1]

(c) The atoms in a hydrogen molecule are bonded using a shared pair of electrons.

What is the name of this type of bond?

Choose from the list.

covalent

intermolecular

ionic

metallic

answer[1]

(d) The elements in the Periodic Table are arranged in groups and periods.

(i) Write down what is meant by a **period**.

.....
[1]

(ii) Lithium, sodium and potassium are in the same group.

Explain why.

.....[1]

[Total: 5]

11 This question is about Group 1 elements.

(a) The Group 1 elements have a name.

Look at the list.

- alkali metals
- halogens
- noble gases
- transition metals

What is the name given to the Group 1 elements?

Choose from the list.

answer[1]

(b) (i) Sodium reacts with water.

Sodium hydroxide and hydrogen gas are made.

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

.....[1]

(ii) Potassium also reacts with water.

What are the names of the **products** of this reaction?

.....[1]

(c) The labels have fallen off three bottles.

Sarah tests the chemical from one bottle.

She uses the flame test.

She gets an orange flame.

Which chemical is in the bottle?

Choose from the list.

- lithium chloride
- potassium chloride
- sodium chloride

answer[1]

[Total: 4]

12 This question is about electrolysis.

(a) Draw a straight line to match each **word** with its **correct meaning**.

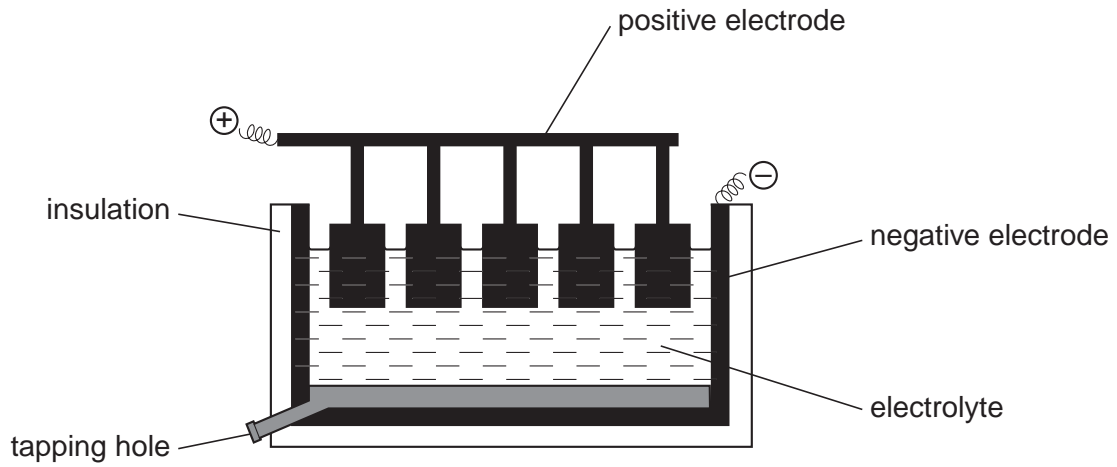
One has been done for you.

word		meaning
anion		positive electrode
anode		negative ion
cathode	—	negative electrode
cation		liquid that conducts electricity
electrolyte		positive ion

[3]

(b) Look at the diagram.

It shows how aluminium is made during electrolysis.



Write about how the aluminium is made using this equipment.

Your answer should include

- what chemicals are used
- what is made at each electrode.

.....

.....

.....

.....[3]

[Total: 6]

13 This question is about metals.

(a) Look at the list.

copper

iron

lead

sodium

zinc

(i) Which metal is most suitable for making car bodies?

Choose from the list.

answer[1]

(ii) Which metal is used for making electrical wiring?

Choose from the list.

answer[1]

(b) The bottom of a saucepan is often made from copper.

Suggest why.

.....[1]

(c) All metals conduct electricity.

At very low temperatures, some metals become very good conductors.

What are these metals called?

.....[1]

(d) Look at the table.

It shows some information about the densities of metals.

metal	density in g/cm ³
aluminium	2.7
copper	8.9
iron	7.9
lead	11.3
tin	7.3

A new aeroplane is being made out of a metal with a low density.

Which metal is most suitable?

Choose from the table.

answer[1]

[Total: 5]

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										
	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> relative atomic mass atomic symbol <small>name</small> atomic (proton) number </div>																	
	7 Li lithium 3	9 Be beryllium 4	11 Na sodium 11	12 Mg magnesium 12	13 Al aluminium 13	14 Si silicon 14	15 P phosphorus 15	16 S sulfur 16	17 Cl chlorine 17	18 Ar argon 18								
	19 K potassium 19	20 Ca calcium 20	21 Sc scandium 21	22 Ti titanium 22	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	31 Ga gallium 31	32 Ge germanium 32	33 As arsenic 33	34 Se selenium 34	35 Br bromine 35	36 Kr krypton 36
	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	46 Pd palladium 46	47 Ag silver 47	48 Cd cadmium 48	49 In indium 49	50 Sn tin 50	51 Sb antimony 51	52 Te tellurium 52	53 I iodine 53	54 Xe xenon 54
	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	79 Au gold 79	80 Hg mercury 80	81 Tl thallium 81	82 Pb lead 82	83 Bi bismuth 83	84 Po polonium 84	85 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.