



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE
NAME

CENTRE
NUMBER

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CANDIDATE
NUMBER

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SCIENCE

5124/03
5126/03

Paper 3 Chemistry

October/November 2008

1 hour 15 minutes

Candidates answer Section A on the Question Paper.

Additional Materials: Answer Booklet/Paper

READ THESE INSTRUCTIONS FIRST

If you have been given an Answer Booklet, follow the instructions on the front cover of the booklet.
Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
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.
DO NOT WRITE ON ANY BARCODES.

Section A

Answer **all** questions.
Write your answers in the spaces provided on the question paper.

Section B

Answer any **two** questions.
Write your answers on the lined pages provided and, if necessary, continue on separate answer paper.

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

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.

For Examiner's Use	
Section A	
Section B	/
Total	

This document consists of **12** printed pages and **4** lined pages.



Section A

Answer **all** the questions.

Write your answers in the spaces provided on the question paper.

For
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Use

- 1 Fig. 1.1 shows the composition by volume of dry, unpolluted air.

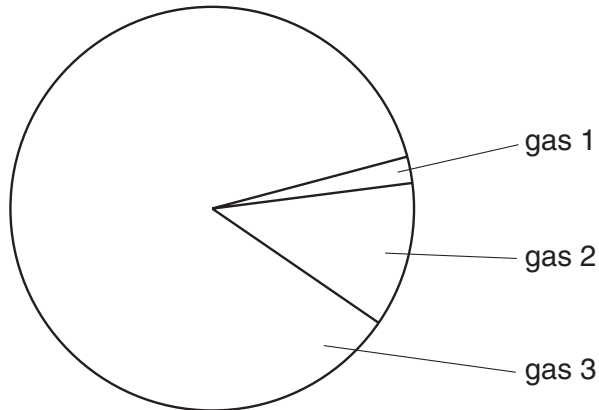


Fig. 1.1

Complete Table 1.1 to give the names of these gases and their uses. One row has been completed for you.

Table 1.1

gas	name	use
gas 1	argon	filling lamps
gas 2		
gas 3		

[4]

- 2 A ship has gone aground on a coral reef. It is believed that the ship's tanks are half-filled with hydrochloric acid. Hydrochloric acid reacts with coral.

For
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- (a) You are supplied with a sample of the contents of the ship's tanks. Describe tests to show the presence of an acid and the presence of a chloride.

- (i) test for acid

.....

positive result

.....

- (ii) test for chloride

.....

positive result

.....

[2]

- (b) Another ship has a large amount of concentrated alkali on board. The captain of this ship states that this alkali will neutralise the acid. He suggests pumping all the alkali into the tanks of the wrecked ship.

Give **one** reason why this should **not** be done.

.....

..... [1]

- (c) Coral consists mainly of calcium carbonate. Name a substance that is formed when coral reacts with hydrochloric acid. Give the chemical formula of this substance.

name

formula

[2]

- 3 (a) Complete Table 3.1 to describe the neutral atoms of two different isotopes of uranium.

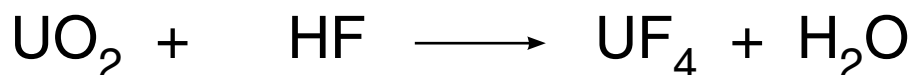
Table 3.1

	${}_{92}^{235}\text{U}$	${}_{92}^{238}\text{U}$
number of protons in each atom	92	
number of neutrons in each atom		
number of electrons in each atom		92

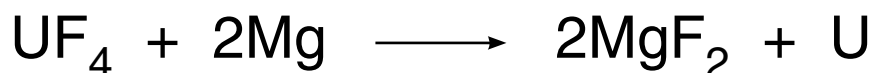
[4]

- (b) (i) In the manufacture of uranium metal, uranium dioxide is first converted into a fluoride.

Balance this equation for the reaction.



- (ii) Uranium tetrafluoride is then reduced to uranium metal by heating with magnesium, according to this balanced chemical equation.



Calculate the mass of uranium tetrafluoride and the mass of magnesium that combine to manufacture 10 tonnes of uranium.

[Relative atomic masses: A_r : Mg, 24; F, 19; U, 238.]

mass of uranium tetrafluoride needed = tonnes

mass of magnesium needed = tonnes

[4]

- 4 (a) Organic chemicals can be grouped into homologous series.

Give two features of all members of the same homologous series.

1

2 [2]

- (b) Fig. 4.1 shows some of the substances that are made from ethene. Complete the **dotted spaces** in Fig. 4.1 with names, chemical structures and types of reactions.

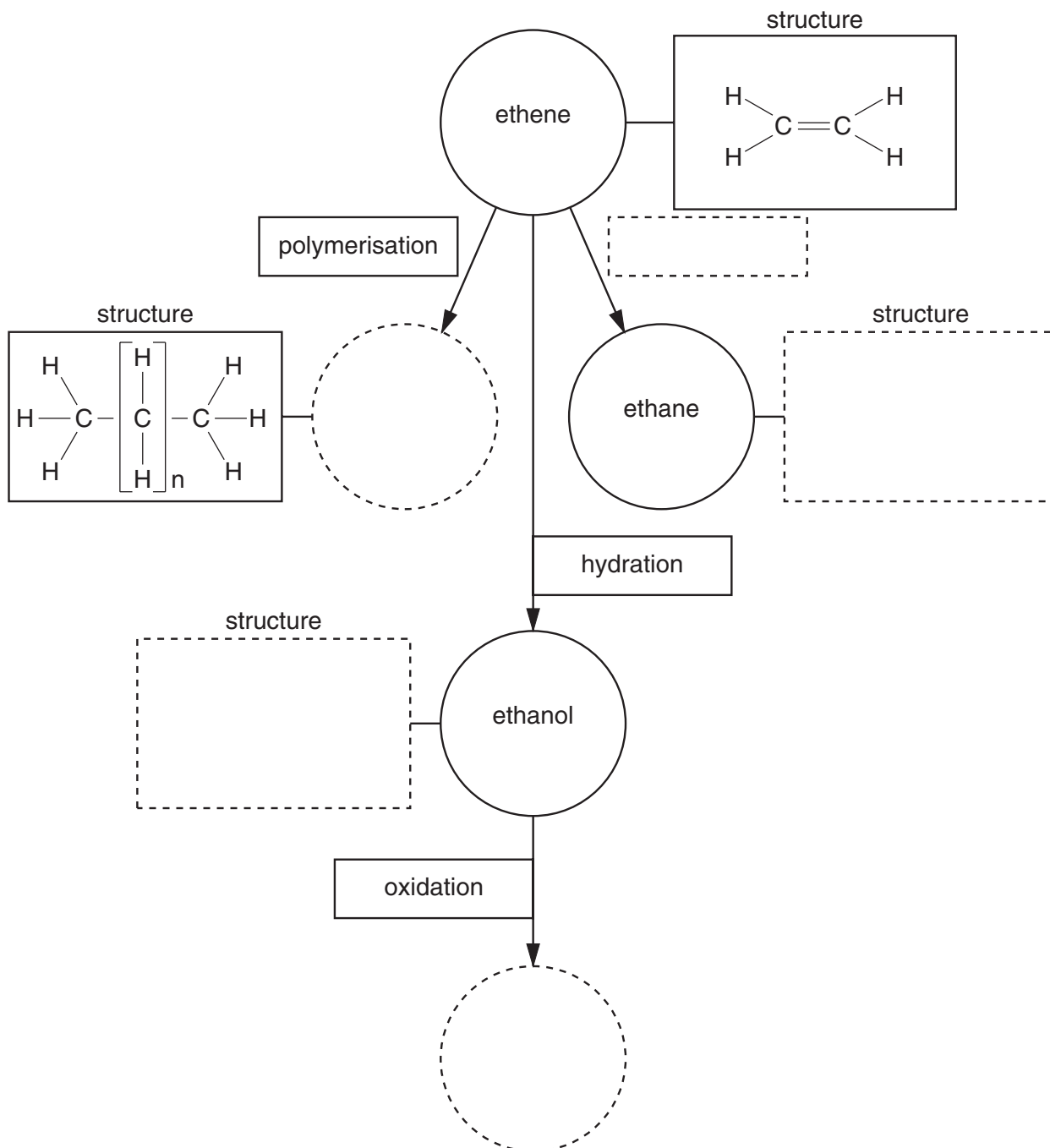


Fig. 4.1

[5]

5 This question is about the Periodic Table shown on page 16 of this question paper.

(a) What is the general name given to the elements in Group I?

.....

[1]

(b) Table 5.1 gives information about **five** elements. Parts of the table have been completed. Fill in the empty boxes in the table.

Table 5.1

element	member of Group I	metal	rate of reaction with cold water
potassium	yes	yes	very fast
sodium	yes	yes	fast
lithium	yes		slow
copper		yes	
rubidium		yes	

[5]

6 The diagrams **A**, **B**, **C**, **D**, **E** and **F** in Fig. 6.1 represent the particles in different substances.

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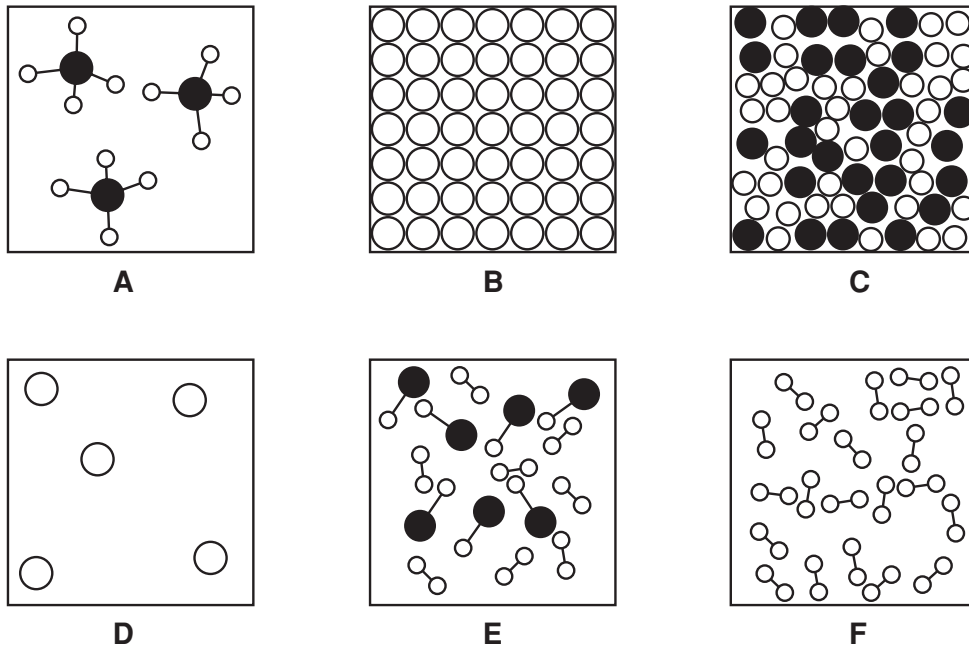


Fig. 6.1

Which of the diagrams **A**, **B**, **C**, **D**, **E** and **F** best represents a

(a) liquid element,

.....

[1]

(b) gaseous compound,

.....

[1]

(c) solid mixture,

.....

[1]

(d) liquid mixture,

.....

[1]

(e) gaseous element?

.....

[1]

- 7 A metal reacts with an excess of dilute acid to form a gas. The volume of gas produced is measured over the first 40 seconds of the reaction. After this time about 110 cm^3 of the gas has been collected. A datalogger is used to plot the graph shown in Fig. 7.1.

For
Examiner's
Use

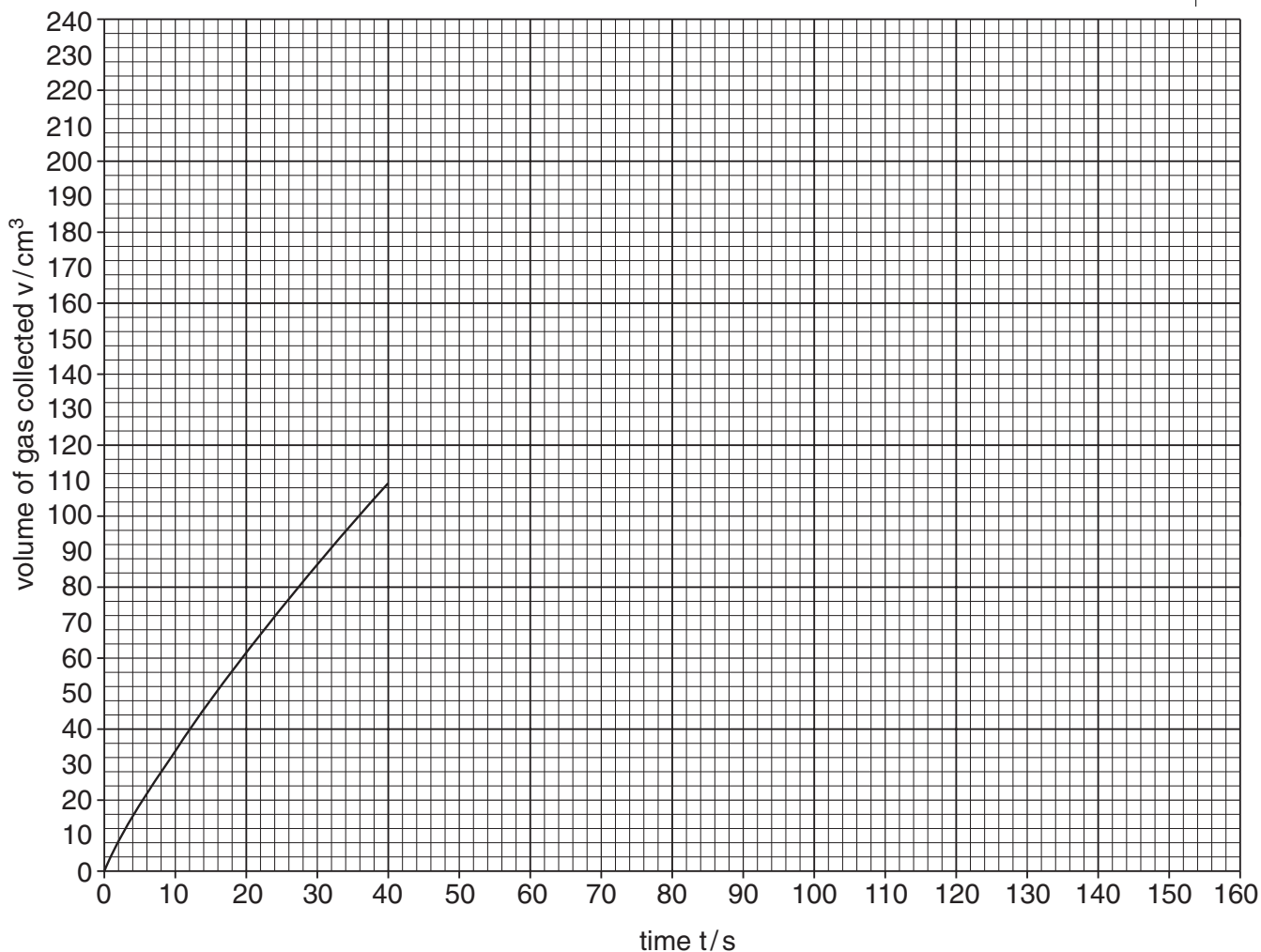


Fig. 7.1

- (a) How does the rate of this reaction change during the first 40 seconds of the reaction?

..... [1]

- (b) (i) Sketch on Fig. 7.1 how you expect the graph to extend over the next 120 seconds.
 (ii) The experiment is repeated with the same mass of metal but with excess of a slightly less concentrated solution of acid.

On Fig. 7.1 sketch the graph you would expect for this second experiment. [4]

- (c) Use your knowledge of how particles move in liquids to explain the shape of these graphs.

.....

 [2]

8 (a) State **one** of the problems of using non-biodegradable plastics.

..... [1]

(b) Give two reasons why metals such as copper should be recycled.

1

2 [2]

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Section B

Answer any **two** questions.

Write your answers on the lined pages provided and, if necessary, continue on separate answer paper.

- 9 When combining with other elements, chlorine can form both ionic bonds and covalent bonds.
- (a) Draw the electronic structures of **two** named substances that contain chlorine, **one** named substance with ionic bonds and **one** named substance with covalent bonds. Label one structure IONIC and the other COVALENT. [6]
- (b) Give **two** ways in which the physical properties of these two substances differ. [2]
- (c) Use your knowledge of the particles in ionic and covalently bonded substances to suggest reasons for these differences. [2]
- 10 (a) Solid glucose, $C_6H_{12}O_6$, can be changed into a solution of ethanol by fermentation. Briefly describe how this change could be completed in the laboratory. Write an equation for the change. [7]
- (b) Calculate the relative molecular mass of glucose and the percentage by mass of oxygen in each molecule of glucose.
- [Relative atomic masses: A_r : H, 1; C, 12; O, 16.] [3]

11 Fig. 11.1 describes the reactions of several substances.

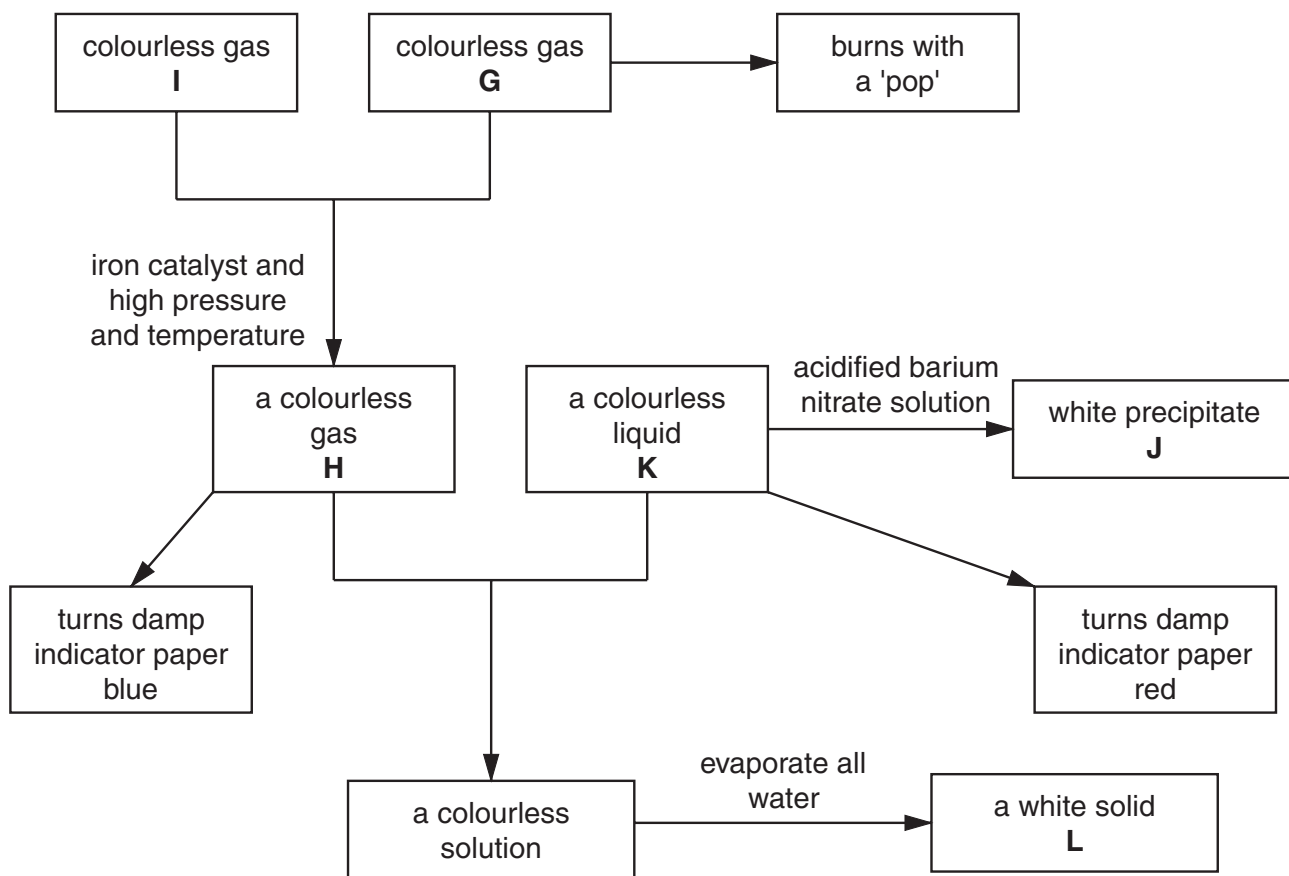


Fig. 11.1

- (a) Name substance **G**, **H**, **I**, **J**, **K** and **L**. [6]
- (b) Write an equation for any **one** of the reactions shown in Fig. 11.1. [2]
- (c) Give a use for **G** and a use for **L**. [2]

For
Examiner's
Use

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Dotted lines for writing or marking.

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DATA SHEET
The Periodic Table of the Elements

		Group																													
		I	II	III	IV	V	VI	VII	0																						
		<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%; text-align: center;">1</td> <td style="width: 10%; text-align: center;">H Hydrogen 1</td> <td colspan="8"></td> <td style="width: 10%; text-align: center;">4</td> <td style="width: 10%; text-align: center;">He Helium 2</td> </tr> </table>										1	H Hydrogen 1									4	He Helium 2								
1	H Hydrogen 1									4	He Helium 2																				
7	Li Lithium 3	9	Be Beryllium 4											19	F Fluorine 9	20	Ne Neon 10														
23	Na Sodium 11	24	Mg Magnesium 12	11	B Boron 5	12	C Carbon 6	14	N Nitrogen 7	16	O Oxygen 8	31	P Phosphorus 15	32	S Sulphur 16	35.5	Cl Chlorine 17	40	Ar Argon 18												
39	K Potassium 19	40	Ca Calcium 20	27	Al Aluminium 13	28	Si Silicon 14	31	P Phosphorus 15	32	S Sulphur 16	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	45	Sc Scandium 21	48	Ti Titanium 22	49	Y Yttrium 39	56	Fe Iron 26	59	Ni Nickel 28	64	Cu Copper 29	65	Zn Zinc 30	112	Cd Cadmium 48	115	In Indium 49	119	Sn Tin 50	122	Sb Antimony 51	127	I Iodine 53	131	Xe Xenon 54		
133	Cs Caesium 55	137	Ba Barium 56	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	210	Rn Radon 86
226	Fr Francium 87	226	Ra Radium 88	227	Ac Actinium 89											227	Fr Francium 87											227	Ac Actinium 89		

	140	Ce Cerium 58	141	Pr Praseodymium 59	144	Nd Neodymium 60	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	238	Pa Protactinium 91	238	U Uranium 92	238	Np Neptunium 93	238	Pu Plutonium 94	238	Am Americium 95	238	Cm Curium 96	238	Bk Berkelium 97	238	Cf Californium 98	238	Es Einsteinium 99	238	Fm Fermium 100	238	Md Mendelevium 101	238	No Nobelium 102	238	Lr Lawrencium 103

	a	X	b
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*58-71 Lanthanoid series
†90-103 Actinoid series

a = relative atomic mass
X = atomic symbol
b = proton (atomic) number

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).