Cambridge Assessment International Education

Cambridge IGCSE™

COMBINED SCIENCE **0653/23**

Paper 2 Multiple Choice (Extended) **October/November 2025**

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)

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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 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. Any blank pages are indicated.

1 Nutrition is the taking in of materials.

What are these materials needed for?

	development	energy	growth
A	✗	✓	✓
B	✓	✗	✓
C	✓	✓	✗
D	✓	✓	✓

2 Which statement describes osmosis?

A net movement of water molecules from a lower to a higher water potential through the cell membrane

B net movement of water molecules from a lower to a higher water potential through the cell wall

C net movement of water molecules from a higher to a lower water potential through the cell membrane

D net movement of water molecules from a higher to a lower water potential through the cell wall

3 Which statement about enzymes is correct for temperatures up to the optimum temperature?

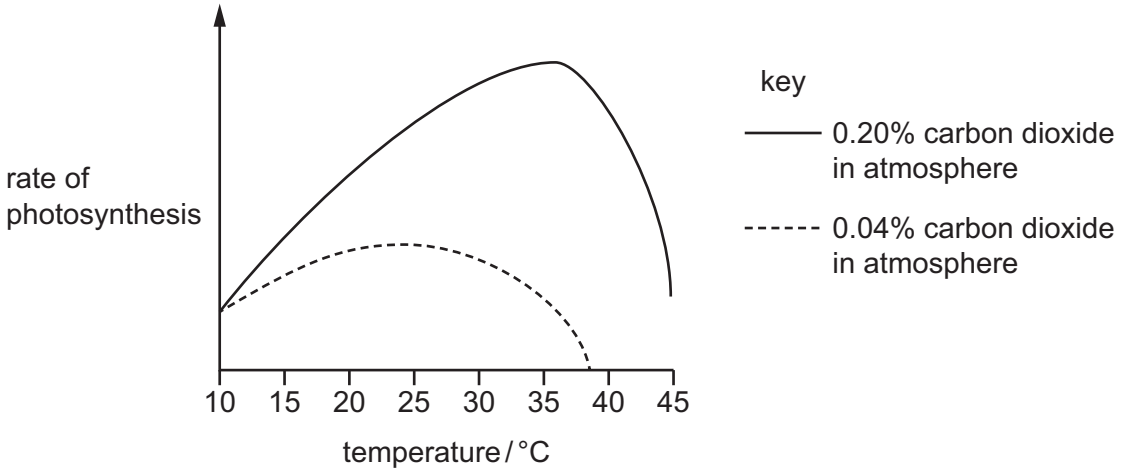
A As temperature increases, substrates react with the active sites more slowly.

B As temperature increases, enzymes have more kinetic energy.

C As temperature decreases, enzymes denature.

D As temperature decreases, the number of effective collisions increases.

4 The graph shows the effect of temperature and carbon dioxide concentration on the rate of photosynthesis in a plant.



What is a correct conclusion from the graph?

A The higher the temperature, the faster the rate of photosynthesis.

B The optimum temperature for photosynthesis for both carbon dioxide concentrations is 37.5 °C.

C The rate of photosynthesis depends on both carbon dioxide concentration and temperature.

D Increasing carbon dioxide concentration doubles the rate of photosynthesis at all temperatures.

5 What is an example of a mineral ion?

A calcium

B fibre

C protein

D vitamin C

6 Which statement about lipase is correct?

A It is secreted into the colon and breaks down fats and oils.

B It is secreted into the small intestine and breaks down fats and oils.

C It is secreted into the small intestine and breaks down fatty acids into glycerol.

D It is secreted into the stomach and breaks down glycerol into fatty acids.

7 A student investigates transpiration in four small plants of the same species.

The student places each plant at a different distance away from an electric fan. All other conditions are kept the same.

The table shows the mass of each plant at the beginning of the investigation and after 48 hours.

Which plant is placed the furthest distance away from the electric fan?

	mass of plant / g	
	at beginning	after 48 hours
A	295	255
B	312	262
C	300	247
D	280	235

8 Which row explains the effect of physical activity on heart rate?

	heart rate	explanation
A	decreases	increases blood flow to the muscles
B	decreases	decreases blood flow to the muscles
C	increases	increases blood flow to the muscles
D	increases	decreases blood flow to the muscles

9 What are features of an artery?

1 a narrow lumen

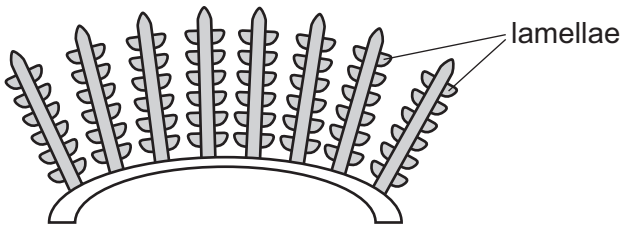
2 a thick wall

3 a valve

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

10 The diagram shows structures called lamellae.

Lamellae are found in the gills of fish.



Lamellae give the gills a large surface area.

The gills are the site of gas exchange in fish.

What is the effect of this large surface area?

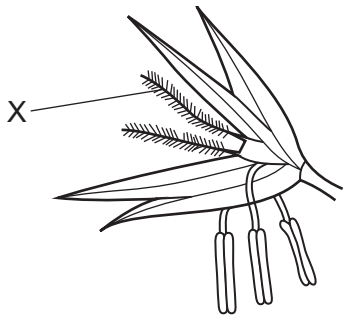
A low rate of carbon dioxide diffusion into the blood

B low rate of oxygen diffusion into the blood

C high rate of carbon dioxide diffusion into the blood

D high rate of oxygen diffusion into the blood

11 The diagram shows a flower.



What is structure X?

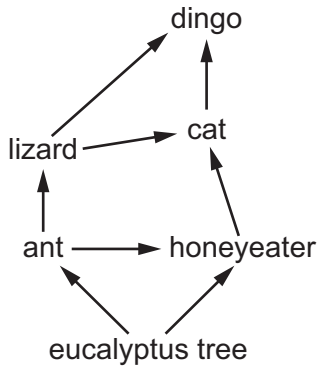
A anther of an insect-pollinated flower

B anther of a wind-pollinated flower

C stigma of an insect-pollinated flower

D stigma of a wind-pollinated flower

12 The diagram shows a food web.



Which row describes the honeyeater and the cat?

	honeyeater	cat
A	primary and secondary consumer	secondary and tertiary consumer
B	primary and secondary consumer	secondary consumer only
C	primary consumer only	tertiary consumer only
D	primary consumer only	secondary and tertiary consumer

13 What is described as a community of organisms and their environment interacting together?

A ecosystem

B food chain

C food web

D habitat

14 Bromine is a liquid at room temperature.

When bromine is cooled to –7.2 °C, it turns into a solid.

Which process takes place when the solid forms?

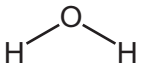
A boiling

B condensing

C freezing

D melting

15 In water, hydrogen atoms and oxygen atoms are bonded together with covalent bonds.



Which row shows information about the electrons in a molecule of water?

	number of electrons in the outer shell of each hydrogen atom	number of electrons in the outer shell of the oxygen atom	total number of electrons in one molecule of water
A	2	6	8
B	2	8	10
C	8	6	14
D	8	8	16

16 Which process is a physical change?

A addition of carbon dioxide to limewater

B addition of sodium to water

C electrolysis of molten lead(II) bromide

D separation of petroleum by fractional distillation

17 Solid lumps of zinc react with dilute hydrochloric acid.

Which change decreases the rate of this reaction?

A adding a catalyst to the reaction mixture

B increasing the concentration of the hydrochloric acid

C increasing the size of the zinc lumps

D increasing the temperature of the hydrochloric acid

18 The equation for the complete combustion of ethane is shown.

$$2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O$$

Which statement about this reaction is correct?

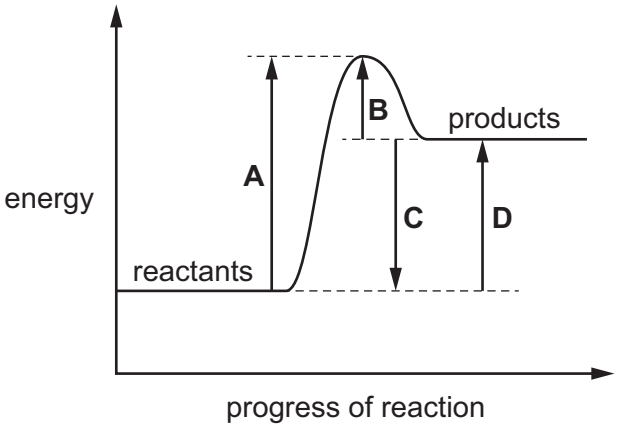
A Ethane is oxidised because it gains oxygen.

B Ethane is reduced because carbon–hydrogen bonds are broken.

C It is endothermic because thermal energy is transferred to the surroundings.

D It is exothermic because thermal energy is taken in from the surroundings.

19 Which arrow on the reaction pathway diagram represents the overall energy change for the reaction?



20 Which word equation describes a reaction of dilute sulfuric acid?

A sulfuric acid + zinc → zinc sulfate + water

B sulfuric acid + zinc carbonate → zinc sulfate + carbon dioxide

C sulfuric acid + zinc hydroxide → zinc sulfate + water

D sulfuric acid + zinc oxide → zinc sulfate + hydrogen

21 Which statement describes a trend in the elements going down Group VII?

A They are darker in colour.

B They are displaced from solutions of their halide ions by elements lower down the group.

C They are more reactive.

D They have lower boiling points.

22 Which statements about an alloy are correct?

1 It contains atoms of different sizes.

2 It contains one type of atom.

3 It only conducts electricity when it is molten.

4 It is a mixture of a metal with another element.

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

23 The equations describe the reactions that happen when iron is extracted in the blast furnace.

$$C + O_2 \rightarrow CO_2$$

$$C + CO_2 \rightarrow 2CO$$

$$Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$$

What is a description of one of these reactions?

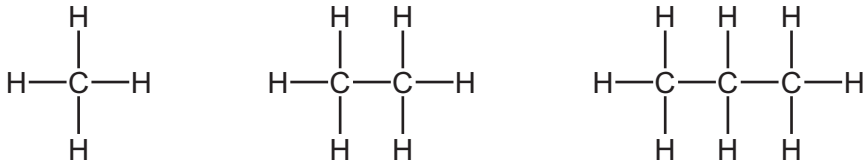
A Carbon dioxide is oxidised to form carbon monoxide.

B Iron(III) oxide is reduced by carbon dioxide.

C Carbon reacts with carbon monoxide to form carbon dioxide.

D Carbon monoxide removes oxygen from iron(III) oxide.

24 The structures of some compounds are shown.



Which statement about these compounds is correct?

A They have the same boiling point.

B They are in the same homologous series.

C They are unsaturated.

D They have different chemical properties.

25 Which statement about methane is correct?

A Its increase in the atmosphere contributes to climate change.

B It reacts with steam in the presence of an acid catalyst.

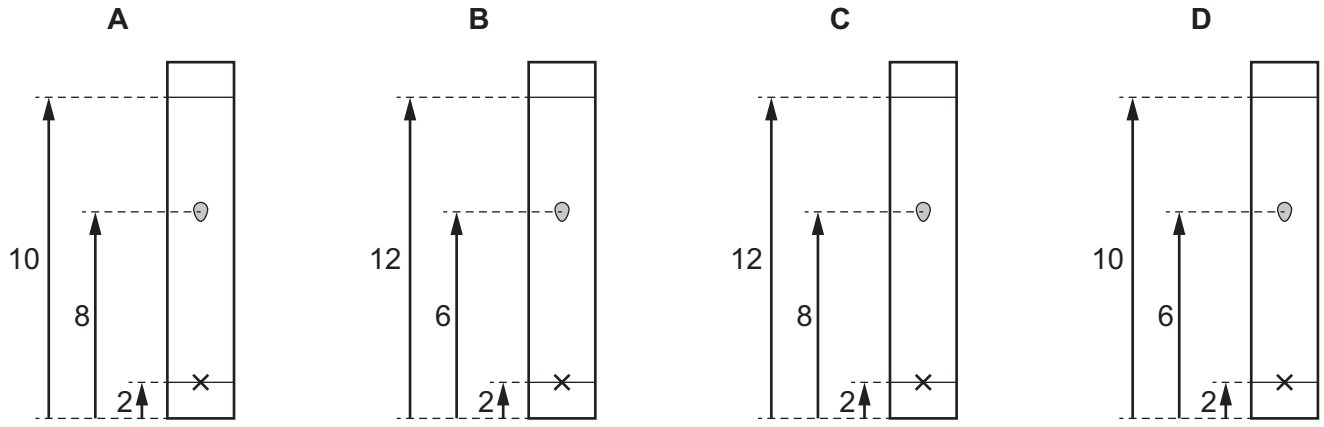
C It has the molecular formula CH_3OH.

D It reacts with bromine in an addition reaction.

26 A chromatography experiment is carried out on a compound.

The R_f value of the compound is 0.60.

Which diagram shows the chromatogram of the compound?



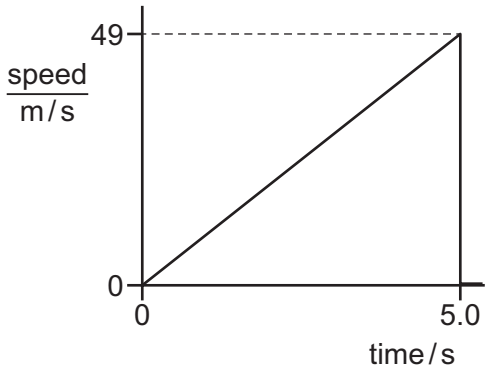
27 Crystals of pure sodium chloride are formed by crystallisation.

Which row describes the structure of a sodium chloride crystal and the arrangement of the ions in the crystal?

	structure	arrangement of ions
A	simple molecular	random
B	simple molecular	regular
C	giant lattice	random
D	giant lattice	regular

28 A stone falls from the top of a cliff to the ground.

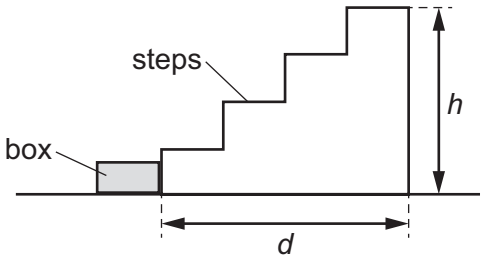
The graph shows how the speed of the stone varies with time until it hits the ground.



What is the height of the top of the cliff above the ground?

A 9.8 m **B** 54 m **C** 123 m **D** 245 m

29 The diagram shows a box of mass *m* and weight *W* at the bottom of a set of steps.



The box is moved from the bottom of the steps to the top of the steps.

Which two quantities on their own are used to determine the change in gravitational potential energy of the box?

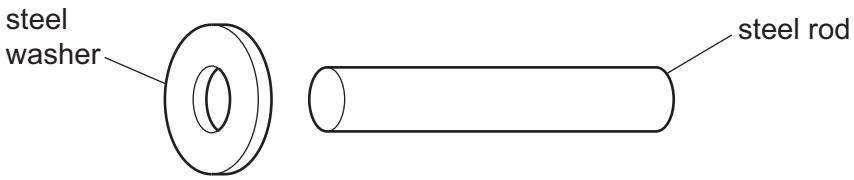
A *h* and *d** **B** *h* and *m** **C** *W* and *d** **D** *W* and *h*

30 Energy is released by a nuclear process in a power station, and energy is released by a nuclear process in the Sun.

Which row shows the process in a power station and the process in the Sun?

	a power station	the Sun
A	nuclear fission	nuclear fission
B	nuclear fission	nuclear fusion
C	nuclear fusion	nuclear fission
D	nuclear fusion	nuclear fusion

31 An engineer wants to fit a steel washer onto a steel rod. The rod is slightly too big to fit into the hole in the washer.



Which statement describes how the engineer fits the washer onto the rod?

A Cool the washer and push it over the rod.

B Cool the washer and the rod to the same temperature and then push them together.

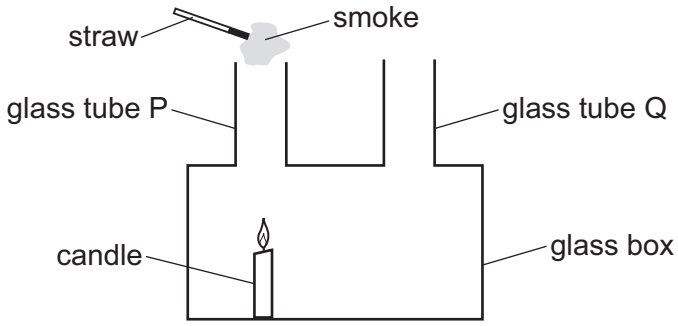
C Heat the rod and then push it in the hole.

D Heat the washer and push it over the rod.

32 Which row correctly lists two good thermal conductors and two bad thermal conductors?

	good thermal conductors	bad thermal conductors
A	copper, air	gold, wood
B	copper, gold	glass, air
C	glass, gold	copper, wood
D	glass, wood	copper, gold

33 The diagram shows apparatus used to show convection in air.



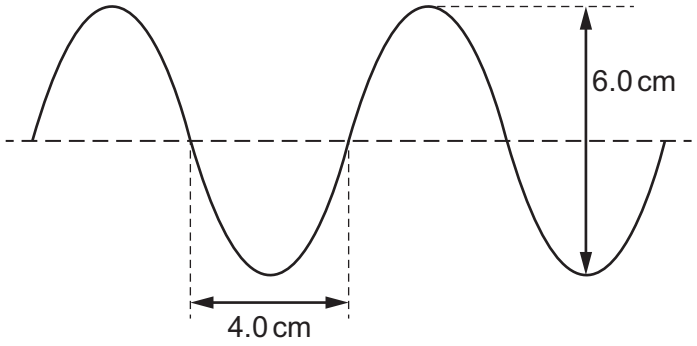
The glass box has two glass tubes, P and Q, at the top. There is a burning candle below P.

A burning straw that produces smoke is held first above P and then above Q.

Which row shows the direction the smoke moves when the straw is placed above each tube?

	straw above P	straw above Q
A	the smoke falls	the smoke falls
B	the smoke falls	the smoke rises
C	the smoke rises	the smoke falls
D	the smoke rises	the smoke rises

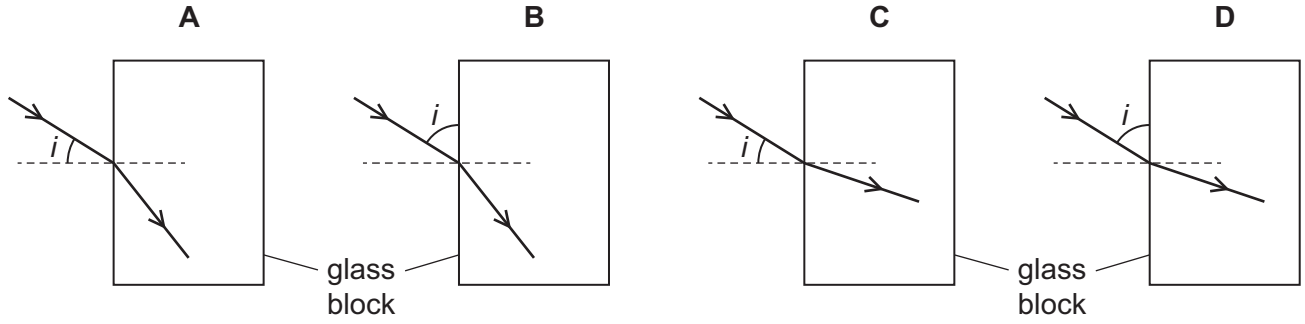
34 The diagram represents a wave on the surface of water.



Which row gives the amplitude and the wavelength of the wave?

	amplitude / cm	wavelength / cm
A	3.0	4.0
B	3.0	8.0
C	6.0	4.0
D	6.0	8.0

35 Which diagram shows how a ray of light passes from air into a glass block and shows the angle of incidence labelled *i*?

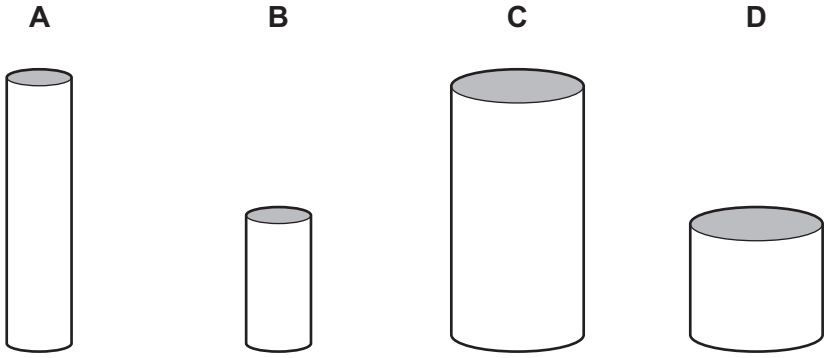


36 Which row describes what happens to sound waves as they travel from air into water and from water into rock?

	sound travelling from air into water	sound travelling from water into rock
A	slows down	slows down
B	slows down	speeds up
C	speeds up	slows down
D	speeds up	speeds up

37 The diagrams show four solid cylinders, all made of the same metal. The diagrams are all drawn to the same scale.

Which cylinder has the greatest electrical resistance between its circular faces?



38 A resistor of resistance 6.0 Ω is connected in parallel with a resistor of resistance 3.0 Ω.

What is the resistance of the parallel combination?

A 0.50 Ω **B** 2.0 Ω **C** 3.0 Ω **D** 9.0 Ω

39 Electrical component Z is designed to break the circuit and stop the current when the current in an electrical circuit becomes too large.

What is component Z?

A fuse

B motor

C resistor

D voltmeter

40 The orbital speed of Mars is *v*. The strength of the gravitational field of the Sun acting on Mars is *f*.

Which row gives expressions for the orbital speed of Mercury and the strength of the gravitational field of the Sun acting on Mercury?

	orbital speed of Mercury	strength of gravitational field of the Sun acting on Mercury
A	greater than *v*	greater than *f*
B	greater than *v*	smaller than *f*
C	smaller than *v*	greater than *f*
D	smaller than *v*	smaller than *f*

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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.).