

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

**COMBINED SCIENCE**

**0653/01**

Paper 1 Multiple Choice

October/November 2004

**45 minutes**

Additional Materials: Multiple Choice Answer Sheet  
Soft clean eraser  
Soft pencil (type B or HB is recommended)

**READ THESE INSTRUCTIONS FIRST**

Write in soft pencil.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Write your name, Centre number and candidate number on the answer sheet in the spaces provided unless this has been done for you.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A, B, C**, and **D**.

Choose the **one** you consider correct and record your choice in **soft pencil** on the separate answer sheet.

**Read the instructions on the answer sheet very carefully.**

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

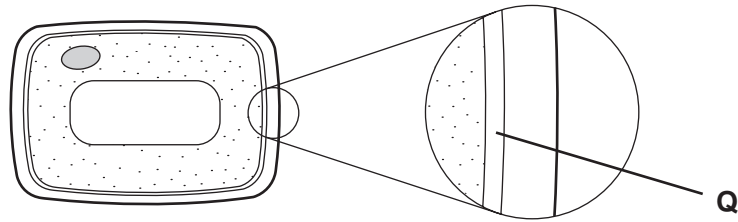
Any rough working should be done in this booklet.

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

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



- 1 The diagram shows a plant cell and part of that cell in higher magnification.



What does structure **Q** do during the uptake of water and mineral ions from the soil?

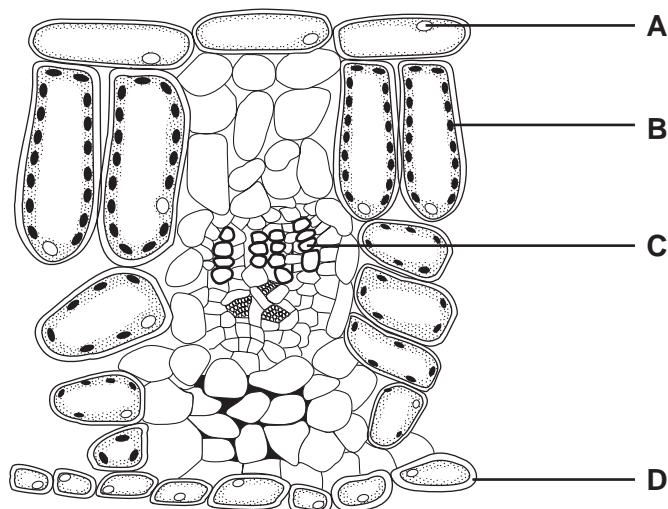
	allows water to pass freely	allows mineral ions to pass freely
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

- 2 Which gas is given off when the enzyme catalase is added to a solution of hydrogen peroxide?

- A** carbon dioxide
- B** carbon monoxide
- C** hydrogen
- D** oxygen

- 3 The diagram shows a section through a leaf.

Where will starch be found?



4 The table shows diets of four different people.

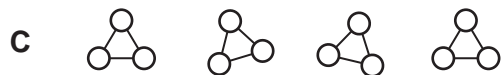
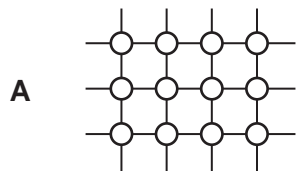
Which diet would cause a person to suffer from scurvy (including bleeding gums) and anaemia (lack of haemoglobin)?

	carbohydrates	vitamin C	proteins	iron
<b>A</b>	x	✓	✓	x
<b>B</b>	✓	x	✓	x
<b>C</b>	✓	✓	x	✓
<b>D</b>	✓	x	x	✓

5 The diagram shows part of a starch molecule.



Which diagram shows this molecule after it has been **completely** digested?



6 What is the correct word equation for respiration?

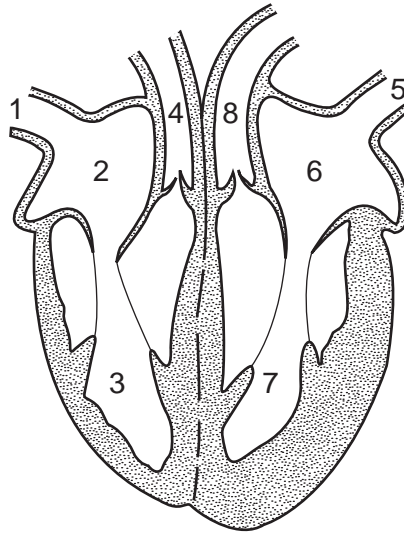
**A** glucose → oxygen + water + carbon dioxide

**B** glucose + carbon dioxide → oxygen + water

**C** glucose + oxygen → water + carbon dioxide

**D** glucose + water → oxygen + carbon dioxide

7 The diagram shows a section through the human heart.

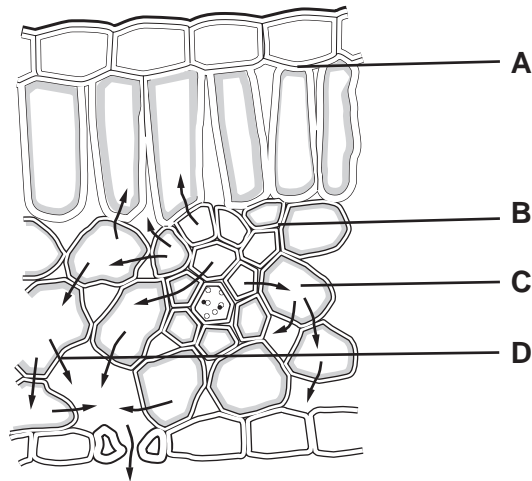


Which sequence shows the flow of **deoxygenated** blood through the heart?

- A 1 → 2 → 3 → 4
  - B 4 → 3 → 2 → 1
  - C 5 → 6 → 7 → 8
  - D 8 → 7 → 6 → 5
- 8 Which part of the blood may be described as 'small colourless fragments of cytoplasm without a nucleus and containing granules'?
- A plasma
  - B platelets
  - C red blood cells
  - D white blood cells

- 9 The diagram shows a section through a leaf. The arrows show water movement.

Where does the water evaporate?



- 10 In experiments on transpiration, both the cutting of a leafy shoot and the assembly of the apparatus must be done under water.

What is the reason for this?

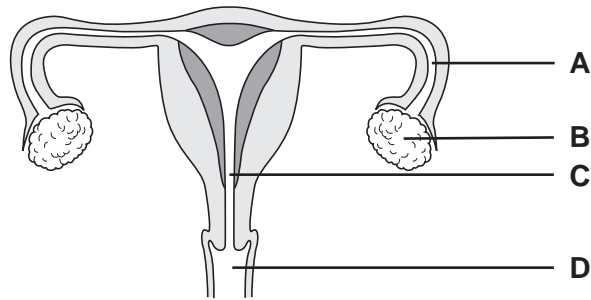
- A to ensure a clean cut
  - B to ensure air-tight seals
  - C to prevent air entering the xylem
  - D to prevent water leaving the shoot
- 11 Four drivers have their reaction times measured.

Which driver is the most likely to have been drinking alcohol?

driver	reaction time /s
<b>A</b>	3
<b>B</b>	4
<b>C</b>	8
<b>D</b>	2

12 The diagram shows the human female reproductive system.

Where is the egg fertilised?



13 The table shows the conditions in which four samples of seeds were kept.

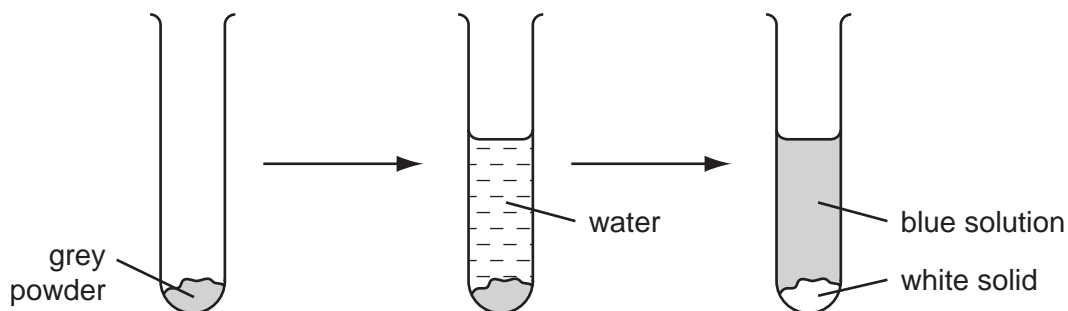
Which sample germinated?

sample	temperature / °C	water	oxygen
<b>A</b>	0	present	absent
<b>B</b>	10	absent	absent
<b>C</b>	20	present	present
<b>D</b>	40	absent	present

14 Which displayed formulae correctly represent a molecule of carbon dioxide and of nitrogen?

	carbon dioxide, CO <sub>2</sub>	nitrogen, N <sub>2</sub>
<b>A</b>	C=O=O	N=N
<b>B</b>	C=O=O	N≡N
<b>C</b>	O=C=O	N=N
<b>D</b>	O=C=O	N≡N

- 15 Some water is added to a grey powder. After shaking, a blue solution and a white solid are seen.



What does the grey powder contain?

- A one element
  - B one compound
  - C a mixture of elements
  - D a mixture of compounds
- 16 Solid mixtures are made from four salts, as shown.

mixture X	mixture Y
barium sulphate: white, insoluble	potassium chromate(VI): yellow, soluble
iron(III) sulphate: brown, soluble	potassium manganate(VII): purple, soluble

Each mixture is shaken with water.

How can the mixtures be separated?

	mixture X	mixture Y
A	chromatography	chromatography
B	chromatography	filtration
C	filtration	chromatography
D	filtration	filtration

- 17 Which formula contains the most elements?

- A  $\text{HClO}$
- B  $\text{PbO}_2$
- C  $\text{Rb}_2\text{S}$
- D  $\text{SiCl}_4$

18 The table below gives information on the properties of four gases.

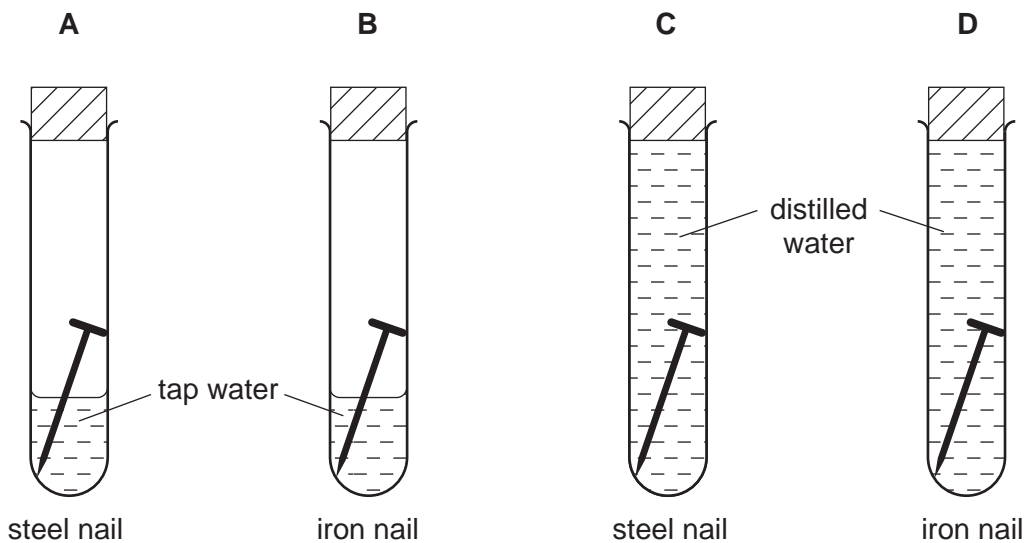
Which gas is the most suitable for filling an airship?

	flammability	density
<b>A</b>	high	high
<b>B</b>	high	low
<b>C</b>	low	high
<b>D</b>	low	low

19 Which substances explode when mixed together at room temperature?

- A** hydrogen and air
- B** magnesium and acid
- C** methane and air
- D** sodium and acid

20 In which test-tube does rusting occur most quickly?





21 The results of flame tests on four ores are shown.

ore	flame colour
P	brick red
Q	green
R	lilac
S	yellow

Which ores contain a metal from Group I?

- A P and Q
- B Q and R
- C R and S
- D S and P

22 In which reaction is carbon dioxide **not** formed?

- A adding hydrochloric acid to calcium
- B adding hydrochloric acid to calcium carbonate
- C burning coke in air
- D burning methane in air

23 What are the correct numbers of atoms in one molecule of nitric acid?

	hydrogen	nitrogen	oxygen
<b>A</b>	1	1	3
<b>B</b>	1	3	1
<b>C</b>	2	1	3
<b>D</b>	2	3	1

24 Are aluminium, iron and sodium hydroxide obtained by electrolysis?

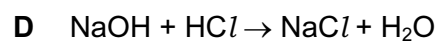
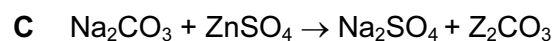
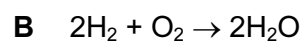
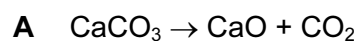
	aluminium	iron	sodium hydroxide
<b>A</b>	✓	✓	✓
<b>B</b>	✓	✓	x
<b>C</b>	x	✓	✓
<b>D</b>	✓	x	✓

25 Octane may undergo, under suitable conditions, either thermal decomposition or combustion.

Which information is correct for these two processes?

	thermal decomposition		combustion	
	oxygen needed	products	oxygen needed	products
<b>A</b>	yes	simpler	no	simpler
<b>B</b>	yes	more complex	no	more complex
<b>C</b>	no	simpler	yes	simpler
<b>D</b>	no	more complex	yes	more complex

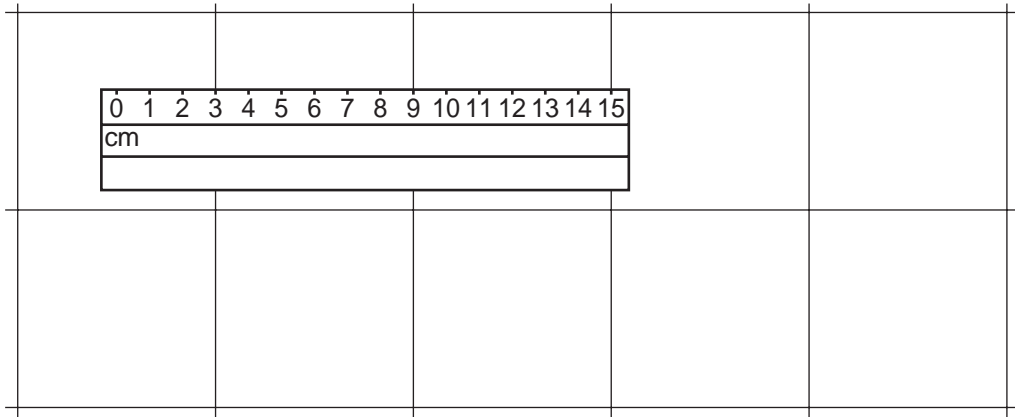
26 Which equation represents a redox reaction?



27 Which of hydrogen, petroleum and wood are fossil fuels?

	hydrogen	petroleum	wood
<b>A</b>	✓	✓	✓
<b>B</b>	✓	x	x
<b>C</b>	x	✓	x
<b>D</b>	x	x	✓

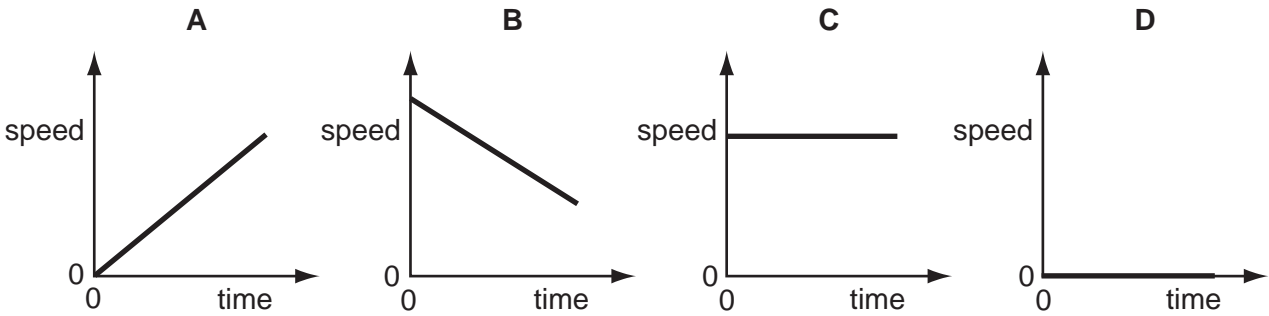
28 A floor is covered with square tiles. The diagram shows a ruler on the tiles.



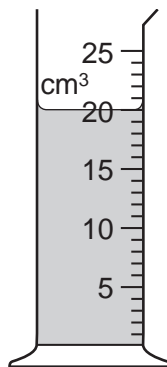
How long is one tile?

- A 3 cm                  B 6 cm                  C 9 cm                  D 12 cm

29 Which speed/time graph applies to an object at rest?



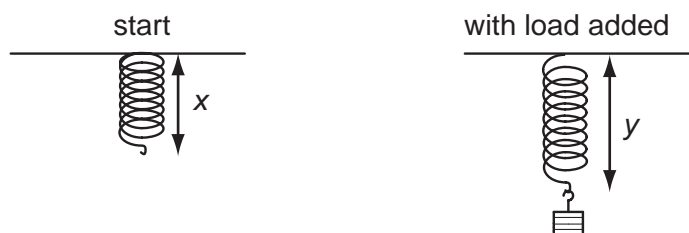
30 The diagram shows some liquid in a measuring cylinder. The mass of the liquid is 16g.



What is the density of the liquid?

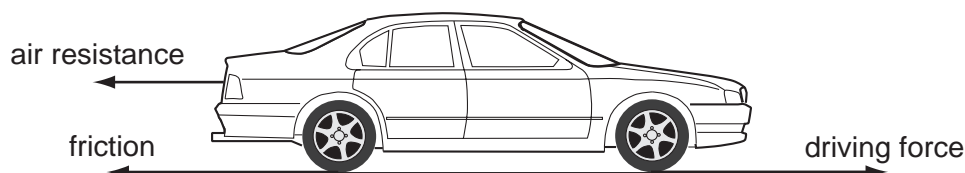
- A  $320\text{g/cm}^3$       B  $36\text{g/cm}^3$       C  $1.25\text{g/cm}^3$       D  $0.8\text{g/cm}^3$

- 31 A student carries out an experiment to plot an extension / load graph for a spring. The diagrams show the apparatus at the start of the experiment and with a load added.



What is the extension caused by the load?

- A**  $x$                       **B**  $y$                       **C**  $y + x$                       **D**  $y - x$
- 32 Three horizontal forces act on a car that is moving along a straight, level road.



Which combination of forces would result in the car moving at constant speed?

	air resistance	friction	driving force
<b>A</b>	200 N	1000 N	800 N
<b>B</b>	800 N	1000 N	200 N
<b>C</b>	800 N	200 N	1000 N
<b>D</b>	1000 N	200 N	800 N

- 33 A child pushes a toy car along a level floor and then lets it go.

As the car slows down, what is the main energy change?

- A** from chemical to heat  
**B** from chemical to kinetic  
**C** from kinetic to gravitational (potential)  
**D** from kinetic to heat

34 A beaker of water is heated at its base.

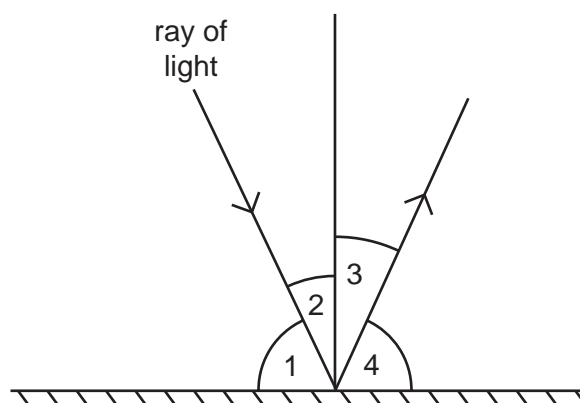
Why does the water at the base rise?

- A It contracts and becomes less dense.
- B It contracts and becomes more dense.
- C It expands and becomes less dense.
- D It expands and becomes more dense.

35 Which type of radiation lies between visible light and microwaves in the electromagnetic spectrum?

- A infra-red
- B radio waves
- C ultra-violet
- D X-rays

36 The diagram shows the path of a ray of light which has been reflected from a smooth surface.

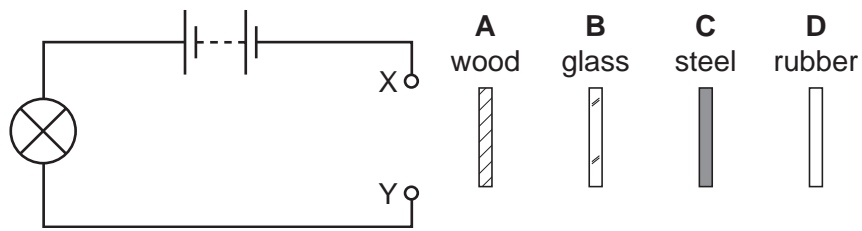


Which angles are the angles of incidence and reflection?

	angle of incidence	angle of reflection
<b>A</b>	1	4
<b>B</b>	2	3
<b>C</b>	3	2
<b>D</b>	4	1

- 37 A circuit is set up with a gap between two terminals X and Y. The four strips of material shown in the diagram are connected in turn across the gap.

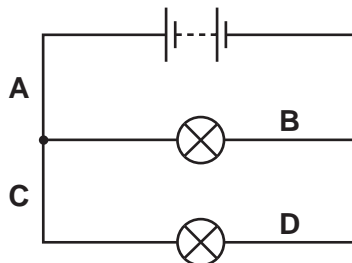
Which strip completes the circuit so that the lamp lights?



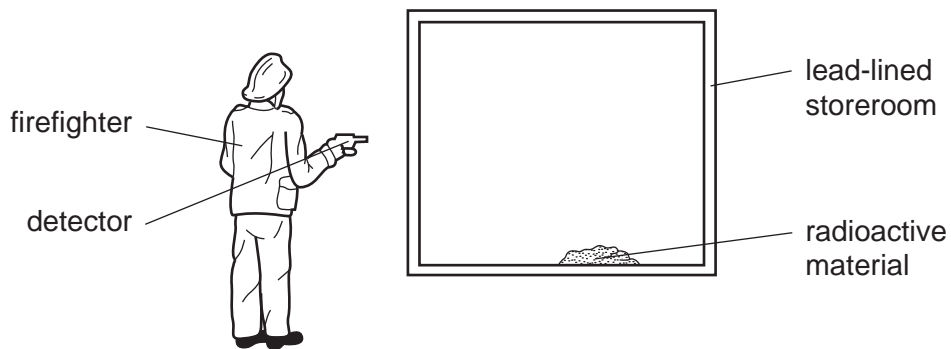
- 38 A pupil measures the voltage across a device and the current in it.

Which calculation gives the resistance of the device?

- A current + voltage
  - B current  $\div$  voltage
  - C voltage  $\div$  current
  - D voltage  $\times$  current
- 39 In which position in the circuit shown should a switch be placed so that both lamps can be switched on or off at the same time?



- 40 During a fire in a laboratory storeroom, some radioactive material was spilled. A firefighter detected radiation through the lead-lined walls of the storeroom. The radiation was emitted by the radioactive material.



Which type of radiation was being detected?

- A alpha-particles
- B beta-particles
- C gamma-rays
- D X-rays

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

		Group																																			
		I	II	III	IV	V	VI	VII	VIII	IX	X																										
7	3	<b>Li</b> Lithium 4	<b>Be</b> Beryllium 4	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td style="width: 5%;"></td> <td style="width: 5%;"></td> <td style="width: 5%;">1</td> <td style="width: 5%;">2</td> <td style="width: 5%;">3</td> <td style="width: 5%;">4</td> <td style="width: 5%;">5</td> <td style="width: 5%;">6</td> <td style="width: 5%;">7</td> <td style="width: 5%;">8</td> <td style="width: 5%;">9</td> <td style="width: 5%;">10</td> </tr> <tr> <td></td> <td></td> <td><b>H</b> Hydrogen 1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>												1	2	3	4	5	6	7	8	9	10			<b>H</b> Hydrogen 1									
		1	2											3	4	5	6	7	8	9	10																
		<b>H</b> Hydrogen 1																																			
23	11	<b>Na</b> Sodium 11	<b>Mg</b> Magnesium 12	<b>B</b> Boron 5	<b>C</b> Carbon 6	<b>N</b> Nitrogen 7	<b>O</b> Oxygen 8	<b>F</b> Fluorine 9	<b>Ne</b> Neon 10																												
39	19	<b>K</b> Potassium 19	<b>Ca</b> Calcium 20	<b>Al</b> Aluminium 13	<b>Si</b> Silicon 14	<b>P</b> Phosphorus 15	<b>S</b> Sulphur 16	<b>Cl</b> Chlorine 17	<b>Ar</b> Argon 18																												
85	37	<b>Rb</b> Rubidium 37	<b>Sr</b> Strontium 38	<b>Ga</b> Gallium 31	<b>Ge</b> Germanium 32	<b>As</b> Arsenic 33	<b>Se</b> Selenium 34	<b>Br</b> Bromine 35	<b>Kr</b> Krypton 36																												
133	55	<b>Cs</b> Caesium 55	<b>Ba</b> Barium 56	<b>In</b> Indium 49	<b>Sn</b> Tin 50	<b>Sb</b> Antimony 51	<b>Te</b> Tellurium 52	<b>I</b> Iodine 53	<b>Xe</b> Xenon 54																												
226	87	<b>Fr</b> Francium 87	<b>Ra</b> Radium 88	<b>Zn</b> Zinc 30	<b>Cd</b> Cadmium 48	<b>Hg</b> Mercury 80	<b>Po</b> Polonium 84	<b>At</b> Astatine 85	<b>Rn</b> Radon 86																												
227	89	<b>La</b> Lanthanum 57	<b>Ac</b> Actinium 89	<b>Co</b> Cobalt 27	<b>Ni</b> Nickel 28	<b>Cu</b> Copper 29	<b>Zn</b> Zinc 30	<b>Ga</b> Gallium 31	<b>Ge</b> Germanium 32	<b>As</b> Arsenic 33	<b>Se</b> Selenium 34																										
178	72	<b>Hf</b> Hafnium 72	<b>Ta</b> Tantalum 73	<b>Fe</b> Iron 26	<b>Mn</b> Manganese 25	<b>Cr</b> Chromium 24	<b>V</b> Vanadium 23	<b>Ti</b> Titanium 22	<b>Sc</b> Scandium 21	<b>Y</b> Yttrium 39	<b>Zr</b> Zirconium 40																										
186	75	<b>Re</b> Rhenium 75	<b>Os</b> Osmium 76	<b>Ru</b> Ruthenium 44	<b>Rh</b> Rhodium 45	<b>Pd</b> Palladium 46	<b>Cd</b> Cadmium 48	<b>In</b> Indium 49	<b>Sn</b> Tin 50	<b>Sb</b> Antimony 51	<b>Te</b> Tellurium 52																										
192	77	<b>Ir</b> Iridium 77	<b>Pt</b> Platinum 78	<b>Ru</b> Ruthenium 44	<b>Rh</b> Rhodium 45	<b>Pd</b> Palladium 46	<b>Cd</b> Cadmium 48	<b>In</b> Indium 49	<b>Sn</b> Tin 50	<b>Sb</b> Antimony 51	<b>Te</b> Tellurium 52																										
197	79	<b>Au</b> Gold 79	<b>Hg</b> Mercury 80	<b>Ag</b> Silver 47	<b>Cd</b> Cadmium 48	<b>Hg</b> Mercury 80	<b>Po</b> Polonium 84	<b>At</b> Astatine 85	<b>Rn</b> Radon 86																												
157	64	<b>Gd</b> Gadolinium 64	<b>Cm</b> Curium 96	<b>Fe</b> Iron 26	<b>Mn</b> Manganese 25	<b>Cr</b> Chromium 24	<b>V</b> Vanadium 23	<b>Ti</b> Titanium 22	<b>Sc</b> Scandium 21	<b>Y</b> Yttrium 39	<b>Zr</b> Zirconium 40																										
152	63	<b>Eu</b> Europium 63	<b>Am</b> Americium 95	<b>Ru</b> Ruthenium 44	<b>Rh</b> Rhodium 45	<b>Pd</b> Palladium 46	<b>Cd</b> Cadmium 48	<b>In</b> Indium 49	<b>Sn</b> Tin 50	<b>Sb</b> Antimony 51	<b>Te</b> Tellurium 52																										
150	62	<b>Sm</b> Samarium 62	<b>Pu</b> Plutonium 94	<b>Os</b> Osmium 76	<b>Ir</b> Iridium 77	<b>Pt</b> Platinum 78	<b>Cd</b> Cadmium 48	<b>In</b> Indium 49	<b>Sn</b> Tin 50	<b>Sb</b> Antimony 51	<b>Te</b> Tellurium 52																										
144	60	<b>Nd</b> Neodymium 60	<b>Np</b> Neptunium 93	<b>Co</b> Cobalt 27	<b>Ni</b> Nickel 28	<b>Cu</b> Copper 29	<b>Zn</b> Zinc 30	<b>Ga</b> Gallium 31	<b>Ge</b> Germanium 32	<b>As</b> Arsenic 33	<b>Se</b> Selenium 34																										
141	59	<b>Pr</b> Praseodymium 59	<b>Pa</b> Protactinium 91	<b>Fe</b> Iron 26	<b>Mn</b> Manganese 25	<b>Cr</b> Chromium 24	<b>V</b> Vanadium 23	<b>Ti</b> Titanium 22	<b>Sc</b> Scandium 21	<b>Y</b> Yttrium 39	<b>Zr</b> Zirconium 40																										
140	58	<b>Ce</b> Cerium 58	<b>Th</b> Thorium 90	<b>Ru</b> Ruthenium 44	<b>Rh</b> Rhodium 45	<b>Pd</b> Palladium 46	<b>Cd</b> Cadmium 48	<b>In</b> Indium 49	<b>Sn</b> Tin 50	<b>Sb</b> Antimony 51	<b>Te</b> Tellurium 52																										
175	71	<b>Lu</b> Lutetium 71	<b>Lr</b> Lawrencium 103	<b>Os</b> Osmium 76	<b>Ir</b> Iridium 77	<b>Pt</b> Platinum 78	<b>Cd</b> Cadmium 48	<b>In</b> Indium 49	<b>Sn</b> Tin 50	<b>Sb</b> Antimony 51	<b>Te</b> Tellurium 52																										
173	70	<b>Yb</b> Ytterbium 70	<b>No</b> Nobelium 102	<b>Re</b> Rhenium 75	<b>Os</b> Osmium 76	<b>Pt</b> Platinum 78	<b>Cd</b> Cadmium 48	<b>In</b> Indium 49	<b>Sn</b> Tin 50	<b>Sb</b> Antimony 51	<b>Te</b> Tellurium 52																										
169	69	<b>Tm</b> Thulium 69	<b>Md</b> Mendelevium 101	<b>Er</b> Erbium 68	<b>Ho</b> Holmium 67	<b>Dy</b> Dysprosium 66	<b>Tb</b> Terbium 65	<b>Gd</b> Gadolinium 64	<b>Eu</b> Europium 63	<b>Sm</b> Samarium 62	<b>Pm</b> Promethium 61																										
167	68	<b>Er</b> Erbium 68	<b>Fm</b> Fermium 100	<b>Ho</b> Holmium 67	<b>Dy</b> Dysprosium 66	<b>Tb</b> Terbium 65	<b>Gd</b> Gadolinium 64	<b>Eu</b> Europium 63	<b>Sm</b> Samarium 62	<b>Pm</b> Promethium 61	<b>Nd</b> Neodymium 60																										
165	67	<b>Ho</b> Holmium 67	<b>Es</b> Einsteinium 99	<b>Er</b> Erbium 68	<b>Ho</b> Holmium 67	<b>Dy</b> Dysprosium 66	<b>Tb</b> Terbium 65	<b>Gd</b> Gadolinium 64	<b>Eu</b> Europium 63	<b>Sm</b> Samarium 62	<b>Pm</b> Promethium 61																										
162	66	<b>Dy</b> Dysprosium 66	<b>Cf</b> Californium 98	<b>Er</b> Erbium 68	<b>Ho</b> Holmium 67	<b>Dy</b> Dysprosium 66	<b>Tb</b> Terbium 65	<b>Gd</b> Gadolinium 64	<b>Eu</b> Europium 63	<b>Sm</b> Samarium 62	<b>Pm</b> Promethium 61																										
159	65	<b>Tb</b> Terbium 65	<b>Bk</b> Berkelium 97	<b>Er</b> Erbium 68	<b>Ho</b> Holmium 67	<b>Dy</b> Dysprosium 66	<b>Tb</b> Terbium 65	<b>Gd</b> Gadolinium 64	<b>Eu</b> Europium 63	<b>Sm</b> Samarium 62	<b>Pm</b> Promethium 61																										
157	64	<b>Gd</b> Gadolinium 64	<b>Cm</b> Curium 96	<b>Er</b> Erbium 68	<b>Ho</b> Holmium 67	<b>Dy</b> Dysprosium 66	<b>Tb</b> Terbium 65	<b>Gd</b> Gadolinium 64	<b>Eu</b> Europium 63	<b>Sm</b> Samarium 62	<b>Pm</b> Promethium 61																										
152	63	<b>Eu</b> Europium 63	<b>Am</b> Americium 95	<b>Er</b> Erbium 68	<b>Ho</b> Holmium 67	<b>Dy</b> Dysprosium 66	<b>Tb</b> Terbium 65	<b>Gd</b> Gadolinium 64	<b>Eu</b> Europium 63	<b>Sm</b> Samarium 62	<b>Pm</b> Promethium 61																										
144	60	<b>Nd</b> Neodymium 60	<b>U</b> Uranium 92	<b>Er</b> Erbium 68	<b>Ho</b> Holmium 67	<b>Dy</b> Dysprosium 66	<b>Tb</b> Terbium 65	<b>Gd</b> Gadolinium 64	<b>Eu</b> Europium 63	<b>Sm</b> Samarium 62	<b>Pm</b> Promethium 61																										
141	59	<b>Pr</b> Praseodymium 59	<b>Pa</b> Protactinium 91	<b>Er</b> Erbium 68	<b>Ho</b> Holmium 67	<b>Dy</b> Dysprosium 66	<b>Tb</b> Terbium 65	<b>Gd</b> Gadolinium 64	<b>Eu</b> Europium 63	<b>Sm</b> Samarium 62	<b>Pm</b> Promethium 61																										
140	58	<b>Ce</b> Cerium 58	<b>Th</b> Thorium 90	<b>Er</b> Erbium 68	<b>Ho</b> Holmium 67	<b>Dy</b> Dysprosium 66	<b>Tb</b> Terbium 65	<b>Gd</b> Gadolinium 64	<b>Eu</b> Europium 63	<b>Sm</b> Samarium 62	<b>Pm</b> Promethium 61																										

\*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 dm<sup>3</sup> at room temperature and pressure (r.t.p.).