EXAMINATIONS COUNCIL OF SWAZILAND
Swaziland General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

COMBINED SCIENCE   6886/03

Paper 3 (Extended)   October/November 2013

1 hour 15 minutes

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.
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.
Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.
Write your answers in the spaces provided on the question paper.
A copy of the Periodic Table is printed on page 16.

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

For Examiner's Use	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
Total	

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

[Turn over

1 **(a)** Both guava trees and sugar cane can reproduce sexually, producing seeds. Sugar cane is normally cultivated by asexual reproduction using cuttings. State an advantage and a disadvantage of the methods of reproduction used in the cultivation of the two plants.

guava trees

advantage ....

....

disadvantage ....

....

sugar cane

advantage ....

....

disadvantage ....

.... [4]

(b) (i) Describe how seeds and fruits are formed in plants.

....

....

....

.... [3]

(ii) A certain fruit is bright red and fleshy. It has tiny seeds that are enclosed in hard coats. Describe how the seeds are likely to be dispersed.

....

....

....

.... [3]

2 (a) Explain, in terms of the kinetic particle theory, how a liquid changes to a gas when heated.

....

....

....

.... [3]

(b) Four **solid** substances **A**, **B**, **C** and **D** are heated. Fig. 2.1 shows the temperature / time graphs for the four substances.
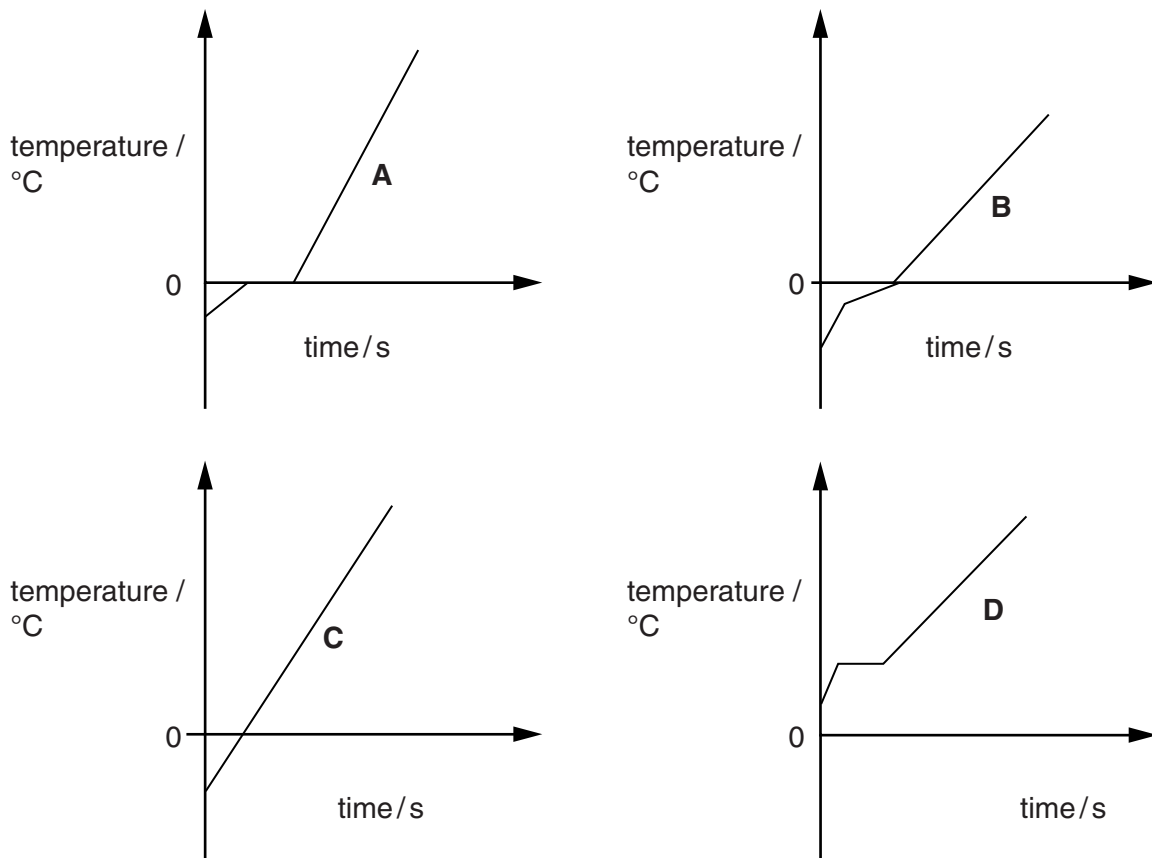

Fig. 2.1

Use the letters **A**, **B**, **C** or **D** to answer the following questions.

(i) One graph shows that the substance being heated is impure.
State and explain which substance is impure.

....

.... [2]

     [Turn over

   (ii) State which substance could be pure water.

.... [1]

   (iii) State and explain which substance could be an ionic compound.

....

.... [2]

3 Fakazile measures the mass of 500 cm^3 of milk and its container, and finds it to be 455 g. The gravitational field strength, *g*, on the Earth's surface is 10 N / kg.

(a) The mass of the milk without the container is 445 g.
Calculate the mass of the container.

.... [1]

(b) Calculate the weight of the milk and its container.

.... [2]

(c) Describe how Fakazile could determine the density of 500 cm^3 of milk in a school laboratory.

....

....

.... [3]

       [Turn over

4 (a) Fig. 4.1 shows changes in atmospheric carbon dioxide concentration, and changes in average annual global temperature, between the years 1880 and 2000.
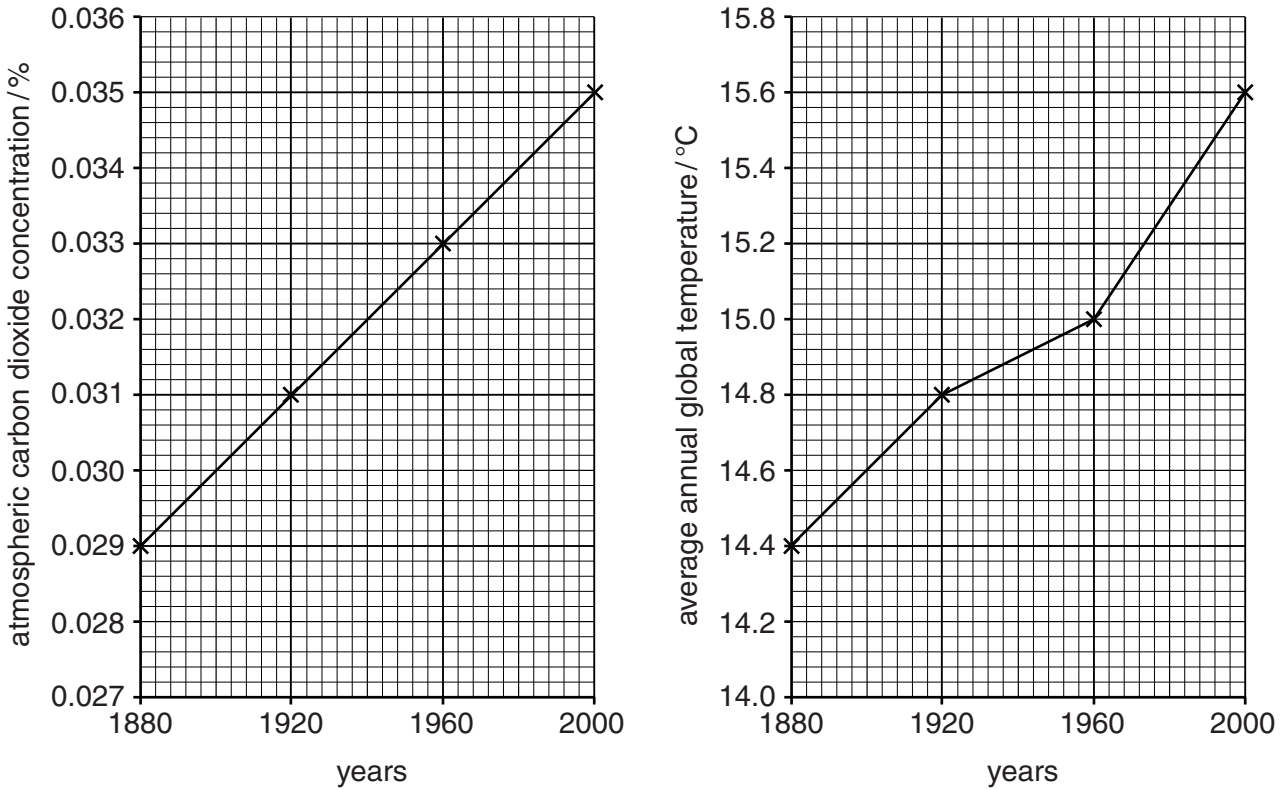

Fig. 4.1

(i) State the concentration of atmospheric carbon dioxide and the average global temperature for the year 1940.

carbon dioxide concentration: ....

temperature: .... [2]

(ii) Describe the relationship between atmospheric carbon dioxide concentration and global temperature.

....

.... [1]

(iii) Describe how destruction of tropical forests has contributed to a change in carbon dioxide concentration in the atmosphere.

....

....

....

.... [2]

(iv) Describe one other negative effect of the destruction of tropical forests.

....

....

.... [2]

(b) Modern technology has led to an increase in food production. State one technological advance that has contributed to this increase.

.... [1]

(c) Describe the use of nitrate ions in plants.

....

....

....

.... [2]

5 **(a)** Explain why spoons are often made of stainless steel instead of mild steel.

....

....

.... [2]

(b) Another way of protecting iron from rusting is galvanising.
Describe how galvanising prevents rusting.

....

....

.... [2]

6 Mr Zwane's car was travelling along a level road at 30 m/s when a pedestrian stepped into the road 55 m ahead. After 0.5 s he applied the brakes and the car decelerated uniformly to rest in 3.5 s.

(a) On the grid below, plot a speed-time graph for the car from the time the pedestrian stepped into the road until the car stopped.
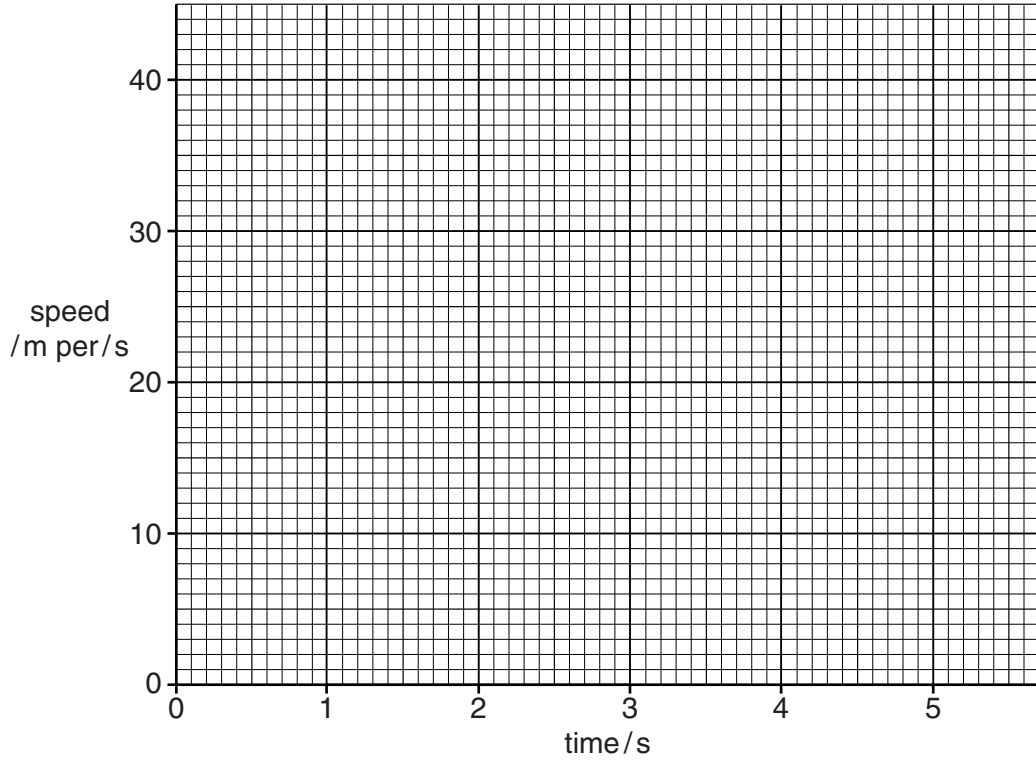
[2]

(b) (i) Calculate the total distance travelled by the car after the pedestrian stepped into the road.

.... [2]

(ii) State and explain if the car hit the pedestrian.

....

.... [1]

7 Fig. 7.1 shows a reaction scheme involving calcium hydroxide and sodium hydroxide.

calcium hydroxide		sodium hydroxide

↓ dilute nitric acid   ↓ dilute sulfuric acid

solution **F**   solution **G**

+ ⌐   ⌐ +

liquid **E**   mixed   water

↓

white precipitate **H**

+
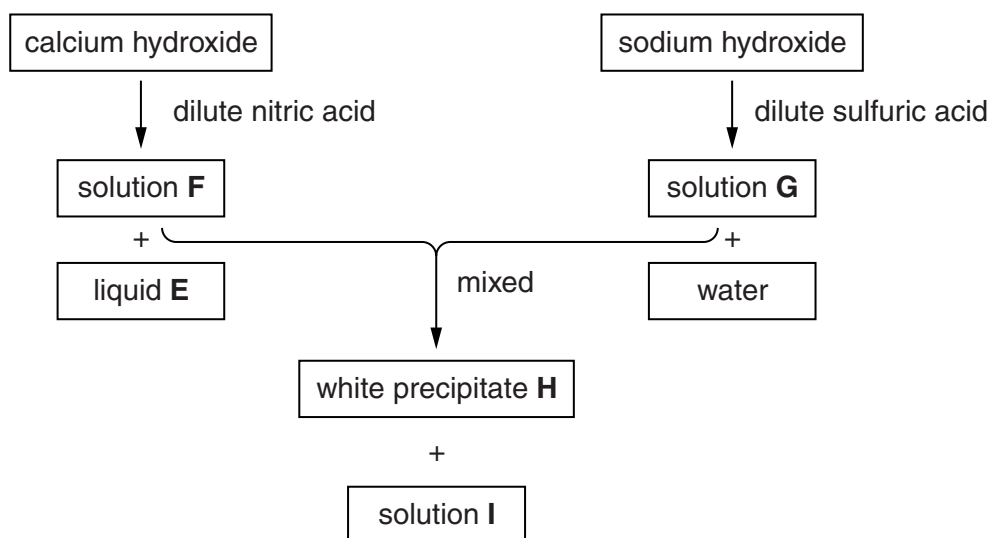
solution **I**

Fig. 7.1

(a) (i) Name solutions **F**, **G**, and **I**.

F ....

G ....

I .... [3]

(ii) Describe how the white precipitate, **H**, may be purified from the mixture.

....

....

.... [3]

(b) (i) Write the formula of the ion found in both calcium hydroxide and sodium hydroxide.

.... [1]

(ii) Write a balanced equation for the reaction between calcium hydroxide solution and ammonium sulfate.

.... [2]

8 Fig. 8.1 shows two resistors connected in parallel to each other and to a battery.
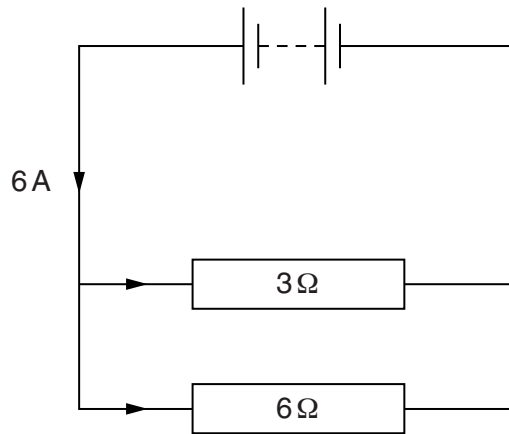
Fig. 8.1

(a) Calculate the combined resistance of the two resistors.

.... [2]

(b) Calculate the current through the 3 Ω resistor.

.... [2]

(c) Calculate the charge flowing through the battery in 0.01 s.

.... [2]

       [Turn over

9 Table 9.1 shows lactic acid concentration in Musa's body during **and** after exercise.

Table 9.1

time (minutes)	lactic acid concentration (AU)
0	0
5	0
10	5
15	10
20	15
25	20
30	15
35	10
40	5
45	0
50	0

(a) (i) State the type of respiration that releases lactic acid in muscles.

.... [1]

(ii) State one difference between the type of respiration in **(a)(i)** and the other type of respiration in humans.

.... [1]

(b) Explain why the lactic acid concentration at 45 minutes is zero.

....

....

.... [2]

(c) Immediately after the exercise Musa sits down to smoke a cigarette.

Suggest how this will affect lactic acid concentration in his body.

....

....

.... [2]

10 (a) The proportion of numbers of atoms in a hydrocarbon is 20% carbon atoms and 80% hydrogen atoms.

Deduce the formula of the hydrocarbon.

.... [2]

(b) Ethane is the second member in its homologous series.
It burns in air to form carbon dioxide and water according to the following reaction:

$$2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O$$
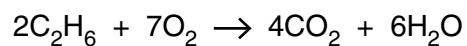
(i) Calculate the mass of carbon dioxide released from burning 26 g of ethane.

.... [3]

(ii) Draw the structural formula of the fifth member of this homologous series.

[1]

11 Fig. 11.1 shows a simple generator. A single coil is positioned between the poles of a magnet.

N   S

1

2
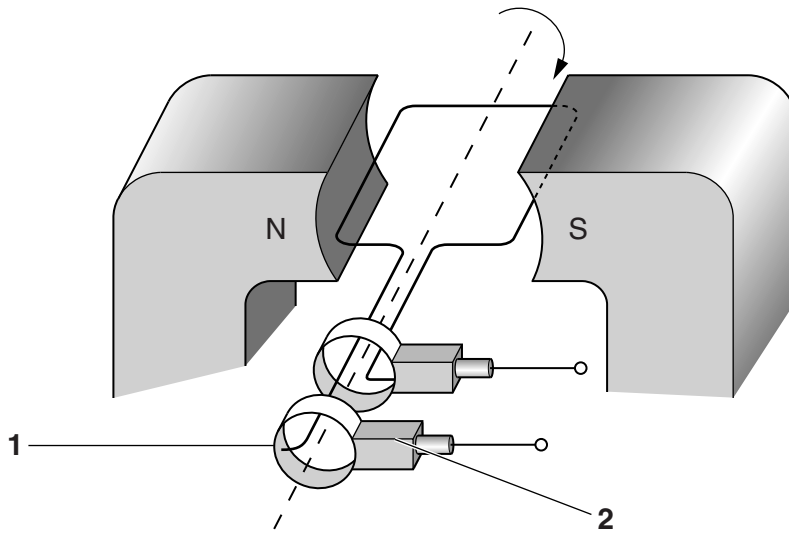
Fig. 11.1

(a) Some of the parts of the generator have been numbered.

Name the parts numbered **1** and **2**.

1 ....

2 .... [2]

(b) Describe one way in which the induced e.m.f. can be changed.

....

.... [2]

12 (a) Fig. 12.1 shows a transverse wave.

direction of wave →

direction of vibration
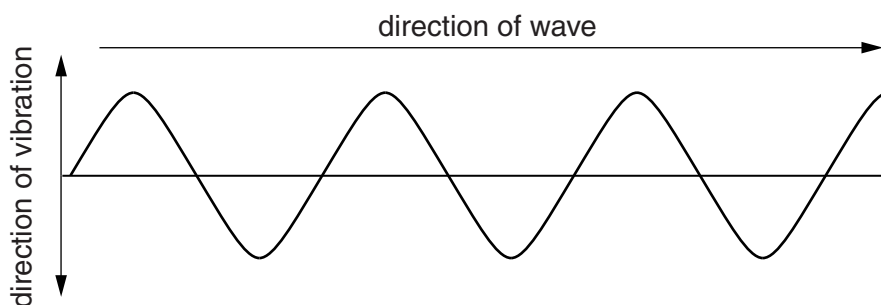
Fig. 12.1

On Fig. 12.1 mark the amplitude of the wave with the letter **a** and the wavelength with λ.

[2]

(b) Radioactive iodine is used to treat tumours of the thyroid gland.
It decays by emitting beta particles and gamma radiation.

Describe the nature and character of the beta particles emitted.

....

.... [2]

(c) (i) State the speed of gamma radiation.

.... [1]

(ii) Name a material that reduces the intensity of gamma radiation.

.... [1]

DATA SHEET
The Periodic Table of the Elements

Group

I	II												III	IV	V	VI	VII	0
																		4 **He** Helium 2
7 **Li** Lithium 3	9 **Be** Beryllium 4							1 **H** Hydrogen 1					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 **A***l* Aluminium 13	28 **Si** Silicon 14	31 **P** Phosphorus 15	32 **S** Sulfur 16	35.5 **C***l* 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	**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 **T***l* Thallium 81	207 **Pb** Lead 82	209 **Bi** Bismuth 83	209 **Po** Polonium 84	210 **At** Astatine 85	222 **Rn** Radon 86
223 **Fr** Francium 87	226 **Ra** Radium 88	227 **Ac** Actinium 89 †																

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	244 **Pu** Plutonium 94	243 **Am** Americium 95	247 **Cm** Curium 96	247 **Bk** Berkelium 97	251 **Cf** Californium 98	252 **Es** Einsteinium 99	257 **Fm** Fermium 100	258 **Md** Mendelevium 101	259 **No** Nobelium 102	260 **Lr** Lawrencium 103

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

Key

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

The volume of one mole of any gas is $24\,dm^3$ at room temperature and pressure (r.t.p.).