

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

B642/01

Unit 2 Modules C4 C5 C6 (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)

**Wednesday 16 June 2010
Morning**

Duration: 1 hour



Candidate Forename		Candidate Surname	
--------------------	--	-------------------	--

Centre Number						Candidate Number				
---------------	--	--	--	--	--	------------------	--	--	--	--

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. Additional paper may be used if necessary but you must clearly write your Candidate Number, Centre Number and question number(s).

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 **24** pages. Any blank pages are indicated.

Answer **all** the questions.

Section A – Module C4

- 1 Sea-water contains many different ions.

Look at the table. It shows some of the ions in sea-water.

ion	formula	percentage by mass in sea-water
chloride	Cl^-	55.0
magnesium	Mg^{2+}	3.7
potassium	K^+	1.1
sodium	Na^+	30.6
sulfate	SO_4^{2-}	7.7

- (a) (i) Name the **positive** ion that has the **greatest** percentage by mass in sea-water.

Choose from the ions in the table.

answer

[1]

- (ii) Silver nitrate solution is used to test for halide ions.

Write down the name of a halide ion in sea-water.

Choose from the ions in the table.

answer

[1]

- (b) Katharine wants to test for sulfate ions in sea-water.

Give the name of the solution she should use.

Choose from the list.

barium chloride

dilute sulfuric acid

sodium hydroxide

sodium nitrate

answer [1]

(c) Sea-water has a pH value of 8.

(i) Which statement correctly describes sea-water?

Choose from:

it is acidic

it is neutral

it is alkaline

answer [1]

(ii) Ryan wants to show that sea-water has a pH of 8.

He does some research on the internet. Ryan finds out he can use a pH meter.

Describe one **other** way Ryan can find out the pH of sea-water.

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

[Total: 6]

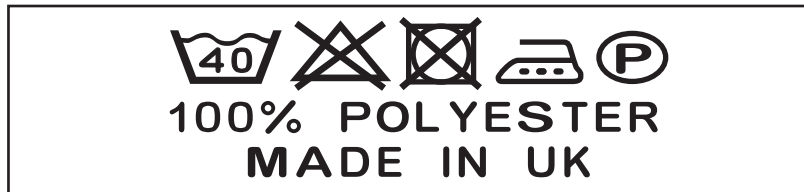
2 This question is about washing clothes.

Kieran wants to wash his dirty shirt.

Kieran's shirt has several food stains on it.

He decides to use a biological washing powder that contains enzymes.

He looks at the wash label on his shirt.



(a) Write down the temperature he should choose to wash his shirt.

Explain your answer.

temperature°C

explanation

.....

..... [2]

(b) The washing powder also contains an optical brightener and a bleach.

(i) The job of the optical brightener is to

..... [1]

(ii) The job of the bleach is to

..... [1]

[Total: 4]

3 Medicines and pharmaceutical drugs are speciality chemicals.

(a) Digitalis is a medicine used to treat heart disease.

Digitalis can be extracted from the foxglove plant.



Describe how chemicals such as digitalis can be extracted from plants.

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

(b) Statins are speciality chemicals.

They are medicines used to reduce cholesterol levels.

Many statins are made in a **batch** process.

(i) Describe what is meant by a batch process.

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

(ii) Several factors affect the cost of making and developing a speciality chemical.

One factor is the cost of the energy used.

Write down two **other** factors.

1
2 [2]

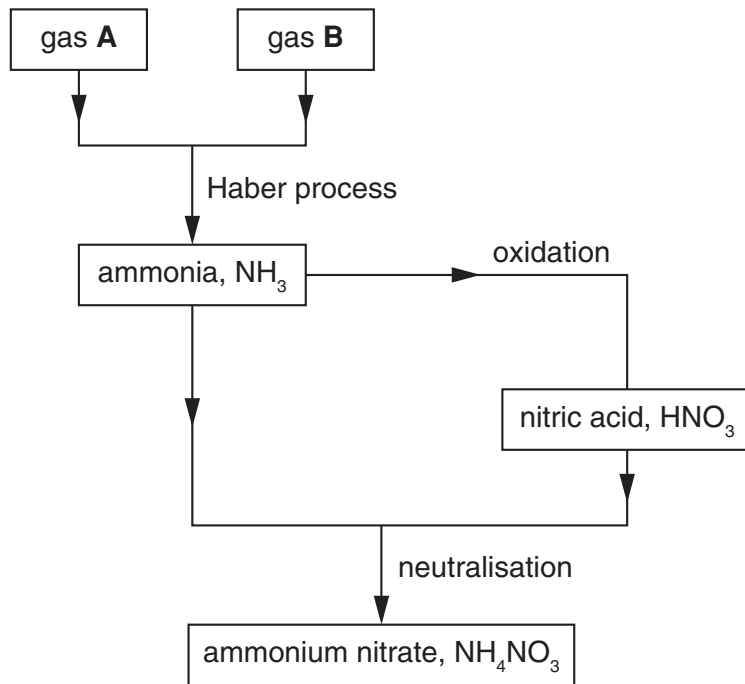
[Total: 5]

4 Ammonium nitrate is a fertiliser used by farmers.

(a) Explain why farmers use fertilisers.

.....
 [1]

(b) Look at the flow chart. It shows how ammonium nitrate can be made from ammonia.



Write down the **names** of the two gases needed to make ammonia.

Gas **A** is

Gas **B** is [1]

(c) A factory makes ammonium nitrate.

Jordan predicts the factory should make 50 tonnes of ammonium nitrate.

The factory actually makes 37.5 tonnes of ammonium nitrate.

Calculate the percentage yield.

.....

percentage yield =% [2]

7

(d) Ammonium nitrate has the formula NH_4NO_3 .

Give the number of nitrogen atoms in the formula.

Choose from:

1

2

7

9

14

28

answer

[1]

[Total: 5]

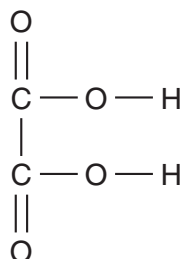
BLANK PAGE

PLEASE DO NOT WRITE ON THIS PAGE

Section B – Module C5

5 Research chemists have identified a weak acid in the leaves of rhubarb.

Look at the displayed formula of the weak acid.



(a) (i) Give the number of different **elements** in the weak acid.

..... [1]

(ii) Write down the molecular formula of the weak acid.

..... [1]

(b) Chris dissolves some of the weak acid in water.

He tests the pH of the solution.

The pH value is 3.5.

(i) Chris adds litmus to the solution of the weak acid.

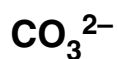
What colour does Chris see?

..... [1]

(ii) The weak acid ionises in water.

Which **one** of the following ions is found in the solution?

Choose from:



answer

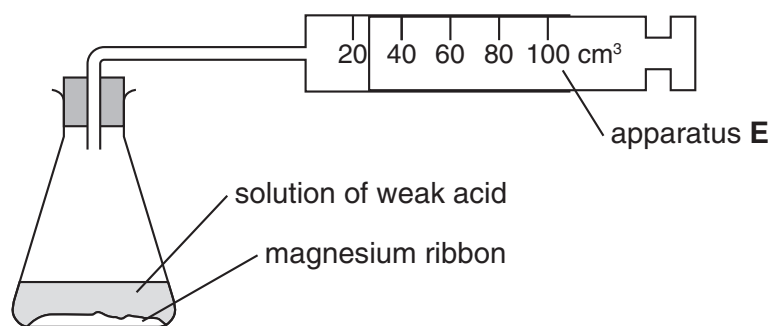
[1]

(c) Chris investigates the reaction of a dilute acid with magnesium ribbon.

He adds a small amount of magnesium ribbon to 50 cm³ of the weak acid solution.

He measures the volume of hydrogen every 10 seconds.

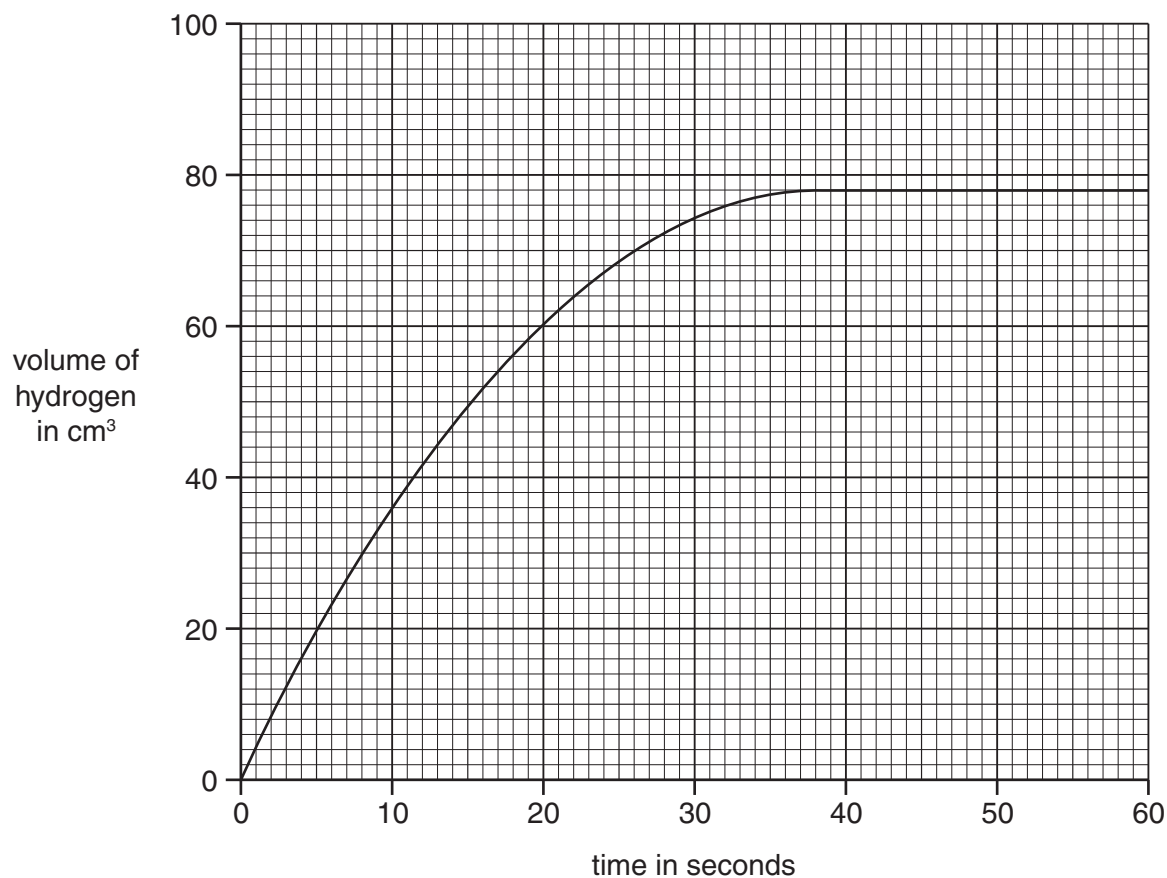
Look at the apparatus he uses.



Give the name of the apparatus labelled **E**.

..... [1]

(d) Look at the graph of Chris' results.



(i) Give the volume of hydrogen made after 20 seconds.

..... cm³ [1]

(ii) After what time did the reaction stop?

..... seconds [1]

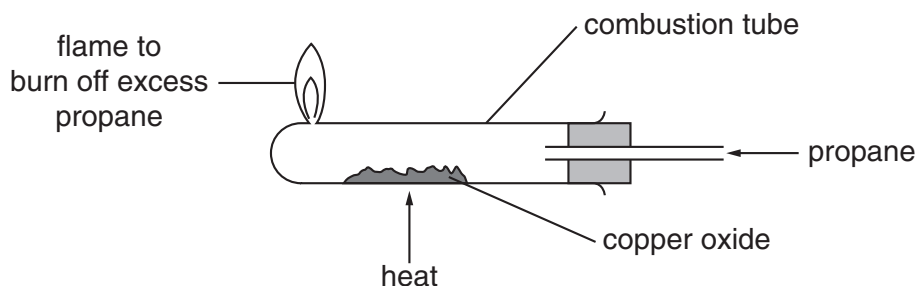
(iii) Suggest why the reaction stops.

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

[Total: 8]

6 Alyce investigates a sample of copper oxide.

Look at the apparatus she uses.



Alyce puts 2.88 g of copper oxide into the combustion tube.

Propane gas moves over the heated copper oxide.

After 20 minutes Alyce makes 2.56 g of copper.

(a) During the reaction all the oxygen in the copper oxide is removed.

Write down the mass of oxygen that was in the sample of copper oxide.

.....

mass of oxygen = g [1]

(b) Alyce repeats the experiment.

She uses **5.76 g** of copper oxide instead of **2.88 g**.

Calculate the mass of copper Alyce should make.

.....

mass of copper = g [1]

(c) Propane has the formula, C_3H_8 .

Work out the molar mass of propane.

The relative atomic mass, A_r , of H is 1 and of C is 12.

.....

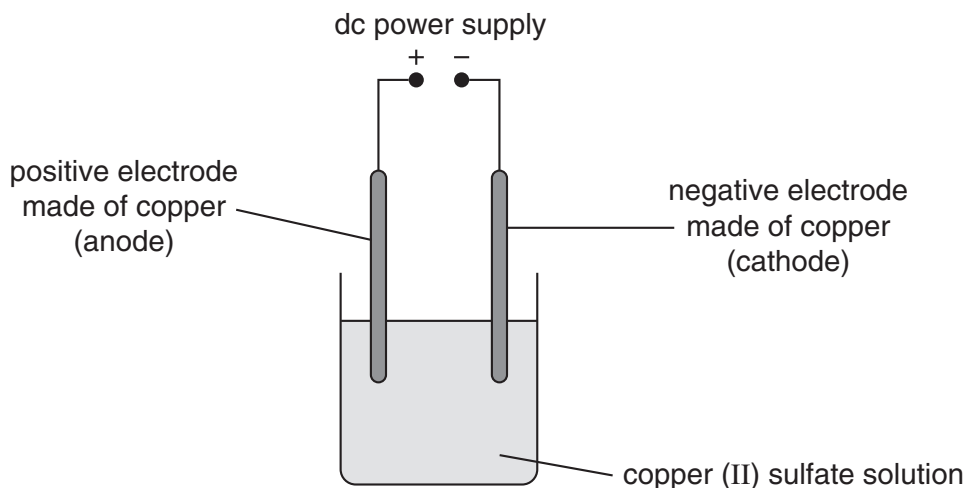
molar mass = g/mol [1]

[Total: 3]

7 This question is about the electrolysis of copper(II) sulfate solution.

Look at the diagram.

Jess uses this apparatus to electrolyse copper(II) sulfate solution.



(a) Look at the list of particles found in copper(II) sulfate solution.

- Cu^{2+} H^+ H_2O OH^- SO_4^{2-}

(i) Name the particle that is a molecule.

Choose from the list.

answer [1]

(ii) Some particles are attracted to the negative electrode.

Choose one from the list.

answer [1]

(b) Jess finds the mass of the copper electrodes before and after doing the electrolysis.

Describe what happens to the mass of each electrode during the electrolysis.

mass of negative electrode

.....

mass of positive electrode

..... [2]

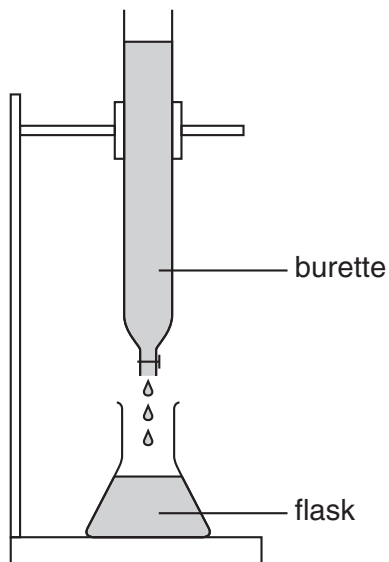
[Total: 4]

8 Matt wants to find the concentration of some dilute nitric acid.

He decides to do an acid-base titration.

Look at the diagram.

It shows some of the apparatus he uses.



Matt uses nitric acid and potassium hydroxide solution.

He uses phenolphthalein as an indicator.

(a) Describe how Matt does his acid-base titration.

Include any measurements he should make.

.....

.....

.....

.....

.....

..... [3]

(b) Matt finds out that the nitric acid is too concentrated.

Describe how Matt can dilute the nitric acid.

.....

..... [1]

(c) Nitric acid is a **strong** acid.

Write down the name of **one other** strong acid.

..... [1]

[Total: 5]

Section C – Module C6

9 This question is about CFCs.

The molecular formula of one CFC is CF_2Cl_2 .

(a) (i) Write down the **names** of the **three** elements in CF_2Cl_2 .

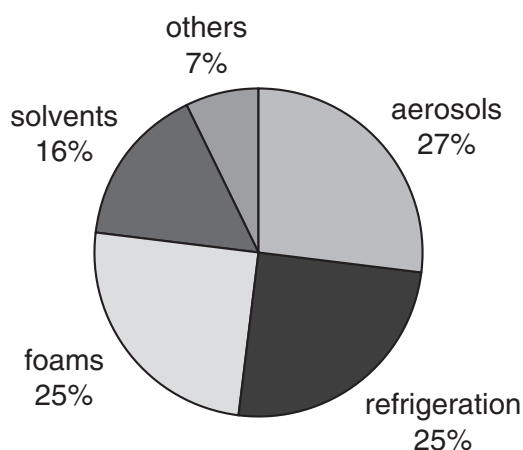
You may use the Periodic Table on the back page to help you.

..... [1]

(ii) Write down the total number of **atoms** in a molecule of CF_2Cl_2 .

answer [1]

(b) The pie chart shows the uses of CFCs in 1986.



(i) One product used the **highest** percentage of CFCs in 1986.

Give the name of this product.

..... [1]

(ii) CFCs were used in aerosols.

Suggest one suitable safe alternative for CFCs.

..... [1]

(c) CFCs in the atmosphere decrease the ozone layer.

This is called ozone depletion.

Ozone depletion allows more ultraviolet light to reach the Earth's surface.

An increase in levels of ultraviolet light can cause problems to your health.

Write down **two** medical problems caused by an increase in ultraviolet light.

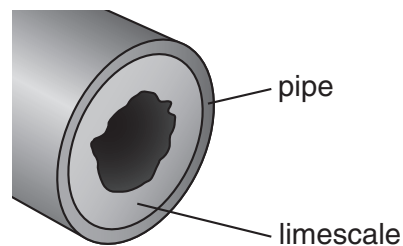
1

2 [2]

[Total: 6]

10 Hot water pipes are often covered with limescale.

Look at the picture of a hot water pipe.



(a) Limescale is made when hard water is heated.

Which of the following can be used to remove hardness from water?

Choose from the list.

catalyst

ion-exchange resin

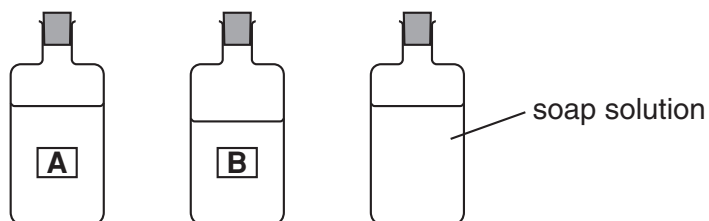
magnesium sulfate

answer [1]

(b) Bev and Jeff bring in two water samples, **A** and **B**.

They want to find out which water sample has the most hardness.

They use soap solution in their experiment.



Write about how they do their experiment.

Your answer should include

- the apparatus they use
- the measurements they take
- how they tell which sample of water has the most hardness.

.....

.....

.....

.....

.....

.....

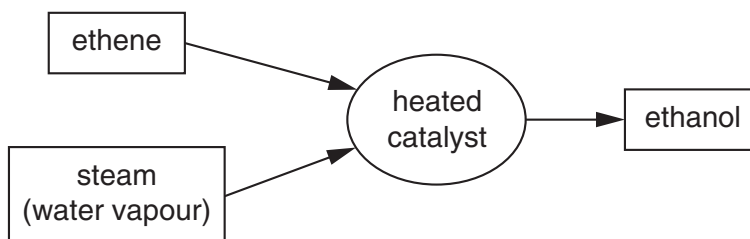
..... [3]

[Total: 4]

11 This question is about ethanol.

Look at the flow chart.

It shows how ethanol is made from ethene.



(a) (i) Write down the **word** equation for making **ethanol** from ethene.

..... [1]

(ii) Look at the list. It shows some different types of chemical reactions.

Name the reaction type used to make ethanol from ethene.

Choose from the list.

dehydration

electrolysis

hydration

saponification

answer [1]

(iii) **Ethene** can be made from ethanol.

Write down **one** condition for this reaction.

.....
 [1]

(b) Ethanol can be made from glucose solution and yeast.

This reaction is called fermentation.

Fermentation makes a solution of ethanol.

Name the process used to obtain ethanol from this solution.

..... [1]

12 This question is about metals.

(a) Some iron objects are covered with tin to stop them rusting.

Write down **two** other methods used to stop iron from rusting.

1

2 [2]

(b) Look at the table of results.

It shows what happens when a metal is put into a solution.

solution used	metal being added		
	iron	tin	zinc
iron sulfate		×	✓
tin sulfate	✓		✓
zinc sulfate	×	×	

× means that nothing happens

✓ means that the metal gets coated

Write down the **three** metals, iron, tin and zinc, in order of reactivity.

Use the table of results to help you.

most reactive metal

.....

least reactive metal

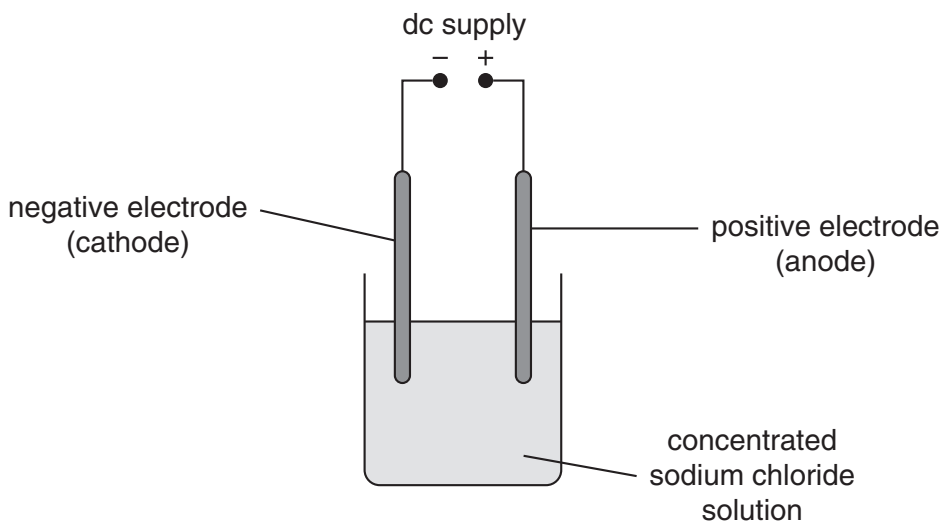
[1]

[Total: 3]

13 This question is about electrolysis and fuel cells.

(a) Ahmed investigates the electrolysis of concentrated sodium chloride solution.

Look at the apparatus he uses.



Hydrogen gas is made at the cathode.

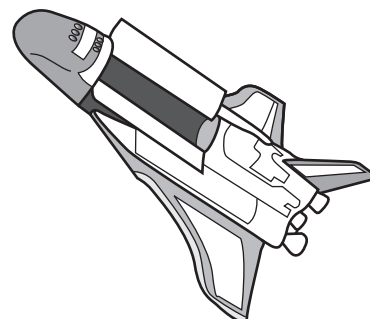
Write down the **name** of the gas made at the **anode**.

..... [1]

(b) The picture shows a spacecraft that uses a fuel cell.

In a fuel cell hydrogen reacts with oxygen.

Water is the only product.



(i) Hydrogen is a pollution-free fuel.

Write down **one** reason why it is a pollution-free fuel.

..... [1]

(ii) Fuel cells produce energy.

Look at the list. It shows different types of energy.

- electrical heat kinetic sound**

Write down the type of energy produced by a fuel cell.

Choose from the list.

answer [1]

[Total: 3]

END OF QUESTION PAPER

BLANK PAGE

PLEASE DO NOT WRITE ON THIS PAGE

PLEASE DO NOT WRITE ON THIS PAGE



Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations, is given to all schools that receive assessment material and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact the Copyright Team, First Floor, 9 Hills Road, Cambridge CB2 1GE.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.

The Periodic Table of the Elements

		1	2											3	4	5	6	7	0														
7	Li lithium 3	9	Be beryllium 4											11	12	14	16	19	4	He helium 2													
23	Na sodium 11	24	Mg magnesium 12											27	28	31	32	35.5	40	Ne neon 10													
39	K potassium 19	40	Ca calcium 20											70	73	75	79	80	84	Ar argon 18													
85	Rb rubidium 37	88	Sr strontium 38											115	119	122	128	127	131	Xe xenon 54													
133	Cs caesium 55	137	Ba barium 56											204	207	209	[209]	[210]	[222]	Rn radon 86													
[223]	Fr francium 87	[226]	Ra radium 88											201	201	201	201	201	201														
														65	63.5	59	59	56	55	52	48												
														Zn zinc 30	Cu copper 29	Ni nickel 28	Co cobalt 27	Fe iron 26	Mn manganese 25	Cr chromium 24	Tc technetium 43	Ru ruthenium 44	Rh rhodium 45	Pd palladium 46	Cd cadmium 48								
														112	108	106	195	197	192	190	101	103	106	112									
														Hg mercury 80	Au gold 79	Pt platinum 78	Ir iridium 77	Os osmium 76	Rh rhodium 75	W tungsten 74	Ru ruthenium 44	Rh rhodium 45	Pd palladium 46	Cd cadmium 48									
														201	201	201	201	201	201	201	201	201	201	201									
														[272]	[272]	[271]	[268]	[277]	[264]	[266]	[261]	[261]	[262]	[266]	[264]	[277]	[272]						
														Rg roentgenium 111	Ds darmstadtium 110	Mt meitnerium 109	Hs hassium 108	Bh bohrium 107	Sg seaborgium 106	Db dubnium 105	Rf rutherfordium 104	Rf rutherfordium 104	Db dubnium 105	Sg seaborgium 106	Bh bohrium 107	Hs hassium 108	Mt meitnerium 109	Ds darmstadtium 110	Rg roentgenium 111				
														Elements with atomic numbers 112-116 have been reported but not fully authenticated																			

1	H hydrogen 1
---	--------------------

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.