Cambridge Assessment International Education

# Cambridge IGCSE™

**CO-ORDINATED SCIENCES** **0654/11**

Paper 1 Multiple Choice (Core) **October/November 2023**

**45 minutes**

You must answer on the multiple choice answer sheet.

*4293456357*

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.

This document has **16** pages. Any blank pages are indicated.




**[Turn over**

**1** Which characteristic of a living organism releases energy for growth?

**A** excretion

**B** reproduction

**C** respiration

**D** sensitivity

**2** A student draws a diagram of a chicken's egg and includes the magnification, m, of the drawing.

The student writes m = ×2.

The image length on the diagram is 140 mm.

What is the length of the actual chicken's egg?

**A** 35 mm **B** 70 mm **C** 140 mm **D** 280 mm

**3** Which colour does Benedict's solution change to when heated with a reducing sugar?

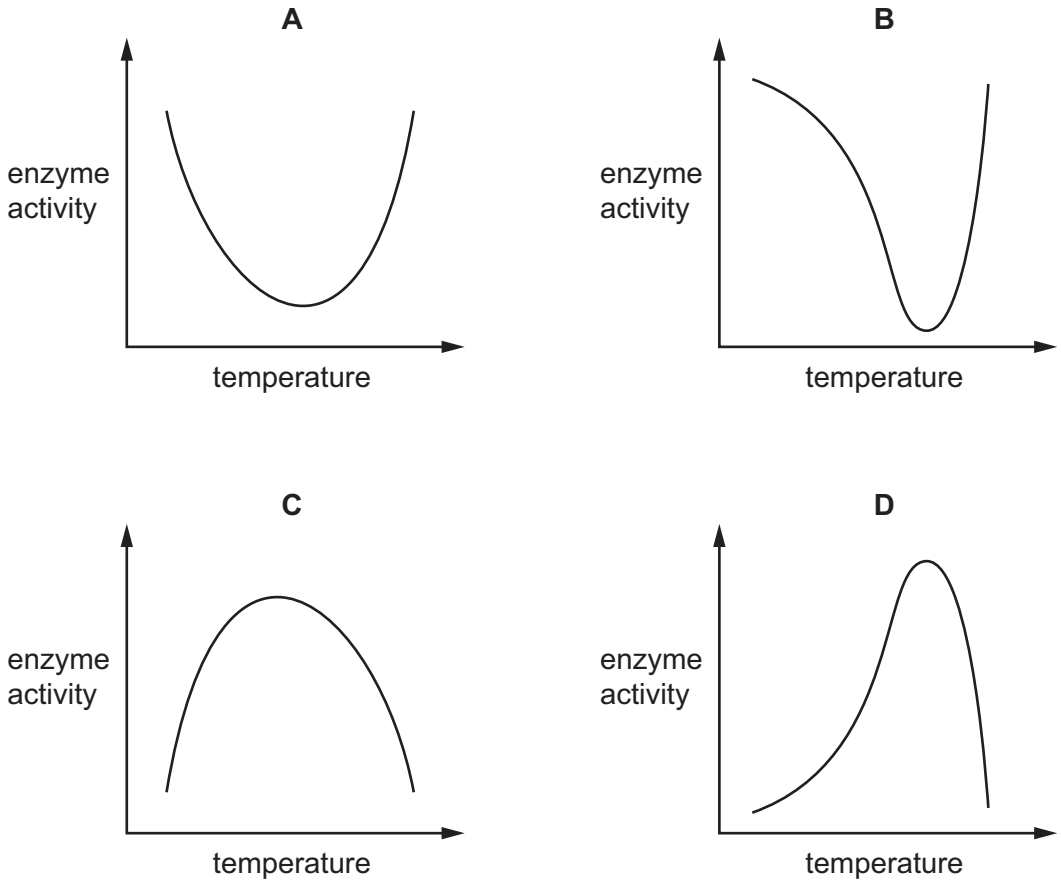
**A** blue

**B** blue-black

**C** orange

**D** purple

**4** Which graph shows the effect of temperature on enzyme activity?



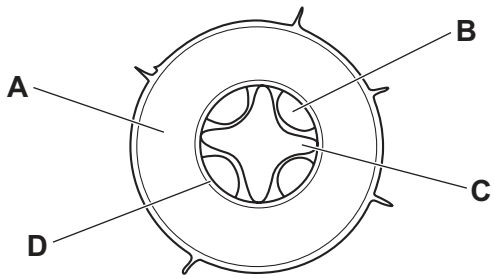

**5** Which conditions will result in the highest rate of photosynthesis?

| | light intensity | carbon dioxide concentration |
|---|---|---|
| **A** | high | high |
| **B** | high | low |
| **C** | low | high |
| **D** | low | low |

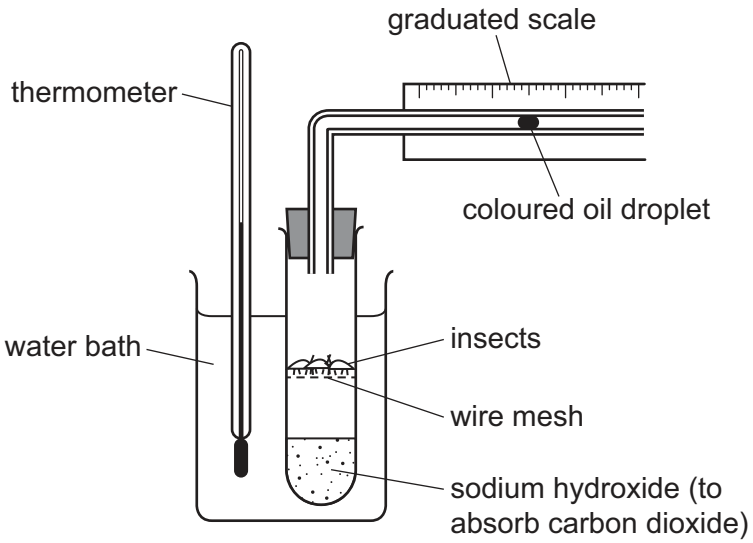
**6** Which row about food groups is correct?

| | food group | main function | food source examples |
|---|---|---|---|
| **A** | carbohydrate | provide energy | bread, pasta, rice |
| **B** | fat | tissue growth and repair | bread, pasta, rice |
| **C** | fibre | tissue growth and repair | fish, meat, seeds |
| **D** | protein | provide energy | fish, meat, seeds |

**7** Which label shows the position of the xylem in the cross-section of the root of a dicotyledonous plant?




**8** The apparatus shown is set up and left for 10 minutes. The insects are able to move around in the test-tube but the wire mesh prevents them from falling into the sodium hydroxide.




In which direction does the oil droplet move and why?

| | direction of oil droplet | effect of respiration of insects |
|---|---|---|
| **A** | to the left | use up carbon dioxide and release oxygen |
| **B** | to the left | use up oxygen and release carbon dioxide |
| **C** | to the right | use up carbon dioxide and release oxygen |
| **D** | to the right | use up oxygen and release carbon dioxide |

**9** One response to a frightening situation is an increase in heart rate caused by the release of adrenaline.

Which statement about adrenaline is correct?

**A** It is an enzyme produced by an organ and travels in the blood to the heart.

**B** It is an enzyme produced by an organ and travels down a nerve to the brain.

**C** It is a hormone produced by a gland and travels in the blood to the heart.

**D** It is a hormone produced by a gland and travels down a nerve to the brain.

**10** Which part of the male reproductive system is correctly matched to its function?

| | part | function |
|---|---|---|
| **A** | prostate gland | transfers sperm to the urethra |
| **B** | scrotum | holds the testes outside of body |
| **C** | testes | secrete fluids for sperm to swim in |
| **D** | urethra | transfers semen to ovary |

**11** Continuous variation is defined as a .....1..... of phenotypes .....2..... .

Which words correctly complete gaps 1 and 2?

| | 1 | 2 |
|---|---|---|
| **A** | limited number | between two extremes |
| **B** | limited number | with no intermediates |
| **C** | range | between two extremes |
| **D** | range | with no intermediates |

**12** In a food chain, what do all living organisms get from their food?

**A** a supply of water

**B** oxygen for respiration

**C** protection from disease

**D** the energy they need

**13** Forests are cut down and burnt in deforestation programmes.

As a result of this, which gas in the atmosphere increases in concentration?

**A** carbon dioxide

**B** hydrogen

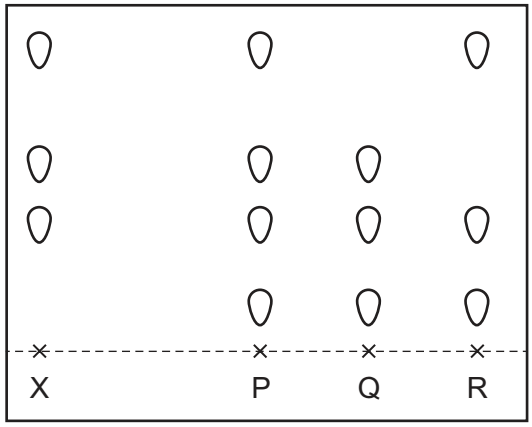
**C** nitrogen

**D** oxygen

**14** Dye X is a mixture of different coloured substances.

Chromatography is used to compare X with three other mixtures, P, Q and R.

The results are shown.




Which mixtures contain dye X?

**A** P, Q and R **B** P and Q only **C** P only **D** R only

**15** What do the chemical symbols $N_2$ and Ni represent?

| | $N_2$ | Ni |
|---|---|---|
| **A** | a compound | a compound |
| **B** | a compound | an element |
| **C** | an element | a compound |
| **D** | an element | an element |

**16** The nucleon number of a hydrogen atom is 1.

What is present inside the nucleus of this atom?

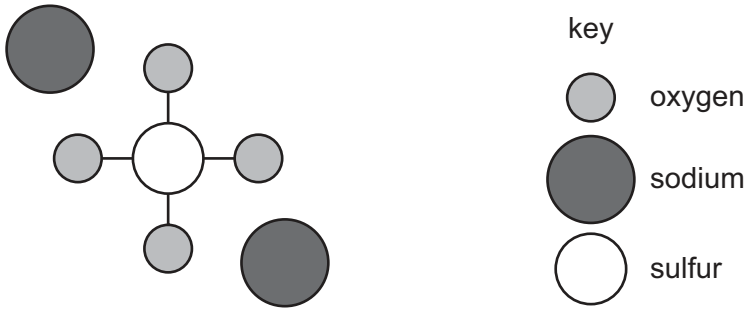
**A** one proton and one electron

**B** one proton and one neutron

**C** one proton only

**D** one neutron only

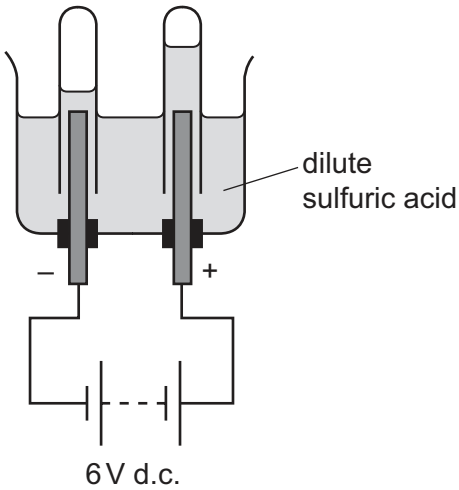
**17** The diagram represents an ionic compound formed from three types of atom.




What is the chemical formula for this compound?

**A** $Na_2S_4O$ **B** $NaO_4S_2$ **C** $Na_2SO_4$ **D** $S_4O_2Na$

**18** The diagram shows the electrolysis of dilute sulfuric acid using inert electrodes.




Which substance is produced by electrolysis at the negative electrode?

**A** hydrogen

**B** oxygen

**C** sulfur dioxide

**D** water vapour

**19** When petrol burns in a car engine, carbon monoxide, CO, and nitrogen monoxide, NO, are produced.

These gases pass through a catalytic converter where carbon monoxide reacts with nitrogen monoxide.

The equation for the reaction is shown.

carbon monoxide + nitrogen monoxide → nitrogen + carbon dioxide

Which statement is **not** correct?

**A** Carbon monoxide is oxidised in the catalytic converter.

**B** Carbon monoxide is produced by the complete combustion of petrol.

**C** Nitrogen from the air is oxidised in the car engine.

**D** Nitrogen monoxide is reduced in the catalytic converter.

**20** Four different oxides are listed.

1 calcium oxide

2 lithium oxide

3 nitrogen oxide

4 phosphorus oxide

Which oxides are acidic oxides?

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

**21** Substance X is mixed with aqueous sodium hydroxide.

A green precipitate is produced.

Which metal ion is present in X?

**A** $Cu^{2+}$ **B** $Fe^{2+}$ **C** $Fe^{3+}$ **D** $Zn^{2+}$

**22** Potassium is in Group I of the Periodic Table.

Which statement about potassium is correct?

**A** It is a relatively hard metal.

**B** It is less dense than lithium.

**C** It has a higher melting point than sodium.

**D** It reacts more vigorously with water than sodium.

**23** What is a use for argon?

**A** as a catalyst

**B** in alloys

**C** in lamps

**D** neutralising chemical waste

**24** Which metal is extracted from its ore by electrolysis?

**A** aluminium

**B** copper

**C** gold

**D** iron

**25** Which gas is present in clean air?

**A** carbon dioxide

**B** carbon monoxide

**C** nitrogen dioxide

**D** sulfur dioxide

**26** Which statement about petroleum is correct?

**A** It contains mostly alkene molecules.

**B** It is a mixture of hydrocarbons.

**C** It is separated into fractions by cracking.

**D** Its main constituent is methane.

**27** Which statement about poly(ethene) is correct?

**A** It always contains less than 12 carbon atoms.

**B** It is formed from ethane.

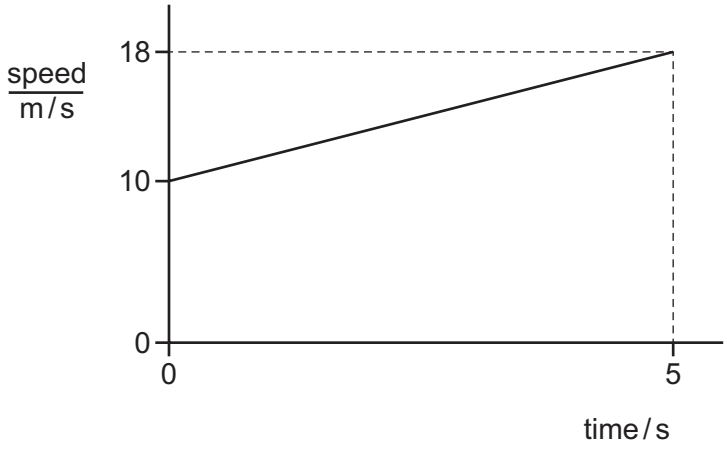
**C** It is formed from ethene.

**D** It occurs naturally.



**[Turn over**

**28** The speed–time graph represents part of a car journey.



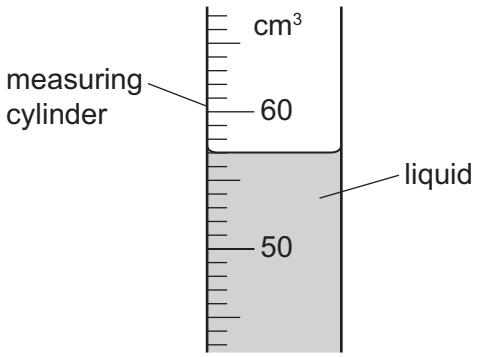

How far does the car travel in the part of the journey shown?

**A** 20 m **B** 45 m **C** 70 m **D** 90 m

**29** The mass of an empty measuring cylinder is 15 g.

Liquid is poured into it and the total mass is now 95 g.

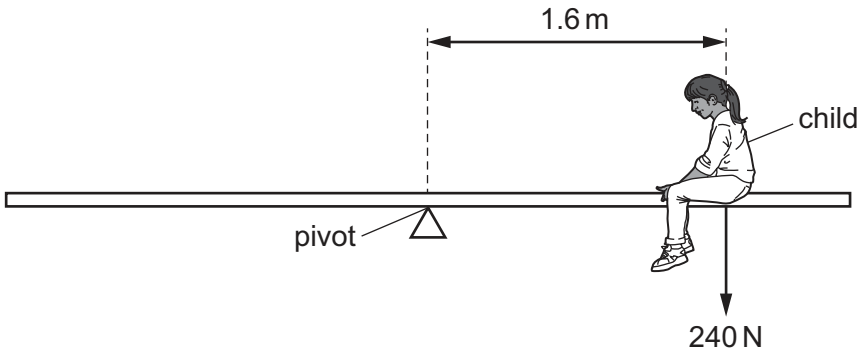
The reading on the measuring cylinder is shown.




What is the density of the liquid?

**A** 1.3 g / $cm^3$ **B** 1.4 g / $cm^3$ **C** 1.5 g / $cm^3$ **D** 1.7 g / $cm^3$

**30** The diagram shows a child of weight 240 N sitting on a see-saw (teeter-totter) at a distance of 1.6 m from the pivot.




What is the moment of the weight of the child about the pivot, with the correct unit?

**A** 150 N m **B** 150 N / m **C** 384 N m **D** 384 N / m

**31** Which two energy sources are both non-renewable?

**A** oil and geothermal resources

**B** oil and natural gas

**C** tides and geothermal resources

**D** tides and wind

**32** Someone wearing wet clothes can feel cold even on a warm day.

Why do they feel cold?

**A** Water gives out heat as it evaporates.

**B** Water takes in heat as it evaporates.

**C** Water vapour gives out heat as it condenses.

**D** Water vapour takes in heat as it condenses.

**33** How is thermal energy transferred from the Sun through the vacuum of space?

**A** by conduction and convection

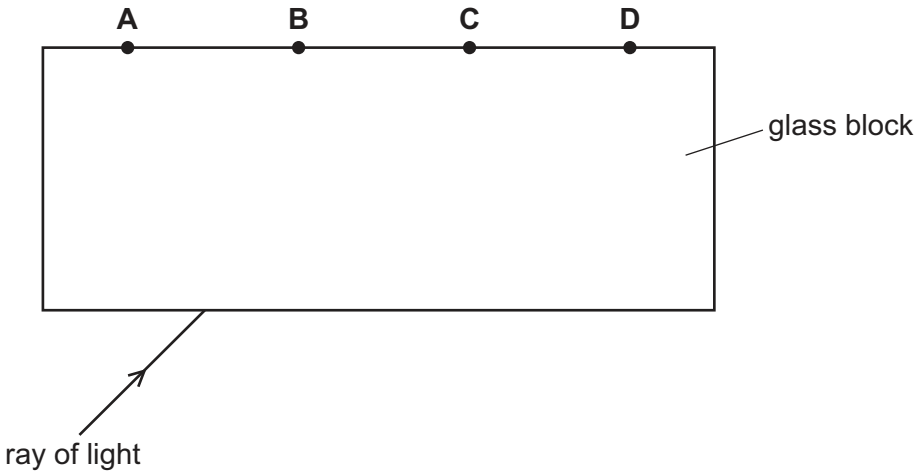
**B** by convection and radiation

**C** by convection only

**D** by radiation only

**34** A ray of light enters a parallel-sided glass block.

At which labelled point does the ray leave the block?




**35** Which change to a sound wave makes the sound louder?

**A** decreasing the amplitude

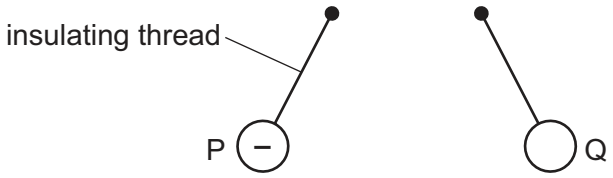
**B** decreasing the wavelength

**C** increasing the amplitude

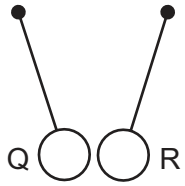
**D** increasing the wavelength

**36** Three charged balls P, Q and R are suspended by insulating threads. Ball P is negatively charged.

Ball Q is brought close to ball P. The balls move away from each other.




Ball Q is now brought close to ball R. The balls move closer to each other.




What are the signs of the charges on ball Q and ball R?

| | ball Q | ball R |
|---|---|---|
| **A** | negative | negative |
| **B** | negative | positive |
| **C** | positive | negative |
| **D** | positive | positive |

**37** Which two electrical quantities are measured in the same unit?

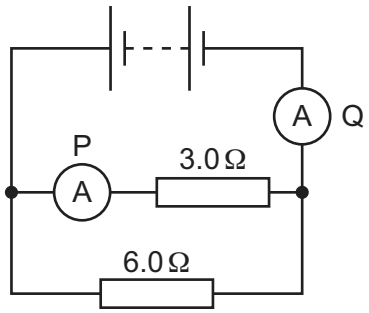
**A** current and potential difference (p.d.)

**B** current and electromotive force (e.m.f.)

**C** potential difference (p.d.) and electromotive force (e.m.f.)

**D** potential difference (p.d.) and resistance

**38** A battery is connected in a circuit to a 3.0 Ω resistor, a 6.0 Ω resistor and two ammeters P and Q.




What is the combined resistance of the two resistors and which ammeter has the greater reading?

| | combined resistance / Ω | ammeter with greater reading |
|---|---|---|
| **A** | less than 3.0 | P |
| **B** | less than 3.0 | Q |
| **C** | 9.0 | P |
| **D** | 9.0 | Q |

**39** The current in an electric kettle used to boil water is 9.0 A.

What is the most appropriate rating of fuse to use with this kettle?

**A** 1 A **B** 3 A **C** 8 A **D** 13 A

**40** A nuclide of hydrogen is represented by $^{3}_{1}H$.

Which row shows the number of protons and the number of neutrons in this nuclide?

| | protons | neutrons |
|---|---|---|
| **A** | 1 | 2 |
| **B** | 1 | 3 |
| **C** | 2 | 1 |
| **D** | 3 | 1 |

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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.).