



General Certificate of Secondary Education
2019–2020

Centre Number

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Candidate Number

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Single Award Science: Chemistry

Unit 2

Foundation Tier

MV24

[GSA21]

THURSDAY 7 NOVEMBER 2019, 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.

You must answer the questions in the spaces provided.

Do not write on blank pages.

Complete in black ink only.

Answer **all nine** questions.

Information for Candidates

The total mark for this paper is 60.

Figures in brackets printed at the end of each question indicate the marks awarded to each question or part question.

Quality of written communication will be assessed in Question 8.

A Data Leaflet, which includes a Periodic Table of the Elements, is included for your use.

- 1 (a) Some chemicals have symbols on their containers to warn of dangers.

What name is given to these symbols?
[1 mark]

Circle the correct answer.

risk

danger

hazard

(b) Shown below are four symbols that can be found on chemical containers.



A



B



C



D

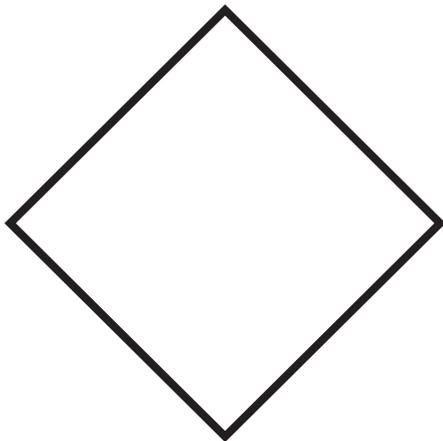
(i) Which symbol (**A**, **B**, **C** or **D**) should be placed on a tank of petrol to show that it is flammable? [1 mark]

(ii) Complete the following sentence.
[1 mark]

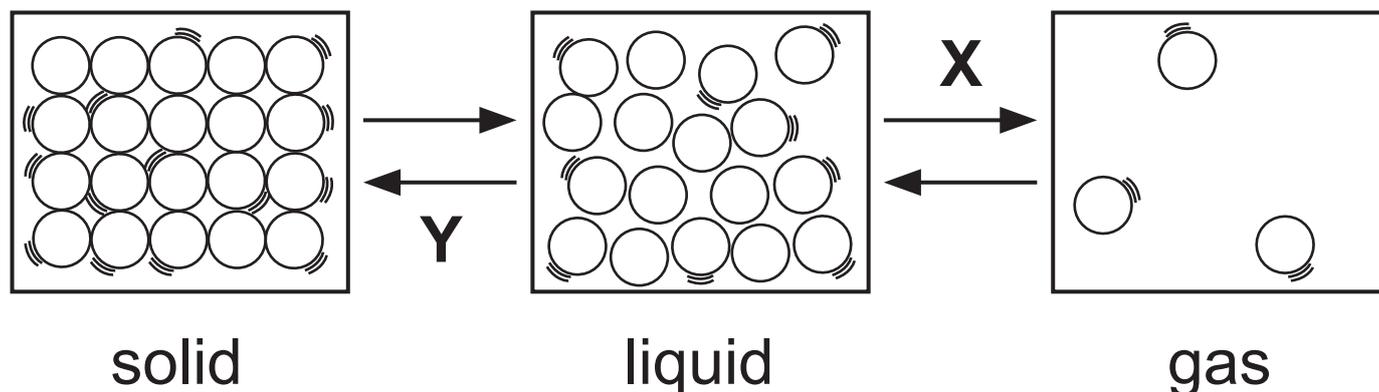
A container of weedkiller has the symbol **C**.

This shows that weedkiller is a
_____ substance.

(c) In the box below draw the symbol that would be found on a cylinder of a gas that is **explosive**. [1 mark]



2 The diagrams below show the arrangement of particles in a solid, a liquid and a gas.



(a) Name the changes of state, **X** and **Y**, shown above. [2 marks]

Choose from:

melting

freezing

condensing

subliming

evaporating

X _____

Y _____

(b) Describe **one** difference between the arrangement of particles in a solid and a liquid. [1 mark]

(c) Some tablets can be dissolved in water.



(i) Suggest **two** ways to make a tablet dissolve more quickly in water. [2 marks]

1. _____

2. _____

(ii) Complete the following sentence.
[1 mark]

Choose from:

saturated

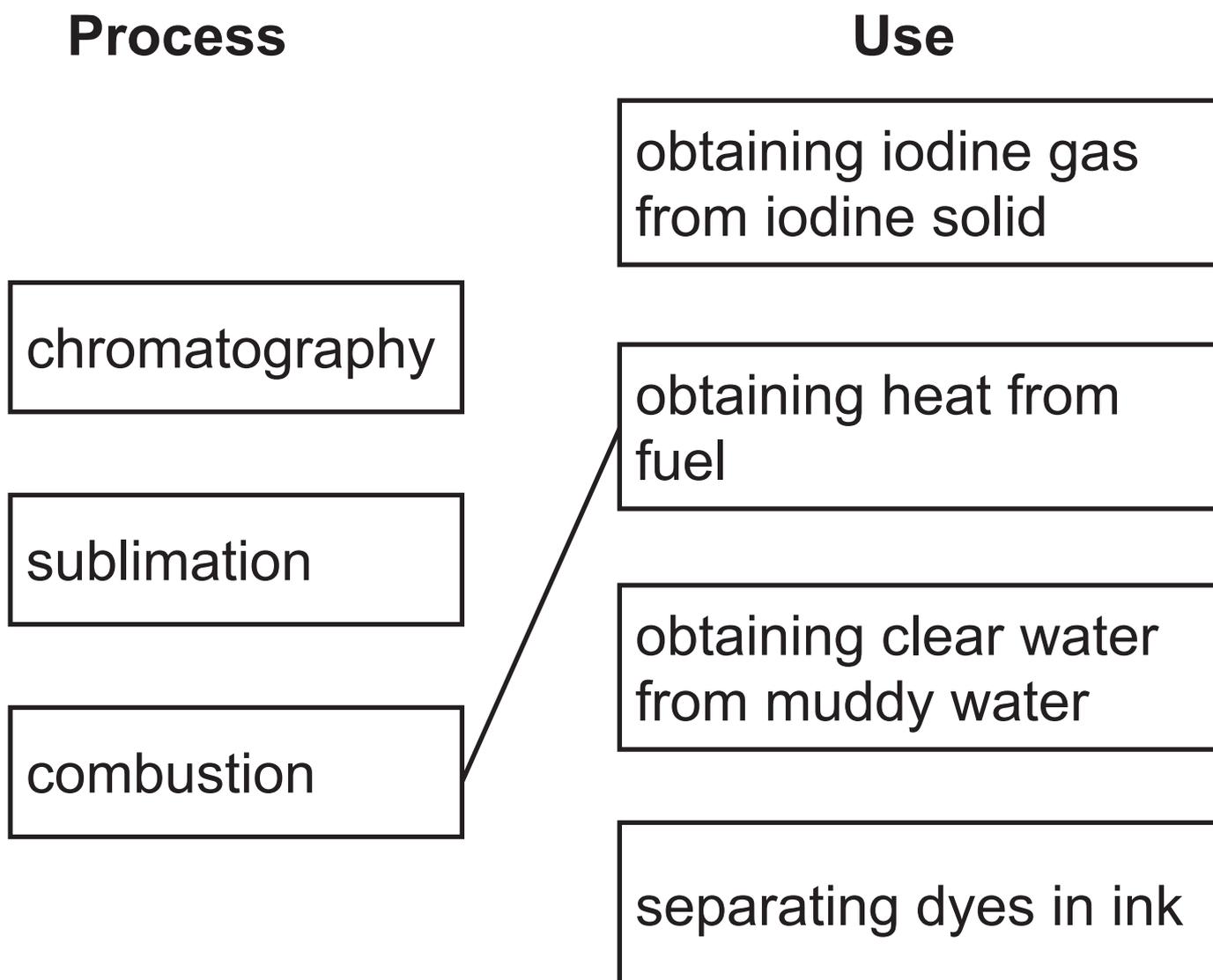
solvent

solute

solution

When a tablet dissolves in water
a _____ is formed.

- 3 (a)** Given below are some scientific processes and what they can be used for. Using lines match each process to one use. [2 marks]
One has been done for you.



The diagram below shows a beaker of water on an electronic balance.



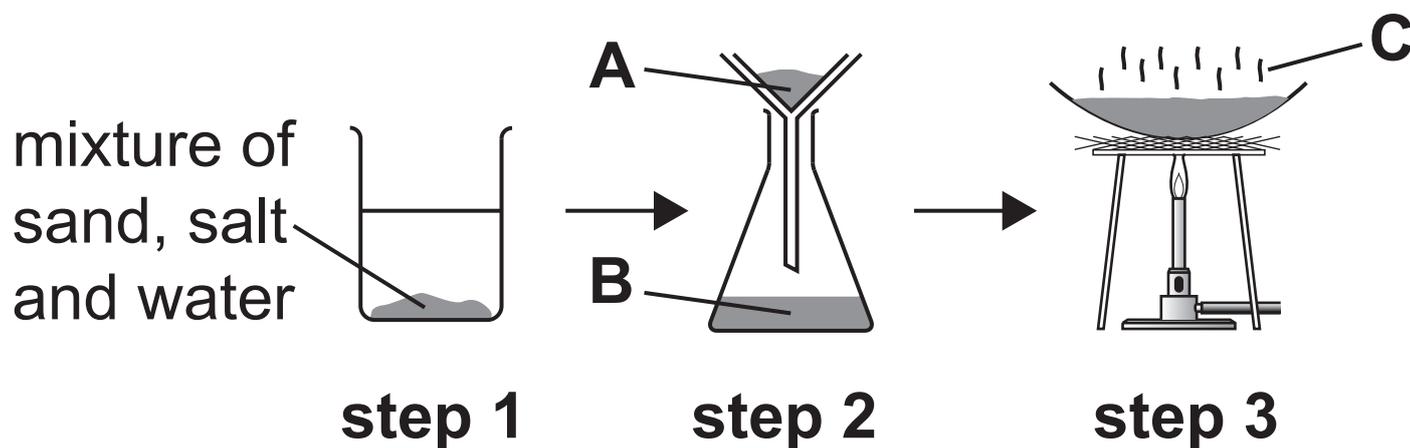
(b) The balance shows a mass of 179.45 g. Mary then adds 10 g of salt and 15 g of sand into the water. Calculate the total mass that will now be shown on the balance. [2 marks]

(Show your working out.)

_____ g

10

(c) Mary wanted to obtain a dry sample of salt from the mixture of sand, salt and water. The diagrams below show the three steps Mary used in this separation.



(i) Name the substances labelled **A**, **B** and **C**. [3 marks]

A _____
B _____
C _____

(ii) Name the separating technique used in **step 2**. [1 mark]

4 The table below gives information about five plastics.

Plastic	Properties	Colours available	Cost
nylon	long-lasting, strong, lightweight	white	high
polystyrene	does not keep its shape, good heat insulator, lightweight	white	low
acrylic	stiff, weather- resistant, good heat insulator	wide range of colours	high
PVC	keeps its shape, hard, weather- resistant	wide range of colours	medium
polythene	flexible, soft, good electrical insulator	wide range of colours but can fade	medium

Use information from the table to answer the following questions.

(a) Which plastic would be best for covering electrical cables? [1 mark]

(b) Give **one** property of polystyrene which means it is **not** suitable to make garden chairs. Explain your choice. [2 marks]

A manufacturer wants to produce cheap, blue buckets to sell in local supermarkets.



(c) Which plastic should the manufacturer choose? Give **two** reasons for your answer. [3 marks]

Plastic _____

Reason 1 _____

Reason 2 _____

(b) Complete the following sentences.

[2 marks]

An atom of neon (Ne) has ten electrons.

It has _____ electrons in the first shell and _____ electrons in the second shell.

Neon is unreactive because it has a _____ outer shell.

(c) The Periodic Table has been developed over many years and now has over 100 elements. Mendeleev was one of the chemists involved in this.

(i) Complete the following sentence.

[1 mark]

Mendeleev arranged the elements in order of increasing atomic

_____ .

(ii) Give **two** other features of Mendeleev's periodic table.

[2 marks]

1. _____

2. _____

- 6 The table below shows the pH range of some chemicals and their colour in different indicators.

Chemical	Colour of red litmus paper	Colour of universal indicator paper	pH range
hydrochloric acid	red	red	1–2
baking soda	blue	blue	8–10
water	red	green	7
sodium hydroxide	blue	purple	12–14
vinegar	red	orange	3–6

- (a) Using information from the table, explain why red litmus paper is less useful than universal indicator paper when testing the pH of chemicals. [2 marks]

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(Questions continue overleaf)

Acid from food can cause tooth decay. Three students, Amy, Rose and Jane were discussing the best way to prevent this decay. They said:

Amy: Toothpaste is best to use. It contains baking soda.

Rose: Add vinegar to the acid on the teeth.

Jane: Add sodium hydroxide to cure it.

(b) Name the pupil who made the correct statement. Explain your answer fully.
[3 marks]

Name _____

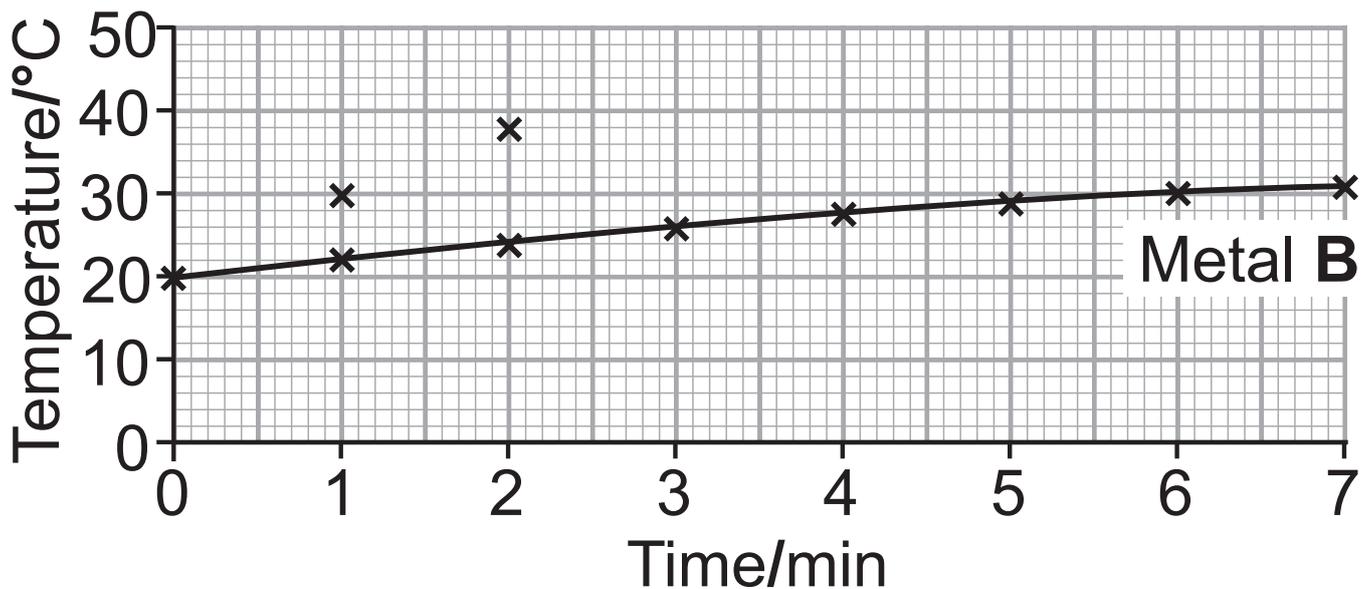
Explanation _____

- 7 (a) Declan investigated the reactivity of two metals **A** and **B**. He added 2 g of each metal to 25 cm³ of copper sulfate solution in separate beakers. The temperature of each mixture was recorded every minute for seven minutes.

His results are shown below.

Time/min	0	1	2	3	4	5	6	7
Temperature/°C Metal A	20	30	38	42	45	47	48	48
Temperature/°C Metal B	20	22	24	26	28	29	30	31

- (i) Plot and draw a line graph of the results for metal **A**. The first three points have been plotted for you. The graph for metal **B** is already drawn. [3 marks]



- (ii) Describe fully the trend shown for metal **A**. [2 marks]

(iii) Calculate the temperature difference between metal **A** and metal **B** at the end of Declan's investigation.
[1 mark]

_____ °C

(iv) What name is given to chemical reactions that give out heat?
[1 mark]

(b) Declan then added 2 g of silver to 25 cm³ of copper sulfate solution and found there was **no** increase in temperature.

(i) Put the three metals **A**, **B** and **silver** in order of reactivity. [1 mark]

Most reactive _____
↓
Least reactive _____

(ii) Give **one** thing that Declan did in his investigation to ensure his results were valid (fair test). [1 mark]

8 Group 1 metals are very reactive. Describe how a teacher could safely demonstrate the reactions of lithium and potassium with water to a group of pupils. [6 marks]

Your answer should include:

- at least **two** things the teacher will do to make sure the pupils are safe
- similarities in the reaction of lithium and potassium with water
- differences in the reaction of lithium and potassium with water.

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

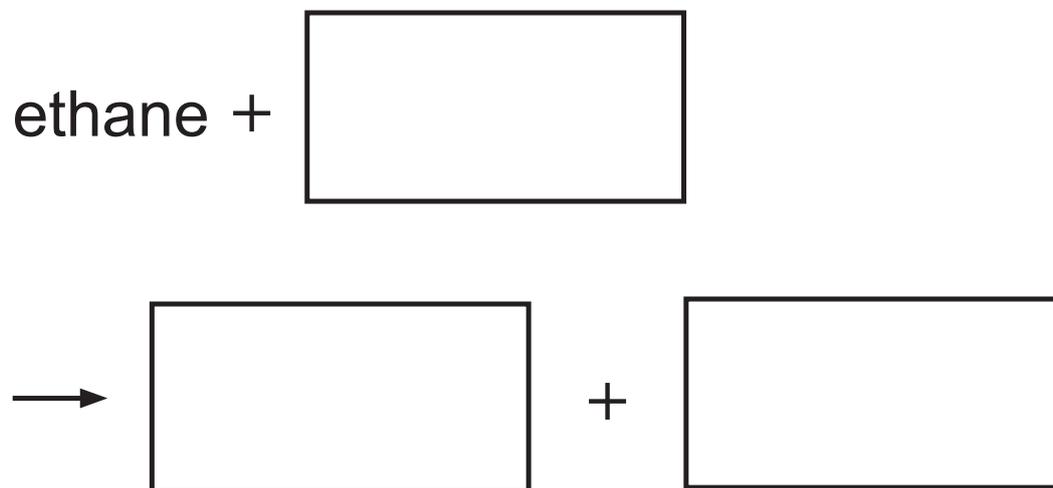
9 Crude oil is a natural resource containing a mixture of hydrocarbons.

(a) Describe fully how crude oil is formed.
[3 marks]

(b) Ethane (C_2H_6) is a member of a family of hydrocarbon compounds called the alkanes.

(i) What is meant by the term **hydrocarbon**? [2 marks]

(ii) Ethane is a fuel that can burn to release energy. Complete the word equation for the burning of ethane.
[3 marks]



**This is the end of the
question paper**

SOURCES

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Q2 Source: *Principal Examiner*

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Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	

Total Marks	
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Examiner Number

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Data Leaflet

Including the Periodic Table of the Elements

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

gcse examinations chemistry

For first teaching from September 2017

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
Butanoate	$\text{C}_3\text{H}_7\text{COO}^-$
Carbonate	CO_3^{2-}
Dichromate	$\text{Cr}_2\text{O}_7^{2-}$
Ethanoate	CH_3COO^-
Hydrogencarbonate	HCO_3^-
Hydroxide	OH^-
Methanoate	HCOO^-
Nitrate	NO_3^-
Propanoate	$\text{C}_2\text{H}_5\text{COO}^-$
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

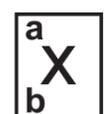
THE PERIODIC TABLE OF ELEMENTS

Group

																		0
																		4
																		He Helium
1	2											3	4	5	6	7		
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	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	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	266 Sg Seaborgium 106	264 Bh Bohrium 107	277 Hs Hassium 108	268 Mt Meitnerium 109	271 Ds Darmstadtium 110	272 Rg Roentgenium 111	285 Cn Copernicium 112							

* 58 – 71 Lanthanum series

† 90 – 103 Actinium series



a = relative atomic mass (approx)

x = atomic symbol

b = atomic number

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	145 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