

**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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**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.

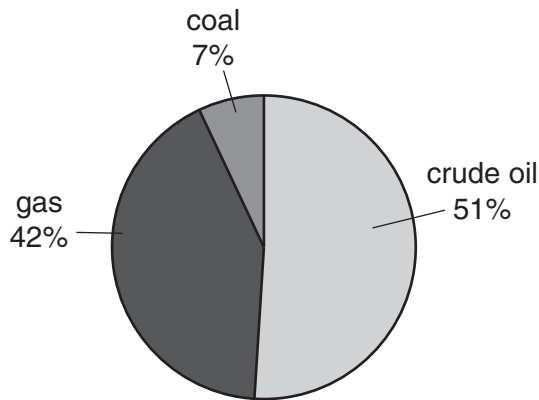
Coal, crude oil and gas are **non-renewable** fuels.

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]

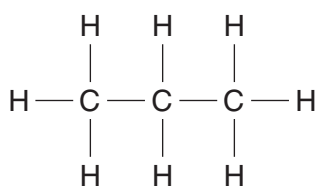
(c) Petrol and diesel are separated from crude oil.

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

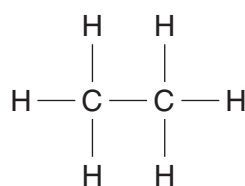
..... [1]

**[Total: 3]**

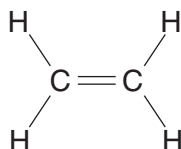
2 Look at the displayed formulas of some compounds of carbon.



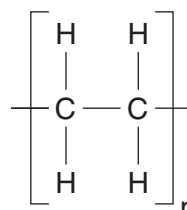
compound **A**



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]

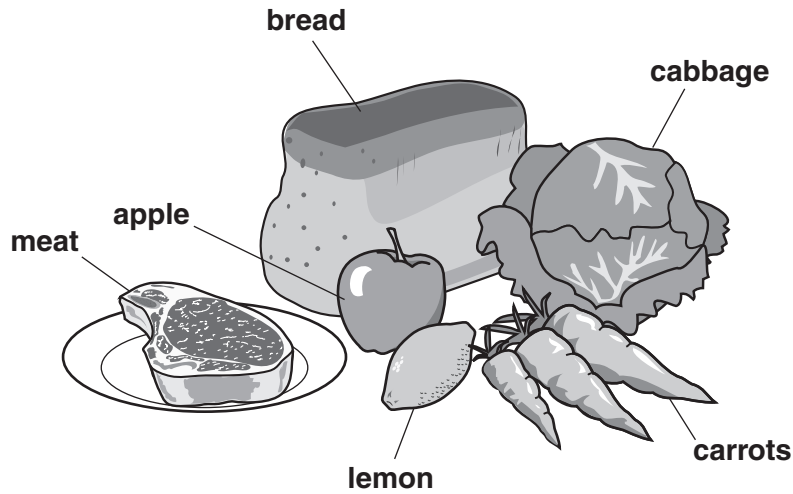
(d) How many **carbon** atoms has compound **A**?

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**.

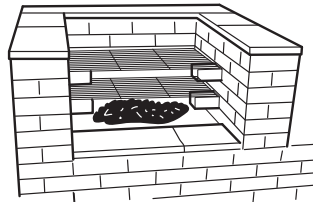
Choose from the foods in the picture.

..... [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.

.....

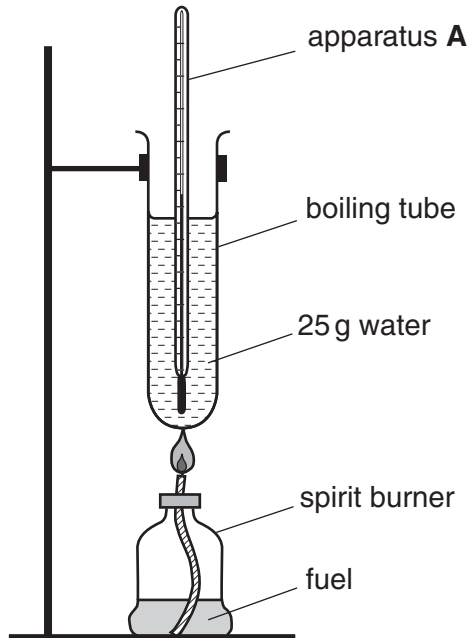
..... [1]

[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.

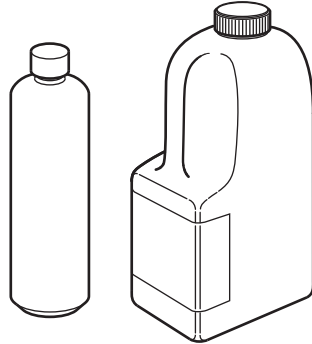
.....  
..... [1]

[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) Write about some ways local councils dispose of these plastic containers.

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

[Total: 3]

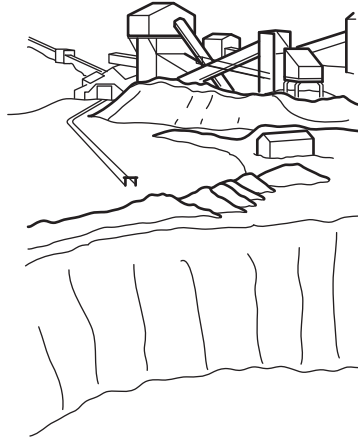
Section B – Module C2

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 heated strongly calcium carbonate changes into calcium oxide.



This change is called **thermal decomposition**.

What is thermal decomposition?

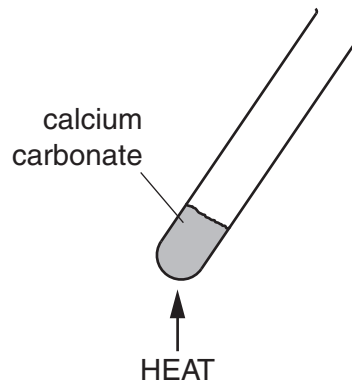
.....

..... [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]

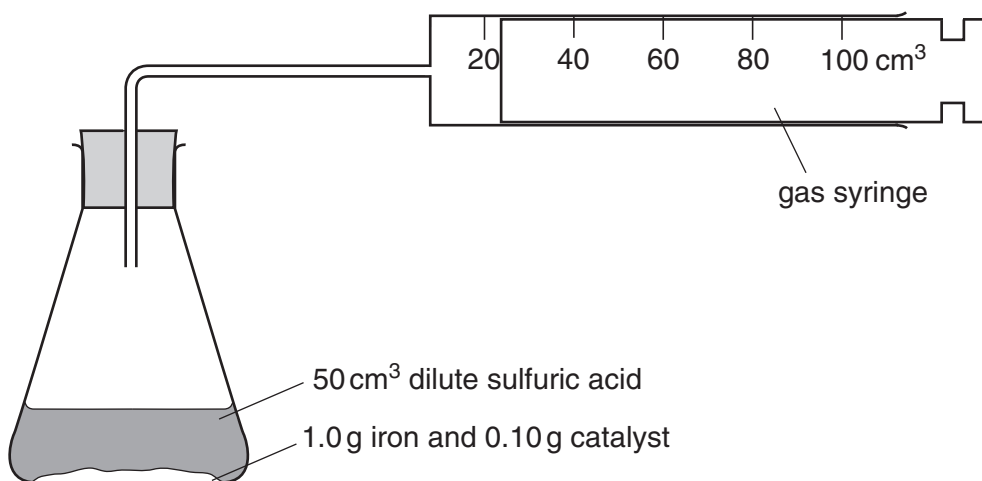
(b) Milly wants to make the reaction faster.

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 cm<sup>3</sup> of hydrogen in the gas syringe.

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

In experiment **1** no catalyst is used.

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 <sup>3</sup> 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						Ne
Na	Mg						Ar
K	Ca						Ar

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	$\text{CuCl}_2$	blue
copper nitrate	$\text{Cu}(\text{NO}_3)_2$	.....
iron(II) chloride	$\text{FeCl}_2$	green
iron(II) sulfate	$\text{FeSO}_4$	green
iron(III) nitrate	$\text{Fe}(\text{NO}_3)_3$	.....

(i) Finish the table. [2]

(ii) Look at the formulas in the table.

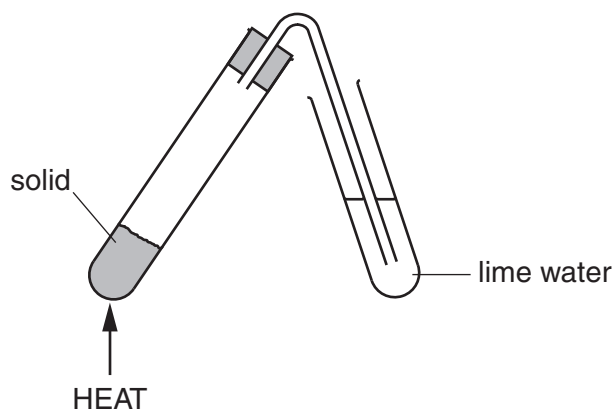
Which formula contains **six** oxygen atoms?

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
<b>copper carbonate</b>	green to black	goes milky
<b>iron(II) sulfate</b>	green to brown	stays colourless
<b>potassium carbonate</b>	stays white	stays colourless
<b>zinc carbonate</b>	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 <sup>3</sup>	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]

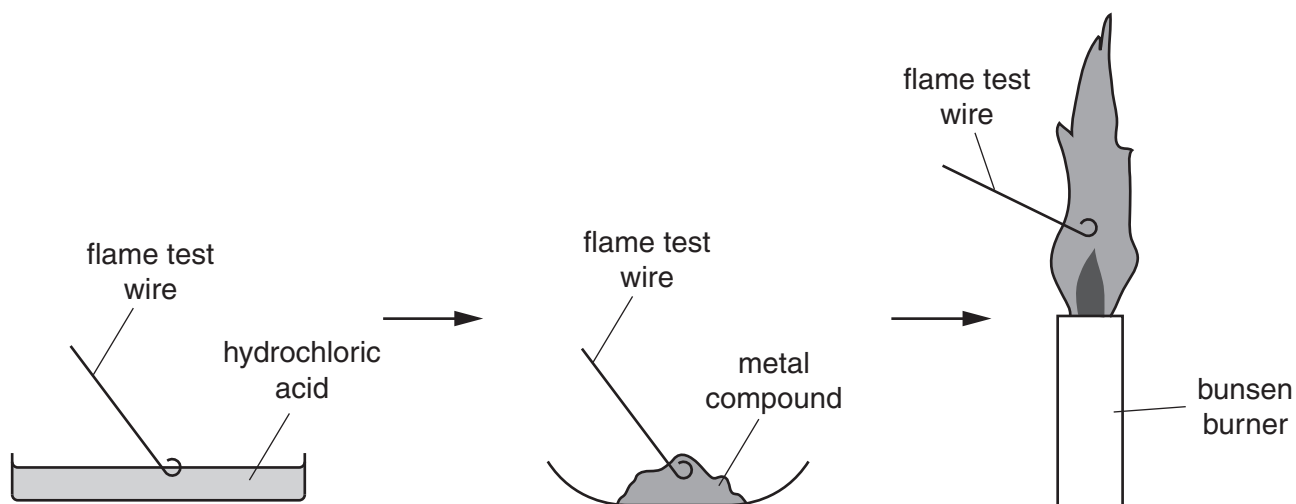
Turn over

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 <b>A</b>	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 <b>Li</b> lithium 3	9 <b>Be</b> beryllium 4	11 <b>Na</b> sodium 11	12 <b>C</b> carbon 6	13 <b>Al</b> aluminium 13	14 <b>N</b> nitrogen 7	15 <b>P</b> phosphorus 15	16 <b>O</b> oxygen 8	17 <b>F</b> fluorine 9	18 <b>Ar</b> argon 18
19 <b>K</b> potassium 19	20 <b>Ca</b> calcium 20	23 <b>V</b> vanadium 23	24 <b>Cr</b> chromium 24	25 <b>Mn</b> manganese 25	26 <b>Fe</b> iron 26	27 <b>Co</b> cobalt 27	28 <b>Ni</b> nickel 28	29 <b>Cu</b> copper 29	30 <b>Zn</b> zinc 30
37 <b>Rb</b> rubidium 37	38 <b>Sr</b> strontium 38	40 <b>Y</b> yttrium 39	41 <b>Zr</b> zirconium 40	42 <b>Nb</b> niobium 41	43 <b>Mo</b> molybdenum 42	44 <b>Tc</b> technetium [98]	45 <b>Ru</b> ruthenium 44	46 <b>Rh</b> rhodium 45	47 <b>Pd</b> palladium 46
55 <b>Cs</b> caesium 55	56 <b>Ba</b> barium 56	57 <b>La*</b> lanthanum 57	72 <b>Hf</b> hafnium 72	73 <b>Ta</b> tantalum 73	74 <b>W</b> tungsten 74	75 <b>Re</b> rhenium 75	76 <b>Os</b> osmium 76	77 <b>Ir</b> iridium 77	78 <b>Pt</b> platinum 78
87 <b>Fr</b> francium 87	88 <b>Ra</b> radium 88	89 <b>Ac*</b> actinium 89	104 <b>Rf</b> rutherfordium 104	105 <b>Db</b> dubnium 105	106 <b>Sg</b> seaborgium 106	107 <b>Bh</b> bohrium 107	108 <b>Hs</b> hassium 108	109 <b>Mt</b> meitnerium 109	110 <b>Ds</b> darmstadtium 110
133 <b>Cs</b> caesium 55	137 <b>Ba</b> barium 56	139 <b>La*</b> lanthanum 57	178 <b>Hf</b> hafnium 72	181 <b>Ta</b> tantalum 73	184 <b>W</b> tungsten 74	186 <b>Re</b> rhenium 75	190 <b>Os</b> osmium 76	192 <b>Ir</b> iridium 77	195 <b>Pt</b> platinum 78
223 <b>Fr</b> francium 87	226 <b>Ra</b> radium 88	227 <b>Ac*</b> actinium 89	261 <b>Rf</b> rutherfordium 104	262 <b>Db</b> dubnium 105	266 <b>Sg</b> seaborgium 106	268 <b>Mt</b> meitnerium 109	271 <b>Ds</b> darmstadtium 110	272 <b>Rg</b> roentgenium 111	201 <b>Hg</b> mercury 80
131 <b>Xe</b> xenon 54	127 <b>I</b> iodine 53	128 <b>Te</b> tellurium 52	119 <b>Sn</b> tin 50	122 <b>Sb</b> antimony 51	125 <b>Bi</b> bismuth 83	204 <b>Tl</b> thallium 81	207 <b>Pb</b> lead 82	209 <b>Bi</b> bismuth 83	210 <b>At</b> astatine 85
86 <b>Rn</b> radon 86	[222]	[222]	[227]	[261]	[266]	[268]	[271]	[272]	[210]
Elements with atomic numbers 112-116 have been reported but not fully authenticated									

1 <b>H</b> 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.