



# Cambridge IGCSE™

## COMBINED SCIENCE

0653/13

Paper 1 Multiple Choice (Core)

October/November 2023

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.

### 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 **12** pages.



1 What is osmosis?

- A the movement of salt across a cell wall
- B the movement of salt across a partially permeable membrane
- C the movement of water across a cell wall
- D the movement of water across a partially permeable membrane

2 Which row shows the elements that make up proteins?

|          | carbon | hydrogen | nitrogen | oxygen |
|----------|--------|----------|----------|--------|
| <b>A</b> | ✓      | ✗        | ✓        | ✗      |
| <b>B</b> | ✓      | ✓        | ✗        | ✗      |
| <b>C</b> | ✗      | ✓        | ✗        | ✓      |
| <b>D</b> | ✓      | ✓        | ✓        | ✓      |

3 What are enzymes made from?

- A fat
- B protein
- C starch
- D oil

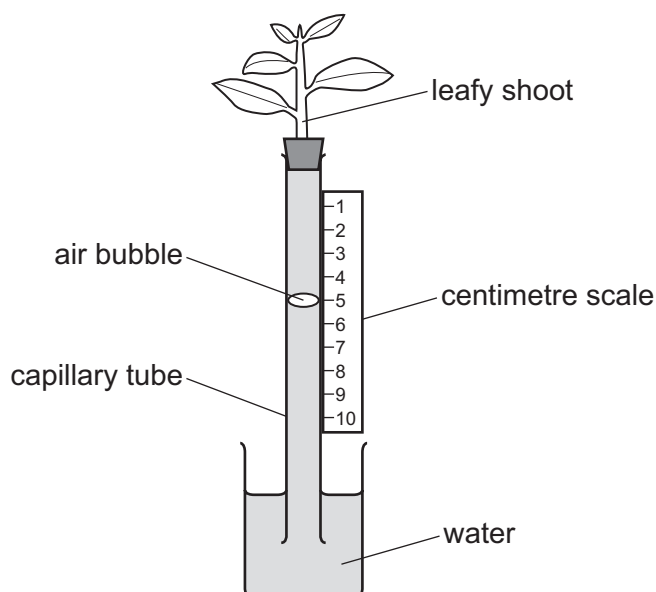
4 Which row correctly matches an organ of the alimentary canal with its functions?

|          | organ           | absorption | digestion | egestion | ingestion |
|----------|-----------------|------------|-----------|----------|-----------|
| <b>A</b> | large intestine | yes        | no        | no       | yes       |
| <b>B</b> | oesophagus      | no         | yes       | yes      | no        |
| <b>C</b> | small intestine | yes        | yes       | no       | no        |
| <b>D</b> | stomach         | no         | no        | yes      | yes       |

5 Which process is defined as taking substances into the body through the mouth?

- A absorption
- B digestion
- C egestion
- D ingestion

- 6 The apparatus shown can be used to measure the rate of transpiration.



Four identical sets of apparatus were set up under different environmental conditions and left for 1 hour.

In all four apparatus, the air bubble was at the 5.0 cm point at the start of the experiment.

What would be the reading on the scale of the apparatus that was left in low humidity and high temperature?

- A** 1.5 cm      **B** 5.0 cm      **C** 7.0 cm      **D** 9.5 cm

- 7 A student is investigating the differences in composition of samples of inspired and expired air.

What can he use to test for carbon dioxide?

- A** biuret solution  
**B** limewater  
**C** ethanol  
**D** iodine solution

- 8 What is the word equation for aerobic respiration?

- A** carbon dioxide + water → glucose + oxygen  
**B** glucose → carbon dioxide + water  
**C** oxygen + carbon dioxide → glucose + water  
**D** glucose + oxygen → carbon dioxide + water

9 Which statement about the growth response of plant roots is correct?

- A They grow away from gravity and away from light.
- B They grow away from gravity and towards light.
- C They grow towards gravity and away from light.
- D They grow towards gravity and towards light.

10 Which row describes asexual reproduction?

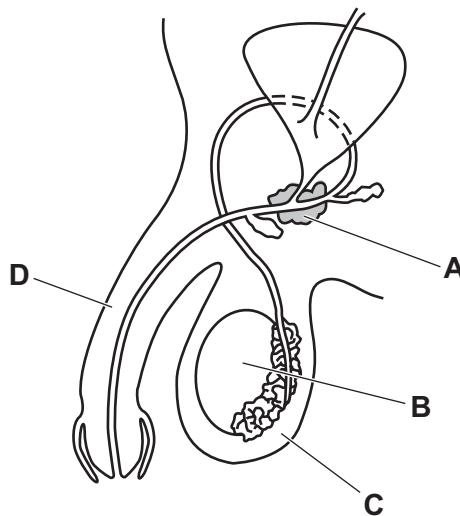
|   | number of parents | a zygote is produced | offspring genetically identical to the parent |
|---|-------------------|----------------------|-----------------------------------------------|
| A | 1                 | no                   | yes                                           |
| B | 1                 | yes                  | no                                            |
| C | 2                 | no                   | yes                                           |
| D | 2                 | yes                  | no                                            |

11 Which statement describes fertilisation in a flowering plant?

- A fusion of a pollen nucleus with a nucleus in the ovule
- B fusion of a pollen nucleus with the stigma
- C transfer of a pollen grain from the anther to the stigma
- D transfer of a pollen grain from the filament to the stigma

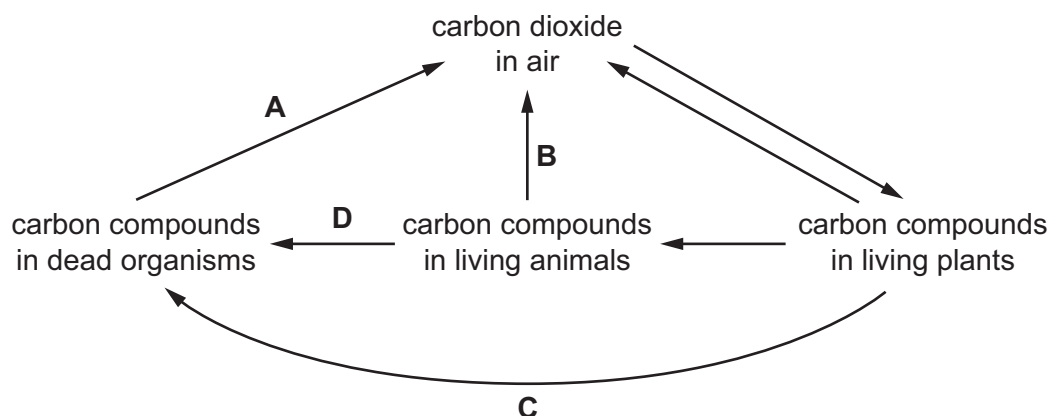
12 The diagram shows the human male reproductive system.

Which labelled part is the prostate gland?



13 The diagram shows part of the carbon cycle.

Which arrow represents respiration by decomposers?

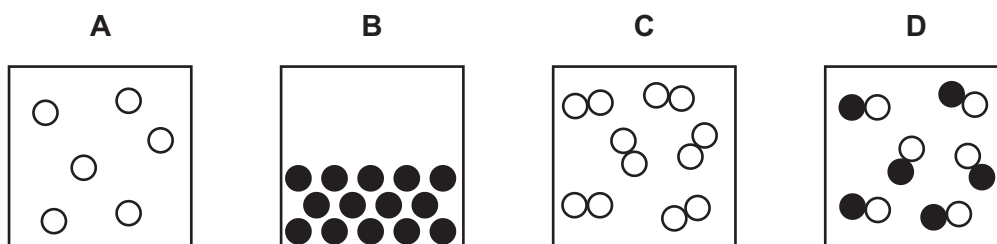


14 Substance X is an element.

It is a gas at room temperature.

It is made of  $X_2$  molecules.

Which diagram represents X?



15 Which statement about tap water is correct?

- A** It is a compound.
- B** It is a mixture of elements.
- C** It is a pure substance.
- D** It is a solution.

16 Compound X contains one iron atom.

It also contains the same number of sulfur atoms as iron atoms and four times as many oxygen atoms as sulfur atoms.

What is the formula of compound X?

- A**  $\text{Fe}(\text{SO})_4$
- B**  $\text{FeSO}_4$
- C**  $\text{FeS}_4\text{O}$
- D**  $\text{Fe}_4\text{S}_4\text{O}$

**17** When solid sodium carbonate and dilute hydrochloric acid are mixed, a reaction occurs.

During this reaction, carbon dioxide is released and the temperature of the mixture increases.

Which chemical terms describe this reaction?

- 1 exothermic
- 2 neutralisation
- 3 thermal decomposition

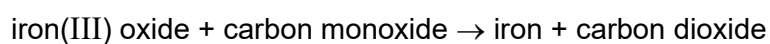
**A** 1, 2 and 3      **B** 1 and 2 only      **C** 1 and 3 only      **D** 2 and 3 only

**18** In which row do **all** of the changes shown increase the rate of reaction?

|          | temperature | concentration | particle size |
|----------|-------------|---------------|---------------|
| <b>A</b> | decrease    | increase      | decrease      |
| <b>B</b> | decrease    | decrease      | increase      |
| <b>C</b> | increase    | increase      | decrease      |
| <b>D</b> | increase    | decrease      | increase      |

**19** Iron is extracted from its ore using carbon monoxide.

The word equation is shown.

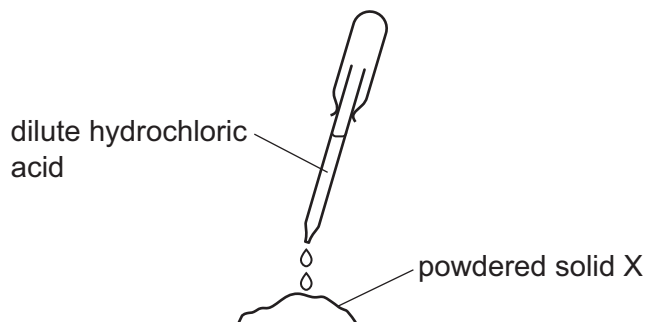


Which statement is correct?

- A** Carbon monoxide is oxidised by gaining oxygen.
- B** Carbon monoxide is reduced by losing oxygen.
- C** Iron(III) oxide is oxidised by losing oxygen.
- D** Iron(III) oxide is reduced by gaining oxygen.

- 20** Dilute hydrochloric acid is added to powdered solid X.

Hydrogen gas is produced.



What is X?

- A** zinc
  - B** zinc carbonate
  - C** zinc hydroxide
  - D** zinc oxide
- 21** Which test is used to identify ammonia?
- A** A glowing splint relights.
  - B** Damp blue litmus paper is bleached.
  - C** Damp red litmus paper turns blue.
  - D** Limewater turns milky.
- 22** Which statement about elements in Period 3 of the Periodic Table is correct?
- A** All the elements in Period 3 are metals.
  - B** All the elements in Period 3 are non-metals.
  - C** Metals are on the left, non-metals are on the right.
  - D** Non-metals are on the left, metals are on the right.

- 23** Hydrogen peroxide decomposes slowly to produce water and oxygen.

Element X and a compound of element X cause hydrogen peroxide to decompose more rapidly.

What is the position of element X in the Periodic Table?

A simplified periodic table grid with 10 columns and 6 rows. The grid is shaped like a standard periodic table, with the first two columns on the left, a gap in the third column, and the remaining columns on the right. The letters A, B, C, and D are placed in specific cells: A is in the first column, second row; B is in the eighth column, second row; C is in the fifth column, third row; and D is in the tenth column, third row. An empty box is located above the gap in the third column, centered between the first and eighth columns.

- 24** Which substance does **not** react with dilute hydrochloric acid to produce copper chloride?

- A** copper  
**B** copper carbonate  
**C** copper hydroxide  
**D** copper oxide

- 25** Which gases are greenhouse gases?

- A** carbon dioxide and methane  
**B** carbon dioxide and oxygen  
**C** methane and nitrogen  
**D** nitrogen and oxygen

- 26** Decane is an alkane.

Which statement about decane is correct?

- A** It burns in air to form carbon dioxide and hydrogen.
- B** It is an unsaturated hydrocarbon.
- C** It only contains single C–C and C–H bonds.
- D** It rapidly decolourises bromine water.

27 Which process is used to produce alkenes?

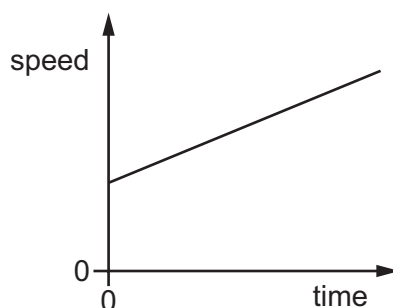
- A addition polymerisation
- B combustion
- C cracking
- D fractional distillation

28 An object travels 6.0 km in two minutes.

What is its speed?

- A 0.050 m/s      B 3.0 m/s      C 50 m/s      D 3000 m/s

29 The graph shows how the speed of a moving car varies with time.



Which statement about the car is correct?

- A The car is accelerating.
- B The car is at rest at time = 0.
- C The car must be travelling in a straight line.
- D The car travels equal distances in equal times.

30 The gravitational field strength on the planet Mercury is 3.7 N/kg.

What is the weight of a 10 kg rock on Mercury?

- A 0.37 N      B 3.7 N      C 10 N      D 37 N

31 A car has an initial kinetic energy of 120 kJ at the bottom of a slope. The car is driven up the slope. At the top of the slope, the car has 260 kJ of kinetic energy and has gained 570 kJ of gravitational potential energy.

What is the total increase in kinetic energy and gravitational potential energy of the car as it moves up the slope?

- A 430 kJ      B 710 kJ      C 830 kJ      D 950 kJ

**32** Which statement about the boiling point of a substance is correct?

- A** At all temperatures above its boiling point, a substance must be a gas.
- B** At all temperatures above its boiling point, a substance must be a liquid.
- C** At all temperatures below its boiling point, a substance must be a gas.
- D** At all temperatures below its boiling point, a substance must be a liquid.

**33** A student puts an object made of metal and another object made of plastic in the same freezer for several days.

The student removes the two objects from the freezer.

When the student touches the objects, the metal one feels colder than the plastic one.

Why is this?

- A** The metal conducts heat quickly away from the hand.
- B** The metal is at a lower temperature than the plastic.
- C** The plastic conducts heat quickly into the hand.
- D** The plastic has a lower melting point than the metal.

**34** What is a use of microwaves?

- A** checking for broken bones
- B** satellite television
- C** tanning lamps
- D** television remote controllers

**35** A loudspeaker vibrates at different frequencies.

Which frequency of vibration does **not** produce a sound that a human can hear?

- A** 60 Hz                      **B** 600 Hz                      **C** 6.0 kHz                      **D** 60 kHz

**36** A potential difference (p.d.) of 6.0 V is applied across a lamp.

The current in the lamp is 1.5 A.

What is the resistance of the lamp?

- A** 0.25  $\Omega$                       **B** 4.0  $\Omega$                       **C** 4.5  $\Omega$                       **D** 9.0  $\Omega$

- 37** A plastic rod is rubbed with a woollen cloth. The rod becomes negatively charged.

What happens to the woollen cloth?

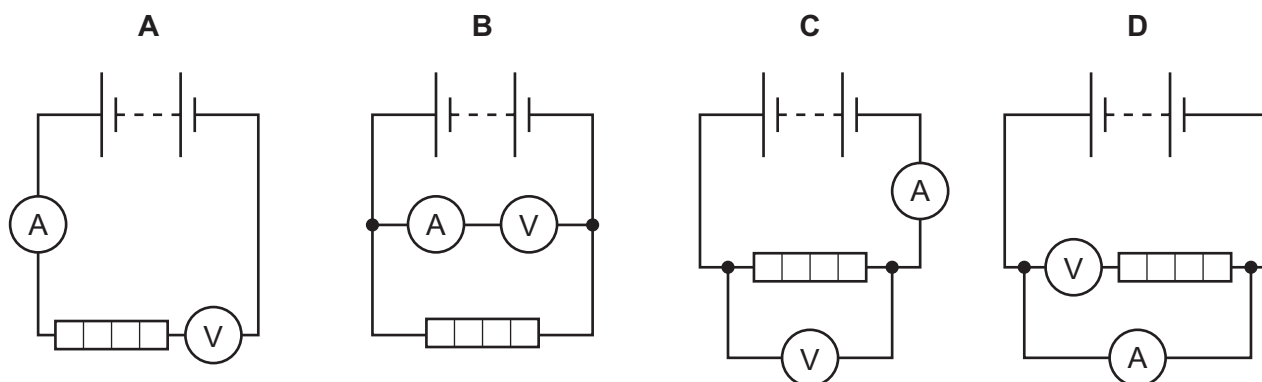
- A** It gains electrons and becomes negatively charged.
- B** It gains electrons and becomes positively charged.
- C** It loses electrons and becomes negatively charged.
- D** It loses electrons and becomes positively charged.

- 38** A battery is connected to a heater, an ammeter and a voltmeter.

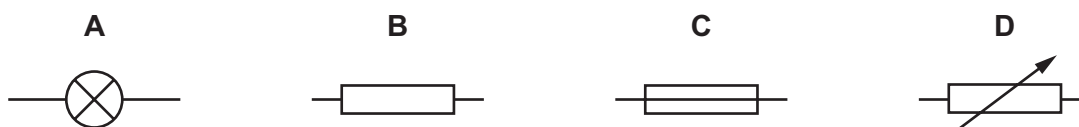
The ammeter measures the current in the heater.

The voltmeter measures the potential difference across the heater.

Which diagram shows this circuit?



- 39** What is the circuit symbol for a component whose only purpose is to protect an electric circuit?



- 40** Which risk is increased by using electrical equipment in damp conditions rather than in dry conditions?

- A** the cable to the equipment overheating
- B** the equipment overheating
- C** the current becoming too low
- D** the person receiving an electric shock

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The Periodic Table of Elements

| Group                      |                             |                                                                                             |                                 |                             |                              |                             |                              |                              |                                |                               |                               |                             |                             |                             |                               |                              |                            |                        |
|----------------------------|-----------------------------|---------------------------------------------------------------------------------------------|---------------------------------|-----------------------------|------------------------------|-----------------------------|------------------------------|------------------------------|--------------------------------|-------------------------------|-------------------------------|-----------------------------|-----------------------------|-----------------------------|-------------------------------|------------------------------|----------------------------|------------------------|
| I                          | II                          |                                                                                             |                                 |                             |                              |                             |                              |                              |                                |                               |                               | III                         | IV                          | V                           | VI                            | VII                          | VIII                       |                        |
| 3<br>Li<br>lithium<br>7    | 4<br>Be<br>beryllium<br>9   | <div>Key</div> <div>atomic number<br/>atomic symbol<br/>name<br/>relative atomic mass</div> |                                 |                             |                              |                             |                              |                              |                                |                               |                               | 1<br>H<br>hydrogen<br>1     | 5<br>B<br>boron<br>11       | 6<br>C<br>carbon<br>12      | 7<br>N<br>nitrogen<br>14      | 8<br>O<br>oxygen<br>16       | 9<br>F<br>fluorine<br>19   | 10<br>Ne<br>neon<br>20 |
|                            |                             |                                                                                             |                                 |                             |                              |                             |                              |                              |                                |                               |                               |                             |                             |                             |                               |                              |                            |                        |
|                            |                             |                                                                                             |                                 |                             |                              |                             |                              |                              |                                |                               |                               |                             |                             |                             |                               |                              |                            |                        |
| 11<br>Na<br>sodium<br>23   | 12<br>Mg<br>magnesium<br>24 |                                                                                             |                                 |                             |                              |                             |                              |                              |                                |                               | 13<br>Al<br>aluminium<br>27   | 14<br>Si<br>silicon<br>28   | 15<br>P<br>phosphorus<br>31 | 16<br>S<br>sulfur<br>32     | 17<br>Cl<br>chlorine<br>35.5  | 18<br>Ar<br>argon<br>40      |                            |                        |
| 19<br>K<br>potassium<br>39 | 20<br>Ca<br>calcium<br>40   | 21<br>Sc<br>scandium<br>45                                                                  | 22<br>Ti<br>titanium<br>48      | 23<br>V<br>vanadium<br>51   | 24<br>Cr<br>chromium<br>52   | 25<br>Mn<br>manganese<br>55 | 26<br>Fe<br>iron<br>56       | 27<br>Co<br>cobalt<br>59     | 28<br>Ni<br>nickel<br>59       | 29<br>Cu<br>copper<br>64      | 30<br>Zn<br>zinc<br>65        | 31<br>Ga<br>gallium<br>70   | 32<br>Ge<br>germanium<br>73 | 33<br>As<br>arsenic<br>75   | 34<br>Se<br>selenium<br>79    | 35<br>Br<br>bromine<br>80    | 36<br>Kr<br>krypton<br>84  |                        |
| 37<br>Rb<br>rubidium<br>85 | 38<br>Sr<br>strontium<br>88 | 39<br>Y<br>yttrium<br>89                                                                    | 40<br>Zr<br>zirconium<br>91     | 41<br>Nb<br>niobium<br>93   | 42<br>Mo<br>molybdenum<br>96 | 43<br>Tc<br>technetium<br>— | 44<br>Ru<br>ruthenium<br>101 | 45<br>Rh<br>rhodium<br>103   | 46<br>Pd<br>palladium<br>106   | 47<br>Ag<br>silver<br>108     | 48<br>Cd<br>cadmium<br>112    | 49<br>In<br>indium<br>115   | 50<br>Sn<br>tin<br>119      | 51<br>Sb<br>antimony<br>122 | 52<br>Te<br>tellurium<br>128  | 53<br>I<br>iodine<br>127     | 54<br>Xe<br>xenon<br>131   |                        |
| 55<br>Cs<br>caesium<br>133 | 56<br>Ba<br>barium<br>137   | 57–71<br>lanthanoids                                                                        | 72<br>Hf<br>hafnium<br>178      | 73<br>Ta<br>tantalum<br>181 | 74<br>W<br>tungsten<br>184   | 75<br>Re<br>rhenium<br>186  | 76<br>Os<br>osmium<br>190    | 77<br>Ir<br>iridium<br>192   | 78<br>Pt<br>platinum<br>195    | 79<br>Au<br>gold<br>197       | 80<br>Hg<br>mercury<br>201    | 81<br>Tl<br>thallium<br>204 | 82<br>Pb<br>lead<br>207     | 83<br>Bi<br>bismuth<br>209  | 84<br>Po<br>polonium<br>—     | 85<br>At<br>astatine<br>—    | 86<br>Rn<br>radon<br>—     |                        |
| 87<br>Fr<br>francium<br>—  | 88<br>Ra<br>radium<br>—     | 89–103<br>actinoids                                                                         | 104<br>Rf<br>rutherfordium<br>— | 105<br>Db<br>dubnium<br>—   | 106<br>Sg<br>seaborgium<br>— | 107<br>Bh<br>bohrium<br>—   | 108<br>Hs<br>hassium<br>—    | 109<br>Mt<br>meitnerium<br>— | 110<br>Ds<br>darmstadtium<br>— | 111<br>Rg<br>roentgenium<br>— | 112<br>Cn<br>copernicium<br>— | 113<br>Nh<br>nihonium<br>—  | 114<br>Fl<br>flerovium<br>— | 115<br>Mc<br>moscovium<br>— | 116<br>Lv<br>livermorium<br>— | 117<br>Ts<br>tennessine<br>— | 118<br>Og<br>oganeson<br>— |                        |

|             |  |                              |                            |                                 |                              |                             |                             |                             |                               |                            |                               |                              |                           |                               |                              |                              |
|-------------|--|------------------------------|----------------------------|---------------------------------|------------------------------|-----------------------------|-----------------------------|-----------------------------|-------------------------------|----------------------------|-------------------------------|------------------------------|---------------------------|-------------------------------|------------------------------|------------------------------|
| lanthanoids |  | 57<br>La<br>lanthanum<br>139 | 58<br>Ce<br>cerium<br>140  | 59<br>Pr<br>praseodymium<br>141 | 60<br>Nd<br>neodymium<br>144 | 61<br>Pm<br>promethium<br>— | 62<br>Sm<br>samarium<br>150 | 63<br>Eu<br>europium<br>152 | 64<br>Gd<br>gadolinium<br>157 | 65<br>Tb<br>terbium<br>159 | 66<br>Dy<br>dysprosium<br>163 | 67<br>Ho<br>holmium<br>165   | 68<br>Er<br>erbium<br>167 | 69<br>Tm<br>thulium<br>169    | 70<br>Yb<br>ytterbium<br>173 | 71<br>Lu<br>lutetium<br>175  |
|             |  | 89<br>Ac<br>actinium<br>—    | 90<br>Th<br>thorium<br>232 | 91<br>Pa<br>protactinium<br>231 | 92<br>U<br>uranium<br>238    | 93<br>Np<br>neptunium<br>—  | 94<br>Pu<br>plutonium<br>—  | 95<br>Am<br>americium<br>—  | 96<br>Cm<br>curium<br>—       | 97<br>Bk<br>berkelium<br>— | 98<br>Cf<br>californium<br>—  | 99<br>Es<br>einsteinium<br>— | 100<br>Fm<br>fermium<br>— | 101<br>Md<br>mendelevium<br>— | 102<br>No<br>nobelium<br>—   | 103<br>Lr<br>lawrencium<br>— |

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).