Cambridge Assessment International Education

Cambridge IGCSE™

COMBINED SCIENCE **0653/23**

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

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.

1 Which structure is **not** found in animal cells?

A cell wall

B cytoplasm

C nucleus

D cell membrane

2 Palisade mesophyll cells are specialised cells.

What is the function of these specialised cells?

A photosynthesis

B transport

C reproduction

D immunity

3 A human egg cell is 0.12 mm in diameter.

How is this converted to a measurement in micrometres, μm?

A multiply by 100

B multiply by 1000

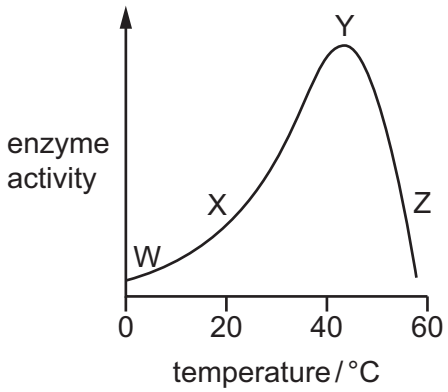
C divide by 100

D divide by 1000

4 Which row about osmosis is correct?

	molecules that move	details of movement	type of permeable membrane
A	water	from a dilute solution to a concentrated solution	partially
B	water	from a concentrated solution to a dilute solution	fully
C	solute	from a dilute solution to a concentrated solution	partially
D	solute	from a concentrated solution to a dilute solution	fully

5 The graph shows the activity of an enzyme at different temperatures.



Which statement about the effect of temperature on the activity of this enzyme is correct?

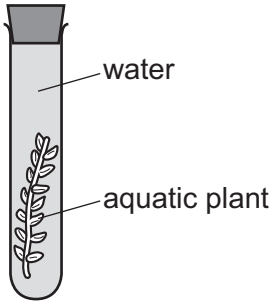
A At X and Z, the activity of the enzyme is the same because the kinetic energy of the enzymes is the same.

B At W, the enzyme activity is lower than at X because there are less-frequent effective collisions between the enzyme and the substrate.

C At Y, the enzyme is working at its optimum rate because it has the most kinetic energy.

D At Z, the enzyme is completely denatured.

6 An aquatic plant is in a test-tube of water. The test-tube is sealed and placed in the dark.



Which changes occur to the concentration of carbon dioxide and oxygen in the water after two hours?

	concentration of carbon dioxide	concentration of oxygen
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

7 A pregnant woman is told she is deficient in iron.

Which food increases the iron content in her diet?

A cheese

B rice

C milk

D red meat

8 Chemical digestion and physical digestion happen in various parts of the alimentary canal and associated organs.

In which organ do both processes happen?

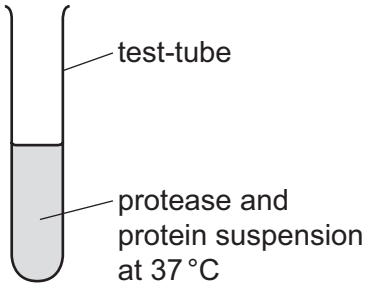
A liver

B mouth

C oesophagus

D pancreas

9 A test-tube is used to model the effect of protease on a protein suspension in the stomach.



What should be added to the test-tube to provide the optimum conditions for the digestion of protein?

A amylase

B bacteria

C hydrochloric acid

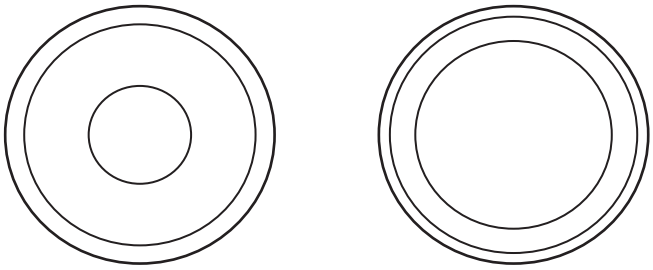
D lipase

10 Water moves through the stomata of leaves during transpiration.

Which row shows the direction of water movement and the form of the water?

	direction	form
A	into the leaf	liquid
B	into the leaf	vapour
C	out of the leaf	vapour
D	out of the leaf	liquid

11 The diagrams show cross-sections of two different blood vessels.



P Q

Which type of blood vessel is Q and what is the relative blood pressure in Q compared with P?

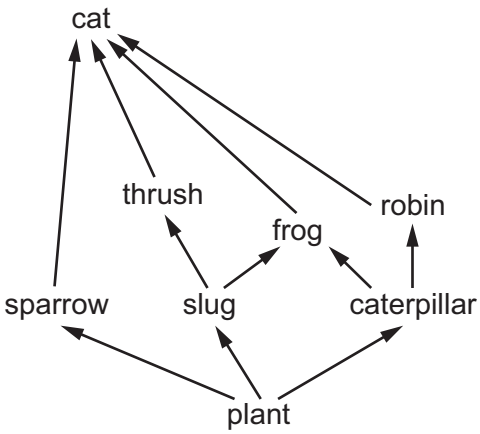
	blood vessel Q	relative blood pressure in Q
A	artery	higher
B	artery	lower
C	vein	higher
D	vein	lower

12 Which types of consumer describe the cat in this food web?

1 primary consumer

2 secondary consumer

3 tertiary consumer



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

13 What is an ecosystem?

A a network of inter-connected food chains

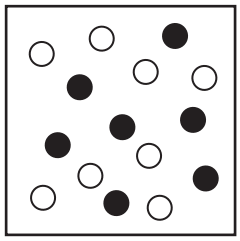
B a specific area in which a plant or an animal lives

C all the plants and animals that live within a specific area

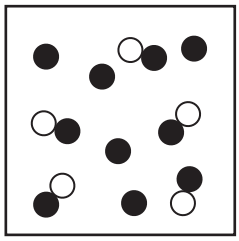
D the interactions between all living organisms and their environment, in a specific area

14 Which diagram represents molecules of a single compound?

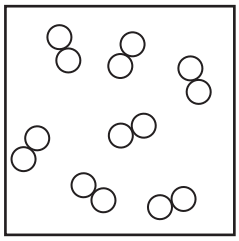
A



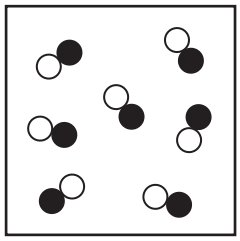
B



C



D



15 Which statement about ions is correct?

A Atoms lose or gain electrons to form ions.

B Ions are held together by strong attraction between negative ions.

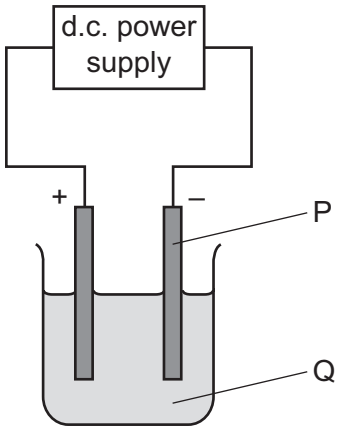
C Ions form when atoms share electrons.

D Metal ions are attracted to each other.

16 Which formula does **not** represent an acid?

A H_2SO_4 **B** HCl **C** HNO_3 **D** NH_3

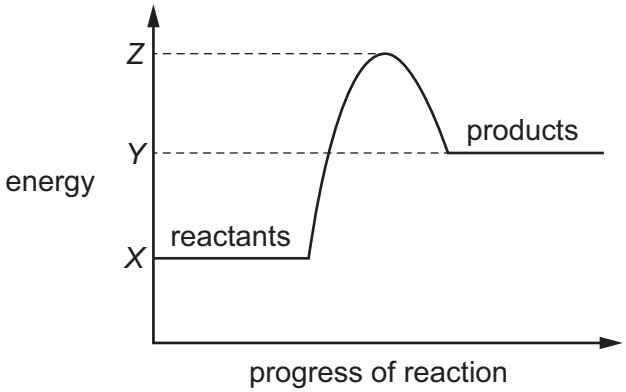
17 Apparatus used to electrolyse molten lead(II) bromide is shown.



Which row identifies P and Q?

	P	Q
A	cathode	electrolyte
B	anode	electrode
C	anode	electrolyte
D	cathode	electrode

18 The reaction pathway diagram for a reaction is shown.



Which statement about the reaction is correct?

A The activation energy for this reaction is equal to the value of $(Z - Y)$.

B The energy released by this reaction is equal to the value of $(Y - X)$.

C The energy used to break bonds is more than the energy released in forming bonds.

D The overall energy change for this reaction is equal to the value of $(Z - X)$.

19 Calcium carbonate pieces react with dilute hydrochloric acid.

Which change decreases the rate of the reaction?

A Add a catalyst.

B Decrease the temperature.

C Increase the concentration of hydrochloric acid.

D Use calcium carbonate powder.

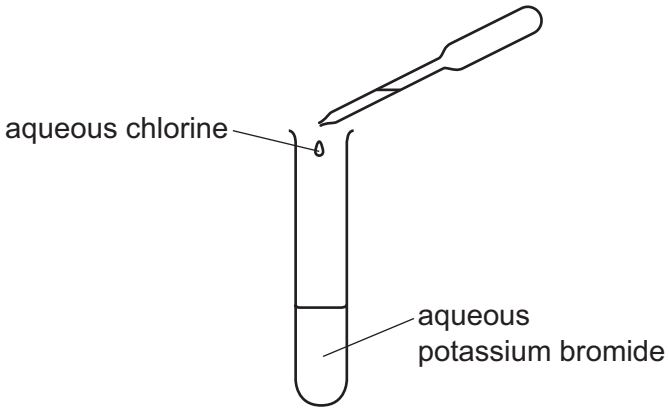
20 Barium sulfate is an insoluble salt.

It is made when aqueous barium chloride reacts with compound W.

Which row identifies compound W and the method used to obtain barium sulfate from the reaction mixture?

	compound W	method
A	dilute hydrochloric acid	crystallisation
B	dilute hydrochloric acid	filtration
C	dilute sulfuric acid	crystallisation
D	dilute sulfuric acid	filtration

21 Aqueous chlorine is added to colourless aqueous potassium bromide.

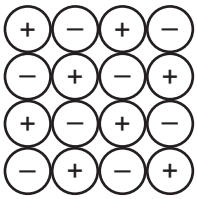


Which row describes and explains the observation?

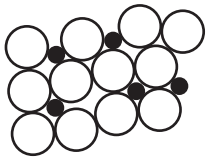
	observation	explanation
A	white precipitate forms	solution contains chloride ions
B	effervescence	bromine gas forms
C	orange solution forms	solution contains aqueous bromine
D	solution remains colourless	there is no change

22 Which diagram represents the structure of an alloy?

A

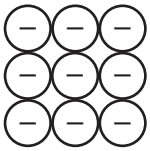


B



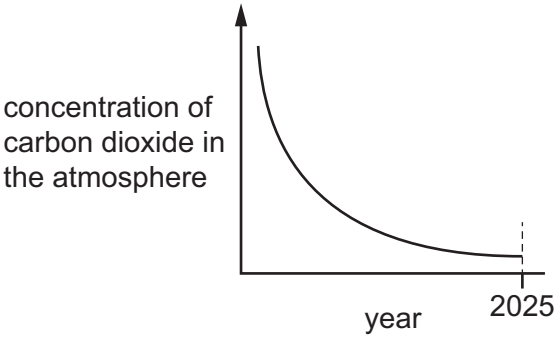
C

D

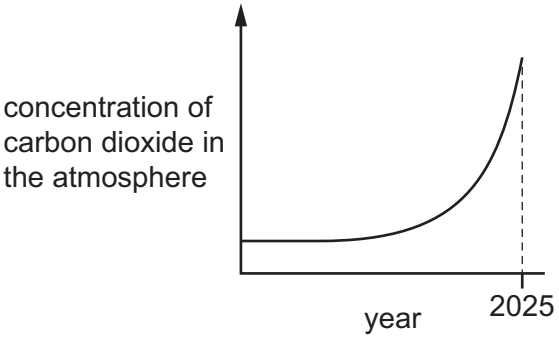


23 Which graph explains why scientists are concerned about climate change?

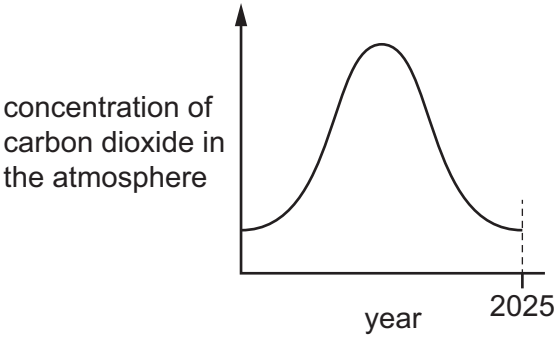
A



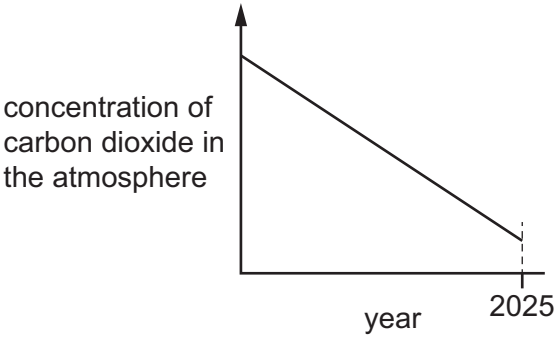
B



C



D



24 Methane, ethane and propane are all members of the same homologous series.

Which statement about these compounds is correct?

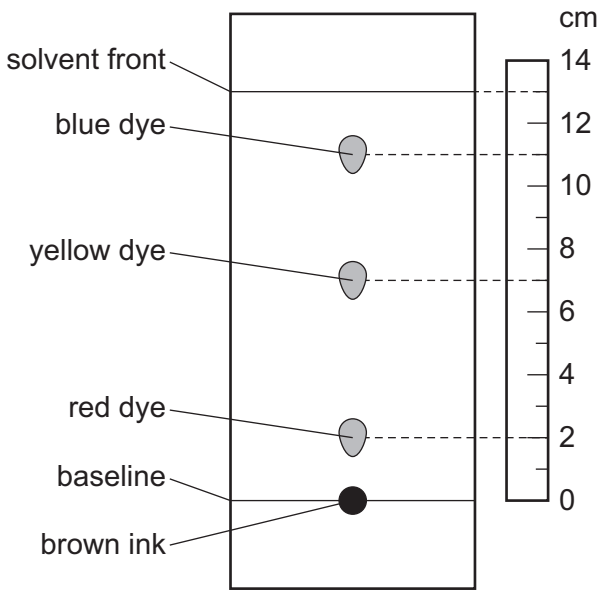
A They contain double carbon–carbon covalent bonds.

B They have different general formulas.

C They have the same molecular structure.

D They react in similar ways.

25 The diagram shows a chromatogram for a brown ink.



What is the R_f value of the blue dye?

A 0.15 **B** 0.54 **C** 0.85 **D** 1.18

26 Which row describes the properties of fractions obtained from petroleum, from the bottom of the fractionating column to the top?

	chain lengths	boiling points
A	decrease	decrease
B	decrease	increase
C	increase	decrease
D	increase	increase

27 Iron is extracted from hematite in the blast furnace.

Which row shows the substance that reduces iron(III) oxide and the source of this substance in the blast furnace?

	substance	source of this substance
A	carbon monoxide	complete combustion of carbon-containing fuels
B	carbon monoxide	reduction of carbon dioxide
C	carbon dioxide	incomplete combustion of carbon-containing fuels
D	carbon dioxide	oxidation of carbon monoxide

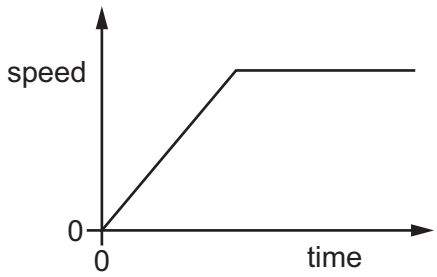
28 On planet R, there is no atmosphere and the acceleration of free fall g is $4.5\,m/s^2$.

A rock of mass 2.0 kg falls from rest on planet R and hits the ground 4.0 m below.

What is the speed of the rock as it hits the ground?

A 4.5 m/s **B** 6.0 m/s **C** 18 m/s **D** 36 m/s

29 The diagram shows a speed–time graph for the motion of a car.



Which statement describes the motion of the car?

A It accelerates and then travels at a constant speed.

B It accelerates and then decelerates.

C It travels at a constant speed and then is stationary.

D It travels at a constant speed and then decelerates.

30 A boy runs up some stairs to get to the top.

Which two quantities on their own are used to calculate the useful power transferred?

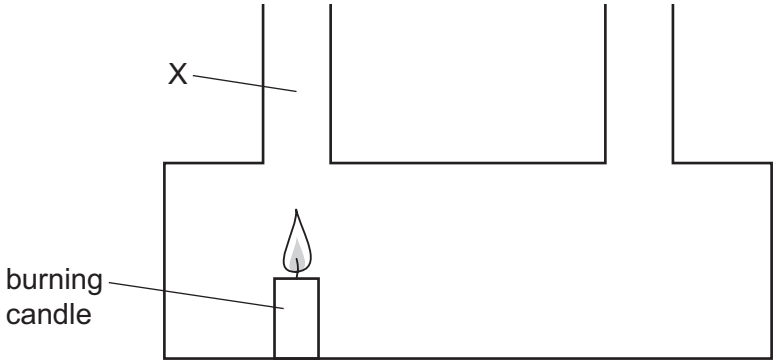
A his weight and the height of the stairs

B his weight and the time he takes to run up the stairs

C the work he does and the height of the stairs

D the work he does and the time he takes to run up the stairs

31 The diagram shows equipment used to demonstrate convection in air. Point X is labelled.



Which row describes and explains the movement of air at X?

	movement of air at X	explanation
A	downwards	air becomes less dense when heated
B	downwards	air becomes more dense when heated
C	upwards	air becomes less dense when heated
D	upwards	air becomes more dense when heated

32 Which states of matter contain particles that are close together?

A solids, liquids and gases

B liquids and gases only

C solids and gases only

D solids and liquids only

33 Which two factors **both** increase the rate at which a shallow pool of water evaporates?

A greater surface area and higher temperature

B greater surface area and lower temperature

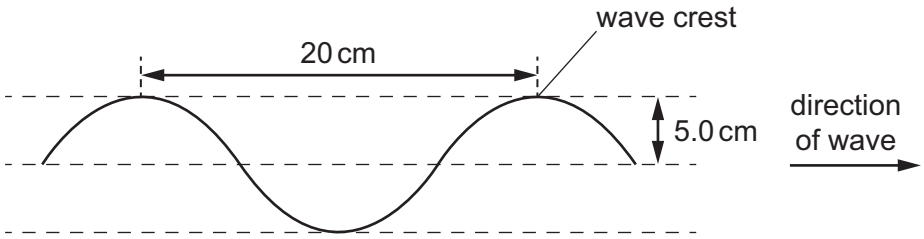
C smaller surface area and higher temperature

D smaller surface area and lower temperature

34 The diagram shows a section of a rope.

Four wave crests pass a point on the rope every second.

Each wave crest travels 80 cm in one second.



What is the speed of the wave?

A 4.0 cm / s **B** 5.0 cm / s **C** 20 cm / s **D** 80 cm / s

35 Which statement about waves is correct?

A In a longitudinal wave, the vibration of the particles is at right angles to the direction of the wave.

B In a sound wave, the vibration of the particles is parallel to the direction of the wave.

C Radio waves are longitudinal waves.

D Sound waves are transverse waves.

36 A student measures the time taken for sound to travel a distance of 1.0 m in air, in water and in steel.

The student puts the three materials in order of time taken, from shortest time to longest time.

Which order is correct?

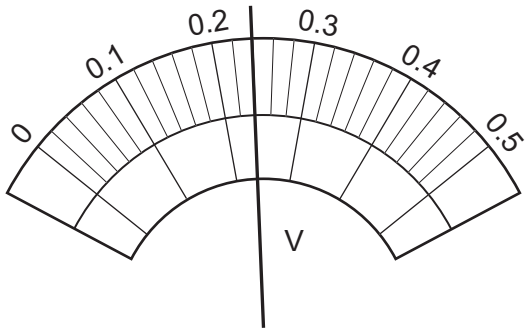
A air → steel → water

B air → water → steel

C steel → water → air

D water → steel → air

37 The diagram shows the scale of an analogue voltmeter.



What is the reading on the voltmeter?

A 0.22 V **B** 0.24 V **C** 0.27 V **D** 0.36 V

38 What is the relationship between the current in a resistor, the potential difference (p.d.) across it and its resistance?

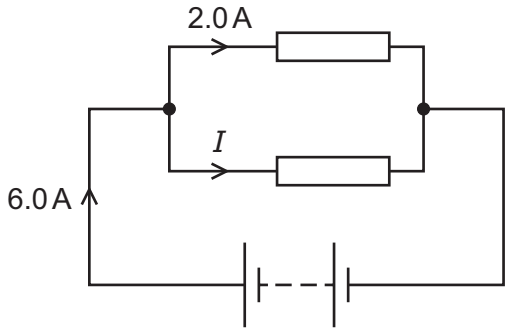
A $\text{current} = \dfrac{\text{p.d.}}{\text{resistance}}$

B $\text{current} = \dfrac{(\text{p.d.})^2}{\text{resistance}}$

C current = resistance × p.d.

D $\text{current} = \dfrac{\text{resistance}}{\text{p.d.}}$

39 The diagram shows two resistors connected to a battery.



What is current I?

A 2.0 A **B** 4.0 A **C** 6.0 A **D** 8.0 A

40 The life cycle of a star depends on whether it has a small mass, a large mass or a very large mass.

Which stars have a supernova as one of the later stages in their life cycles?

A a small mass star, a large mass star and a very large mass star

B a small mass star and a large mass star only

C a small mass star and a very large mass star only

D a large mass star and a very large mass star only

Answer Sheet_____

	A	B	C	D
1	◯	◯	◯	◯
2	◯	◯	◯	◯
3	◯	◯	◯	◯
4	◯	◯	◯	◯
5	◯	◯	◯	◯
6	◯	◯	◯	◯
7	◯	◯	◯	◯
8	◯	◯	◯	◯
9	◯	◯	◯	◯
10	◯	◯	◯	◯
11	◯	◯	◯	◯
12	◯	◯	◯	◯
13	◯	◯	◯	◯
14	◯	◯	◯	◯
15	◯	◯	◯	◯
16	◯	◯	◯	◯
17	◯	◯	◯	◯
18	◯	◯	◯	◯
19	◯	◯	◯	◯
20	◯	◯	◯	◯

	A	B	C	D
21	◯	◯	◯	◯
22	◯	◯	◯	◯
23	◯	◯	◯	◯
24	◯	◯	◯	◯
25	◯	◯	◯	◯
26	◯	◯	◯	◯
27	◯	◯	◯	◯
28	◯	◯	◯	◯
29	◯	◯	◯	◯
30	◯	◯	◯	◯
31	◯	◯	◯	◯
32	◯	◯	◯	◯
33	◯	◯	◯	◯
34	◯	◯	◯	◯
35	◯	◯	◯	◯
36	◯	◯	◯	◯
37	◯	◯	◯	◯
38	◯	◯	◯	◯
39	◯	◯	◯	◯
40	◯	◯	◯	◯

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.).