

**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)

**Wednesday 25 May 2011
Morning**

Duration: 1 hour



Candidate forename		Candidate surname	
Centre number		Candidate number	

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Answer **all** the questions.
- Do **not** write in the bar codes.

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

2

Answer **all** the questions.**Section A – Module C1**

- 1 Look at the food label on a packet of bacon.

INGREDIENTS

pork, water, salt, brown sugar,
sodium ascorbate, sodium nitrate

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

Choose from the ingredients on the food label.

..... [1]

- (b) The food contains an antioxidant and a preservative.

Antioxidants and preservatives are **types** of food additives.

Write down the name of two **other** types of food additives.

1

2 [2]

- (c) Sodium ascorbate is an antioxidant.

Antioxidants stop food 'going off'.

They stop the food reacting with a gas in the air.

Which gas?

..... [1]

[Total: 4]

3

2 Crude oil is a fossil fuel.

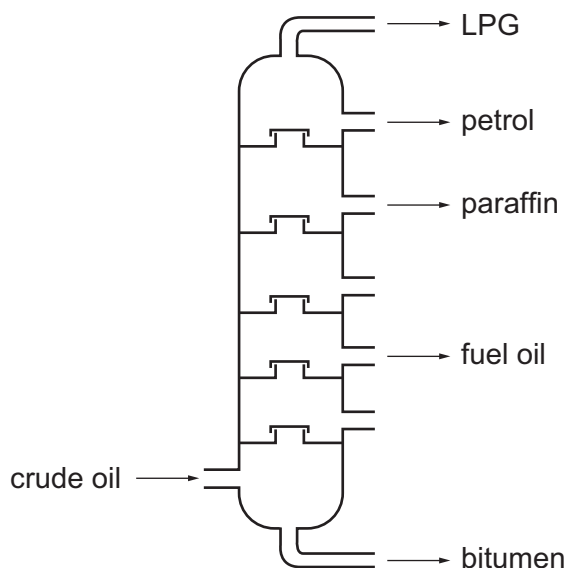
(a) Crude oil is a **non-renewable** fuel.

Explain why.

.....
 [1]

(b) Crude oil is separated into useful substances by fractional distillation.

Look at the diagram. It shows a fractionating column.



The LPG comes out of the top of the fractionating column.

Explain why.

Use ideas about boiling points.

.....
 [1]

(c) LPG contains a mixture of hydrocarbons.

Write down the name of one of these hydrocarbons.

Choose from the list.

hexane

octane

propane

answer [1]

(d) Look at the table.

It shows the amount of some fractions made from 100 tonnes of crude oil.

It also shows the amount of each fraction needed for everyday use.

fraction	amount made in tonnes (supply)	amount needed in tonnes (demand)
LPG	5	10
petrol	10	25
paraffin	15	15
fuel oil	40	30

(i) For which fraction does the supply match the demand?

..... [1]

(ii) The demand for petrol is greater than the supply.

The oil industry solves this problem by **cracking** fuel oil.

Look at the list of statements about cracking.

Which statements about cracking are correct?

Put ticks (✓) in the boxes next to the **two** correct statements.

Cracking needs a catalyst and a high temperature.

☐

Cracking separates crude oil into fractions.

☐

Cracking converts large molecules into smaller molecules.

☐

Cracking reduces petrol production.

☐

Cracking converts LPG into petrol.

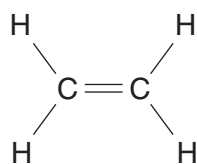
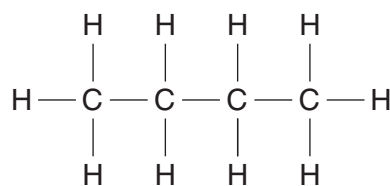
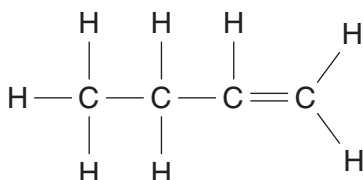
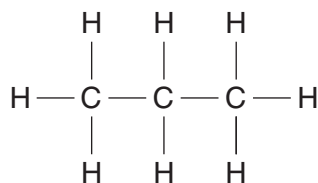
☐

[2]

[Total: 6]

5

3 Look at the displayed formulas of some compounds.

compound **A**compound **B**compound **C**compound **D**

(a) **A**, **B**, **C** and **D** are hydrocarbons.

Write down the **names** of the two elements in hydrocarbons.

..... and [1]

(b) One of the compounds has a molecule with **12 atoms**.

Which one?

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

answer [1]

(c) Look at the displayed formula of compound **D**.

The molecular formula of this compound is C_3H_8 .

Write down the **molecular formula** of compound **B**.

answer [1]

(d) Look at the displayed formula of compound **A**.

The name of compound **A** is ethene.

Ethene can be made into a polymer.

Write down the name of this polymer.

..... [1]

[Total: 4]

6

- 4 Ahmed and Mary want to buy a new car.

They cannot decide which type of car to buy.

One car uses petrol and one car uses hydrogen as fuel.

The table lists some information about the two fuels.

	petrol	hydrogen
state at room temperature	liquid	gas
cost	high	high
combustion products	water, carbon dioxide, carbon monoxide	water

- (a) Explain the **advantages** and **disadvantages** of choosing **hydrogen** as a fuel.

Your answer should include **one** advantage and **one** disadvantage.

You may use the table to help you.

.....

.....

.....

..... [2]

- (b) Octane is a hydrocarbon in petrol.

Octane burns in air.

Carbon dioxide and water are made.

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

..... [1]

[Total: 3]

7

- 5 Nylon is used to make many outdoor clothes.

Jill has a coat made of nylon.

Look at the picture. It shows her coat.



Nylon is a non-biodegradable polymer.

- (a) Suggest one **other** property that makes nylon suitable for an outdoor coat.

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

- (b) Write about some of the problems of using non-biodegradable polymers.

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

[Total: 3]

Section B – Module C2

- 6 This question is about building materials.

A new shopping centre has been built in Liverpool.



- (a) The builders had to choose a material for the floor of the shopping centre.

Three possible materials were granite, limestone and marble.

Write down the names of the three materials in order of **increasing** hardness.

least hard

.....

hardest

[1]

- (b) Write down the names of two **other** materials used for building.

The photograph may help you.

1

2 [2]

- (c) Granite is made from molten magma. Granite has **large** crystals.

Explain why granite has large crystals.

.....

..... [1]

[Total: 4]

- 7 Land Rovers are made mostly of steel.



A new Land Rover will be sold from 2012.

Almost all of it will be made of aluminium.

The new Land Rover will be 225 kg lighter. This is an advantage.

- (a) Write down one **other** advantage and one disadvantage of making the new car out of aluminium.

advantage

disadvantage [2]

- (b) Car engines make carbon monoxide and oxides of nitrogen.

Carbon monoxide and oxides of nitrogen are pollutants.

A catalytic converter decreases the amount of these pollutants released.

Look at the table.

The table shows the amounts of these pollutants released.

	carbon monoxide in g/km	oxides of nitrogen in g/km
BMW Z4	0.516	0.019
Ford Fiesta	0.353	0.058
Honda Civic	0.290	0.013
Land Rover Discovery	0.958	0.029
Vauxhall Astra	0.192	0.053

- (i) Colin owns a Vauxhall Astra.

He drives his car on a 100 km journey.

What mass of carbon monoxide is made during the journey?

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

- (ii) Suggest where the nitrogen in the oxides of nitrogen comes from.

..... [1]

[Total: 4]

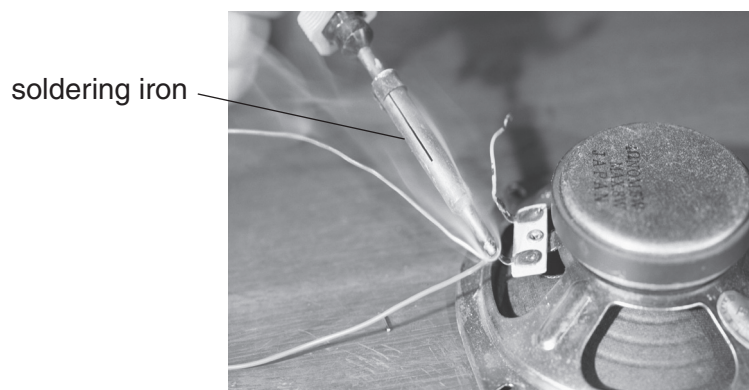
Turn over

8 This question is about **alloys**.

(a) What is meant by an alloy?

..... [1]

(b) Solder can be used to join metals together.



A hot soldering iron is used to melt the solder.

Look at the table.

It gives some information about solder, tin and lead.

	melting point in °C	density in g/cm³	relative hardness
solder	130	10.3	quite hard
tin	232	9.3	soft
lead	328	11.3	soft

Solder is better than lead or tin for joining metals together.

Suggest why. Use the information in the table.

.....
 [1]

(c) Look at the list of materials below.

Some of the materials are **alloys**.

Some of the materials are **metallic elements**.

Put ticks (✓) in the boxes to show whether each material is an alloy or a metallic element.

Two materials have been done for you.

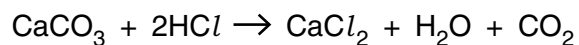
	alloy	metallic element
amalgam	☐	☐
brass	☒	☐
copper	☐	☐
iron	☐	☒
steel	☐	☐

[2]

[Total: 4]

- 9 Wendy investigates the reaction between marble chips and hydrochloric acid.

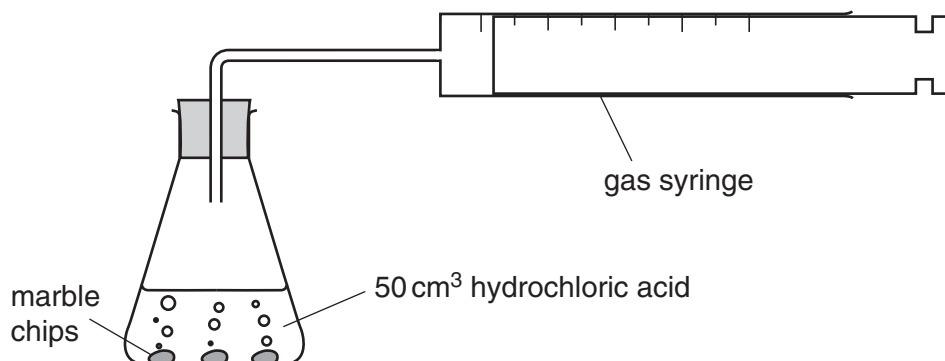
The equation for the reaction is



- (a) Write down the formula of a **reactant**.

..... [1]

- (b) Wendy does three experiments, **A**, **B** and **C**.

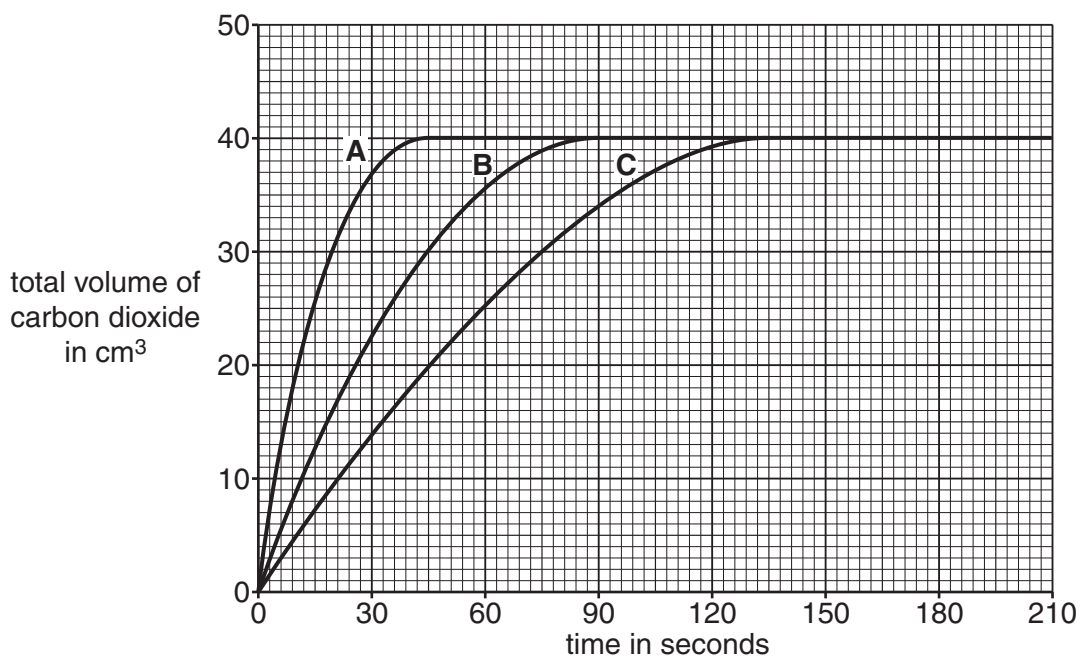


In each experiment she uses a different size of marble chip.

She uses the same mass of marble in each experiment.

She also uses the same concentration of acid.

Look at the graph of Wendy's results.



13

- (i) In which experiment do the marble chips react the fastest?

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

answer [1]

- (ii) Look at the line for experiment **B**.

When is the rate of reaction **greatest**?

Choose your answer from the list.

0 – 30 seconds

30 – 60 seconds

60 – 90 seconds

90 – 120 seconds

answer seconds [1]

- (c) Some marble chips are left at the end of each experiment.

Why does each reaction stop?

..... [1]

- (d) Wendy wants to make the reaction between marble and acid go faster.

She has already investigated different sizes of marble chips.

She does not want to change the volume of acid or the mass of marble.

Write about **other** ways she could make the reaction go faster.

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

[Total: 6]

14

10 Paints are used to decorate or protect surfaces.



Complete the sentences about paints.

Choose words from the list.

binding medium

pigment

solution

solvent

Paints contain several ingredients.

One ingredient gives the paint colour. This ingredient is the

One ingredient thins the paint. This ingredient is the

One ingredient dries and forms a skin, which sticks the paint to the surface.

This ingredient is the

[2]

[Total: 2]

Section C – Module C3

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

Look at the list of elements.

aluminium	lithium
beryllium	neon
bromine	nitrogen
calcium	potassium
iron	sulfur

Choose **only** elements from the list to answer the questions.

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

The Periodic Table on the back page may help you.

- (a) Write down the **name** of the element with atomic number 19.

..... [1]

- (b) Write down the **name** of a transition element.

..... [1]

- (c) Write down the **name** of an element in Group 7.

..... [1]

- (d) Write down the **name** of an element in the same **period** as magnesium.

..... [1]

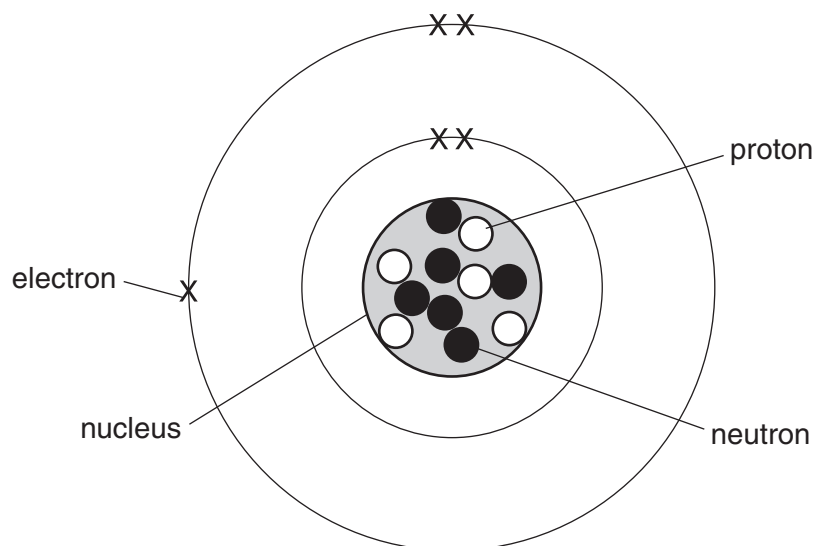
[Total: 4]

16

12 This question is about atomic structure.

Look at the diagram.

It shows the structure of an atom of boron.



(a) (i) Write down the name of the particle which is negatively charged.

Choose from the labels on the diagram.

..... [1]

(ii) What is the **mass** number of this boron atom?

answer [1]

(b) Another isotope of boron has a mass number of 12.

Write down the number of **protons** in this isotope.

answer [1]

[Total: 3]

13 This question is about the halogens.

(a) Bromine is a halogen.

What colour is bromine?

..... [1]

(b) Mandy investigates the reaction between chlorine and sodium iodide solution.

She adds a solution of chlorine to sodium iodide solution.

Iodine is made.

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

..... [1]

(c) Mandy investigates three halogens.

These are bromine, chlorine and iodine.

Write down the names of the three halogens in order of reactivity.

Start with the most reactive halogen first.

most reactive halogen

.....

least reactive halogen

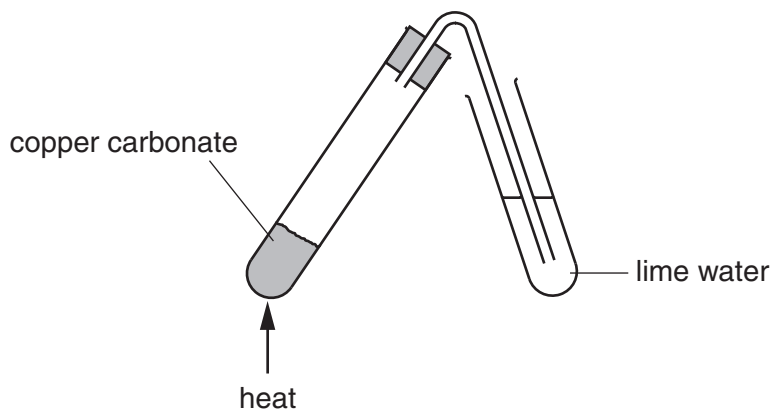
[1]

[Total: 3]

14 This question is about some metals and their compounds.

Richard heats copper carbonate.

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



In this reaction copper carbonate changes into copper oxide and carbon dioxide.

(a) Carbon dioxide is bubbled through limewater.

What happens to the limewater?

..... [1]

(b) This reaction is an example of **thermal decomposition**.

Look at the list.

Which statement best describes thermal decomposition?

Put a tick (✓) in the correct box.

the displacement of a less reactive substance by a more reactive one

☐

making an insoluble substance from two solutions

☐

breaking down a hot liquid substance by the passage of an electric current

☐

breaking down a substance into two different substances using heat

☐

[1]

(c) Look at the table.

It shows information about four metals.

	aluminium	copper	iron	lead
density in g/cm ³	2.7	8.9	7.9	11.4
relative electrical conductivity	40	64	11	5
relative strength	70	220	210	15

(i) Write down the density of iron.

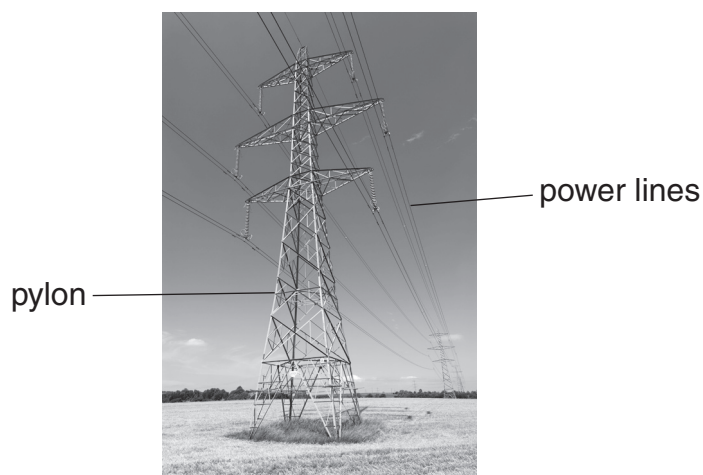
..... g/cm³ [1]

(ii) Which metal has the **highest** relative strength?

..... [1]

(iii) Look at the picture of some power lines.

These power lines are made from aluminium.



Explain why aluminium is used for making power lines.

The information in the table may help you.

.....

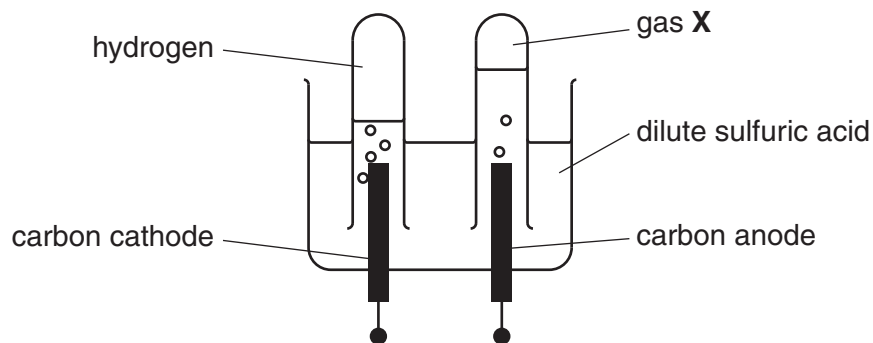
 [2]

[Total: 6]

20

- 15 Luke investigates the electrolysis of dilute sulfuric acid solution.

Look at the apparatus he uses.



- (a) Look at the list. It shows the particles in dilute sulfuric acid solution.



Cations are attracted to the cathode.

Write down the name of one particle which is a cation.

Choose from the list.

answer

[1]

- (b) Look at the diagram.

Write down the name of gas X.

answer

[1]

- (c) The electrolysis of dilute sulfuric acid makes hydrogen gas.

Write about how you can test for hydrogen.

test

result

..... [2]

[Total: 4]

END OF QUESTION PAPER

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The Periodic Table of the Elements

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

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.