



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE

0653/12

Paper 1 Multiple Choice

May/June 2016

45 minutes

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

* 7 0 8 7 2 2 0 3 8 7 0 *

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, 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.
DO NOT WRITE IN ANY BARCODES.

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.

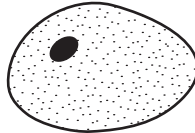
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
A copy of the Periodic Table is printed on page 20.
Electronic calculators may be used.

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

1 Which is a characteristic of all living things?

- A breathing
- B eating
- C photosynthesis
- D respiration

2 The diagram shows an animal cell. The maximum diameter of the diagram is 25 mm.



The maximum diameter of the actual cell was 0.02 mm.

What is the magnification of the drawing?

- A $\times 25$ B $\times 200$ C $\times 1250$ D $\times 2500$

3 Which process depends on diffusion?

- A egestion
- B fertilisation
- C phagocytosis
- D transpiration

4 To which class of compound do enzymes belong?

- A carbohydrates
- B fats
- C proteins
- D vitamins

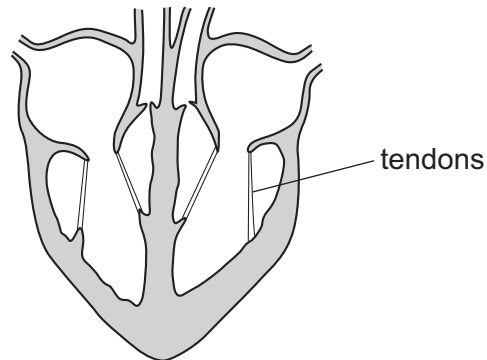
5 Which word equation represents photosynthesis?

- A carbon dioxide + water \rightarrow sugar + oxygen
- B oxygen + water \rightarrow sugar + carbon dioxide
- C sugar + carbon dioxide \rightarrow water + oxygen
- D sugar + oxygen \rightarrow water + carbon dioxide

6 What are the functions of phloem?

	transports mineral ions	transports sugars
A	✓	✓
B	✓	x
C	x	✓
D	x	x

7 The diagram shows a section through the human heart.



Which structures are joined by the tendons?

- A** atrium wall and septum
- B** atrium wall and valve
- C** septum and ventricle wall
- D** valve and ventricle wall

8 How do the contents of **inspired** air differ from those of expired air?

	carbon dioxide	oxygen
A	less	less
B	less	more
C	more	less
D	more	more

- 9 Glucose is involved in the metabolic reaction shown below.



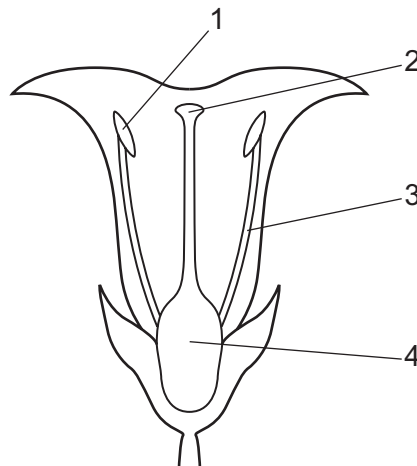
What are P, Q and R?

	P	Q	R
A	carbon dioxide	oxygen	water
B	carbon dioxide	water	oxygen
C	oxygen	water	carbon dioxide
D	water	carbon dioxide	oxygen

- 10 What are the stimuli for geotropism and phototropism?

	geotropism	phototropism
A	gravity	light
B	heat	water
C	light	gravity
D	water	heat

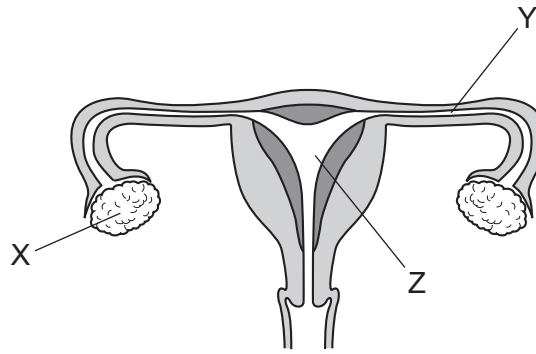
- 11 The diagram shows a section through a flower.



Which numbers identify anther and ovary?

	anther	ovary
A	1	2
B	1	4
C	2	4
D	3	2

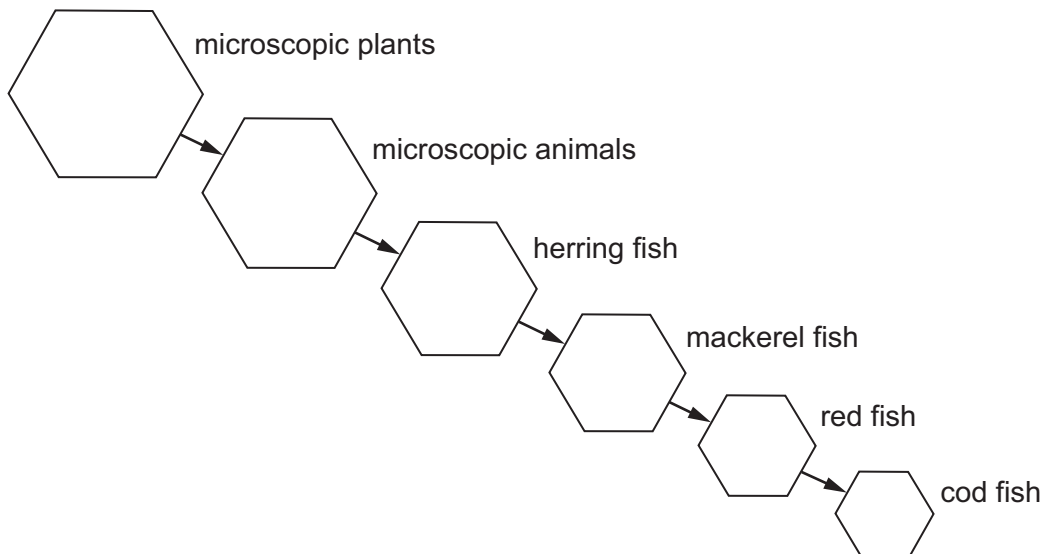
12 The diagram shows the female reproductive system.



Which labelled structures are the ovary and the uterus?

	ovary	uterus
A	X	Y
B	X	Z
C	Z	X
D	Z	Y

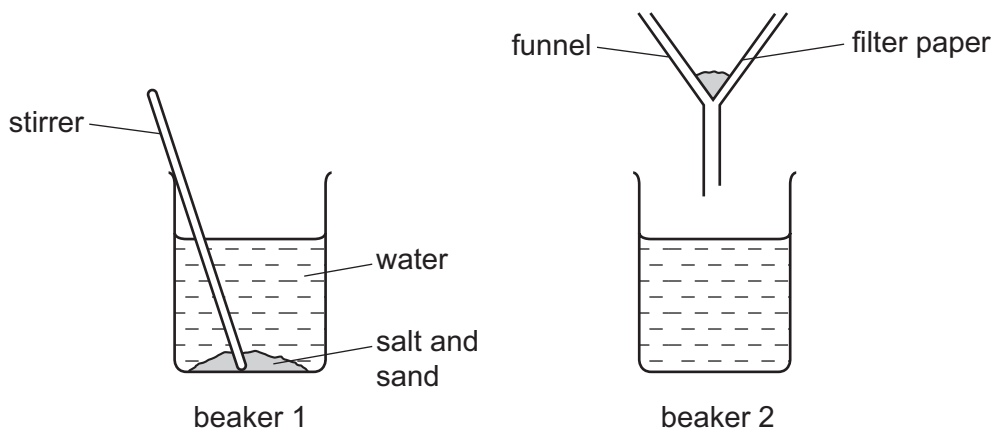
13 The diagram represents a food chain found in the sea.



How many consumer levels are there?

- A** 1 **B** 4 **C** 5 **D** 6

14 The apparatus used to remove sand from a mixture of salt and sand is shown.



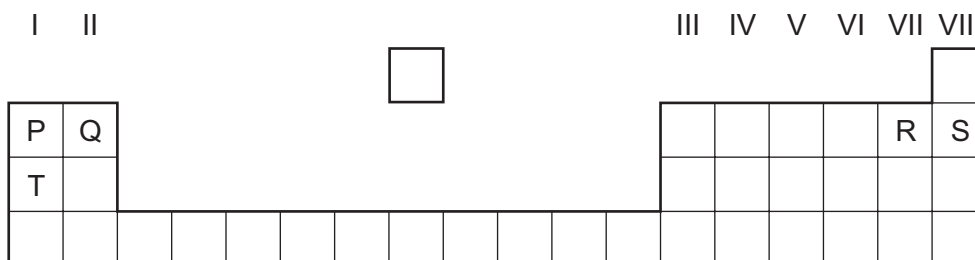
The contents of beaker 1 are stirred and then poured into the funnel above beaker 2.

What is in beaker 2?

- A a mixture of an element and a compound
- B a mixture of two compounds
- C one compound only
- D one element only

15 The positions of elements P, Q, R, S and T in the Periodic Table are shown.

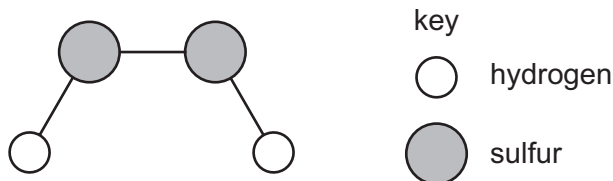
The letters are **not** the symbols for the elements.



Which element forms an ionic compound with element P?

- A Q
- B R
- C S
- D T

16 A model of a molecule is shown.

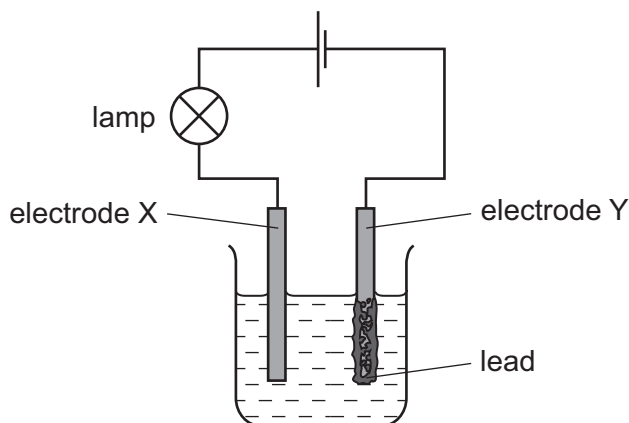


Which row describes this molecule?

	formula	type of substance
A	HS	compound
B	HS	mixture
C	H ₂ S ₂	compound
D	H ₂ S ₂	mixture

17 The diagram shows the apparatus used for the electrolysis of lead(II) bromide using inert electrodes X and Y.

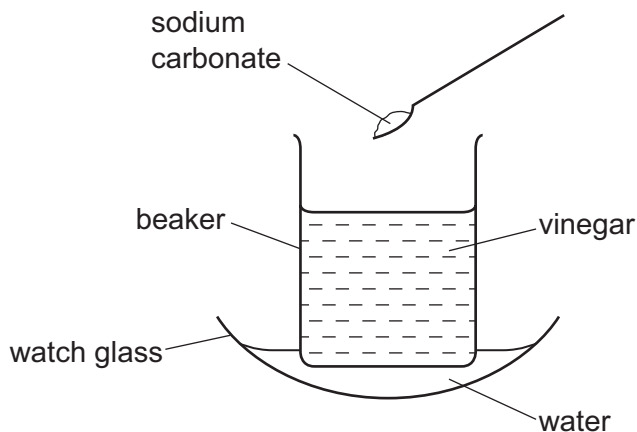
Lead is formed at electrode Y.



Which statement about the electrolysis is correct?

- A** A green gas is given off at electrode X.
- B** Electrode Y is the anode.
- C** Only a physical change takes place when a current is passed.
- D** The electrolyte is in the molten state.

- 18 Solid sodium carbonate is added to vinegar in a beaker and stirred.



The water in the watch glass freezes.

Which statement about the reaction explains why the water freezes?

- A It is a redox reaction.
 - B It is an endothermic reaction.
 - C It is catalysed by sodium carbonate.
 - D It is thermal decomposition.
- 19 Carbon dioxide reacts with carbon.



Which row describes what happens to the carbon dioxide and to the carbon during the reaction?

	carbon dioxide	carbon
A	oxidised	oxidised
B	oxidised	reduced
C	reduced	oxidised
D	reduced	reduced

- 20 Which element reacts with dilute sulfuric acid to form a salt?

- A carbon
- B copper
- C sulfur
- D zinc

21 The results of two tests on substance Q are shown.

tests	results
add dilute hydrochloric acid to solid Q	bubbles of colourless gas, R, which turns limewater milky
add aqueous sodium hydroxide to a solution of Q	green precipitate

Which cation is present in Q and what is gas R?

	cation present in Q	gas R
A	iron(II)	carbon dioxide
B	iron(II)	chlorine
C	iron(III)	carbon dioxide
D	iron(III)	chlorine

22 A soft metal reacts vigorously with cold water.

What is the position of this metal in the Periodic Table?

23 What are two properties of transition metals?

- A** act as catalysts and form white compounds
- B** high densities and low boiling points
- C** high melting points and form coloured compounds
- D** low densities and their compounds act as catalysts

24 Which metal reacts with dilute hydrochloric acid but does **not** react with cold water?

- A** copper
- B** calcium
- C** sodium
- D** zinc

25 What is a chemical test for water?

- A It boils at 100 °C.
- B It turns blue cobalt chloride paper pink.
- C It turns blue copper sulfate crystals white.
- D It turns pink litmus paper blue.

26 Which reaction involves combustion?

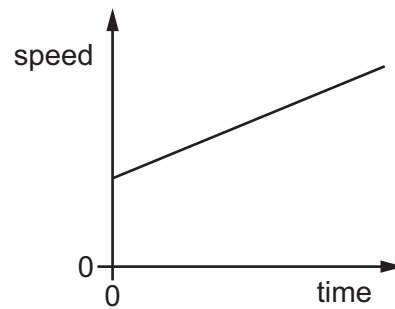
- A calcium carbonate \rightarrow calcium oxide + carbon dioxide
- B methane + oxygen \rightarrow carbon dioxide + water
- C sodium carbonate + hydrochloric acid \rightarrow sodium chloride + water + carbon dioxide
- D sodium hydroxide + hydrochloric acid \rightarrow sodium chloride + water

27 Petroleum is a mixture of hydrocarbon molecules.

Which row describes the method of separation of petroleum and the type of bond in hydrocarbon molecules?

	method of separation	type of bond
A	distillation	covalent
B	distillation	ionic
C	fractional distillation	covalent
D	fractional distillation	ionic

28 The graph shows how the speed of a car varies with time.



Which statement about the car is correct?

- A The car is accelerating.
 - B The car is at rest at time = 0.
 - C The car must be travelling in a straight line.
 - D The car travels equal distances in equal times.
- 29 A solid metal cube of side 5.0 cm has a mass of 250 g.
- What is the density of the metal from which the cube is made?
- A 0.50 g/cm^3
 - B 2.0 g/cm^3
 - C 10 g/cm^3
 - D 50 g/cm^3
- 30 In which case is work **not** being done on the object involved?
- A holding a heavy weight stationary above your head
 - B holding both ends of a spring then stretching it
 - C pushing a heavy chair over a rough, horizontal floor
 - D raising a load off the ground
- 31 A substance is easily compressed into a smaller volume.
- What is the state of the substance?
- A gas or liquid
 - B gas only
 - C liquid only
 - D solid or liquid

32 Benzene and glycerine are two substances.

The table gives the melting point and the boiling point of benzene and of glycerine.

	melting point/ $^{\circ}\text{C}$	boiling point/ $^{\circ}\text{C}$
benzene	5.4	80
glycerine	18	290

At which temperature are both benzene and glycerine liquid?

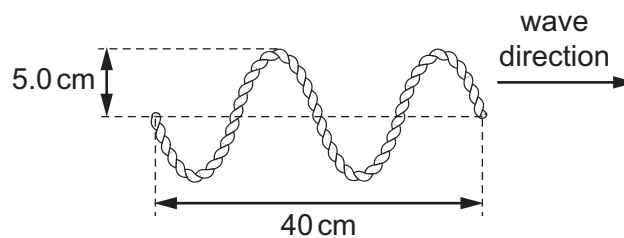
- A** 0°C **B** 50°C **C** 90°C **D** 300°C

33 A hot, solid metal block is placed in a vacuum. Its temperature decreases.

By which method is energy transferred through the vacuum?

- A** conduction
B convection
C evaporation
D radiation

34 A student vibrates the end of a horizontal rope and sends a wave along the rope. The wave is shown in the diagram.

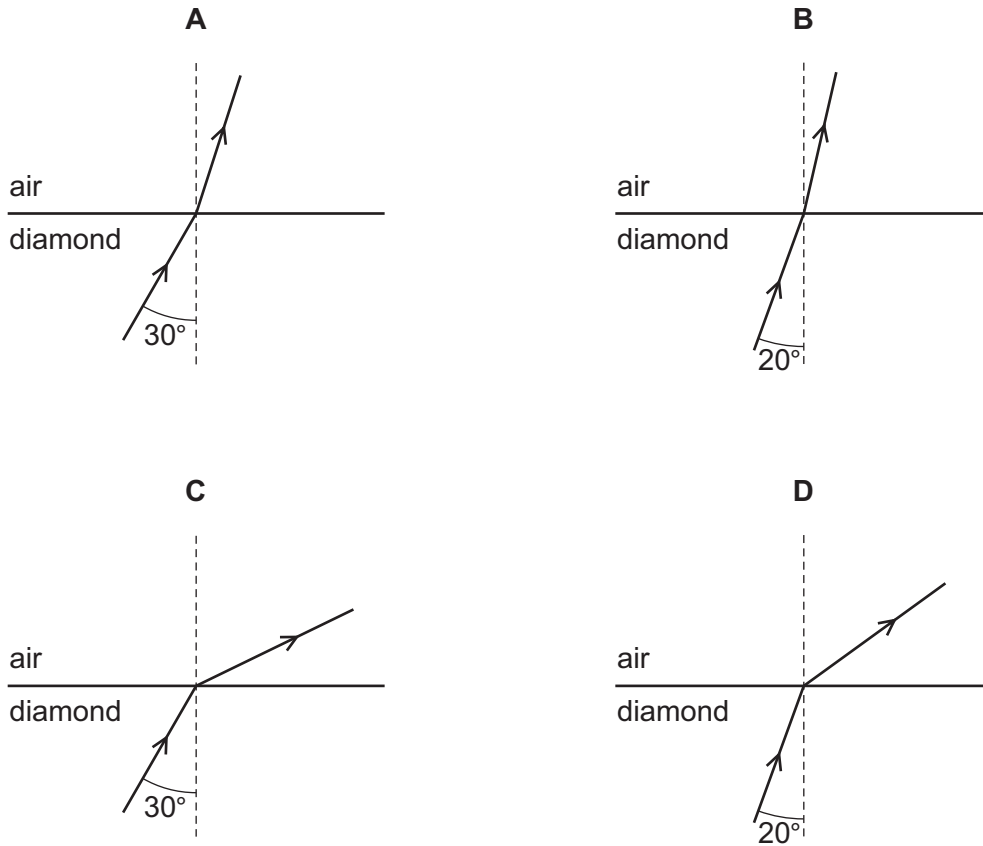


What is the amplitude of the wave, and what is the wavelength of the wave?

	amplitude / cm	wavelength / cm
A	5.0	10
B	5.0	20
C	10	10
D	10	20

35 The critical angle for diamond in air is 25° .

Which diagram shows the path of light passing from diamond (denser) into air (less dense)?



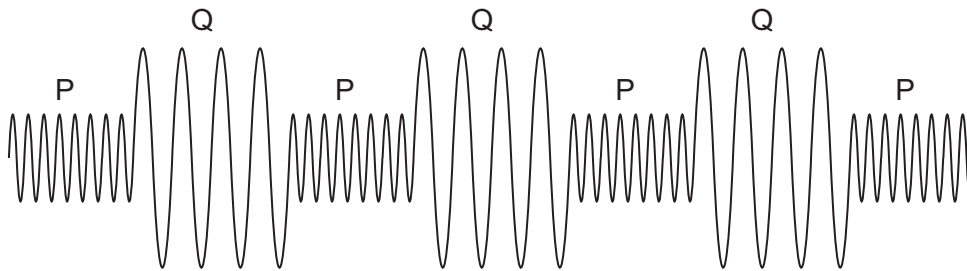
36 A worker in a hospital operates an X-ray machine.

Which is **not** a useful precaution to help protect her from the X-rays while the machine is operating?

- A keeping a large distance away from the machine
- B limiting for how long she operates the machine
- C placing lead blocks between her and the machine
- D using safety glasses when operating the machine

- 37 A police car sounds its siren when travelling to an emergency. The siren produces two different sounds P and Q, which are emitted alternately.

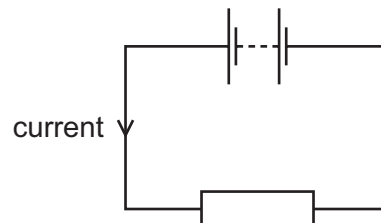
The diagram represents the sound waves emitted by the siren.



Which of the two sounds P and Q is the louder and which has the higher pitch?

	louder sound	sound with higher pitch
A	P	P
B	P	Q
C	Q	P
D	Q	Q

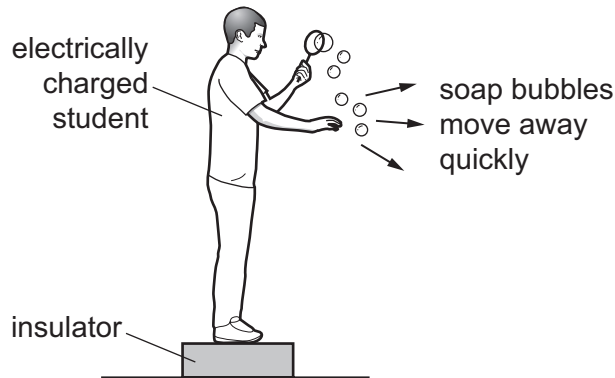
- 38 A battery is connected to a resistor.



Which changes to the resistance of the resistor, and to the potential difference across the resistor, **must** produce a smaller current?

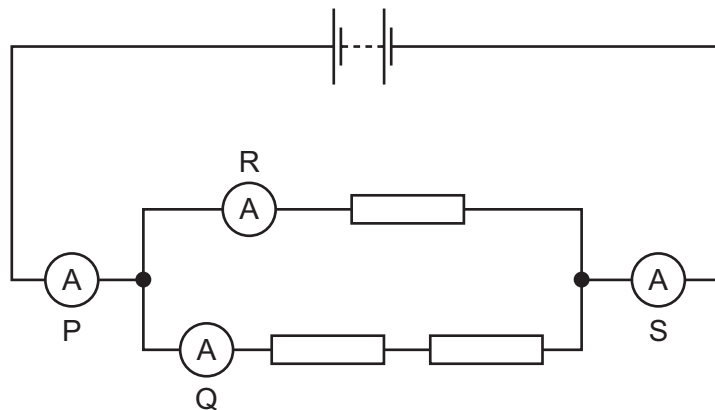
	resistance	potential difference
A	decrease	decrease
B	decrease	increase
C	increase	decrease
D	increase	increase

- 39 An electrically charged student produces soap bubbles. When he holds his hand near the bubbles, they move away quickly from his hand.



For this movement of the bubbles to happen, which statement is correct?

- A The bubbles must be negatively charged.
 - B The bubbles must be positively charged.
 - C The bubbles must have the opposite charge to the charge on the student.
 - D The bubbles must have the same charge as the charge on the student.
- 40 In the circuit shown, three identical resistors are connected with four ammeters P, Q, R and S.



Which two ammeters have the same reading?

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

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The Periodic Table of Elements

		Group															
I	II	III	IV	V	VI	VII	VIII										
3 Li lithium 7	4 Be beryllium 9	1 H hydrogen 1	5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20									
11 Na sodium 23	12 Mg magnesium 24	<p>Key</p> <p>atomic number</p> <p>atomic symbol</p> <p>name</p> <p>relative atomic mass</p>															
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Al aluminium 27	32 Ga gallium 70	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium —	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131
55 Cs caesium 133	56 Ba barium 137	57–71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium —	85 At astatine —	86 Rn radon —
87 Fr francium —	88 Ra radium —	89 Ac actinoids —	104 Rf rutherfordium —	105 Db dubnium —	106 Sg seaborgium —	107 Bh bohrium —	108 Hs hassium —	109 Mt meitnerium —	110 Ds darmstadtium —	111 Rg roentgenium —	112 Cn copernicium —	114 Fl flerovium —	116 Lv livermorium —	118 Og oganesson —	119 Uue unbinetium —	120 Uuo unbinetium —	121 Uuq unbinetium —

lanthanoids	57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium —	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
actinoids	89 Ac actinium —	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium —	94 Pu plutonium —	95 Am americium —	96 Cm curium —	97 Bk berkelium —	98 Cf californium —	99 Es einsteinium —	100 Fm fermium —	101 Md mendelevium —	102 No nobelium —	103 Lr lawrencium —

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