Cambridge Assessment International Education

Cambridge IGCSE™

CO-ORDINATED SCIENCES **0654/22**

Paper 2 Multiple Choice (Extended) **May/June 2023**

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.

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.

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[Turn over

1 Which is **not** a characteristic of all living organisms?

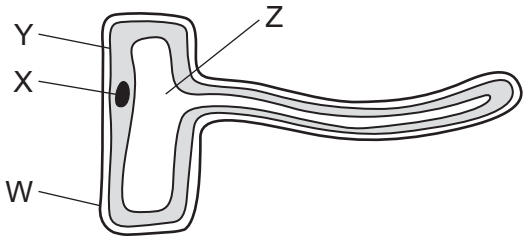
A excretion

B growth

C photosynthesis

D sensitivity

2 The diagram shows a specialised cell from a plant.



Which structures **not** found in animal cells are shown in the diagram and which structure often found in other plant cells is missing?

	structures not found in animal cells	structure found in other plant cells
A	W and X	chloroplast
B	X and Y	nucleus
C	Y and Z	nucleus
D	Z and W	chloroplast

3 Which row shows the elements and the small molecules that are used to make the larger molecules?

	elements	small molecule	larger molecule
A	carbon, hydrogen and oxygen	glucose	fats
B	carbon, hydrogen, oxygen and nitrogen	amino acids	fats
C	carbon, hydrogen and oxygen	glucose	proteins
D	carbon, hydrogen, oxygen and nitrogen	amino acids	proteins

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4 Which type of molecules speed up chemical digestion?

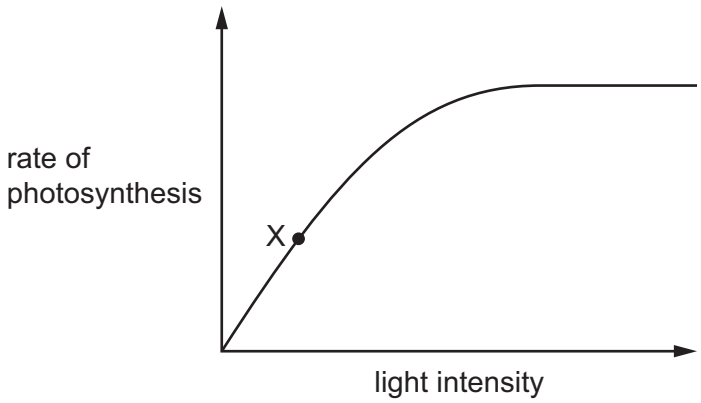
A carbohydrates

B enzymes

C hormones

D fatty acids

5 The graph shows the effect of increasing light intensity on the rate of photosynthesis of a submerged aquatic plant.



Which factor is limiting the rate of photosynthesis at X?

A carbon dioxide concentration

B humidity

C light intensity

D temperature

6 What is one of the functions of bile?

A denaturing lipase

B digesting fats

C emulsifying fats

D increasing acidity

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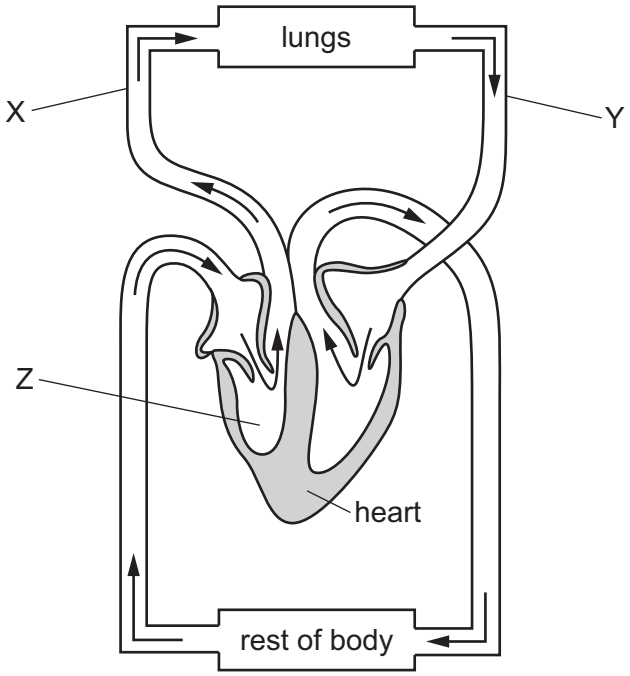
7 The diagram shows the circulatory system of a mammal.



Which row shows the correct names for blood vessels X and Y and for chamber Z?

	X	Y	Z
A	pulmonary artery	aorta	left ventricle
B	vena cava	pulmonary vein	left ventricle
C	vena cava	aorta	right ventricle
D	pulmonary artery	pulmonary vein	right ventricle

8 During cold weather, warm blooded animals, such as mammals and birds, require more food.

Which statement explains the reason for this?

	energy required to maintain constant body temperature	rate of respiration
A	high	high
B	high	low
C	low	high
D	low	low

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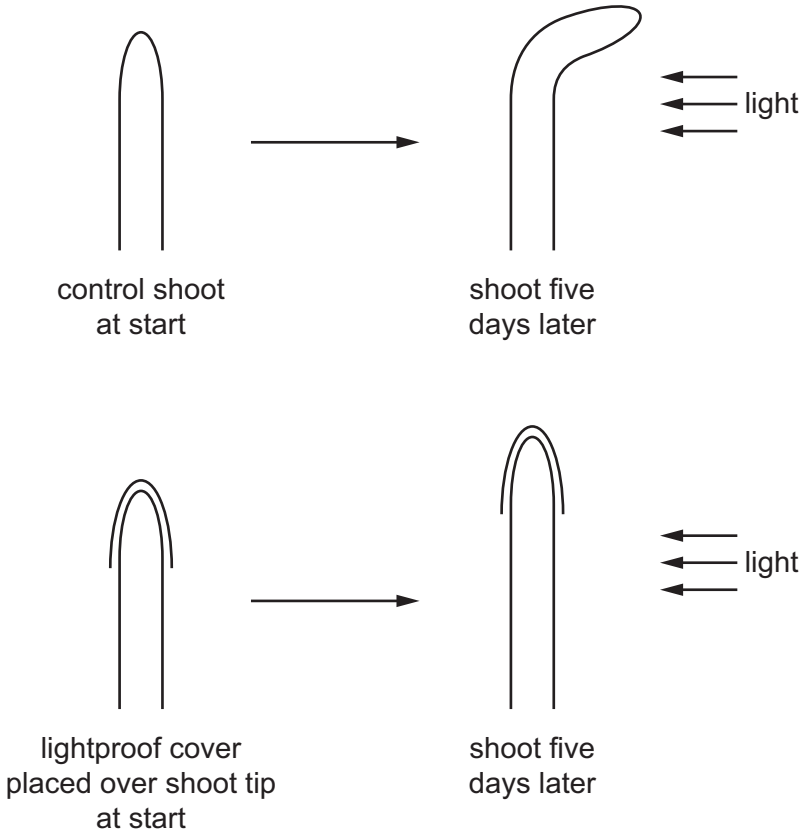
9 The diagram shows an experiment using the shoots of seedlings.



Which statement explains why the covered shoot tip does **not** grow towards the light?

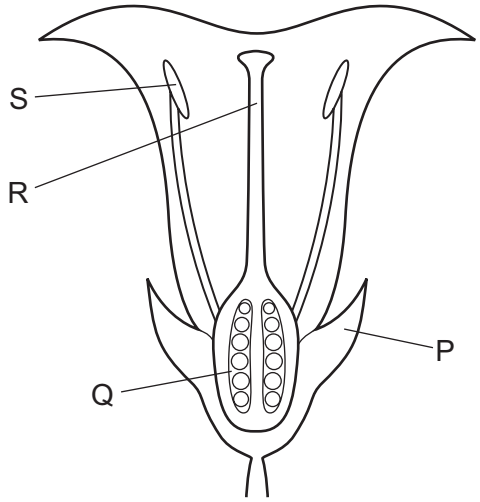
A The lightproof cover decreases auxin production by the shoot tip.

B The lightproof cover keeps auxin distribution even on all sides of the shoot.

C The lightproof cover prevents auxin from diffusing from the shoot tip.

D The lightproof cover stimulates cell elongation without requiring auxin.

10 The diagram shows a section through a flower.



Which labelled structures are the anther and the ovary?

	anther	ovary
A	R	P
B	R	Q
C	S	P
D	S	Q

11 Which process results in the development of strains of antibiotic-resistant bacteria?

A artificial selection

B discontinuous variation

C natural selection

D selective breeding

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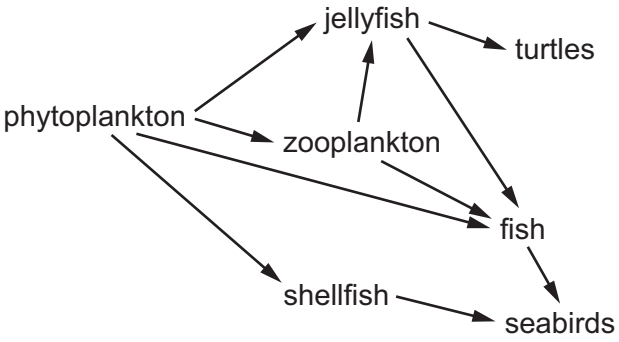
12 The diagram shows a food web.



Which groups of organisms are both primary **and** secondary consumers?

A fish and jellyfish

B fish and shellfish

C seabirds and turtles

D shellfish and zooplankton

13 The flow diagram shows the consequence of the overuse of fertilisers on farm land.

leaching fertiliser → fast growth of algae → death of algae → fast growth of **X** → death of fish

Which group of organisms is represented by **X**?

A decomposers

B fish

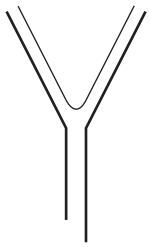
C invertebrates

D plants

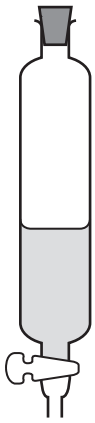
14 Hexane and octane are liquid hydrocarbons that mix together.

Which apparatus is used to separate a mixture of these two liquids?

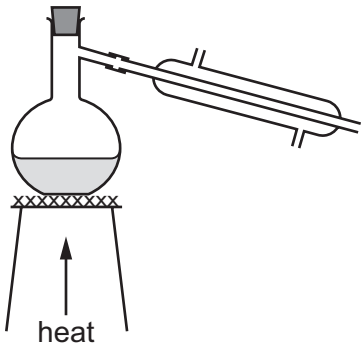
A



B



C



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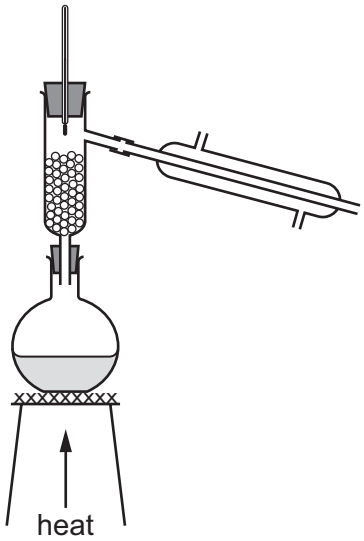

15 When solid zinc carbonate is heated, a different solid and a gas are formed.

Which type of change occurs?

A chemical

B exothermic

C physical

D separation

16 An atom of osmium is represented by $^{190}_{76}Os$.

How many neutrons are in this atom?

A 76 **B** 114 **C** 190 **D** 266

17 Due to an issue with Question 17, the question has been removed from the question paper.

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18 Which statement about the extraction of aluminium from its ore by electrolysis is correct?

A Aluminium gains electrons from the anode.

B Aluminium ions are oxidised at the cathode.

C Aluminium ore is called cryolite.

D Aluminium oxide is in the electrolyte.

19 Which statement explains why increasing the concentration of reactants increases the rate of a reaction?

A The proportion of particles that possess the activation energy is greater.

B The particles collide more frequently.

C The particles collide more slowly.

D The particles collide with greater energy.

20 Copper(II) sulfate is produced by reacting copper(II) oxide with dilute sulfuric acid.

The stages in the process to produce pure dry crystals are listed.

1 Leave to crystallise in a cool place.

2 Filter the reaction mixture.

3 Press the crystals between dry filter papers.

4 Add copper(II) oxide until it is in excess.

5 Heat the filtrate to concentrate it.

6 Heat the dilute sulfuric acid.

What is the correct order for these stages?

A $6 \rightarrow 4 \rightarrow 2 \rightarrow 5 \rightarrow 3 \rightarrow 1$

B $6 \rightarrow 4 \rightarrow 1 \rightarrow 2 \rightarrow 5 \rightarrow 3$

C $6 \rightarrow 4 \rightarrow 2 \rightarrow 5 \rightarrow 1 \rightarrow 3$

D $4 \rightarrow 6 \rightarrow 2 \rightarrow 1 \rightarrow 5 \rightarrow 3$

21 The box lists four substances.

Br_2	CO	Cu	Na

Which substance is an element that forms a basic oxide and coloured compounds?

A Br_2 **B** CO **C** Cu **D** Na

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22 Car engines produce pollutant gases.

Which gases are removed by catalytic converters?

A carbon monoxide, nitrogen monoxide and sulfur dioxide

B carbon monoxide and nitrogen monoxide only

C nitrogen monoxide and sulfur dioxide only

D carbon dioxide and sulfur dioxide

23 In the blast furnace, which substance is added to make slag?

A calcium carbonate

B carbon dioxide

C carbon monoxide

D coke

24 Which catalyst is used in the Contact process?

A iron

B phosphoric(V) acid

C nickel

D vanadium(V) oxide

25 Which statements about limestone are correct?

1 It contains calcium oxide.

2 It is used to manufacture lime.

3 It neutralises acidic industrial waste products.

4 It neutralises alkaline soil.

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

26 Naphtha is obtained by the fractional distillation of petroleum.

Which statements about naphtha are correct?

1 It burns to form carbon dioxide and water.

2 It is a mixture of hydrocarbons.

3 It is present in bottled gas.

4 The main component of naphtha is methane.

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

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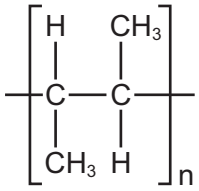
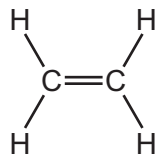
27 The structure of an addition polymer is shown.



Which monomer is used to make this polymer?

A



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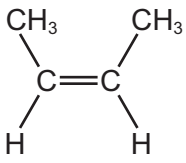

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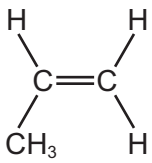

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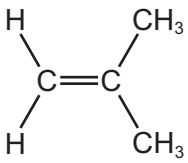
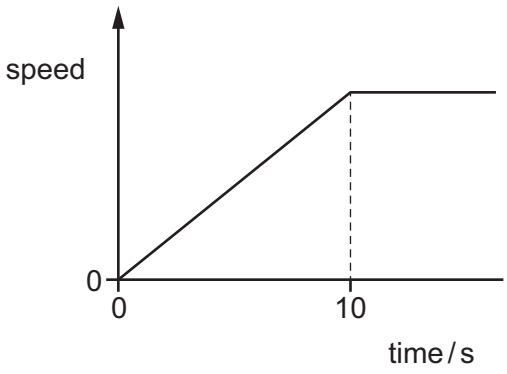


28 The diagram shows the speed–time graph for an object moving in a straight line.



Which statement about the motion of the object is **not** correct?

A The acceleration is constant during the first 10 s.

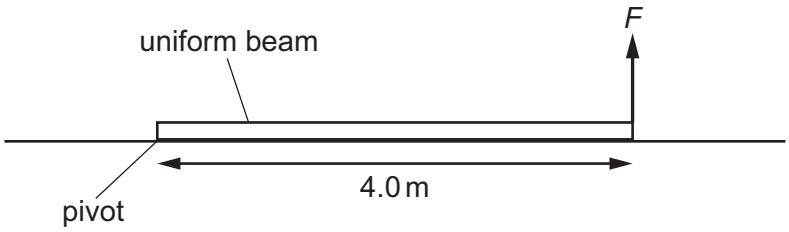
B The acceleration steadily increases and then becomes constant.

C The rate of change of speed is constant during the first 10 s.

D The speed steadily increases and then becomes constant.

29 A uniform beam has a mass of 12 kg and a length of 4.0 m. The beam rests on horizontal ground.

One end of the beam is now raised from the ground by a vertical force *F*. The other end of the beam remains in contact with the ground and acts as a pivot.



The gravitational field strength *g* is 10 N / kg.

What is the value of *F*?

A 6.0 N **B** 24 N **C** 60 N **D** 240 N

30 A solid block of weight 14 N rests on a horizontal table. The pressure on the table due to the block is 70 Pa.

What is the area of the surface of the block in contact with the table?

A 0.20 m^2 **B** 5.0 m^2 **C** 98 m^2 **D** 980 m^2

31 Which object is mainly responsible for the energy stored in tides in the sea?

A Mars

B the Earth

C the Moon

D the Sun

32 Which statement about gas particles is **not** correct?

A Increasing the temperature of a gas makes the gas particles move more slowly.

B The gas particles are in constant random motion.

C The pressure of a gas is caused by the collision of gas particles with the container.

D Very small particles suspended in a gas are in constant random motion.

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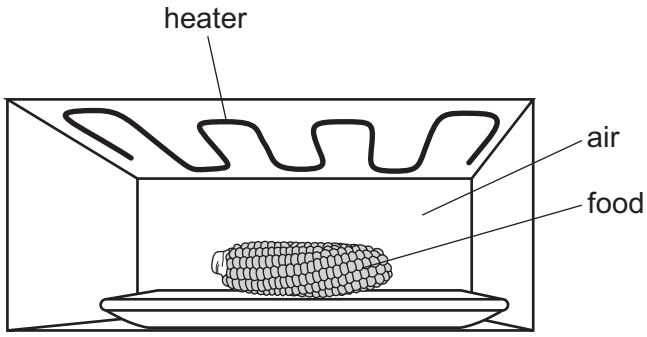
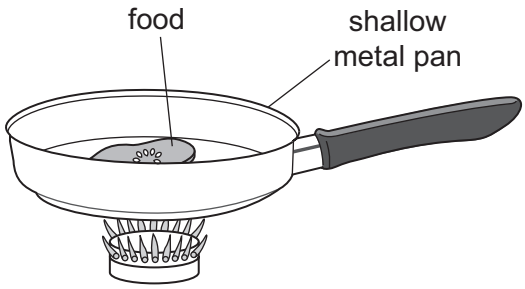
33 Two methods of cooking are grilling under a red-hot heater and frying in a shallow metal pan.



method 1: grilling



method 2: frying

How does thermal energy pass through the air to reach the food in method 1 and how does thermal energy pass through the bottom of the metal pan in method 2?

	method 1	method 2
A	convection	conduction
B	convection	radiation
C	radiation	conduction
D	radiation	radiation

34 An object is placed in front of a plane mirror on a wall.

What are the characteristics of the image formed?

A same size as object and inverted top to bottom

B same size as object and laterally inverted (left to right)

C smaller than object and inverted top to bottom

D smaller than object and laterally inverted (left to right)

35 A ray of light in air enters glass at an angle of incidence of 34°.

The refractive index of glass is 1.5.

What is the angle of refraction of the ray of light in the glass?

A 22° **B** 24° **C** 56° **D** 57°

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36 Which material is used for the core of an electromagnet?

A aluminium

B copper

C iron

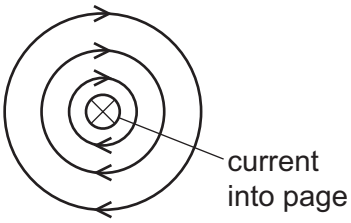
D steel

37 There is a current-carrying wire perpendicular to the page.

The direction of the current is into the page.

Which diagram shows the pattern and direction of the magnetic field around the wire?

A



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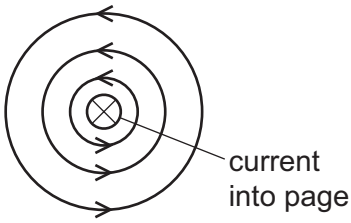

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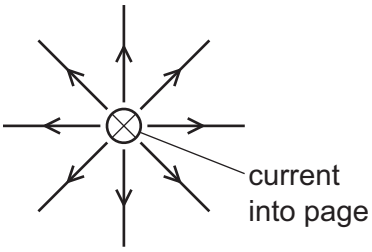

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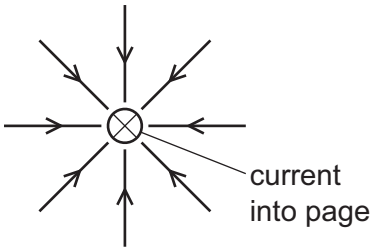

38 When a straight conductor moves through a magnetic field, an electromotive force (e.m.f.) is induced between the ends of the conductor.

Which factor does **not** affect the magnitude of the induced e.m.f.?

A the length of conductor in the field

B the resistance of the conductor

C the speed at which the conductor moves

D the strength of the magnetic field

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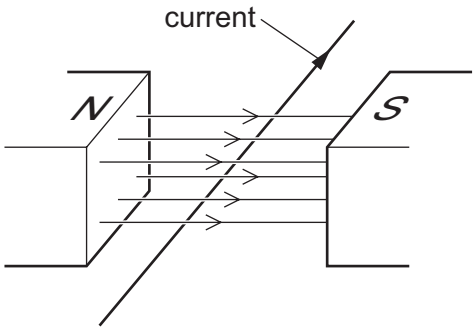
39 Cables transmit electrical power.

The power input to the cables is constant, but the voltage input is increased.

What happens to the power loss from the cables, and what happens to the current in the cables?

	power loss from cables	current in cables
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

40 The diagram shows a current-carrying conductor in a magnetic field. The direction of the current is shown.



In which direction is the force on the wire due to the magnetic field?

A downwards

B to the left

C to the right

D upwards

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The Periodic Table of Elements

Group																	
I	II											III	IV	V	VI	VII	VIII
							1 H hydrogen 1										2 He helium 4
3 Li lithium 7	4 Be beryllium 9											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 –

Key

atomic number
atomic symbol
name
relative atomic mass

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