



# Cambridge IGCSE™

**COMBINED SCIENCE**

**0653/02**

Paper 2 Multiple Choice (Extended)

**For examination from 2025**

SPECIMEN PAPER

**45 minutes**

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet  
Soft clean eraser  
Soft pencil (type B or HB is recommended)



## INSTRUCTIONS

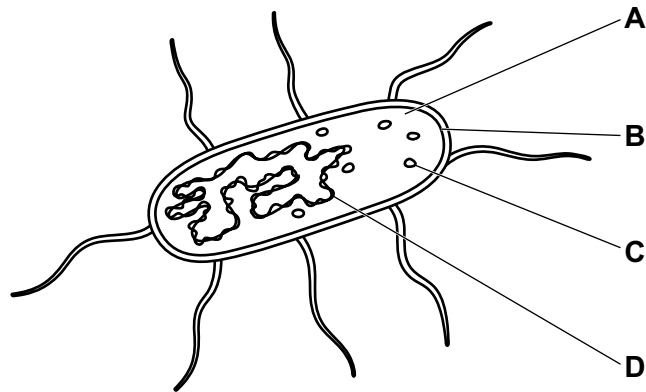
- There are **forty** questions on this paper. Answer **all** questions.
- For each question there are four possible answers **A, B, C** and **D**. Choose the **one** you consider correct and record your choice in soft pencil on the multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- Take the weight of 1.0 kg to be 9.8 N (acceleration of free fall =  $9.8 \text{ m/s}^2$ ).

## INFORMATION

- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.

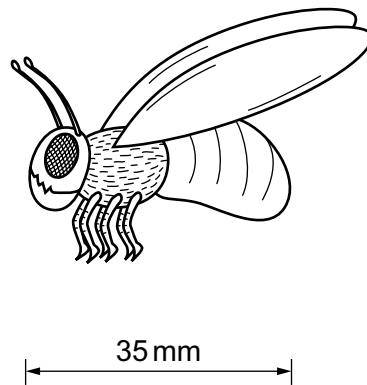
This document has **16** pages.

1 Which label represents a plasmid in this diagram of a bacterium?



2 The actual length of a phorid fly is  $5500\ \mu\text{m}$  long.

What is the magnification of this diagram of a phorid fly?

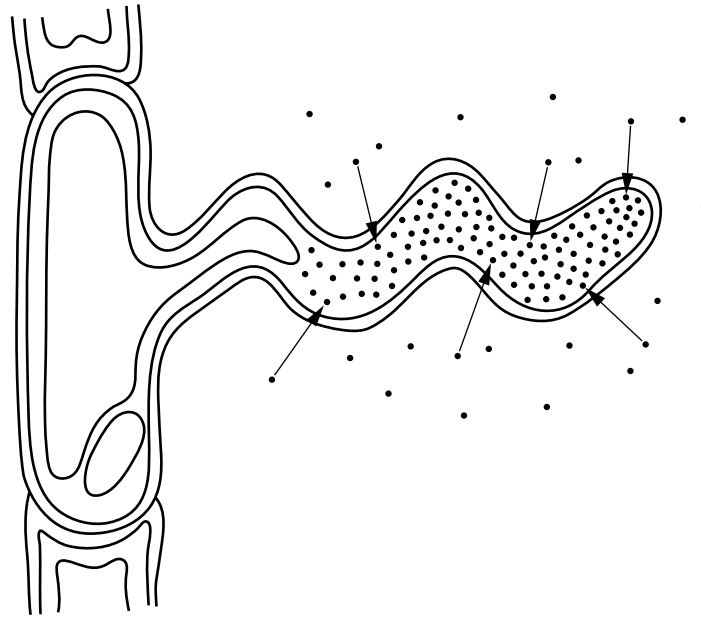


- A 0.006
- B 0.16
- C 6.4
- D 157

3 Which factor would decrease the rate of diffusion from a plant cell?

- A high temperature
- B large surface area
- C small concentration gradient
- D small diffusion distance

- 4 The diagram shows a root hair cell.



Which type of transport is shown by the arrows in this diagram?

- A active transport
  - B diffusion
  - C osmosis
  - D xylem transport
- 5 The data shows the concentrations of sugar and starch in an onion.

total sugar including reducing sugar /g per 100 g	starch /g per 100 g
3.7	0.0

The onion is tested with Benedict's solution and iodine solution.

Which set of results is correct?

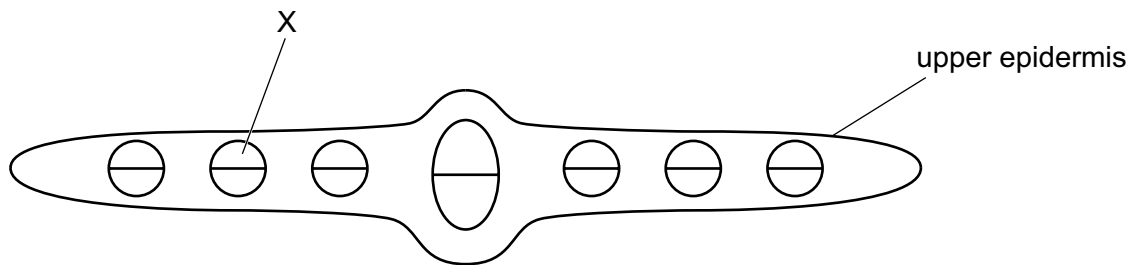
	Benedict's solution	iodine solution
<b>A</b>	blue	blue-black
<b>B</b>	blue	yellow-brown
<b>C</b>	red	blue-black
<b>D</b>	red	yellow-brown

- 6 An aquatic plant is placed in a beaker of water containing hydrogencarbonate indicator and kept in the dark.

Which colour will the hydrogencarbonate indicator be after 24 hours?

- A blue
- B red
- C purple
- D yellow

- 7 The diagram shows a cross-section through a leaf.



What are the functions of the tissue labelled X?

- 1 transport of amino acids
- 2 transport of sucrose
- 3 transport of water
- 4 support

- A 1 and 2 only    B 3 and 4 only    C 1 and 4 only    D 2 and 3 only

- 8 Which factors could a person change to reduce their risk of developing coronary heart disease?

- 1 diet and exercise
- 2 stress and smoking
- 3 genetic predisposition and age

- A 1 only
- B 1 and 2 only
- C 2 and 3 only
- D 1, 2 and 3

9 What produces active immunity?

	infection by a pathogen	vaccination
<b>A</b>	✓	✓
<b>B</b>	✓	✗
<b>C</b>	✗	✓
<b>D</b>	✗	✗

10 A doctor tells a patient that they are suffering from a viral infection.

Why would the doctor **not** prescribe antibiotics to the patient?

- A** antibiotics do not affect viruses
- B** antibiotics are drugs
- C** long-term use of antibiotics may reduce the effectiveness against the viruses
- D** some bacteria are resistant to antibiotics

11 Which row contains the words that can replace **X**, **Y** and **Z** in the description of a food chain?

Energy from the Sun is transferred as ...**X**... to be stored as ...**Y**... energy in a ...**Z**... .

	<b>X</b>	<b>Y</b>	<b>Z</b>
<b>A</b>	chemical	light	consumer
<b>B</b>	chemical	kinetic	producer
<b>C</b>	light	chemical	producer
<b>D</b>	light	kinetic	consumer

- 12** Since the introduction of grey squirrels into the UK, the number of red squirrels has decreased from 3.5 million to about 150 000.

The statements give possible reasons for this decrease.

- 1 Grey squirrels brought a disease (squirrelpox) which kills red squirrels.
- 2 Grey squirrels are better at getting food than the red squirrels.
- 3 Red squirrels are less obvious to predators.

Which statements could explain this decrease in the number of red squirrels?

- A** 1 only  
**B** 1 and 2 only  
**C** 2 and 3 only  
**D** 1, 2 and 3
- 13** Which reasons explain why deforestation contributes to climate change?

	species become extinct	increased risk of flooding	increase in atmospheric carbon dioxide
<b>A</b>	x	x	✓
<b>B</b>	✓	✓	x
<b>C</b>	x	✓	x
<b>D</b>	✓	x	x

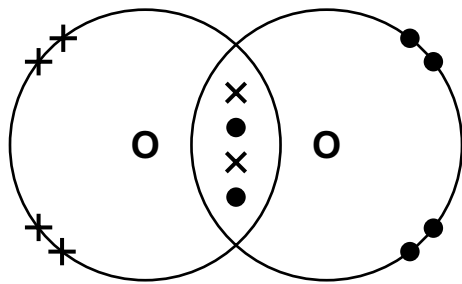
- 14** Which statement describes what happens to the particles of a gas during condensation?

- A** They gain energy and get closer together.  
**B** They gain energy and get further apart.  
**C** They lose energy and get closer together.  
**D** They lose energy and get further apart.

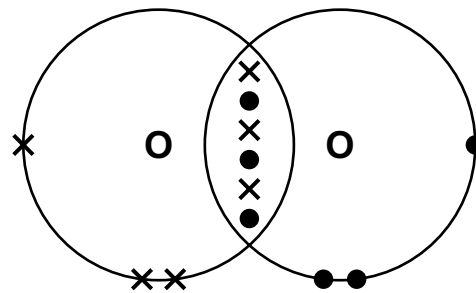
- 15** Which statement describes the giant lattice structure of sodium chloride?

- A** It is a random arrangement of alternating positive and negative ions.  
**B** It is a random arrangement of alternating sodium and chlorine atoms.  
**C** It is a regular arrangement of alternating positive and negative ions.  
**D** It is a regular arrangement of alternating sodium and chlorine atoms.

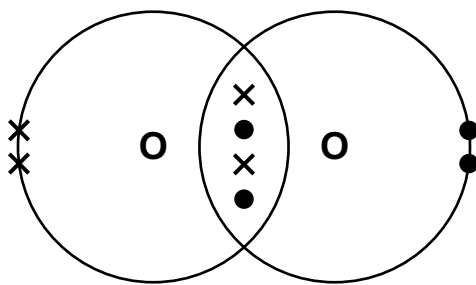
16 Which dot-and-cross diagram shows the outer shell electrons in a molecule of oxygen,  $O_2$ ?



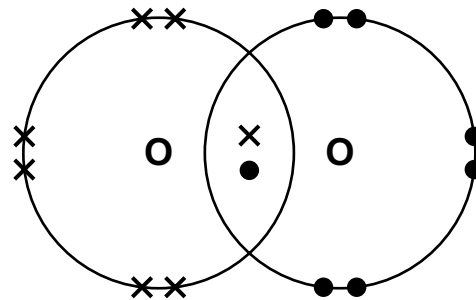
A



B



C



D

17 The formula of sodium phosphate is  $Na_3PO_4$ .

The formula of calcium chloride is  $CaCl_2$ .

What is the formula of calcium phosphate?

- A  $CaPO_4$
- B  $Ca_3(PO_4)_2$
- C  $Ca(PO_4)_2$
- D  $Ca_3PO_4$

18 Which row identifies the product at each electrode during the electrolysis of molten potassium bromide using inert electrodes?

	anode	cathode
<b>A</b>	bromide ions	potassium ions
<b>B</b>	bromine	potassium
<b>C</b>	potassium	bromine
<b>D</b>	potassium ions	bromide ions

19 Which statement explains how a catalyst increases the rate of a chemical reaction?

- A It increases the energy of the particles in the reaction mixture.
- B It increases the minimum energy that colliding particles must have to react.
- C It reduces the energy of the particles in the reaction mixture.
- D It reduces the minimum energy that colliding particles must have to react.

20 Which equation shows a reduction of the underlined substance?

- A C + O<sub>2</sub> → CO<sub>2</sub>
- B C + CO<sub>2</sub> → 2CO
- C Mg + H<sub>2</sub>O → MgO + H<sub>2</sub>
- D NaOH + HCl → NaCl + H<sub>2</sub>O

21 Which row identifies the formulas of an acidic oxide and a basic oxide?

	acidic oxide	basic oxide
A	NO <sub>2</sub>	CaO
B	SO <sub>2</sub>	CO <sub>2</sub>
C	CuO	Na <sub>2</sub> O
D	Li <sub>2</sub> O	SiO <sub>2</sub>

22 Which statement describes the trends shown by the elements down Group I of the Periodic Table?

- A They become less dense and less reactive.
- B They become less dense and more reactive.
- C They become more dense and less reactive.
- D They become more dense and more reactive.

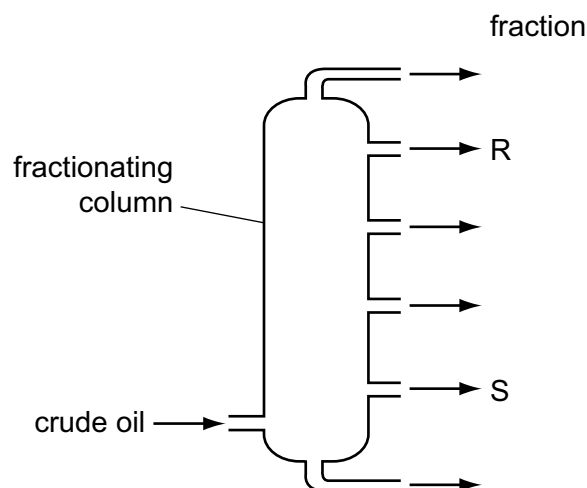
23 Aqueous bromine is added to aqueous sodium chloride.

Which statement describes the colour of the resulting mixture and explains the observation?

- A It is pale yellow-green because bromine is less reactive than chlorine.
- B It is pale yellow-green because bromine is more reactive than chlorine.
- C It is red-brown because bromine is less reactive than chlorine.
- D It is red-brown because bromine is more reactive than chlorine.



- 24 Which statement describes helium and neon?
- A They are diatomic and have high thermal conductivities.  
 B They are diatomic and have low melting points.  
 C They are monatomic and have high boiling points.  
 D They are monatomic and have low electrical conductivities.
- 25 Which statement about the industrial extraction of metals from their ores is correct?
- A Aluminium is obtained from bauxite.  
 B Iron is obtained by the electrolysis of iron(III) oxide.  
 C Iron is obtained by the oxidation of iron(III) oxide.  
 D The higher a metal is in the reactivity series the easier it is to extract.
- 26 The diagram shows a fractionating column used in the separation of petroleum.



Which row explains why fraction R is collected above fraction S?

	boiling point of R	average chain length of R
<b>A</b>	higher than S	longer than S
<b>B</b>	higher than S	shorter than S
<b>C</b>	lower than S	longer than S
<b>D</b>	lower than S	shorter than S

27 A mixture of salt solution and an insoluble solid is separated by ...**P**...

The insoluble solid that is collected is the ...**Q**...

Pure salt crystals are obtained from the separated salt solution by ...**R**... of the water.

Which words complete gaps **P**, **Q** and **R**?

	<b>P</b>	<b>Q</b>	<b>R</b>
<b>A</b>	evaporation	filtrate	filtration
<b>B</b>	evaporation	residue	filtration
<b>C</b>	filtration	filtrate	evaporation
<b>D</b>	filtration	residue	evaporation

28 A car of mass 800 kg is travelling in a straight line at a constant speed of 12 m/s. A constant resultant force then acts on the car causing the speed to increase.

After 5.0 s, the speed of the car is 20 m/s.

What is the size of the resultant force acting on the car?

- A** 0 N
- B** 500 N
- C** 1280 N
- D** 3200 N

29 A rock has a mass of 20 kg. The rock is at rest at a height of 5.0 m above the ground.

It then falls to the ground.

What is the speed of the rock just before it hits the ground?

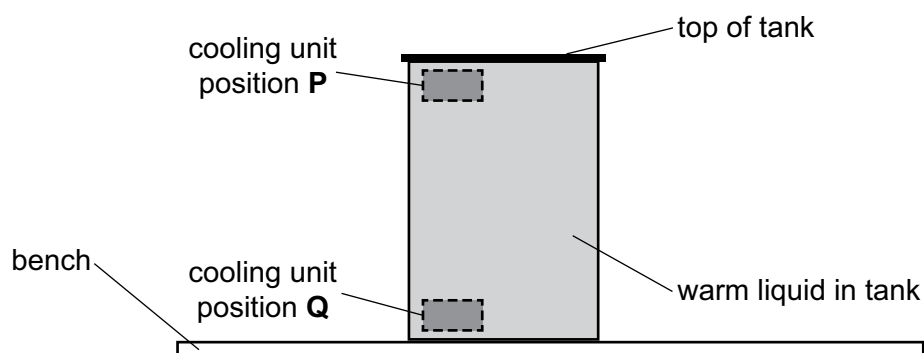
- A** 7.0 m/s
- B** 9.9 m/s
- C** 44 m/s
- D** 98 m/s

- 30 A sample of a substance has a definite shape and a definite volume.

The substance changes state. The sample now has **no** definite shape but still has a definite volume.

What is the name of the change of state?

- A condensation  
 B evaporation  
 C freezing  
 D melting
- 31 A tank is full of a warm liquid. A student wants to place a cooling unit inside the tank to cool all the liquid as quickly as possible. There are two possible positions for the cooling unit, **P** and **Q**. The positions are shown in the diagram.



How does cooling affect the density of the liquid and what is the best position for the cooling unit?

	effect of cooling	best position for cooling unit
<b>A</b>	decreases density	<b>P</b>
<b>B</b>	decreases density	<b>Q</b>
<b>C</b>	increases density	<b>P</b>
<b>D</b>	increases density	<b>Q</b>

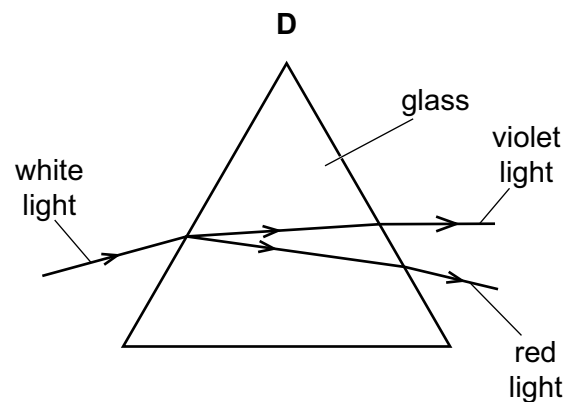
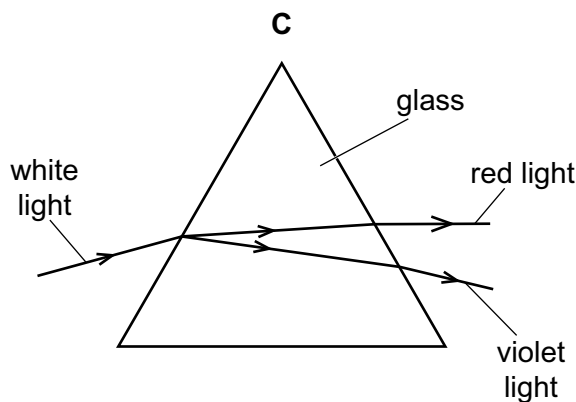
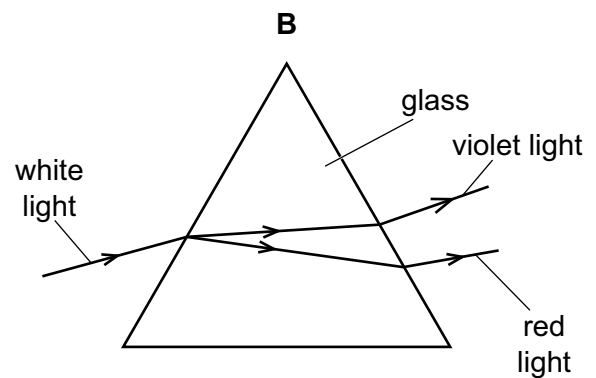
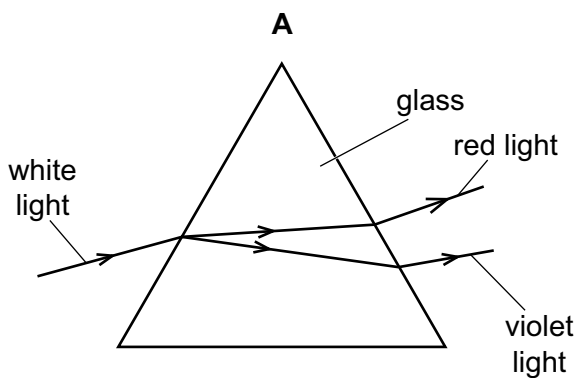
32 A seismic P-wave (primary) passes through the ground.

What is the nature of this wave and what is the direction of vibration of the ground as the P-wave passes through it?

	nature of P-wave	direction of vibration
<b>A</b>	longitudinal	at right angles to direction of propagation
<b>B</b>	longitudinal	parallel to direction of propagation
<b>C</b>	transverse	at right angles to direction of propagation
<b>D</b>	transverse	parallel to direction of propagation

33 White light passes through a glass prism and produces an spectrum.

Which diagram shows the paths of the red light and the violet light?



34 An electric heater and an electric motor are connected to a mains power supply.

The power of the heater is 3.0 kW and the power of the motor is 1.0 kW.

The cost of electricity is \$0.20 per kWh.

What is the total cost of using the heater and the motor for 5.0 hours?

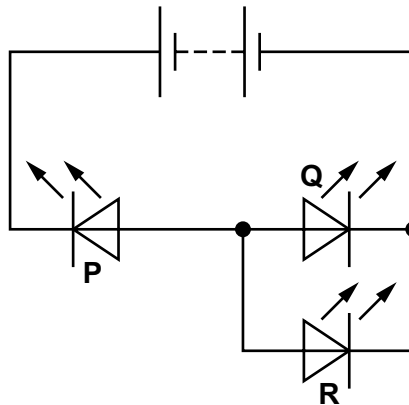
- A \$0.12
- B \$0.16
- C \$3.00
- D \$4.00

35 A quantity is defined as ‘the electrical work done by a source in moving a unit charge around a complete circuit’.

What is the quantity?

- A electric current
- B electromotive force (e.m.f.)
- C potential difference (p.d.)
- D resistance

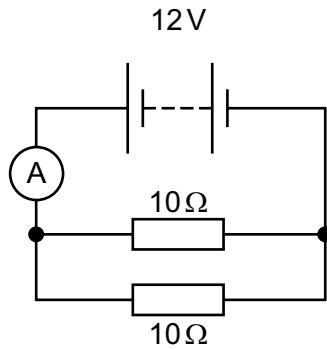
36 The diagram shows a battery that is connected to three LEDs, P, Q and R.



Which of the LEDs are lit?

- A P only
- B P and Q only
- C Q and R only
- D none of them

- 37 The diagram shows a 12 V battery connected to an ammeter and two  $10\ \Omega$  resistors.



What is the reading on the ammeter?

- A 0.60 A  
 B 1.2 A  
 C 2.4 A  
 D 60 A
- 38 A teacher wants to connect an electric heater to the mains supply.  
 The safety label on the heater states that the heater is double-insulated.  
 What does the teacher know from reading this label?
- A The outer casing of the heater does **not** need to be earthed.  
 B The outer casing of the heater must be earthed.  
 C The heater needs two fuses.  
 D The heater needs two trip switches.
- 39 A planet orbits the Sun with an orbital speed of  $48\text{ km/s}$ . The radius of the orbit is  $5.7 \times 10^7\text{ km}$ .  
 What is the orbital period of the planet?
- A  $3.7 \times 10^6\text{ s}$   
 B  $7.5 \times 10^6\text{ s}$   
 C  $8.6 \times 10^9\text{ s}$   
 D  $1.7 \times 10^{10}\text{ s}$

- 40 Which sequence is part of the life cycle of a small star (about the same size as the Sun)?
- A red giant → planetary nebula + white dwarf
  - B red giant → supernova → black hole
  - C red supergiant → planetary nebula + black hole
  - D red supergiant → supernova → white dwarf

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	13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40														
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 Ga gallium 70	32 Ge germanium 73	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 —	89–103 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 —	113 Nh nihonium —	114 Fl flerovium —	115 Mc moscovium —	116 Lv livermorium —	117 Ts tennessine —	118 Og oganesson —				
		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					
		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 dm<sup>3</sup> at room temperature and pressure (r.t.p.).

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (Cambridge University Press & Assessment) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

Cambridge Assessment International Education is part of Cambridge University Press & Assessment. Cambridge University Press & Assessment is a department of the University of Cambridge.