Cambridge Assessment International Education

# Cambridge IGCSE™ (9–1)

**CO-ORDINATED SCIENCES** **0973/01**

Paper 1 Multiple Choice (Core) **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 m / $s^2$).

**INFORMATION**

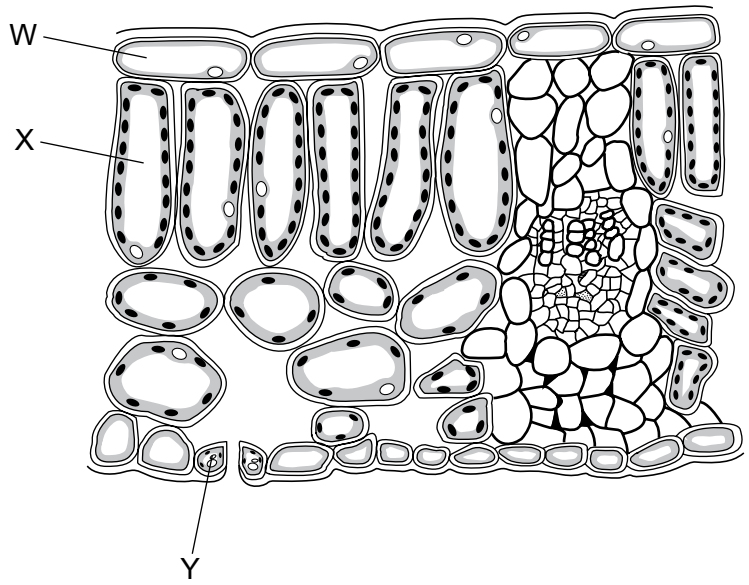
- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.

This document has **16** pages.

**1** Which row shows active transport?

| | particles move from high concentration to low concentration | particles move from low concentration to high concentration | requires energy |
|---|---|---|---|
| **A** | × | ✓ | × |
| **B** | ✓ | × | × |
| **C** | × | ✓ | ✓ |
| **D** | ✓ | × | ✓ |

**2** Which row shows the correct labels on the diagram of a leaf section?




| | W | X | Y |
|---|---|---|---|
| **A** | cuticle | palisade mesophyll | stoma |
| **B** | epidermis | palisade mesophyll | guard cell |
| **C** | cuticle | spongy mesophyll | guard cell |
| **D** | epidermis | spongy mesophyll | stoma |

**3** Which disease can be caused by a lack of vitamin C?

**A** AIDS

**B** coronary heart disease

**C** rickets

**D** scurvy

**4** A student inflates balloons by exhaling into them.

What is the approximate composition of the air in the balloons?

| | percentage of oxygen | percentage of carbon dioxide | water vapour |
|---|---|---|---|
| **A** | 16 | 0.04 | low |
| **B** | 16 | 4.5 | high |
| **C** | 21 | 0.04 | high |
| **D** | 21 | 4.5 | low |

**5** A student writes the following sentences.

1 During aerobic respiration, oxygen is used to break down nutrient molecules to release energy.

2 Energy is needed for muscle contraction, protein synthesis and cell division.

3 The passage of nerve impulses does **not** require energy.

Which sentences are correct?

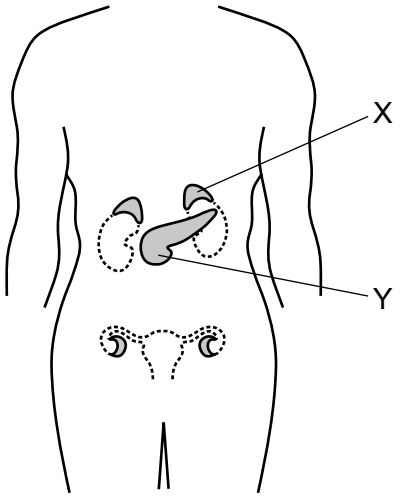
**A** 1 only

**B** 1 and 2 only

**C** 1, 2 and 3

**D** 2 and 3 only

**6** The diagram shows the position of different endocrine glands in the human body.




Which row shows the correct label for each endocrine gland and the hormone that the gland secretes?

| | X | | Y | |
|---|---|---|---|---|
| | gland | hormone | gland | hormone |
| **A** | adrenal | adrenaline | ovary | insulin |
| **B** | adrenal | adrenaline | pancreas | insulin |
| **C** | pancreas | insulin | adrenal | adrenaline |
| **D** | ovary | insulin | pancreas | adrenaline |

**7** What is meant by antibiotic resistance?

**A** No bacteria will be killed by any antibiotic.

**B** Only some bacteria will be killed by some antibiotics.

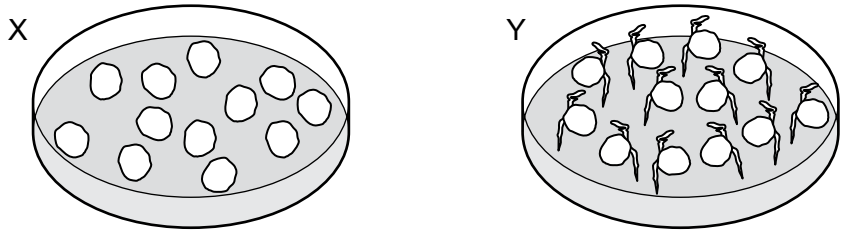
**C** No viruses will be killed by any antibiotic.

**D** Only some viruses will be killed by some antibiotics.

**8** A student investigates two conditions needed for seeds to germinate. All the seeds are given water.

Which conditions would give the results shown in diagrams X and Y?




| | X | Y |
|---|---|---|
| **A** | carbon dioxide, 25 °C | oxygen, 25 °C |
| **B** | carbon dioxide, 2 °C | oxygen, 2 °C |
| **C** | oxygen, 25 °C | carbon dioxide, 25 °C |
| **D** | oxygen, 2 °C | carbon dioxide, 2 °C |

**9** Which of the following occur due to increased secretion of testosterone during puberty in male humans?

1 increased growth rate

2 increased muscle development

3 pubic and underarm hair growth

4 voice deepens

**A** 1, 2, 3 and 4

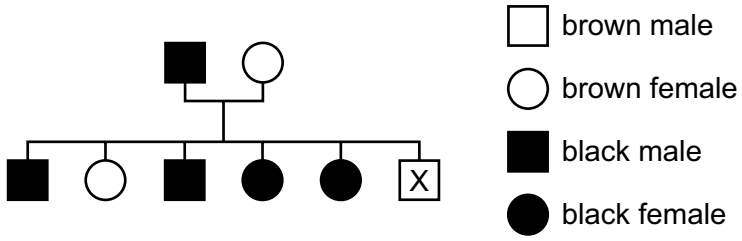
**B** 1, 2 and 3 only

**C** 1 and 2 only

**D** 3 and 4 only

**10** In some dogs, brown coat colour is dominant to black. Two dogs of different colours breed together. Six offspring were produced as shown in the diagram.

If the male labelled X is later mated to a black female, what ratio of coat colour would be expected in the offspring?




**A** all black

**B** all brown

**C** 3 : 1 brown : black

**D** 1 : 1 brown : black

**11** What is the definition of a gene?

**A** all the DNA in a cell that controls metabolic reactions

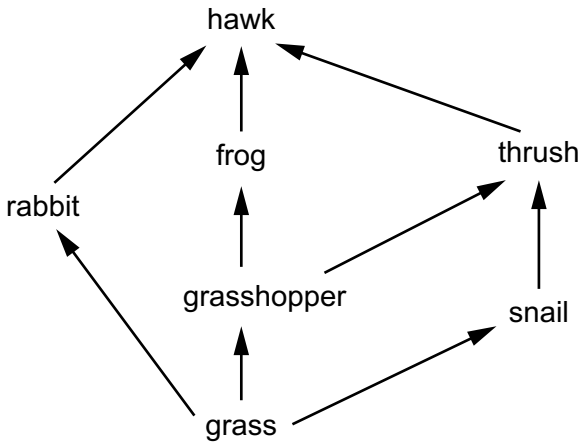
**B** a length of DNA that codes for a protein

**C** the nucleus and its chromosomes

**D** all the DNA in a cell that determines the inheritance of sex

**12** Humans can have an impact on the environment when they add or remove certain species. The hawks are removed from the food web shown.




What is the effect of removing hawks on the number of grasshoppers and rabbits?

| | number of grasshoppers | number of rabbits |
|---|---|---|
| **A** | no change | decreases |
| **B** | decreases | increases |
| **C** | decreases | no change |
| **D** | increases | increases |

**13** What is meant by the term biodiversity?

**A** an increase in the number of different species that live in an area

**B** how organisms and their environment interact

**C** the number of different animals that live in an area

**D** the number of different species that live in an area

**14** Which two elements react together to form an ionic compound?

| element | electronic structure |
|---|---|
| R | 2,4 |
| T | 2,8 |
| X | 2,8,1 |
| Z | 2,8,7 |

**A** R and T **B** T and X **C** X and Z **D** Z and R

**15** Aluminium sulfate contains aluminium, sulfur and oxygen.
In aluminium sulfate, there are six times as many oxygen atoms as aluminium atoms.
In aluminium sulfate, there are four times as many oxygen atoms as sulfur atoms.

What is the formula of aluminium sulfate?

**A** $Al_2(SO_4)_3$

**B** $Al_2(SO_3)_4$

**C** $Al_3(SO_4)_2$

**D** $Al_4(SO_3)_2$

**16** The equation for the reaction of ammonia, $NH_3$, and hydrogen chloride, $HCl$, is shown.

$$NH_3(g) + HCl(g) \rightarrow NH_4Cl(s)$$

When 1.7 g of ammonia is used, 5.35 g of ammonium chloride, $NH_4Cl$, is produced.

What is the mass of hydrogen chloride that reacts with 5.1 g of ammonia?

**A** 3.65 g

**B** 10.95 g

**C** 7.05 g

**D** 21.15 g

**17** Molten lead(II) bromide is electrolysed using inert electrodes.

Which row identifies the product at each electrode?

| | cathode | anode |
|---|---|---|
| **A** | bromide ions | lead ions |
| **B** | bromine | lead |
| **C** | lead ions | bromide ions |
| **D** | lead | bromine |

**18** Hydrogen–oxygen fuel cells are used to power vehicles.

Which row identifies the chemical product of the fuel cell and the type of energy used to power the vehicles?

| | chemical product | type of energy |
|---|---|---|
| **A** | hydrogen | electrical |
| **B** | hydrogen | thermal |
| **C** | water | electrical |
| **D** | water | thermal |

**19** During a reaction, the temperature of the reaction mixture decreases.

Which statement about the reaction is correct?

**A** It is endothermic and thermal energy is absorbed from the surroundings.

**B** It is endothermic and thermal energy is transferred to the surroundings.

**C** It is exothermic and thermal energy is absorbed from the surroundings.

**D** It is exothermic and thermal energy is transferred to the surroundings.

**20** Which statement about catalysts is correct?

**A** They decrease the time taken for a reaction to finish and they are unchanged at the end of the reaction.

**B** They decrease the time taken for a reaction to finish and they are used up in the reaction.

**C** They increase the time taken for a reaction to finish and they are unchanged at the end of the reaction.

**D** They increase the time taken for a reaction to finish and they are used up in the reaction.

**21** Dilute nitric acid is mixed with excess aqueous calcium hydroxide in a test-tube containing the indicator methyl orange.

The equation for the reaction is shown.

$$2HNO_3 + Ca(OH)_2 \rightarrow Ca(NO_3)_2 + 2H_2O$$

Which row shows the type of reaction that occurs and the colour of the mixture at the end of the reaction?

| | type of reaction | colour |
|---|---|---|
| **A** | neutralisation | orange |
| **B** | neutralisation | yellow |
| **C** | redox | orange |
| **D** | redox | yellow |

**22** Which statement explains why elements in the same group of the Periodic Table have similar chemical properties?

**A** They have different numbers of protons.

**B** They have the same number of neutrons.

**C** They have the same number of electron shells.

**D** They have the same number of outer-shell electrons.

**23** Which row shows the correct order of reactivity for the elements?

| | most reactive ⟶ least reactive | | | |
|---|---|---|---|---|
| **A** | silver | calcium | carbon | potassium |
| **B** | silver | carbon | calcium | potassium |
| **C** | sodium | hydrogen | zinc | gold |
| **D** | sodium | zinc | hydrogen | gold |

**24** Which colour change is observed when water is added to anhydrous cobalt(II) chloride?

**A** blue to white

**B** blue to pink

**C** white to blue

**D** pink to blue

**25** Which statements about air pollutants are correct?

1 Carbon monoxide comes from the complete combustion of carbon-containing fuels.

2 Oxides of nitrogen come from digestion in animals.

3 Methane comes from the decomposition of vegetation.

4 Particulates come from the incomplete combustion of carbon-containing fuels.

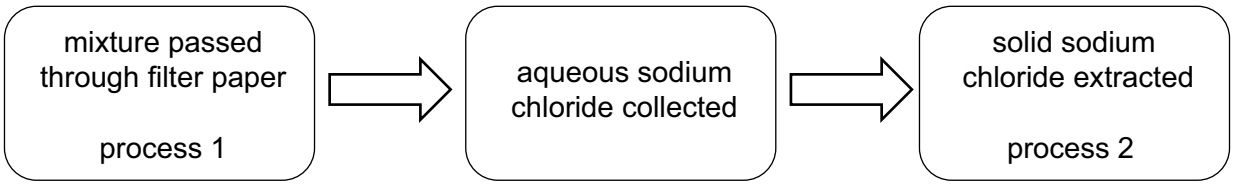
**A** 1 and 2

**B** 1 and 3

**C** 2 and 4

**D** 3 and 4

**26** A mixture contains aqueous sodium chloride and an insoluble salt.
Two processes are used to extract solid sodium chloride from the mixture.
The diagram shows the processes used.




Which row describes aqueous sodium chloride in process 1 and the name of process 2?

| | aqueous sodium chloride | process 2 |
|---|---|---|
| **A** | residue | evaporation |
| **B** | residue | filtration |
| **C** | filtrate | evaporation |
| **D** | filtrate | filtration |

**27** Aqueous potassium iodide is acidified with dilute nitric acid.

What is observed when aqueous silver nitrate is added to this mixture?

**A** white precipitate

**B** white solution

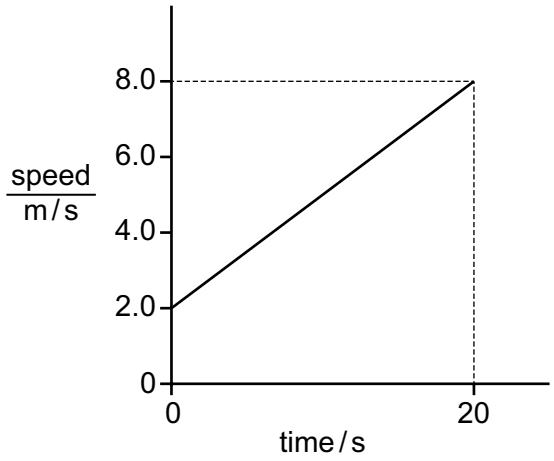
**C** yellow precipitate

**D** yellow solution

**28** The graph shows how the speed of a car varies with time.

What is the distance travelled by the car in the 20 s shown?




**A** 80 m

**B** 100 m

**C** 160 m

**D** 200 m

**29** A solid block has a mass of 10 g and a volume of 5.0 $cm^3$.

The block is lowered into a liquid of density 1.5 $g/cm^3$.

What is the density of the block and does it float or sink in the liquid?

| | density of block / $g/cm^3$ | floats or sinks |
|---|---|---|
| **A** | 0.50 | floats |
| **B** | 0.50 | sinks |
| **C** | 2.0 | floats |
| **D** | 2.0 | sinks |

**30** A machine does work $W$ by transferring energy $\Delta E$ in a time $t$.

Which equation is used to calculate the power $P$ of the machine?

**A** $P = \Delta E \times t$

**B** $P = W \times t$

**C** $P = \frac{\Delta E}{t}$

**D** $P = \frac{W}{\Delta E}$

**31** The particles in a substance are close together and can move around.

The substance changes state so that the particles are still close together but become fixed in a pattern.

What is the name of the change of state?

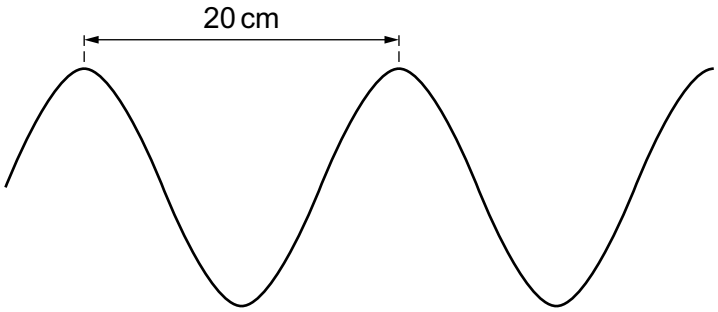
**A** condensation

**B** evaporation

**C** melting

**D** solidification

**32** The diagram represents a wave. The frequency of the wave is 30 Hz.




What is the speed of the wave?

**A** 1.5 cm / s

**B** 3.0 cm / s

**C** 300 cm / s

**D** 600 cm / s

**33** White light is dispersed and produces a visible spectrum of seven colours.

Which pair contains two of these colours in order of increasing frequency (lower frequency first)?

**A** green, red

**B** green, violet

**C** violet, yellow

**D** yellow, red

**34** A 2.0 kW heater is connected to a mains power supply.
The cost of electricity is $0.30 per kW h.

What is the total cost of using the heater for 15 minutes?

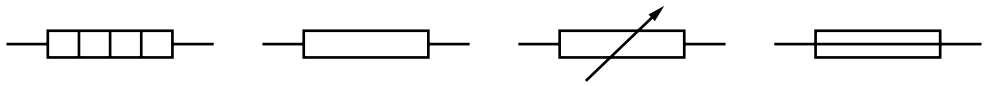
**A** $0.04

**B** $0.15

**C** $2.40

**D** $9.00

**35** Which circuit symbol represents a heater?



**A** **B** **C** **D**

**36** The outer casing of a mains electrical appliance is **not** earthed.
The appliance is working and is safe to use.

Which statement about the appliance must be correct?

**A** It does **not** have a live connection.

**B** It has two fuses.

**C** It has two switches.

**D** It is double-insulated.

**37** Which row gives the relative charges of electrons and neutrons?

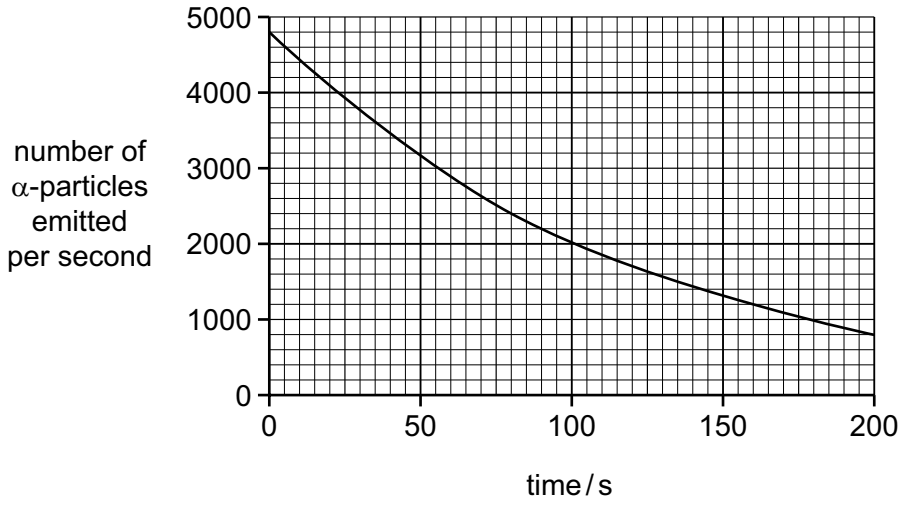
| | electrons | neutrons |
|---|---|---|
| **A** | 0 | 0 |
| **B** | 0 | −1 |
| **C** | −1 | 0 |
| **D** | −1 | +1 |

.

**38** A radioactive isotope emits $\alpha$-particles. The graph shows how the number of $\alpha$-particles emitted per second changes with time.

What is the half-life of the isotope?




**A** 80 s

**B** 100 s

**C** 200 s

**D** 2400 s

**39** Which sequence is part of the life cycle of a very large mass star?

**A** red giant → planetary nebula + neutron star

**B** red giant → planetary nebula + black hole

**C** red supergiant → supernova → neutron star

**D** red supergiant → supernova → black hole

**40** What is a light-year?

**A** the distance travelled by light in a vacuum in 1 year

**B** the distance travelled by light in a vacuum in 100 000 years

**C** the time taken for light to travel across the Milky Way

**D** the time taken for light to travel from the Sun to the Earth

## The Periodic Table of Elements

| | Group | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | I | II | | | | | | | | | | III | IV | V | VI | VII | VIII |
| | | | | | | | | | | | | | | | | | 2 He helium 4 |
| | | | | | | | 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 |
| | 3 Li lithium 7 | 4 Be beryllium 9 | | | | | | | | | | 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 |
| | 11 Na sodium 23 | 12 Mg magnesium 24 | | | | | | | | | | 31 Ga gallium 70 | 32 Ge germanium 73 | 33 As arsenic 75 | 34 Se selenium 79 | 35 Br bromine 80 | 36 Kr krypton 84 |
| | 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 | 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 |
| | 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.).