



CO-ORDINATED SCIENCES

0654/11

Paper 1 Multiple Choice (Core)

October/November 2019

45 minutes

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

* 2 6 3 5 1 9 9 5 5 0 *

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, glue or correction fluid.

Write your name, centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.

DO NOT WRITE IN ANY BARCODES.

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 separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this booklet.

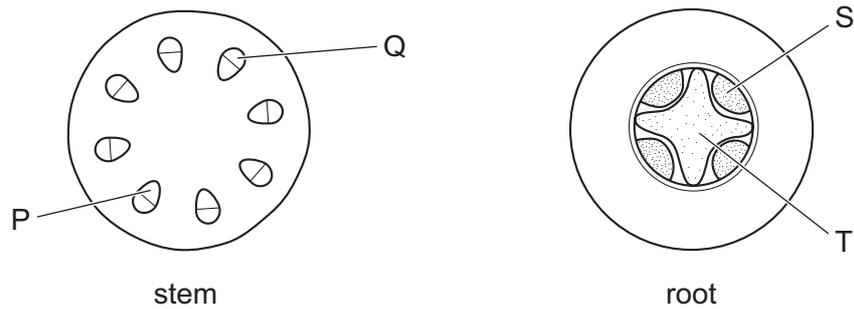
A copy of the Periodic Table is printed on page 16.

Electronic calculators may be used.

This document consists of **15** printed pages and **1** blank page.

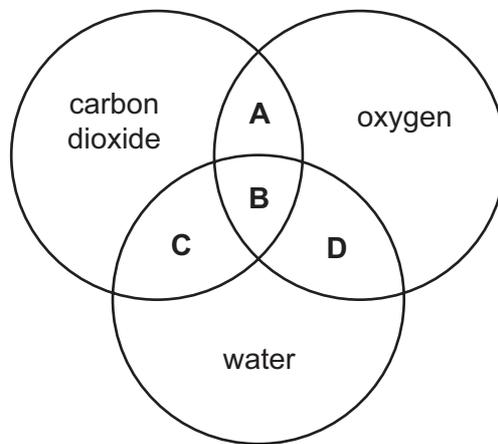
- 1 Which process do all living organisms carry out?
- A asexual reproduction
 - B excretion
 - C ingestion
 - D photosynthesis
- 2 Which statement about animal cells and plant cells is correct?
- A Only animal cells possess cell membranes.
 - B Only animal cells possess cell walls.
 - C Only plant cells possess cell membranes.
 - D Only plant cells possess cell walls.
- 3 Which result with the biuret test shows that protein is present?
- A blue
 - B green
 - C orange
 - D purple
- 4 Which statements are correct for all enzymes?
- 1 They are proteins.
 - 2 They are unaffected by temperature.
 - 3 They speed up chemical reactions.
 - 4 They work best at a high pH.
- A 1, 2 and 4 B 1, 3 and 4 C 1 and 3 only D 2 and 4 only
- 5 What is the word equation for photosynthesis?
- A carbon dioxide + glucose → oxygen + water
 - B carbon dioxide + water → oxygen + glucose
 - C oxygen + glucose → carbon dioxide + water
 - D oxygen + water → carbon dioxide + glucose

- 6 Which process can be defined as the movement of small, water-soluble food molecules through the wall of the intestine into the blood?
- A absorption
 B assimilation
 C digestion
 D egestion
- 7 The diagrams show sections through a stem and a root.



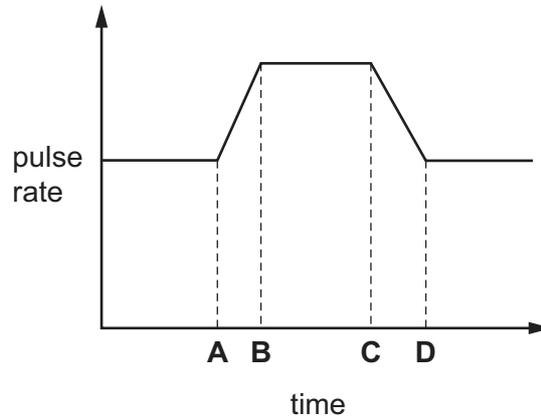
Which indicate the positions of the xylem?

- A P and S B P and T C Q and S D Q and T
- 8 Which area represents the substances produced in aerobic respiration?



- 9 The graph shows the pulse rate over a period of time.

At which point was adrenaline released into the blood?

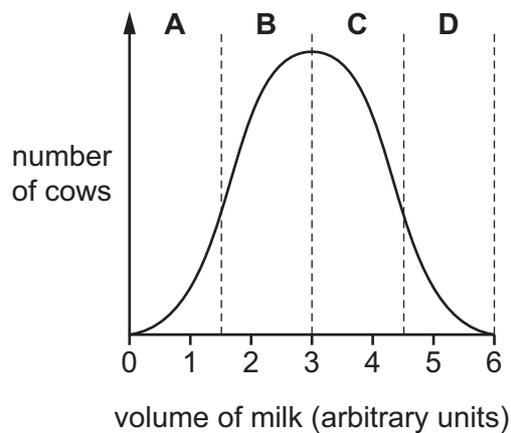


- 10 Which row is correct about human gametes?

| | site of female gamete production | site of male gamete production |
|----------|----------------------------------|--------------------------------|
| A | ovaries | sperm ducts |
| B | ovaries | testes |
| C | oviduct | sperm ducts |
| D | oviduct | testes |

- 11 The graph shows the number of cows producing different volumes of milk.

Which group of cows should be used in a programme to breed more cows with the highest milk yield?



12 The diagram shows a food chain.

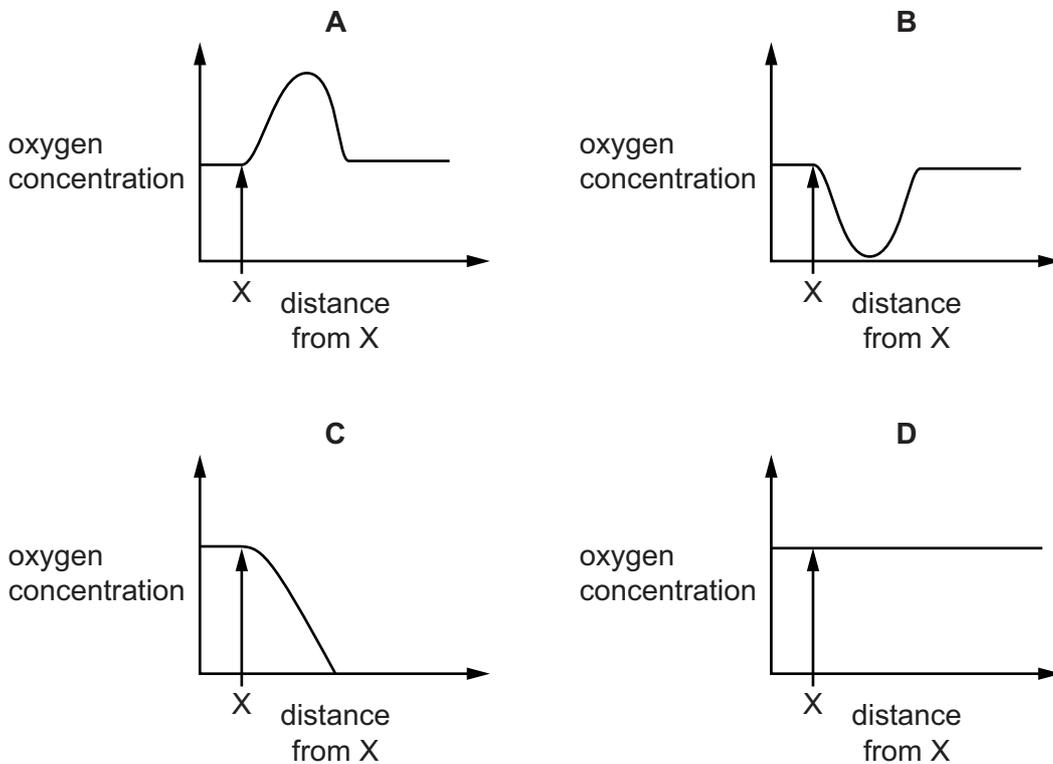
grass → grasshopper → frog → snake → buzzard

Which is correct?

- A The buzzard is a producer.
- B The frog is a primary consumer.
- C The grasshopper is a secondary consumer.
- D The snake is a tertiary consumer.

13 Untreated sewage is released into a river at point X.

Which graph correctly shows changes in oxygen concentration of the water as the river flows away from X?



14 Which statement describes the arrangement of particles in a solid?

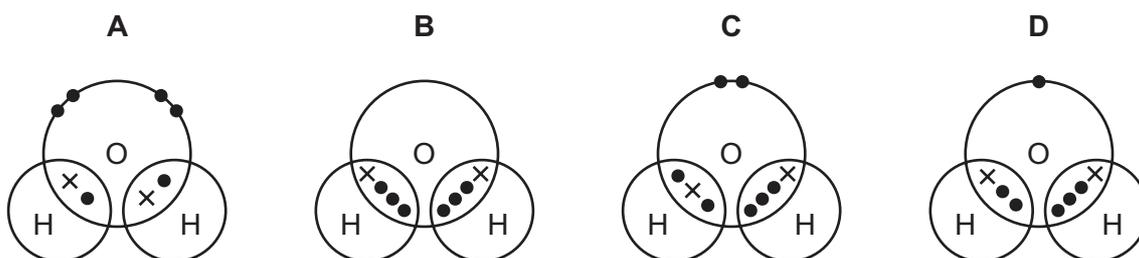
- A The particles are close together and move randomly.
- B The particles are close together and vibrate about a fixed point.
- C The particles are far apart and move randomly.
- D The particles are far apart and vibrate about a fixed point.

15 Which processes are chemical changes?

- 1 conversion of steam to liquid water
- 2 cracking of alkanes
- 3 fractional distillation of petroleum
- 4 thermal decomposition of calcium carbonate

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

16 What is the dot-and-cross diagram for a water molecule?



17 Hydrogen peroxide is a compound.

A molecule of hydrogen peroxide can be represented as shown.



key

● = oxygen

○ = hydrogen

What is the formula of hydrogen peroxide?

A HO B H₂O₂ C (OH)₂ D 2OH

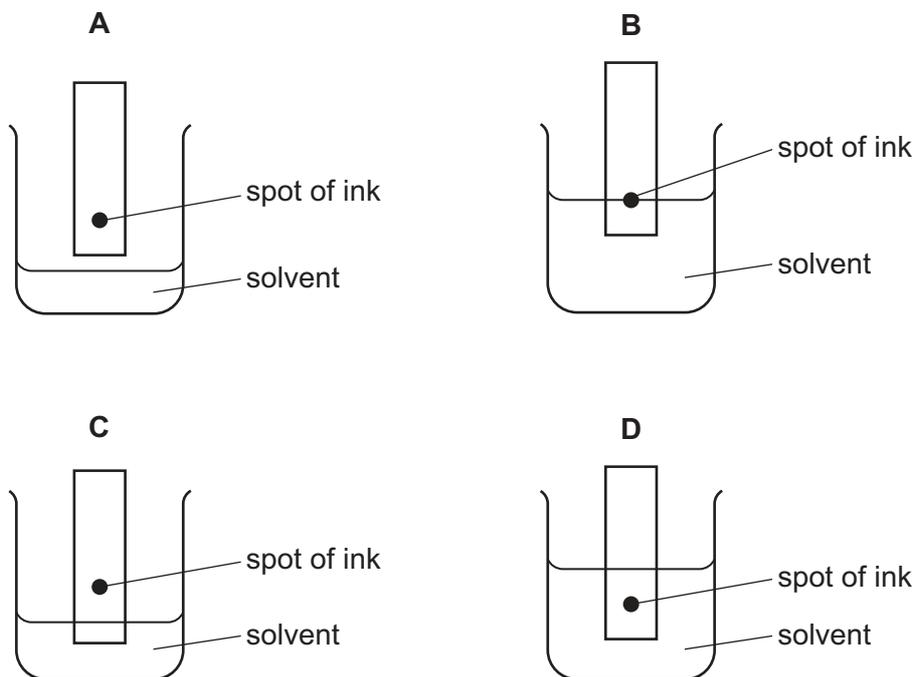
18 Concentrated aqueous sodium chloride is electrolysed using inert electrodes.

Which row identifies the product at each electrode?

| | product at anode | product at cathode |
|----------|------------------|--------------------|
| A | chlorine | sodium |
| B | hydrogen | chlorine |
| C | sodium | chlorine |
| D | chlorine | hydrogen |

22 The colours in an ink can be separated by chromatography.

Which diagram shows the correct way to set up the apparatus?



23 Which statement about the Periodic Table is correct?

- A Elements are listed in order of neutron number.
- B Elements are listed in order of nucleon number.
- C Elements are listed in order of proton number.
- D Elements are listed in order of relative atomic mass.

24 Four properties of metals are listed.

- 1 high melting point
- 2 low density
- 3 resistance to corrosion
- 4 conducts electricity

Which properties make aluminium suitable for use in cans containing drinks?

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

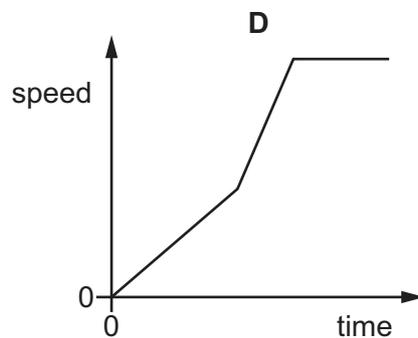
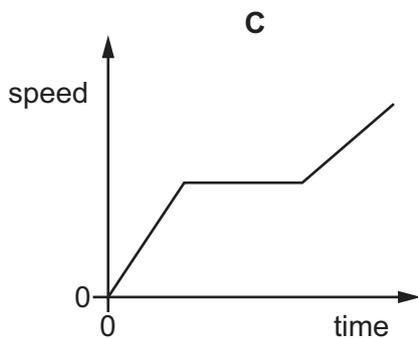
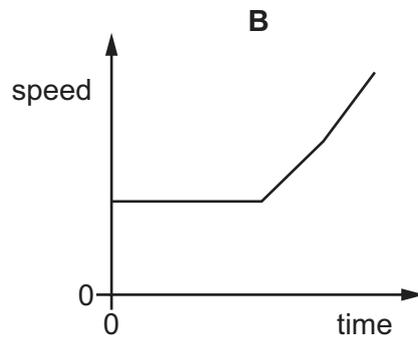
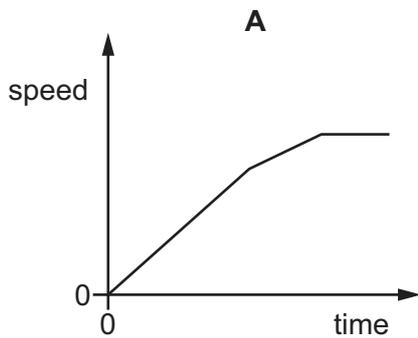
- 25 Which three elements are needed in fertilisers to help plants grow?
- A nitrogen, phosphorus, potassium
 B nitrogen, phosphorus, sodium
 C nitrogen, sodium, potassium
 D sodium, phosphorus, potassium
- 26 Which statement about the manufacture of lime from limestone is **not** correct?
- A A high pressure is used.
 B A high temperature is used.
 C Carbon dioxide is produced.
 D Thermal decomposition occurs.
- 27 Petroleum is separated into useful fractions by fractional distillation.

Which row matches the fractions to their uses?

| | fuel | heating and cooking | making chemicals |
|----------|----------|---------------------|------------------|
| A | bitumen | naphtha | refinery gas |
| B | gasoline | bitumen | naphtha |
| C | gasoline | refinery gas | naphtha |
| D | naphtha | refinery gas | gasoline |

28 The speed-time graphs represent the motion of a car moving in a straight line.

Which graph represents the car moving first with a constant acceleration, then with a larger constant acceleration and then with a constant speed?



29 An object has a mass of 20 kg and a density of 8400 kg/m^3 .

What is the volume of the object?

- A $2.4 \times 10^{-3} \text{ m}^3$
- B $4.2 \times 10^2 \text{ m}^3$
- C $1.6 \times 10^5 \text{ m}^3$
- D $1.7 \times 10^5 \text{ m}^3$

30 An engine is doing work on a car as the car moves along a road.

Which two changes **must** result in less work being done on the car by the engine?

- A decreasing the engine's force on the car and decreasing the distance moved by the car
- B decreasing the engine's force on the car and increasing the distance moved by the car
- C increasing the engine's force on the car and decreasing the distance moved by the car
- D increasing the engine's force on the car and increasing the distance moved by the car

31 The table shows four sources of energy used to generate electricity.

Which source is shown with a statement of whether it is renewable and whether it is reliable at all times?

| | source | renewable | reliable at all times |
|----------|-----------------|-----------|-----------------------|
| A | coal | yes | no |
| B | nuclear fission | no | yes |
| C | tides | no | no |
| D | wind | yes | yes |

32 The more energetic molecules of a liquid are escaping from its surface, causing the liquid to cool.

What is happening to the liquid?

- A** It is boiling.
- B** It is condensing.
- C** It is evaporating.
- D** It is melting.

33 A substance is a gas when its temperature is 65°C .

How do the boiling point and the melting point of this substance compare with 65°C ?

| | boiling point | melting point |
|----------|----------------------------|----------------------------|
| A | above 65°C | above 65°C |
| B | above 65°C | below 65°C |
| C | below 65°C | above 65°C |
| D | below 65°C | below 65°C |

34 Which material is a good thermal conductor?

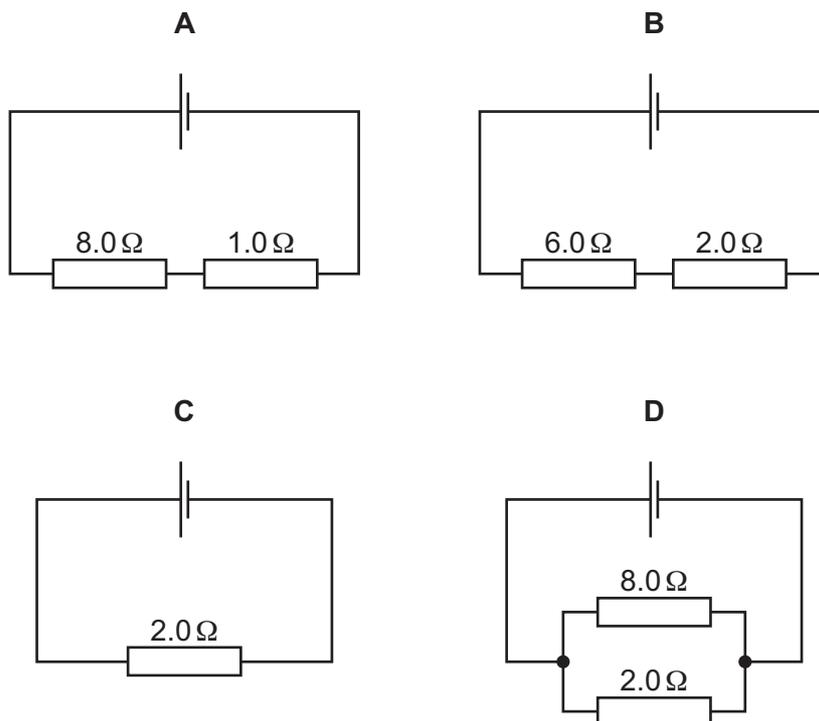
- A** aluminium
- B** cardboard
- C** rubber
- D** wool

35 There is a battery of e.m.f. V in a circuit of total resistance R .

Which pair of changes **must** result in a larger current in the circuit?

- A decreasing V and decreasing R
- B decreasing V and increasing R
- C increasing V and decreasing R
- D increasing V and increasing R

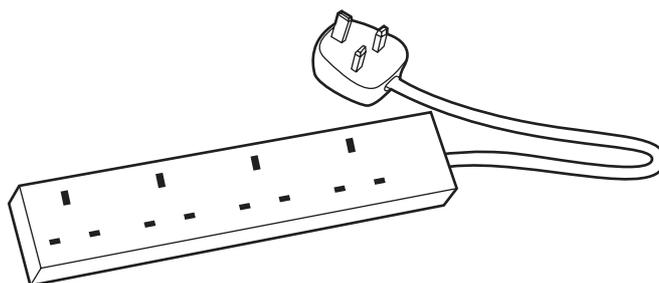
36 Which circuit has the smallest resistance?



37 Which row shows how lamps are connected in a lighting circuit in a house and gives an advantage of connecting them in this way?

| | how lamps are connected | advantage of connecting them in this way |
|---|-------------------------|--|
| A | in parallel | they can be switched separately |
| B | in parallel | they share the voltage |
| C | in series | they can be switched separately |
| D | in series | they share the voltage |

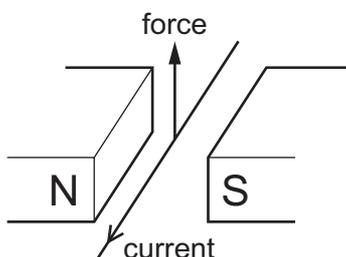
- 38 An electrical extension block has four sockets, a cable which can safely take a current of 6 A and a plug. It is protected by a fuse rated at 5 A.



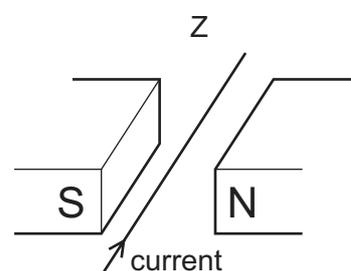
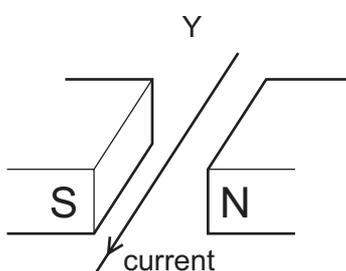
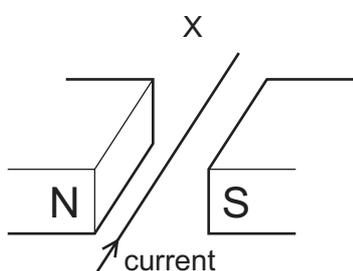
The extension block is used with four appliances and the 5 A fuse blows. The owner replaces the 5 A fuse with a 13 A fuse.

Why is the extension block now dangerous?

- A The appliances may overheat before the fuse blows.
 B The cable may overheat before the fuse blows.
 C The sockets may burn out before the fuse blows.
 D The 13 A fuse may blow too soon.
- 39 A wire is placed between two magnetic poles. There is a current in the wire in the direction shown. The wire experiences an upward force.



There is also a force on the wire in arrangements X, Y and Z.



In which of the arrangements is the force upwards?

- A X only B X and Y only C Z only D X, Y and Z

40 Which type of radiation has the greatest ionising effect, and which is the most penetrating?

| | greatest ionising effect | most penetrating |
|----------|--------------------------|---------------------|
| A | α -particles | α -particles |
| B | α -particles | γ -rays |
| C | γ -rays | α -particles |
| D | γ -rays | γ -rays |

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The Periodic Table of Elements

| | | Group | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------------|-----------------------------|-----------------------------|---------------------------------|-----------------------------|------------------------------|------------------------------|------------------------------|------------------------------|--------------------------------|-------------------------------|-------------------------------|-----------------------------|-------------------------------|-----------------------------|-------------------------------|-----------------------------|------------------------------|--------------------------------|--------------------------------|-------------------------------|--------------------------------|-------------------------------|-------------------------------|-------------------------------|----------------------------------|----------------------------------|----------------------------------|------------------------------------|-----------------------------------|-------------------------------------|-----------------------------------|-----------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| I | II | III | IV | V | VI | VII | VIII | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 Li lithium 7 | 4 Be beryllium 9 | 11 Na sodium 23 | 12 Mg magnesium 24 | 19 K potassium 39 | 20 Ca calcium 40 | 37 Rb rubidium 85 | 55 Cs caesium 133 | 87 Fr francium — | 1 H hydrogen 1 | 2 He helium 4 | 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 | 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 — | 114 Fl flerovium — | 116 Lv livermorium — | 118 Og oganeson — | 119 Uue unbinetium — | 120 Uub ununbium — | 121 Uut ununtrium — | 122 Uuq ununquadium — | 123 Uup ununpentium — | 124 Uuq ununhexium — | 125 Uuh ununheptium — | 126 Uuq ununoctium — | 127 Uuh ununnonium — | 128 Uuo unundecium — | 129 Uuh unundundecium — | 130 Uuo ununtridecium — | 131 Uuq ununquadecium — | 132 Uuh ununpentadecium — | 133 Uuo ununhexadecium — | 134 Uuh ununseptendecium — | 135 Uuo ununoctadecium — | 136 Uuh ununnonadecium — | 137 Uuo ununtriacontium — | 138 Uuh ununtriacontium — | 139 Uuo ununtriacontium — | 140 Uuh ununtriacontium — |

Key
atomic number
atomic symbol
name
relative atomic mass

| | | | | | | | | | | | | | | |
|------------------------------|----------------------------|---------------------------------|------------------------------|-----------------------------|-----------------------------|-----------------------------|-------------------------------|----------------------------|-------------------------------|------------------------------|---------------------------|-------------------------------|------------------------------|------------------------------|
| 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 |
| 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 — |

lanthanoids

actinoids

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).