Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2016–2017

Science: Single Award

Unit 2 (Chemistry)
Foundation Tier

ML

[GSS21]

THURSDAY 23 FEBRUARY 2017, MORNING

TIME

1 hour, plus your additional time allowance.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all ten** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 60.
Quality of written communication will be assessed in Question **9(b)**.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
A Data Leaflet, which includes a Periodic Table of the Elements, is included for your use.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total Marks	

Examiner Only	
Marks	Remark

1 Materials that come from living things are described as natural. Other materials are described as man-made.

(a) Look at the list of materials below. Put each material in the correct place in the table.

polythene **wool** **cotton** **silk**

Natural	Man-made

[2]

Most modern buckets are made from plastic instead of metal.

© mbongorus / iStock / Thinkstock

(b) Write down **two** reasons why plastic is better than metal for making buckets.

1. _____

2. _____ [2]

Examiner Only	
Marks	Remark

2 A photograph of a fossil is shown below.

© Dorling Kindersley / UIG / Science Photo Library

(a) What is a fossil?

_____

_____ [2]

(b) The sentences below are about different rock types.
Fill in the missing words.

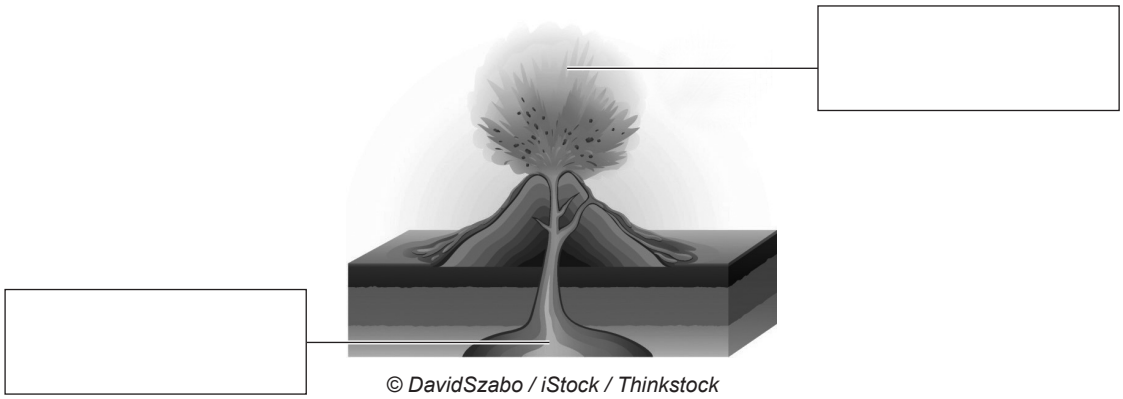
Volcanic eruptions produce a type of rock

called _____.

One example of a sedimentary rock

is _____. [2]

(c) The diagram below shows a volcanic eruption.



© DavidSzabo / iStock / Thinkstock

Label the parts of the volcano shown above.

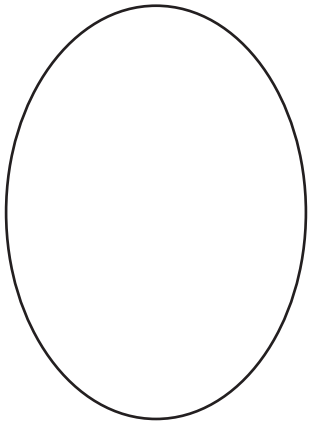
Choose from:

magma : lava : dust and ash : crust [2]

Examiner Only	
Marks	Remark

3 Scientists can take fingerprints from crime scenes.

(a) (i) Draw the pattern of a **whorl** fingerprint.
Do this in the space below.



[1]

(ii) A whorl is one type of fingerprint. Write down the name of one **other** type of fingerprint.

_____ [1]

(b) Below are the steps a scientist might use to take a fingerprint from a white surface at a crime scene. They are **not** in the correct order.

1. brush off excess powder

2. sprinkle carbon black powder onto the surface

3. transfer the print onto card

4. lift the print with clear tape

(i) Put the steps (**1**, **2**, **3**, and **4**) in the correct order.

_____ _____ _____ _____ [2]

(ii) Write down one reason why aluminium powder is **not** used on a white surface.

_____

_____ [1]

BLANK PAGE

(Questions continue overleaf)

Examiner Only	
Marks	Remark

4 Household substances can have a range of pH values.

(a) Fill in the missing answers in the table below.

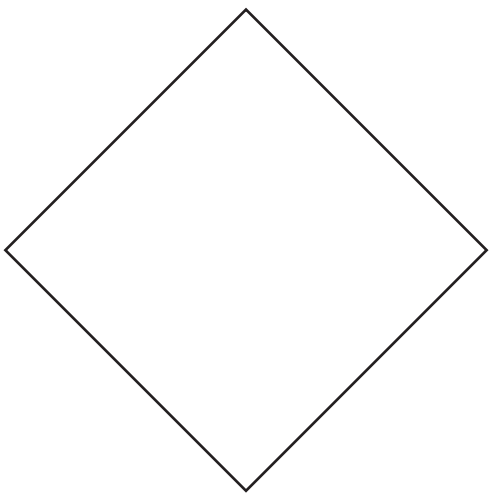
Household substance	pH	Colour with Universal Indicator	Type of solution
oven cleaner	13		strong alkali
lemon juice		yellow	weak acid
baking soda	8	green/blue	

[3]

(b) Most aerosols such as deodorants and air fresheners are flammable.

© Cristina Pedrazzini / Science Photo Library

Draw the hazard symbol you would usually find on a flammable aerosol. Do this in the space below.



[1]

(c) A wasp sting is alkaline. Mary, Sophie and John are talking about how to treat a wasp sting.

© KiroM / iStock / Thinkstock

Write down the name of the pupil who gave the best answer.
Explain fully why you think this is the best answer.

_____

_____

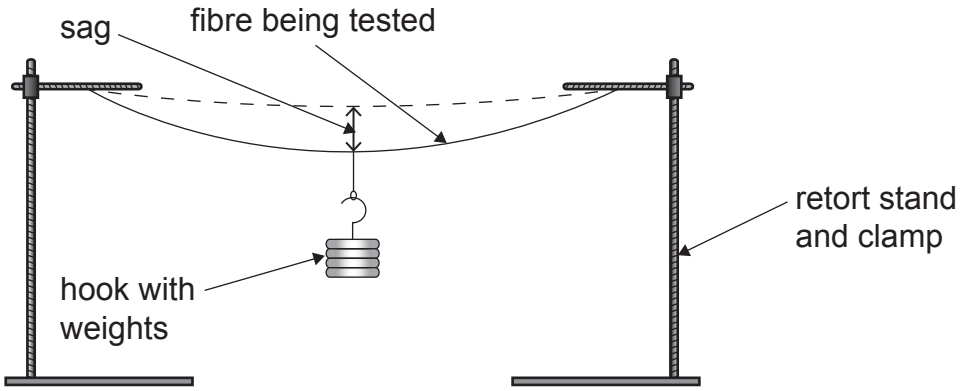
_____

_____ [3]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

5 Look at the apparatus below. It was used to test the flexibility of four different fibres.



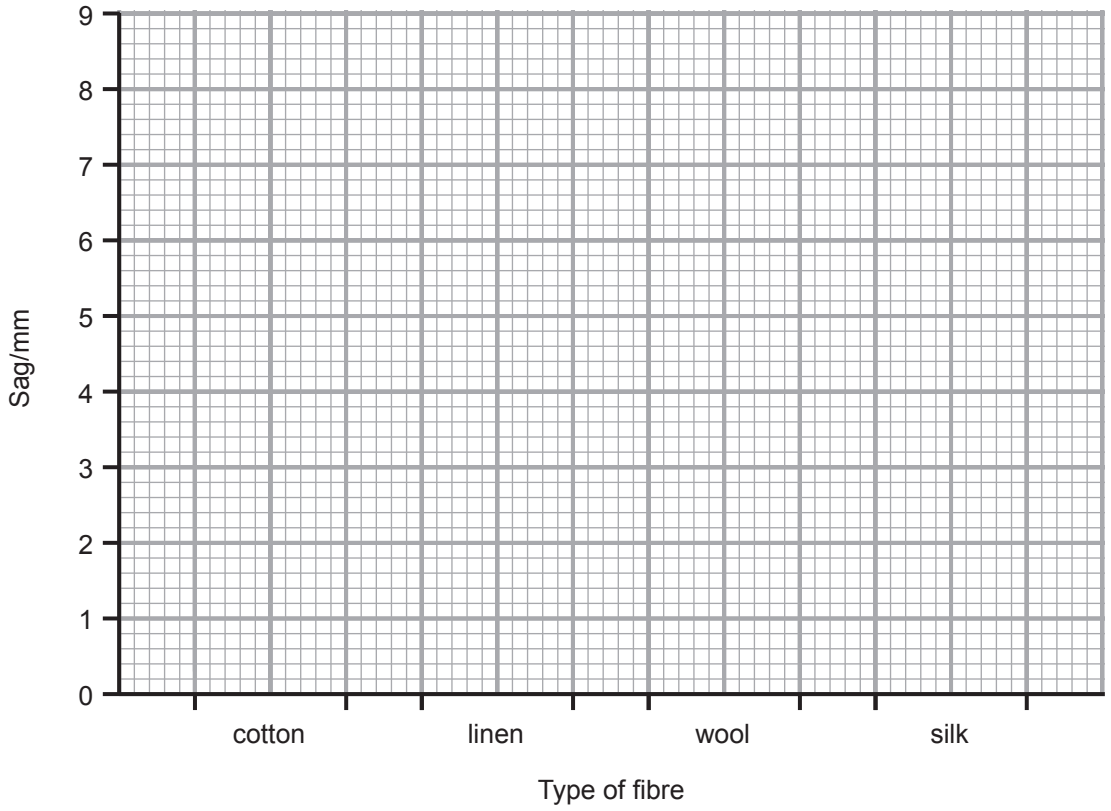
Source: Principal Examiner

Weights were added to each type of fibre. Then the amount the fibre sagged was measured. The results are shown below.

Type of fibre	Sag/mm
cotton	7.0
linen	2.0
wool	8.5
silk	5.2

Examiner Only	
Marks	Remark

(a) (i) Draw a **bar chart** for these results. Do this on the grid below.



[2]

(ii) Which fibre is the most flexible?

_____ [1]

(b) Write down **one** thing that should have been done to make this a fair test.

_____

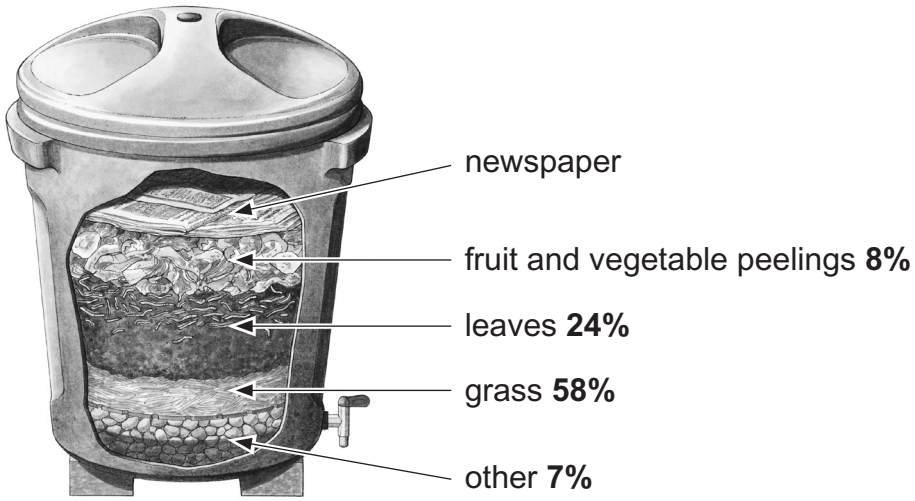
_____ [1]

(c) Write down **one** thing that should have been done to make the results reliable.

_____ [1]

Examiner Only	
Marks	Remark

6 Look at the information below. It shows the percentage of different types of waste in a compost bin.



(a) Calculate the percentage of newspaper in the compost bin.

_____ % [1]

(b) All the waste in a compost bin is biodegradable. What does the word **biodegradable** mean?

_____

_____ [2]

(c) Write down **one** reason why the percentage of grass added to the compost bin decreases in winter.

_____

_____ [1]

(d) Aluminium is a material that can be recycled. Write down **two** reasons why it is important to recycle aluminium.

1. _____

2. _____ [2]

BLANK PAGE

(Questions continue overleaf)

7 **(a)** Carbon dioxide is produced when sodium hydrogencarbonate is heated.

(i) Complete the word equation for this reaction.

sodium hydrogencarbonate $\xrightarrow{\text{heat}}$ carbon dioxide + ☐ + ☐

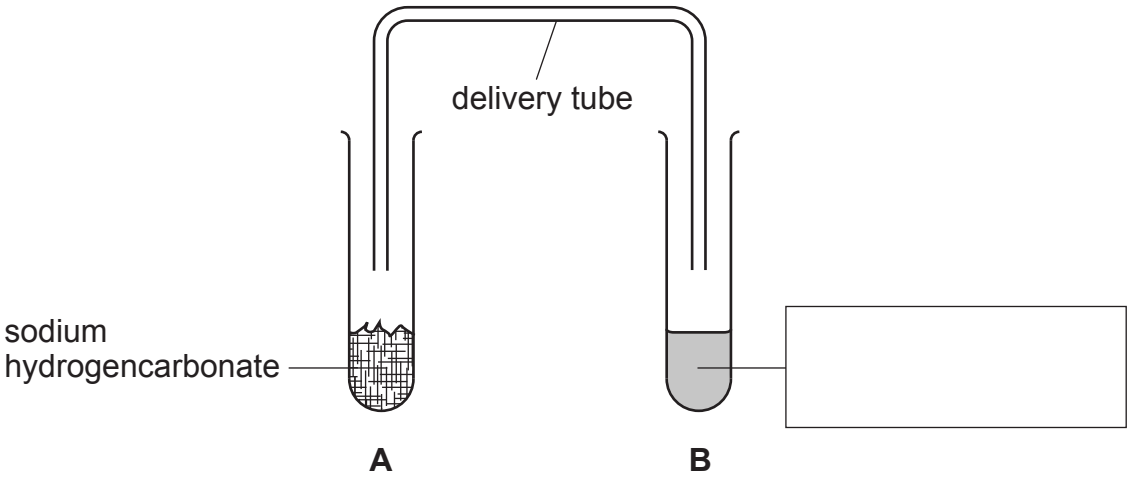
[2]

Examiner Only	
Marks	Remark

(ii) What is the name for this **type** of reaction?

_____ [1]

(b) A pupil wanted to make and test for carbon dioxide. She used the apparatus shown below. However, the experiment did not work as the apparatus was not correctly set up.



Source: Principal Examiner

(i) Write down the name of the chemical in test tube **B**, that is used to test for carbon dioxide. Do this on the diagram above. [1]

(ii) Describe one mistake in the set-up of test tube **A** and one mistake in the set-up of test tube **B**.

Test tube **A** _____

_____ [1]

Test tube **B** _____

_____ [1]

(c) Baking powder contains sodium hydrogencarbonate and it is used in making cakes.

(i) What chemical do you add to sodium hydrogencarbonate to make baking powder?

_____ [1]

(ii) Write down **one** reason why baking powder is used in making cakes.

_____

_____ [1]

Examiner Only	
Marks	Remark

8 The table below gives some properties of five materials.

material	relative heaviness	relative strength	relative stiffness	relative cost
steel	7800	10	105	low
Kevlar	1400	30	70	high
graphene	1000	2000	5	very high
glass reinforced plastic	1900	15	10	medium
wood	5000	5	40	low

Answer the questions below.
Only use the information in the table to do this.

(a) For many years canoes were made from wood. However, modern canoes can be made from Kevlar.

© Jim West / Science Photo Library

Write down the main advantage and the main disadvantage of using Kevlar.

Advantage _____

Disadvantage _____ [2]

(b) For many years tennis rackets were made from wood. However, now scientists are investigating the use of graphene instead of wood. Describe fully how using graphene tennis rackets will be different from using wooden tennis rackets.

_____

_____

_____ [2]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

9 **(a)** **(i)** What does the term **hard water** mean?

_____

_____ [2]

(ii) Write down the name of **one** ion that can cause water to be hard.

_____ [1]

(b) Describe an experiment that would show the difference between the two types of hard water.

Your answer should include:

- the names of the two types of hard water
- a method for the experiment including how to make it a fair test
- the expected results for each type of hard water

In this question you will be assessed on your written communication skills including the use of specialist scientific terms.

_____

_____

_____

_____

_____

_____

_____

_____

_____

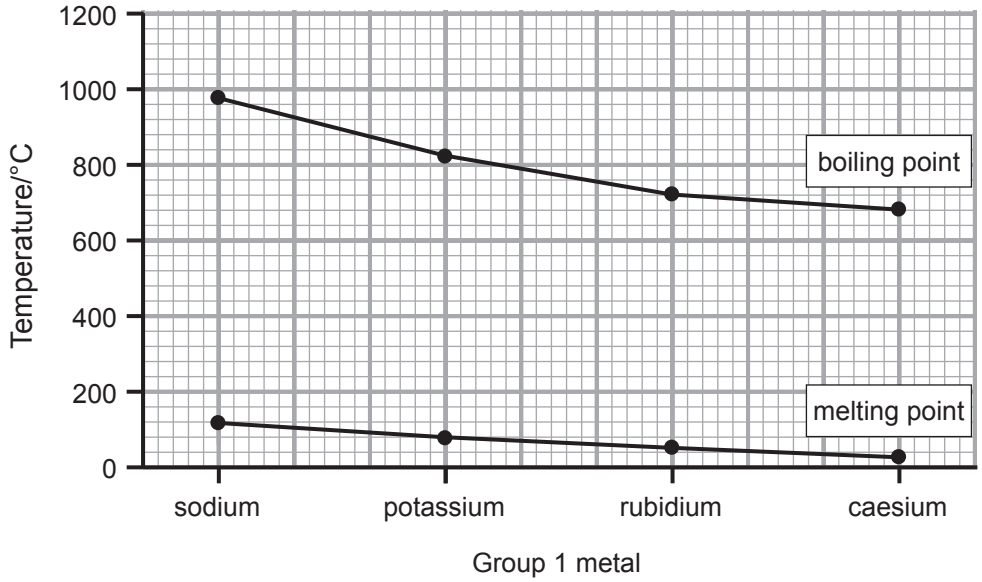
_____

_____

_____ [6]

Examiner Only	
Marks	Remark

10 Look at the graph below. It shows the melting and boiling points of some Group 1 metals.



You might find your Data Leaflet helpful.

(a) Write down **one** similarity and **one** difference between the trends in melting points and boiling points of the metals in Group 1.

Similarity _____

_____ [1]

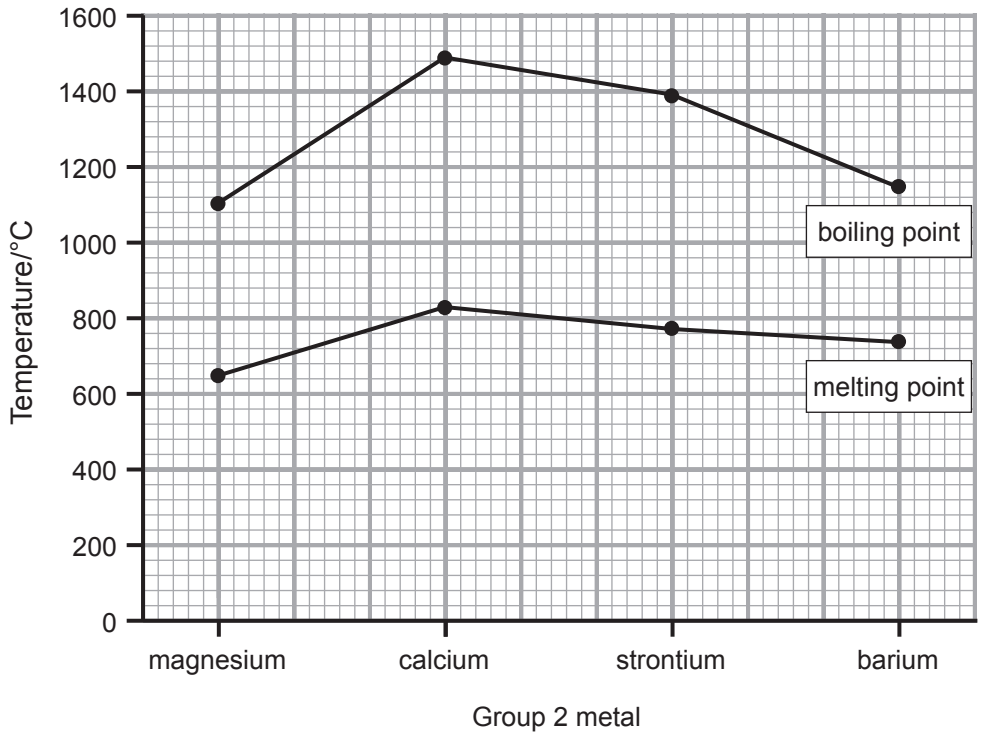
Difference _____

_____ [1]

(b) What is the name given to the metals in Group 1 of the Periodic Table?

_____ [1]

Look at the graph below. It shows the melting and boiling points of some Group 2 metals.



You might find your Data Leaflet helpful.

(c) Describe fully the trend in **boiling** points of the metals in Group 2.

_____

_____

_____ [2]

(d) Predict the melting point of radium, which is another Group 2 metal.

_____ °C [1]

THIS IS THE END OF THE QUESTION PAPER

Examiner Only	
Marks	Remark

113159

SYMBOLS OF SELECTED IONS

Positive ions

Name	Symbol
Ammonium	NH_4^+
Chromium(III)	Cr^{3+}
Copper(II)	Cu^{2+}
Iron(II)	Fe^{2+}
Iron(III)	Fe^{3+}
Lead(II)	Pb^{2+}
Silver	Ag^+
Zinc	Zn^{2+}

Negative ions

Name	Symbol
Carbonate	CO_3^{2-}
Dichromate	$Cr_2O_7^{2-}$
Ethanoate	CH_3COO^-
Hydrogen carbonate	HCO_3^-
Hydroxide	OH^-
Methanoate	$HCOO^-$
Nitrate	NO_3^-
Sulfate	SO_4^{2-}
Sulfite	SO_3^{2-}

SOLUBILITY IN COLD WATER OF COMMON SALTS, HYDROXIDES AND OXIDES

Soluble
All sodium, potassium and ammonium salts
All nitrates
Most chlorides, bromides and iodides EXCEPT silver and lead chlorides, bromides and iodides
Most sulfates EXCEPT lead and barium sulfates Calcium sulfate is slightly soluble

Insoluble
Most carbonates EXCEPT sodium, potassium and ammonium carbonates
Most hydroxides EXCEPT sodium, potassium and ammonium hydroxides
Most oxides EXCEPT sodium, potassium and calcium oxides which react with water

COUNCIL FOR THE CURRICULUM EXAMINATIONS AND ASSESSMENT
29 Clarendon Road, Clarendon Dock, Belfast BT1 3BG
✆ +44 (0)28 9026 1200 🖷 +44 (0)28 9026 1234 ☎ +44 (0)28 9024 2063 ✉ info@ccea.org.uk 🌐 www.ccea.org.uk
Rewarding Learning

Rewarding Learning

DATA LEAFLET

For the use of candidates taking
Science: Chemistry,
Science: Double Award
or Science: Single Award

Copies must be free from notes or additions of any kind. No other type of data booklet or information sheet is authorised for use in the examinations.

Contents **Page**

gcse

science

chemistry
double award
single award

Rewarding Learning

THE PERIODIC TABLE OF ELEMENTS

Group

1	2											3	4	5	6	7	0
							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	64 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	99 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	210 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	263 Sg Seaborgium 106	262 Bh Bohrium 107	265 Hs Hassium 108	266 Mt Meitnerium 109	269 Ds Darmstadtium 110	272 Rg Roentgenium 111	285 Cn Copernicium 112						

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	147 Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71
232 Th Thorium 90	231 Pa Protactinium 91	238 U Uranium 92	237 Np Neptunium 93	242 Pu Plutonium 94	243 Am Americium 95	247 Cm Curium 96	245 Bk Berkelium 97	251 Cf Californium 98	254 Es Einsteinium 99	253 Fm Fermium 100	256 Md Mendelevium 101	254 No Nobelium 102	257 Lr Lawrencium 103

* 58 – 71 Lanthanum series
† 90 – 103 Actinium series

a
b x

a = relative atomic mass (approx)
x = atomic symbol
b = atomic number