

Centre Number	Candidate Number	Name
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CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

**COMBINED SCIENCE**

**0653/02**

Paper 2

May/June 2003

**1 hour**

Candidates answer on the Question Paper.  
No Additional Materials are required.

**READ THESE INSTRUCTIONS FIRST**

Write your Centre number, candidate number and name on all the work you hand in.  
Write in dark blue or black pen in the spaces provided on the Question Paper.  
You may use a soft pencil for any diagrams, graphs, tables or rough working.  
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [ ] at the end of each question or part question.

A copy of the Periodic Table is printed on page 16.

For Examiner's Use	
1	
2	
3	
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9	

If you have been given a label, look at the details. If any details are incorrect or missing, please fill in your correct details in the space given at the top of this page.

Stick your personal label here, if provided.

This document consists of **16** printed pages.

1 Fig. 1.1 shows a fruit containing seeds.

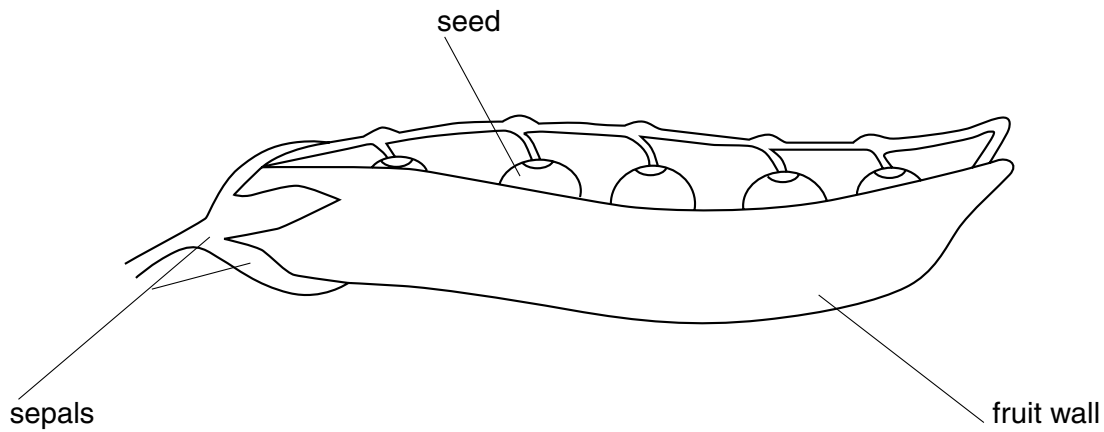


Fig. 1.1

(a) Name the part of the flower from which each of the following parts developed.

the whole fruit .....

the seeds inside the fruit ..... [2]

(b) A student investigated the conditions needed for the germination of these seeds.

He set up the apparatus shown in Fig. 1.2.

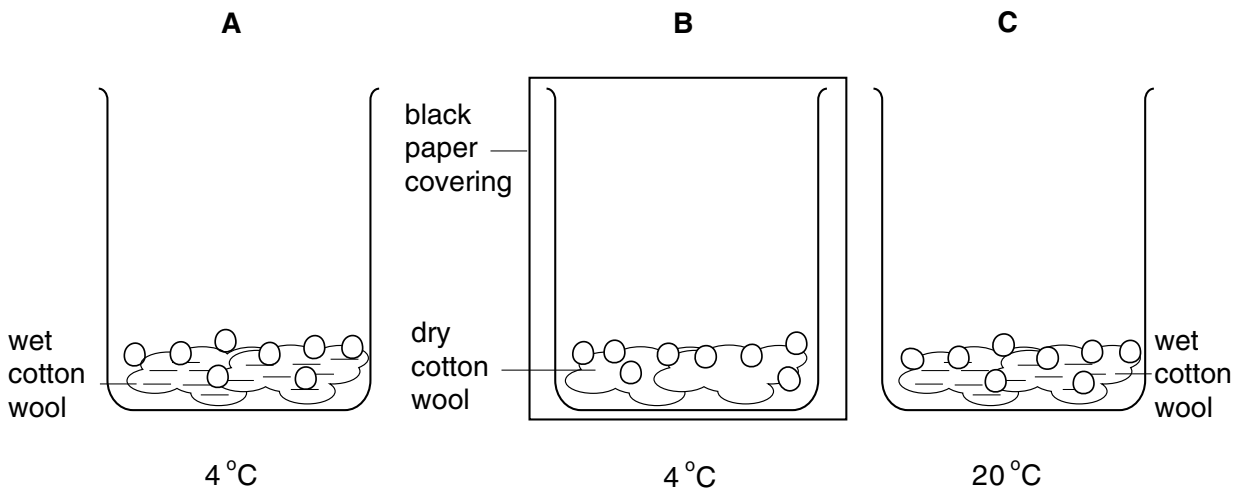


Fig. 1.2

The student found that the seeds in beakers **A** and **B** did not germinate. The seeds in beaker **C** did germinate.

He concluded that the seeds needed water, a warm temperature and light in order to germinate.

(i) Which **two** of these conclusions **cannot** be made from the results of this investigation?

..... [1]

(ii) Explain your answer.

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

(c) Seeds, such as beans, are a good source of carbohydrate and protein in the human diet.

(i) Describe how you would test a bean seed to see if it contained starch.

..... [1]

(ii) State what you would see if the result of the test was positive.

..... [1]

2 Hydrocarbons are important compounds found in crude oil (petroleum).

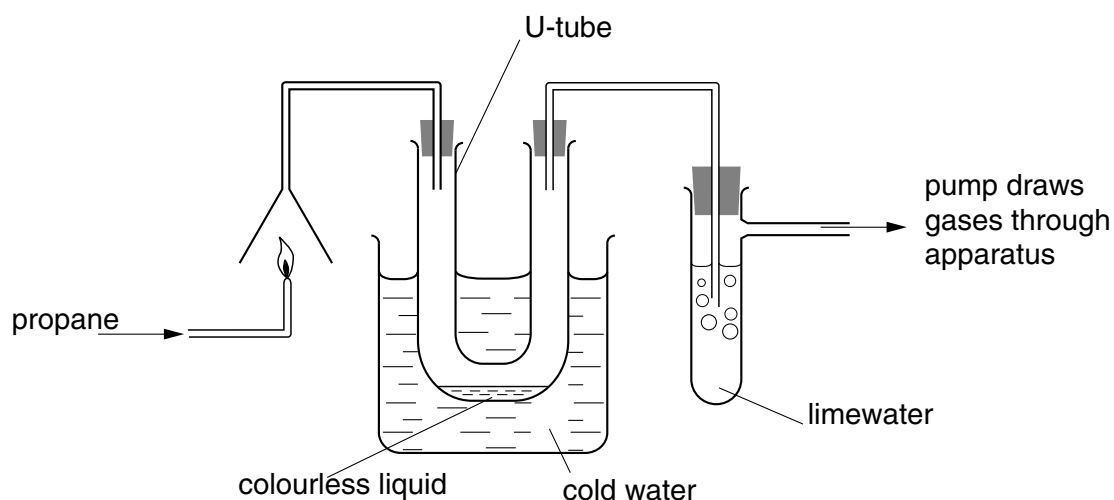
(a) Write the names and chemical symbols of the two elements which are combined in hydrocarbon molecules.

1. name ..... symbol .....

2. name ..... symbol ..... [2]

(b) Propane is a gaseous hydrocarbon fuel.

Fig. 2.1 shows apparatus used to investigate the products of complete combustion of propane.



**Fig. 2.1**

(i) Name the colourless liquid which condenses in the U-tube.

..... [1]

(ii) Predict and explain what is observed in the tube containing limewater.

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

3 This question is about these types of radiation:

- alpha radiation
- beta radiation
- gamma radiation
- infra-red radiation
- ultra-violet radiation

Which of these types of radiation

(a) is a stream of electrons?

..... [1]

(b) can penetrate a thick sheet of lead?

..... [1]

(c) causes the most ionisation?

..... [1]

(d) are forms of electromagnetic radiation?

..... [2]

4 All living things have certain characteristics. These include sensitivity and movement.

(a) List **four** other characteristics of living things.

.....  
.....  
.....  
.....

[2]

(b) In humans, sensitivity and movement are coordinated by the nervous system.

Name the two structures which form the **central** nervous system.

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

(c) Alcohol affects the nervous system.

A car was travelling at 12 metres per second along a city street. The driver had not drunk any alcohol. A child ran out in front of the car. The driver saw the child, and reacted by pressing his foot onto the brake. Fig. 4.1 shows the motion of the car during these events.

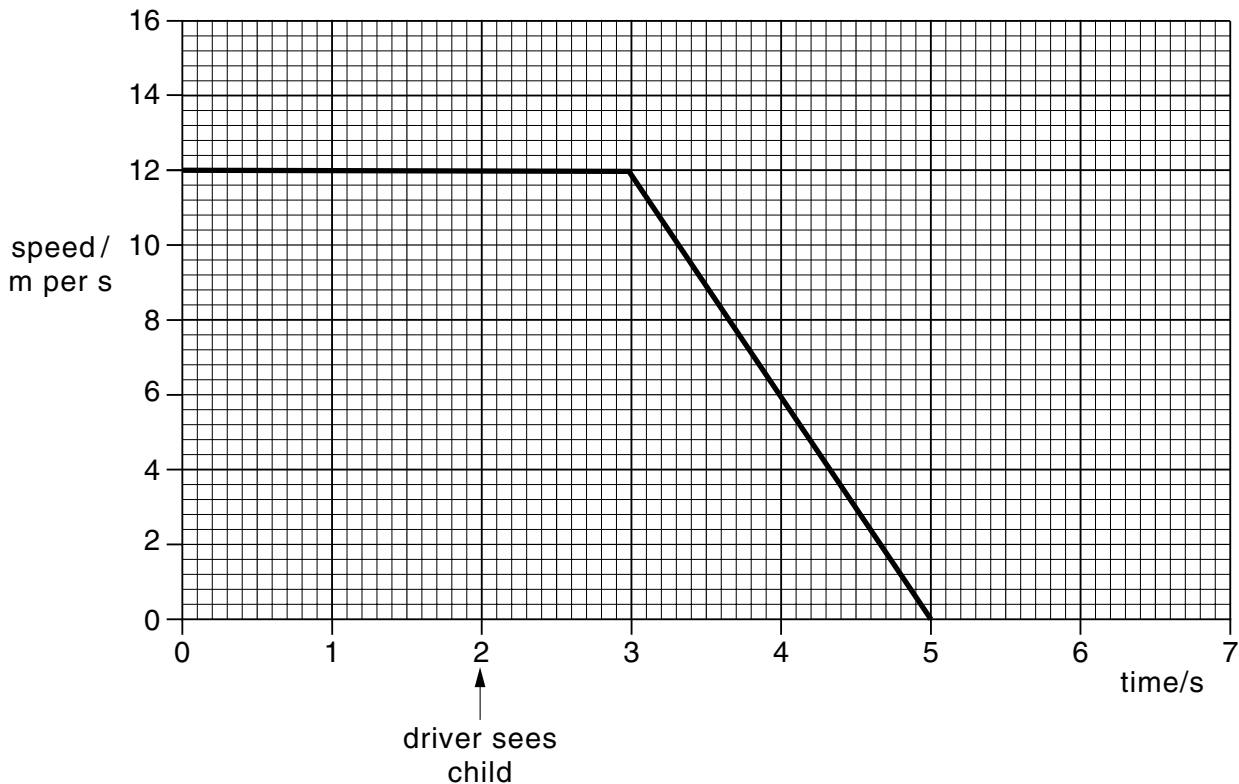


Fig. 4.1

(i) On Fig. 4.1, draw a curve to show the motion of the car if the driver had been drinking alcohol before driving the car. [2]

(ii) Using the information in Fig. 4.1, and your own knowledge about the effects of alcohol on the nervous system, explain why drivers should not drink alcohol.

.....

.....

..... [2]

5 Two reactions, **A** and **B**, involving metals and non-metals are carried out.

(a) Fig. 5.1 shows reaction **A**.

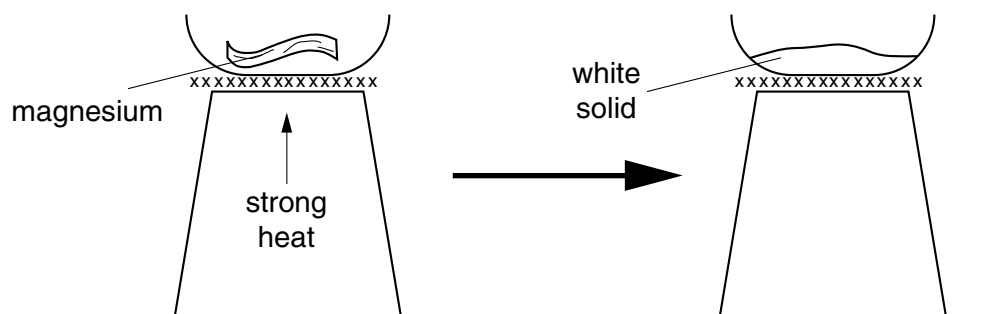


Fig. 5.1

(i) Reaction **A** is an example of oxidation.

Name the substance reacting with magnesium in reaction **A**.

..... [1]

(ii) Name the white solid produced in reaction **A**.

..... [1]

(b) Some of the white solid produced in reaction **A** was shaken with water.

State, with a reason, which of the following could be the pH of the mixture.

5      7      9

pH .....

reason .....

..... [3]



(c) Fig. 5.2 shows reaction **B**.

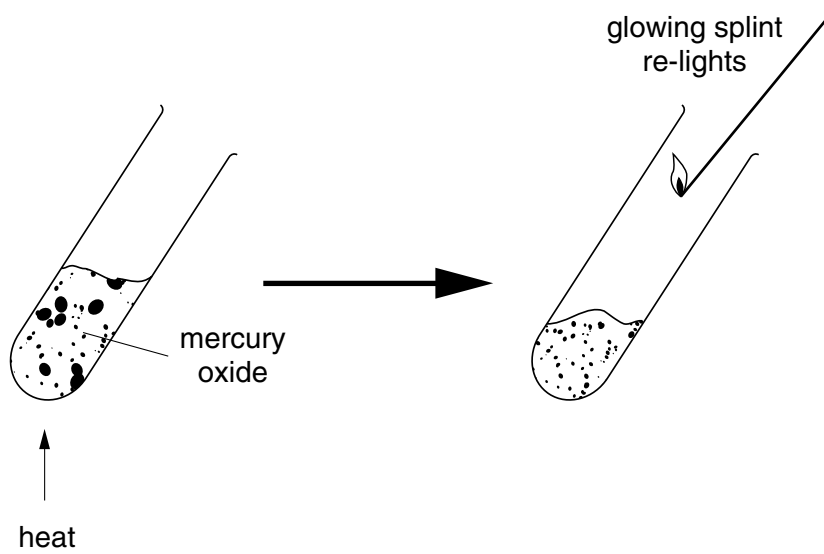


Fig. 5.2

(i) Name the gas produced during reaction **B**.

..... [1]

(ii) Suggest a word equation for reaction **B**.

..... [1]

(iii) Underline the type of chemical reaction which best describes reaction **B**.

**combustion**      **decomposition**      **neutralisation**      [1]

- 6 Masses were hung on a spring. The length of the spring was measured and the extension was calculated.

Fig. 6.1 shows some of the results.

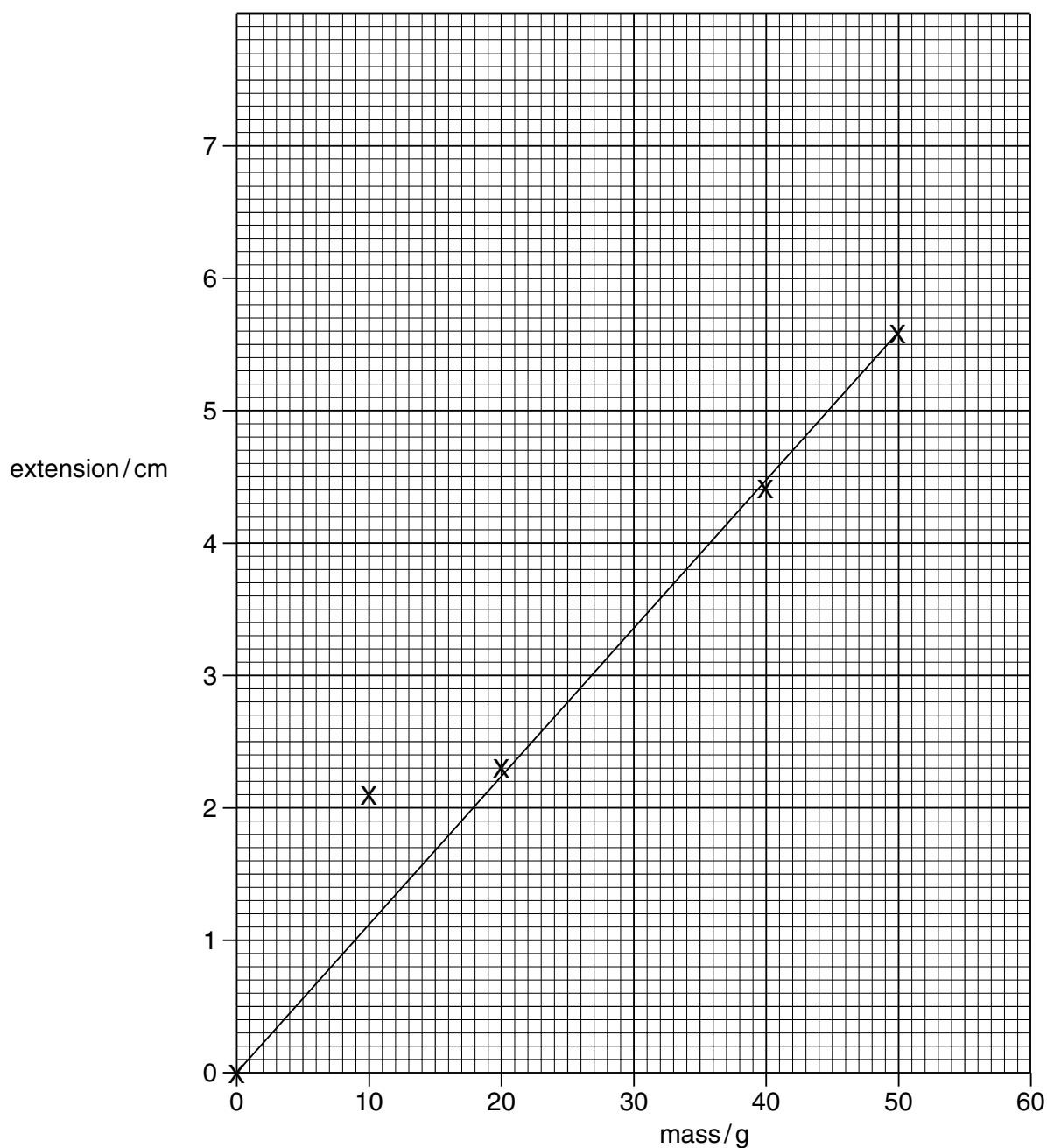
mass / g	length of spring / cm	extension of spring / cm
0	10.0	0
10	12.1	2.1
20	12.3	2.3
30	13.4	
40	14.4	4.4
50	15.6	5.6
60		6.7

**Fig. 6.1**

- (a) Complete Fig. 6.1 by filling in the two missing values.

[2]

(b) The graph in Fig. 6.2 has been plotted for some of the values.



**Fig. 6.2**

(i) Suggest which result was probably measured inaccurately.

Explain your answer.

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

(ii) Use the graph to find the value of the mass needed to produce an extension of 5.0 cm. Show your working on the graph.

..... [2]

(c) The masses are made of iron.

A 10 g mass has a volume of 1.25 cm<sup>3</sup>.

Calculate the density of iron.

Show your working and state the formula that you use.

formula used .....

working

answer ..... g/cm<sup>3</sup> [3]

7 (a) Complete the sentences below, using some of the words from the list. You may use each word once, or not at all.

- |                       |                          |                       |
|-----------------------|--------------------------|-----------------------|
| <b>carbon dioxide</b> | <b>conservation</b>      | <b>deforestation</b>  |
| <b>global warming</b> | <b>oxygen</b>            | <b>photosynthesis</b> |
| <b>soil erosion</b>   | <b>species diversity</b> | <b>temperature</b>    |

Many people are worried about the loss of tropical rain forests. It is important that rain forests should be conserved, because they have a very high ..... Also, when trees have been cut down, ..... is more likely to occur when there is heavy rainfall.

If the trees are burnt, then ..... is released into the atmosphere. An increase in the concentration of this gas in the atmosphere may lead to ..... [4]

(b) Decomposers play an important role in tropical rain forests.

Describe the role of decomposers in the carbon cycle.

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



9 Fig. 9.1 shows a simple electrical circuit.

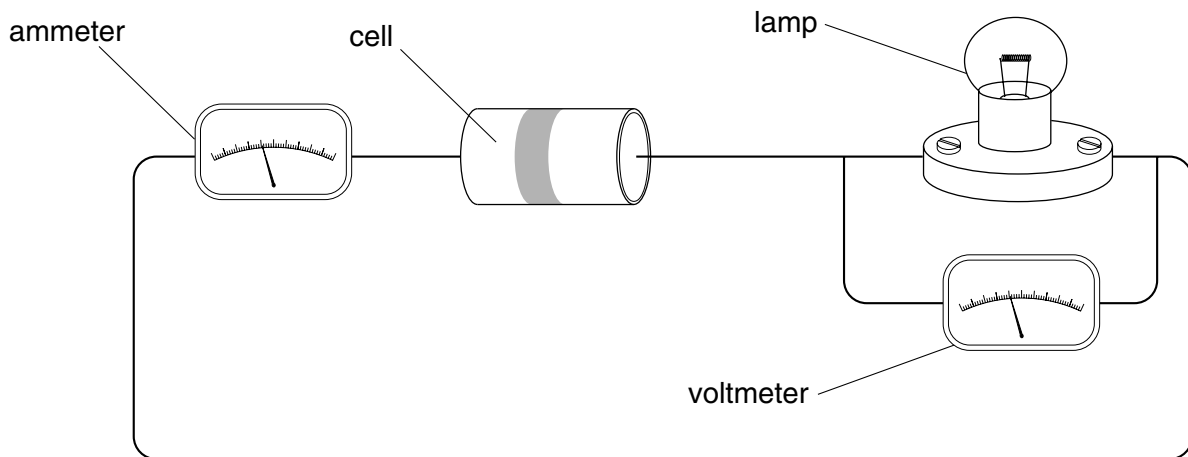


Fig. 9.1

(a) In the space below, draw the circuit diagram for the circuit in Fig. 9.1, using the correct symbols.

[3]

- (b) The current flowing through the ammeter is 0.1 A and the potential difference measured by the voltmeter is 1.5 V.

Calculate the resistance of the lamp. Show your working and state the formula that you use.

..... ohms [2]

- (c) Electrical devices such as an electric fire can be dangerous, especially when they are handled with wet hands.

Explain why you are quite likely to be electrocuted if you handle an electrical device with wet hands rather than dry hands.

.....

..... [1]

**DATA SHEET**  
**The Periodic Table of the Elements**

		Group																					
I	II	III	IV	V	VI	VII	O																
7 <b>Li</b> Lithium 3	9 <b>Be</b> Beryllium 4	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td>1 <b>H</b> Hydrogen 1</td> <td colspan="10"></td> </tr> </table>										1 <b>H</b> Hydrogen 1											4 <b>He</b> Helium 2
1 <b>H</b> Hydrogen 1																							
23 <b>Na</b> Sodium 11	24 <b>Mg</b> Magnesium 12	11 <b>B</b> Boron 5	12 <b>C</b> Carbon 6	14 <b>N</b> Nitrogen 7	16 <b>O</b> Oxygen 8	19 <b>F</b> Fluorine 9	20 <b>Ne</b> Neon 10	27 <b>Al</b> Aluminium 13	28 <b>Si</b> Silicon 14	31 <b>P</b> Phosphorus 15	32 <b>S</b> Sulphur 16	35.5 <b>Cl</b> Chlorine 17	40 <b>Ar</b> Argon 18										
39 <b>K</b> Potassium 19	40 <b>Ca</b> Calcium 20	51 <b>V</b> Vanadium 23	48 <b>Ti</b> Titanium 22	55 <b>Mn</b> Manganese 25	56 <b>Fe</b> Iron 26	59 <b>Co</b> Cobalt 27	59 <b>Ni</b> Nickel 28	64 <b>Cu</b> Copper 29	65 <b>Zn</b> Zinc 30	70 <b>Ga</b> Gallium 31	73 <b>Ge</b> Germanium 32	75 <b>As</b> Arsenic 33	79 <b>Se</b> Selenium 34	84 <b>Kr</b> Krypton 36									
85 <b>Rb</b> Rubidium 37	88 <b>Sr</b> Strontium 38	93 <b>Nb</b> Niobium 41	91 <b>Zr</b> Zirconium 40	96 <b>Mo</b> Molybdenum 42	101 <b>Ru</b> Ruthenium 44	103 <b>Rh</b> Rhodium 45	106 <b>Pd</b> Palladium 46	108 <b>Ag</b> Silver 47	112 <b>Cd</b> Cadmium 48	115 <b>In</b> Indium 49	119 <b>Sn</b> Tin 50	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52	131 <b>Xe</b> Xenon 54									
133 <b>Cs</b> Caesium 55	137 <b>Ba</b> Barium 56	181 <b>Ta</b> Tantalum 73	178 <b>Hf</b> Hafnium 72	184 <b>W</b> Tungsten 74	190 <b>Os</b> Osmium 76	192 <b>Ir</b> Iridium 77	195 <b>Pt</b> Platinum 78	197 <b>Au</b> Gold 79	201 <b>Hg</b> Mercury 80	204 <b>Tl</b> Thallium 81	207 <b>Pb</b> Lead 82	209 <b>Bi</b> Bismuth 83	210 <b>Po</b> Polonium 84	222 <b>Rn</b> Radon 86									
87 <b>Fr</b> Francium	88 <b>Ra</b> Radium	226 <b>Ac</b> Actinium											89 †										
		140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	144 <b>Nd</b> Neodymium 60	144 <b>Pm</b> Promethium 61	150 <b>Sm</b> Samarium 62	152 <b>Eu</b> Europium 63	157 <b>Gd</b> Gadolinium 64	159 <b>Tb</b> Terbium 65	162 <b>Dy</b> Dysprosium 66	165 <b>Ho</b> Holmium 67	167 <b>Er</b> Erbium 68	169 <b>Tm</b> Thulium 69	173 <b>Yb</b> Ytterbium 70	175 <b>Lu</b> Lutetium 71								
		232 <b>Th</b> Thorium 90	232 <b>Pa</b> Protactinium 91	238 <b>U</b> Uranium 92	238 <b>Np</b> Neptunium 93	244 <b>Pu</b> Plutonium 94	244 <b>Am</b> Americium 95	244 <b>Cm</b> Curium 96	247 <b>Bk</b> Berkelium 97	247 <b>Cf</b> Californium 98	251 <b>Es</b> Einsteinium 99	252 <b>Fm</b> Fermium 100	257 <b>Md</b> Mendelevium 101	258 <b>No</b> Nobelium 102	259 <b>Lr</b> Lawrencium 103								

\*58-71 Lanthanoid series  
†90-103 Actinoid series

	a	= relative atomic mass
<b>X</b>	b	= atomic symbol
<b>Key</b>	c	= proton (atomic) number

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).