



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE
NAME

CENTRE
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.

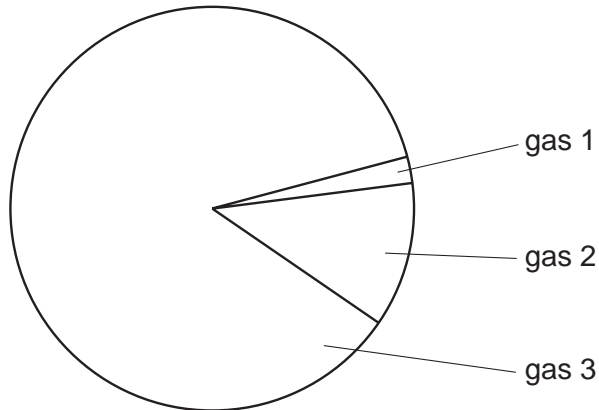


Fig. 1.1

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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Use

- (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.

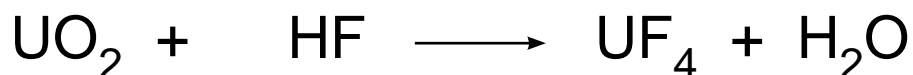
Table 3.1

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

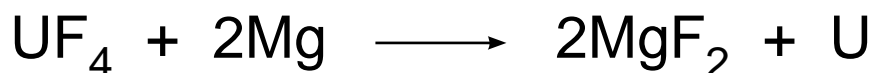
[4]

- (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.

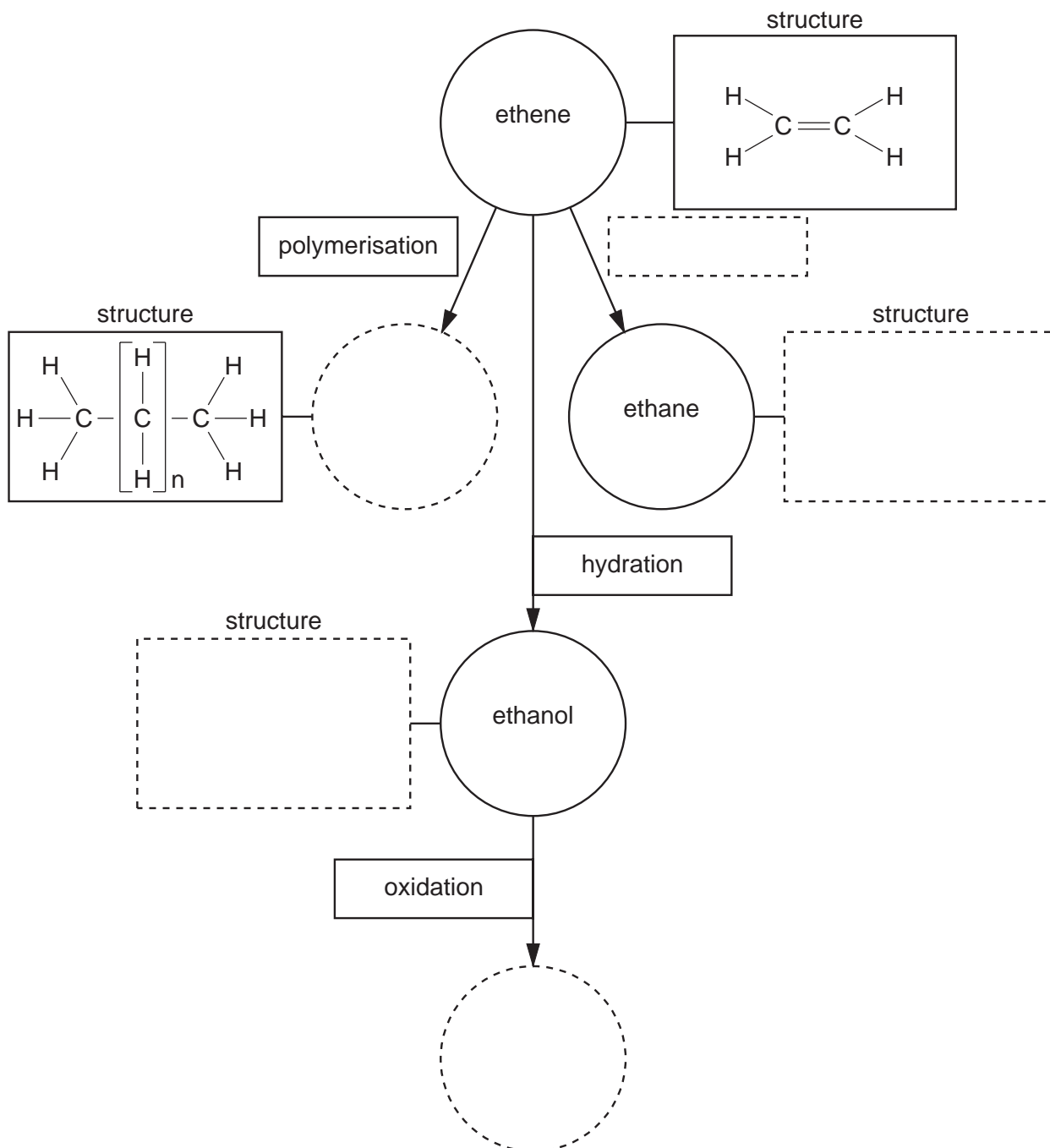


Fig. 4.1

[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.

For
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Use

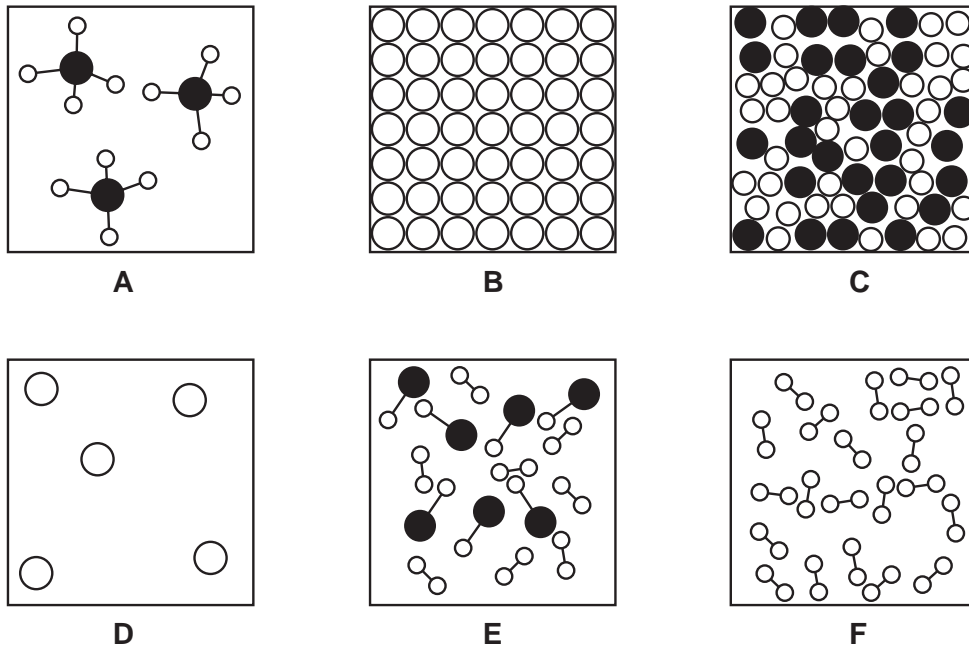


Fig. 6.1

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

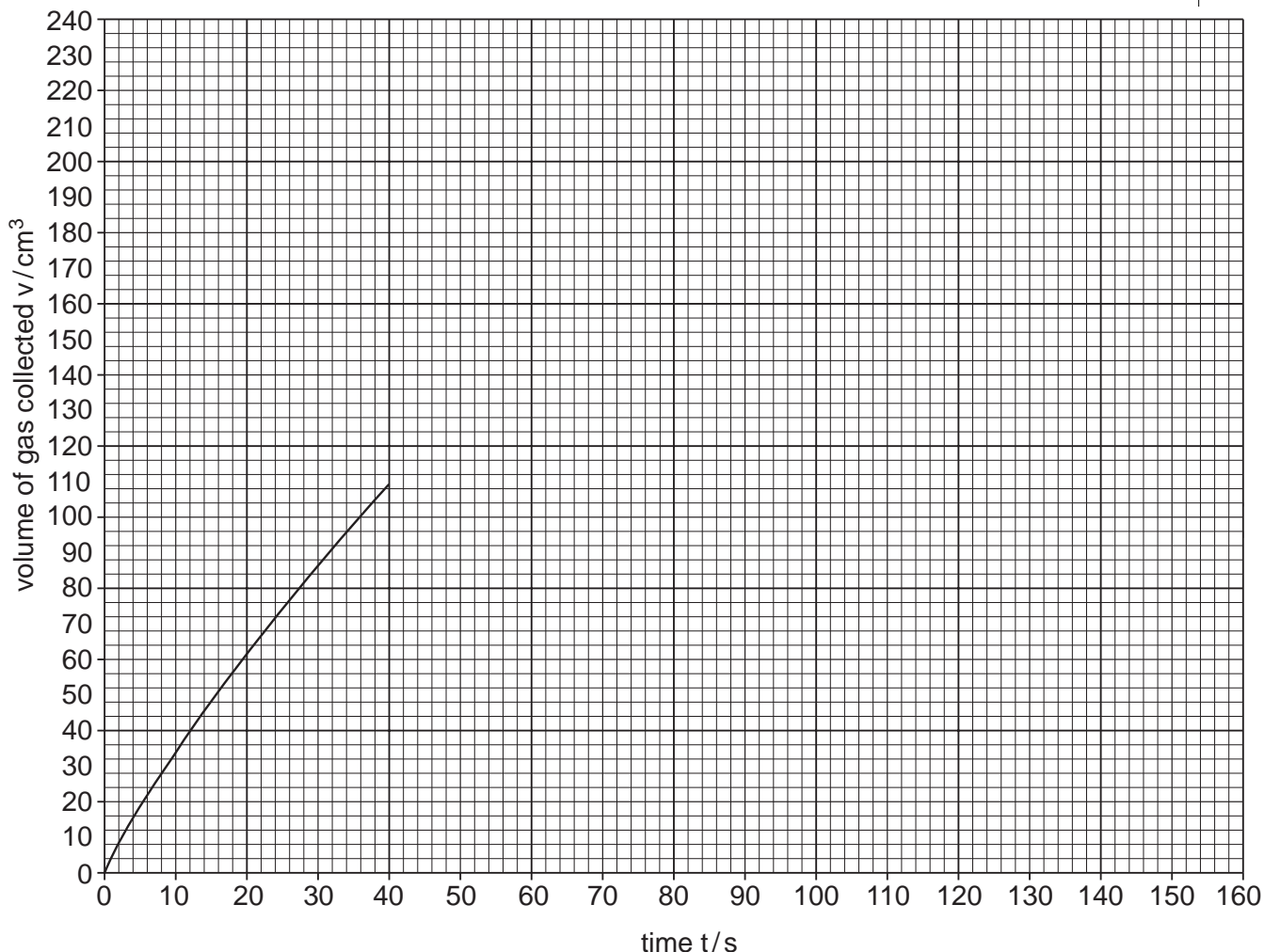


Fig. 7.1

- (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]

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.

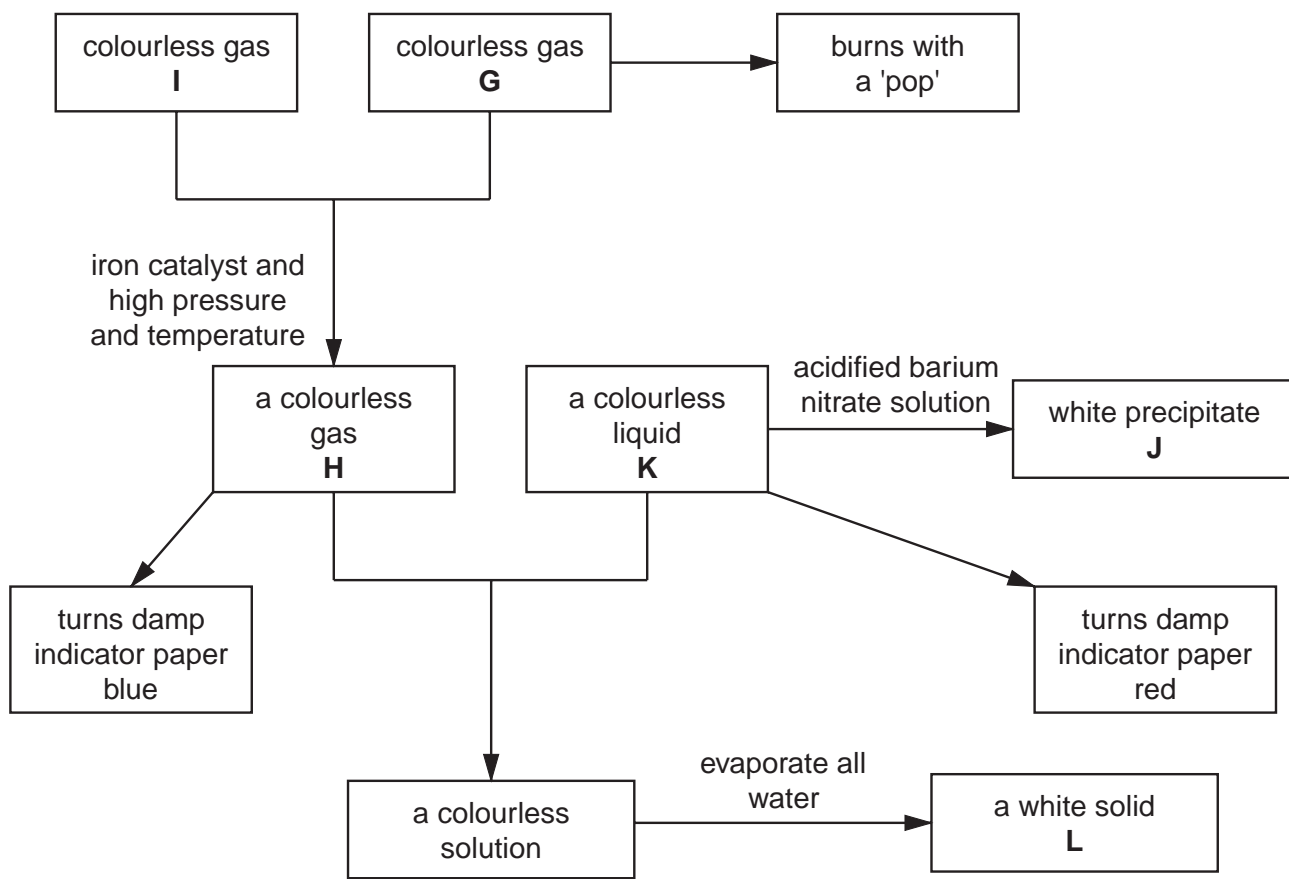


Fig. 11.1

- (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]

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[A series of approximately 25 horizontal dotted lines spanning most of the page width, intended for use as a writing area.]

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DATA SHEET
The Periodic Table of the Elements

		Group																					
I	II	III	IV	V	VI	VII	0																
7 Li Lithium 3	9 Be Beryllium 4	1 H Hydrogen 1	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	4 He Helium 2	23 Na Sodium 11	24 Mg Magnesium 12	27 Al Aluminium 13	28 Si Silicon 14	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	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	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	101 Ru Ruthenium 44	101 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	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	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	85 At Astatine 85	86 Rn Radon 86								
226 Ra Radium 88	227 Ac Actinium 89											162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71						
												140 Ce Cerium 58	141 Pr Praseodymium 59	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 U Uranium 92	238 Pa Protactinium 91	238 U Uranium 92	238 Pa Protactinium 91	238 U Uranium 92	238 Pa Protactinium 91	238 U Uranium 92	238 Pa Protactinium 91	238 U Uranium 92	238 Pa Protactinium 91	238 U Uranium 92
												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	175 Lu Lutetium 71	
												97 Bk Berkelium 97	96 Cm Curium 96	95 Am Americium 95	94 Pu Plutonium 94	93 Np Neptunium 93	92 U Uranium 92	91 Pa Protactinium 91	90 Th Thorium 90	89 Ac Actinium 89	88 Ra Radium 88	87 Fr Francium 87	86 Rn Radon 86

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

Key

a	X
b	

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.).