UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

COMBINED SCIENCE **5129/01**

Paper 1 Multiple Choice **October/November 2010**

1 hour

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.

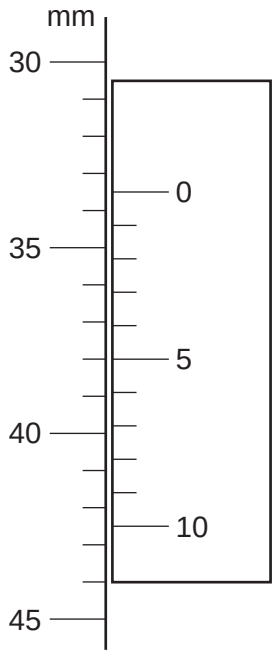
There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A**, **B**, **C** and **D**.
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

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 20.

This document consists of **17** printed pages and **3** blank pages.

1 The diagram shows part of a vernier scale.



What is the correct reading?

A 30.5 mm **B** 33.5 mm **C** 38.0 mm **D** 42.5 mm

2 The gradient of the line on a graph gives the acceleration of a moving object.

What are the quantities on the horizontal and vertical axes of this graph?

	quantity on horizontal axis	quantity on vertical axis
A	speed	distance
B	speed	time
C	time	distance
D	time	speed

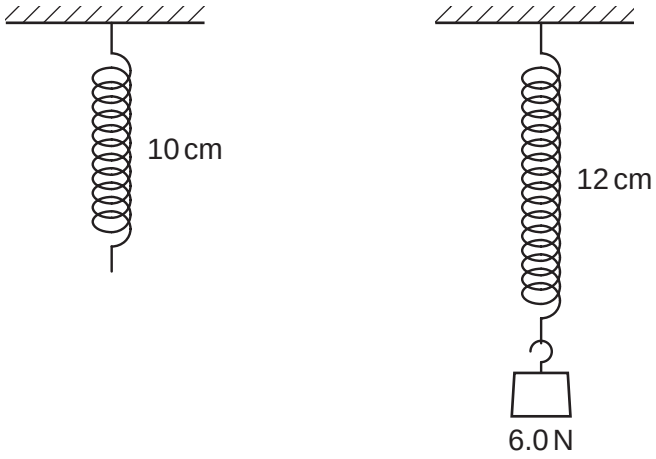
3 The gravitational field strength is 2 N / kg on the Moon and 10 N / kg on the Earth.

An astronaut returns from the Moon to the Earth.

What effect does this have on the astronaut's mass and weight?

	mass	weight
A	less on Earth	same on Earth and Moon
B	more on Earth	same on Earth and Moon
C	same on Earth and Moon	less on Earth
D	same on Earth and Moon	more on Earth

4 The diagrams show how a spring extends when a weight of 6.0 N is hung on it.



Which weight hanging from the spring causes the length to become 15 cm?

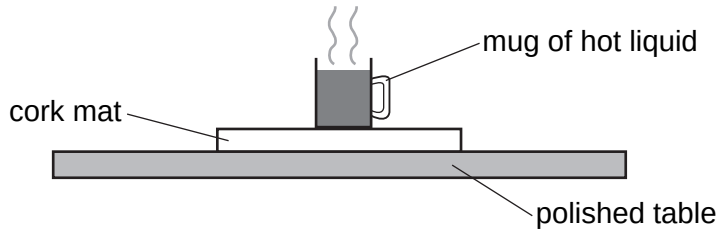
A 7.5 N **B** 15 N **C** 30 N **D** 45 N

5 An electric motor lifts a weight of 8 N through a height of 5 m in 4 s.

What is the power developed?

A 2.5 W **B** 6.4 W **C** 10 W **D** 40 W

6 To protect a polished table, a cork mat may be put on the table underneath a mug containing hot liquid.



Why is this effective?

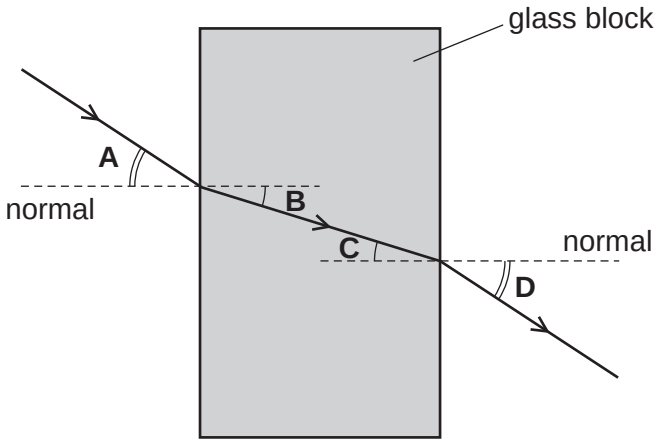
A Cork is a good conductor.

B Cork is a good radiator.

C Cork is a poor conductor.

D Cork is a poor radiator.

7 What is the angle of refraction for this ray of light moving from glass to air?

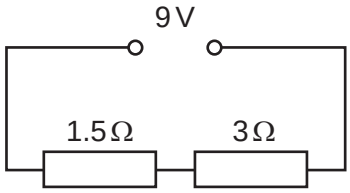


8 Electric current is defined as rate of flow of charge and is measured in amperes, A.

How can the unit of current also be written?

A Cm **B** C/m **C** Cs **D** C/s

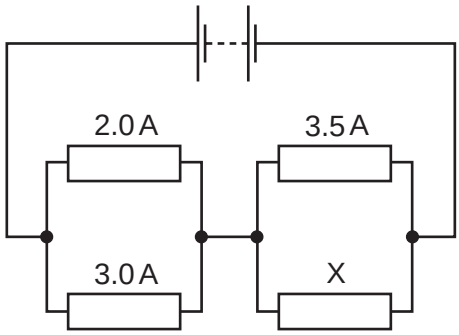
9 Two resistors are connected in series with a 9 V supply.



What is the current flowing in the circuit?

A 2.0 A **B** 3.0 A **C** 4.5 A **D** 6.0 A

10 A circuit consists of a battery and four resistors.



The current in three of the resistors is shown.

What is the current in X?

A 1.5 A **B** 2.0 A **C** 3.0 A **D** 5.0 A

11 A 2 kW appliance is to be connected to the 240 V mains supply.

Which fuse should be fitted in the plug?

A 1 A **B** 3 A **C** 5 A **D** 10 A

12 What is the nucleon number of a nuclide?

A the number of neutrons

B the number of protons

C the total number of neutrons and protons

D the total number of protons and electrons

13 A radioactive material gives a count rate of 8000 counts per minute.

After 20 days, it gives a count rate of 500 counts per minute.

What is the half-life of the material?

A 4 days **B** 5 days **C** 20 days **D** 80 days

14 A test-tube containing a liquid X is placed in a beaker of boiling water.

The liquid X starts to boil immediately.

The boiling point of liquid X is

A 100 °C.

B above 100 °C.

C between 0 °C and room temperature.

D between room temperature and 100 °C.

15 Why are sodium and chlorine in the same period of the Periodic Table?

A Sodium and chlorine combine together to form a compound of formula NaC*l*.

B Sodium is a reactive metal and chlorine is a reactive non-metal.

C The atoms of both elements have eight electrons in their second electron shell.

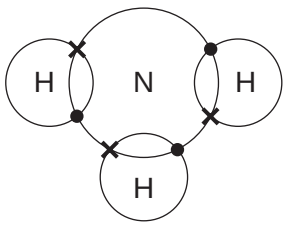
D The atoms of both elements have only three electron shells containing electrons.

16 Which substance could be sodium chloride?

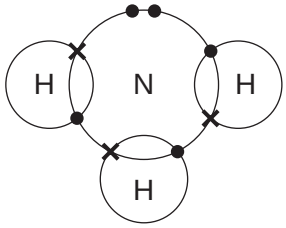
	melting point / °C	conduction of electricity	
		when liquid	in aqueous solution
A	–114	none	none
B	–114	none	good
C	180	none	insoluble
D	808	good	good

17 Which dot and cross diagram is correct for ammonia?

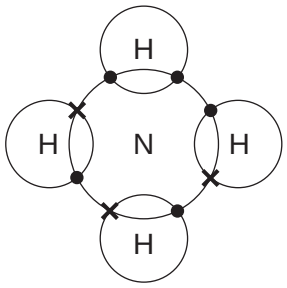
A



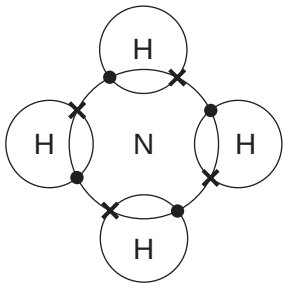
B



C



D



18 7.8 g of an element X react with oxygen to form 9.4 g of an oxide X_2O.

What is the relative atomic mass of X?

A 78 **B** 39 **C** 9.4 **D** 7.8

19 The approximate pH values of the aqueous solutions of four substances commonly used in cooking are shown.

Which substance could be taken to neutralise excess acid in the stomach?

	substance	pH
A	baking soda	9
B	salt	7
C	lemon juice	4
D	vinegar	3

20 A new halogen Z is discovered.

Its relative atomic mass is 370.

Which properties is Z likely to have?

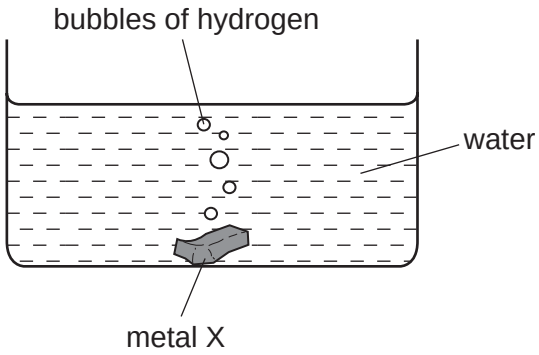
A dark green gas, soluble in water

B black solid, high melting point

C grey solid, reacting violently with water

D white solid, reacting with acid giving hydrogen

21 The diagram shows a metal X reacting with water.



What is X?

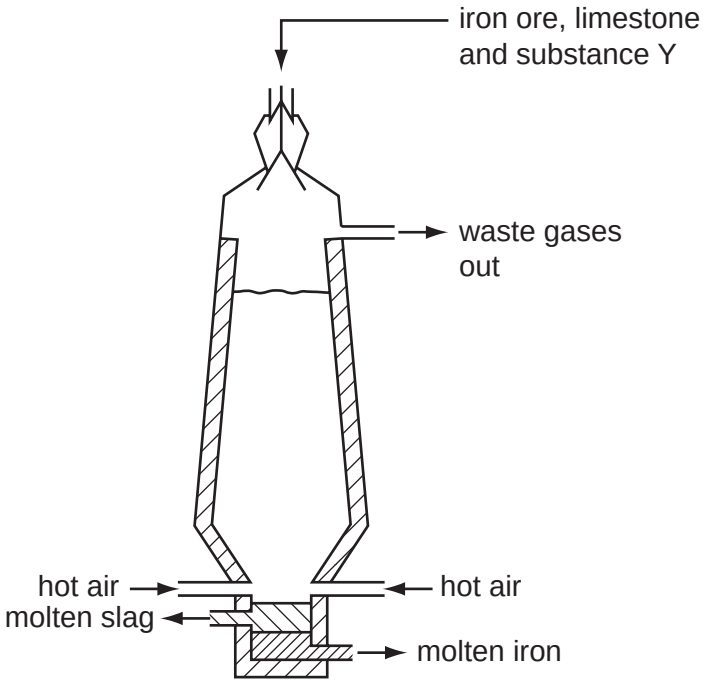
A calcium

B copper

C potassium

D sodium

22 The diagram shows a blast furnace used to extract iron from iron ore.



What is Y?

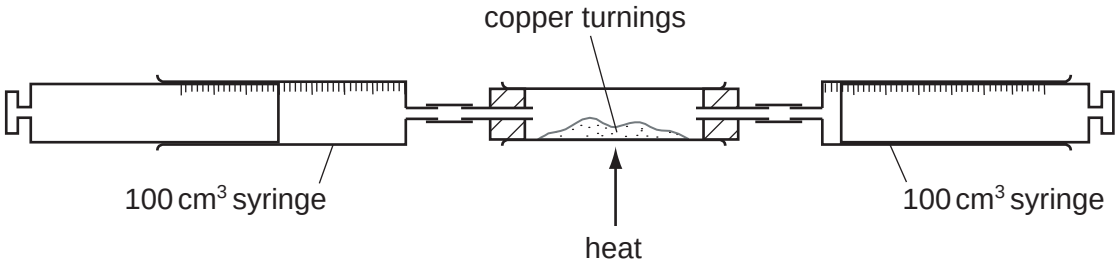
A bauxite

B coke

C oxygen

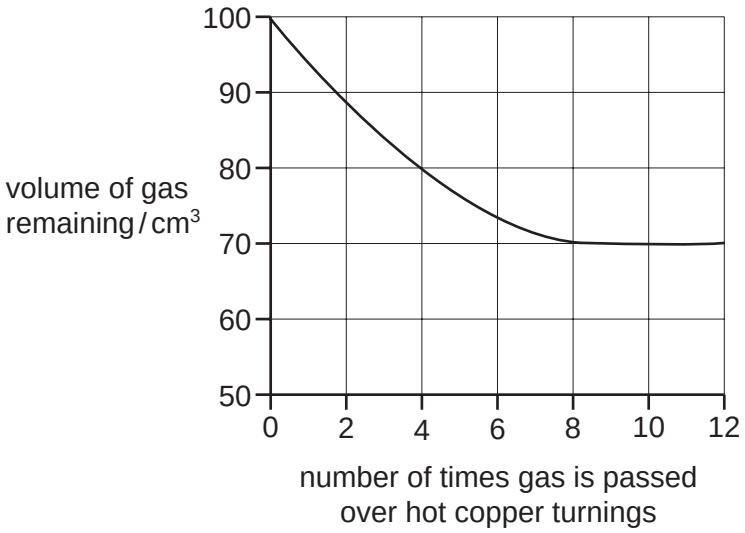
D sand

23 A 100 cm^3 sample of bottled gas, used for diving, was placed in a gas syringe in the apparatus shown.



The gas was passed backwards and forwards over the heated copper turnings.

The results obtained were used to plot the graph below.



What is the percentage of oxygen in the bottled gas?

A 20 % **B** 30 % **C** 70 % **D** 80 %

24 In the Haber process, nitrogen and hydrogen react to produce ammonia.

The reaction is represented by the equation shown.

$$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$$

Which conditions favour the production of ammonia?

A high temperature and high pressure

B high temperature and low pressure

C low temperature and high pressure

D low temperature and low pressure

25 Which statement about a homologous series is correct?

A The boiling point increases with decreasing relative molecular mass.

B The members have the same empirical formula.

C The members have similar chemical properties.

D The relative molecular masses of consecutive members differ by 12.

26 Which formula represents a compound that undergoes an addition reaction with hydrogen?

A C_2H_6 **B** C_2H_4 **C** CH_4 **D** $C_2H_4Br_2$

27 The list shows reactions in which ethanol is either a reactant or a product.

1 combustion of ethanol

2 conversion of ethene to ethanol

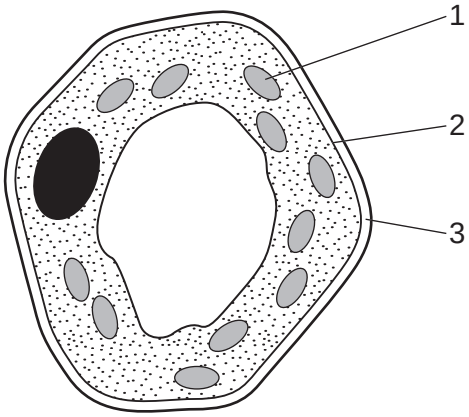
3 fermentation of glucose

4 oxidation of ethanol to ethanoic acid

In which reactions is water also either a reactant or a product?

A 1, 2 and 4 **B** 1, 3 and 4 **C** 2, 3 and 4 **D** 3 only

28 The diagram shows a plant cell as seen under a microscope.



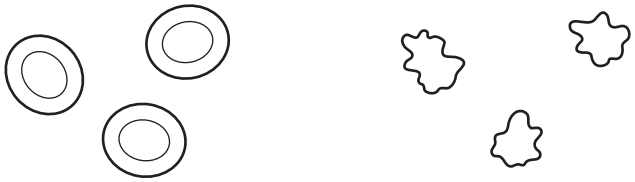
What are the functions in the cell of the numbered parts?

	controlling entry of substances	synthesis of carbohydrate
A	1	3
B	2	1
C	3	2
D	3	1

29 Diagram 1 represents some red blood cells in a solution of the same water potential as plasma.

Diagram 2 shows the same cells after treatment.

diagram 1 diagram 2



Which solution has been used in diagram 2 and in which direction has water moved?

	solution used in diagram 2	direction of water movement
A	higher water potential	into the cells
B	higher water potential	out of the cells
C	lower water potential	into the cells
D	lower water potential	out of the cells

30 Which statements are correct for **all** enzymes?

1 They are proteins.

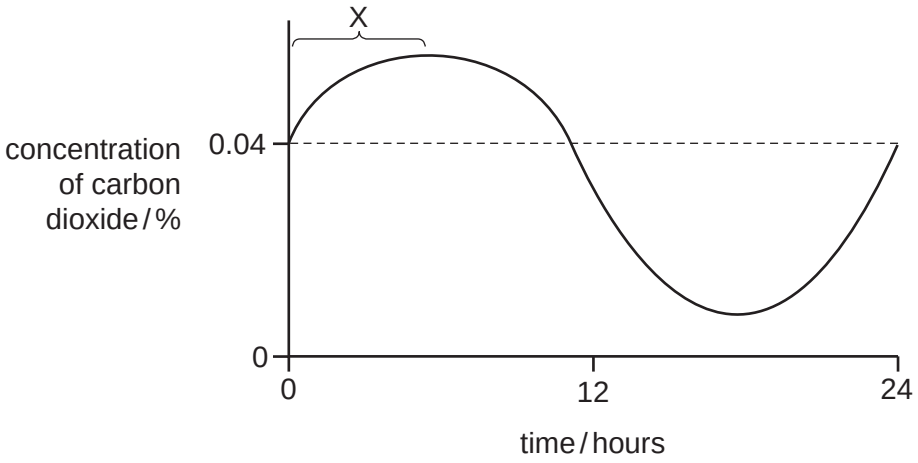
2 They are secreted into the gut.

3 They speed up biochemical reactions.

4 None of them work at low pH.

A 1 and 3 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

31 The graph shows the concentration of carbon dioxide in the air surrounding a plant measured over 24 hours.



What explains the change in carbon dioxide concentration at X?

	light intensity	plant process
A	darkness	respiration
B	darkness	transpiration
C	daylight	photosynthesis
D	daylight	respiration

32 In which order do these events occur in human nutrition?

A digestion → ingestion → absorption → assimilation

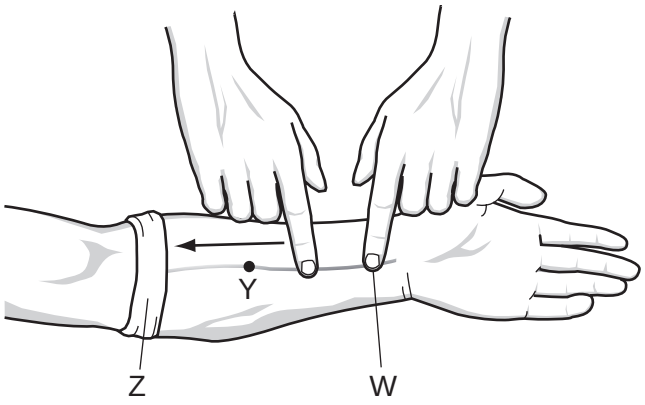
B digestion → ingestion → assimilation → absorption

C ingestion → digestion → absorption → assimilation

D ingestion → digestion → assimilation → absorption

[Turn over

33 The diagram shows the investigation of blood flow in the veins of the lower arm.



A cloth is tightly wrapped round the arm at point Z and the veins stand out clearly. One finger presses on the vein at W.

When another finger strokes the vein, as shown in the diagram, the vein lies flat between points W and Y.

Some possible explanations are listed.

1 The bandage at Z prevents backflow of blood.

2 The finger pressed at W prevents more blood entering the vein.

3 A valve at Y prevents backflow.

4 A valve at Z prevents more blood from entering the vein.

Which explanations of the vein lying flat are correct?

A 1 and 2 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

34 Why is the percentage of nitrogen in inspired air more than in expired air?

A Ciliated cells in the bronchus absorb nitrogen.

B Nitrogen is absorbed into the blood in the alveoli.

C The expired air is mainly carbon dioxide.

D There is an increase in water vapour in expired air.

35 Where are most nitrogen compounds excreted from humans?

A kidneys

B liver

C rectum

D skin

36 The eye changes focus from looking at a wrist watch to looking at an aeroplane flying overhead. What changes occur inside the eye?

	shape of lens	suspensory ligaments	ciliary muscles
A	thicker	slacken	contract
B	thicker	taut	relax
C	thinner	slacken	contract
D	thinner	taut	relax

37 Which statements about alcohol are correct?

	acts as a depressant	speeds up reaction times	may damage the liver
A	✓	✓	✗
B	✓	✗	✓
C	✗	✓	✗
D	✗	✗	✓

key

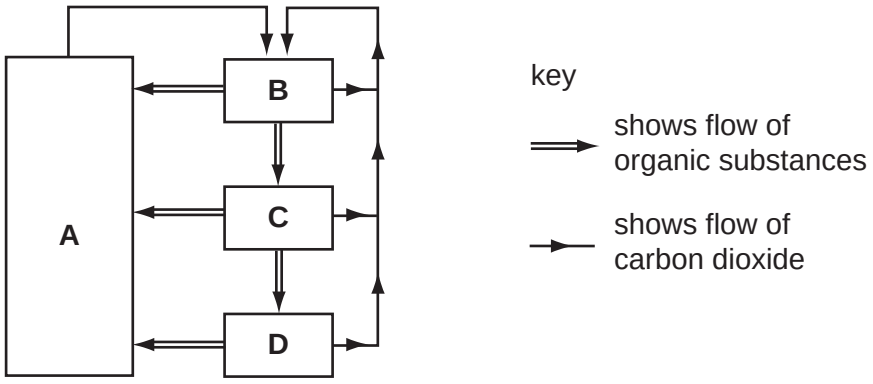
✓ = correct

✗ = incorrect

38 The diagram represents the flow of substances within a balanced ecosystem.

The boxes are various trophic levels.

Which box represents herbivores?



39 Which processes increase and decrease the amount of carbon dioxide in the air?

	process causing increase in carbon dioxide	process causing decrease in carbon dioxide
A	burning of fossil fuels	respiration of plants
B	photosynthesis in plants	respiration of bacteria
C	respiration of animals	photosynthesis in plants
D	respiration of bacteria	burning of fossil fuels

40 Which diseases can be cured with antibiotics?

	gonorrhoea	HIV infection	syphilis
A	✓	✓	✓
B	✓	✗	✓
C	✗	✓	✗
D	✗	✗	✓

key

✓ = can be cured with antibiotics

✗ = cannot be cured with antibiotics

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DATA SHEET
The Periodic Table of the Elements

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

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

*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^3 at room temperature and pressure (r.t.p.).