



CO-ORDINATED SCIENCES

0654/12

Paper 1 Multiple Choice (Core)

May/June 2018

45 minutes

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

* 2 5 7 7 4 8 7 9 6 3 *

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 rows correctly match characteristics of living things with their descriptions?

| | characteristic | description |
|---|----------------|--|
| 1 | excretion | removing the waste products of metabolism |
| 2 | growth | making more living things of the same type |
| 3 | nutrition | taking in or producing food |
| 4 | respiration | releasing energy from food |

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

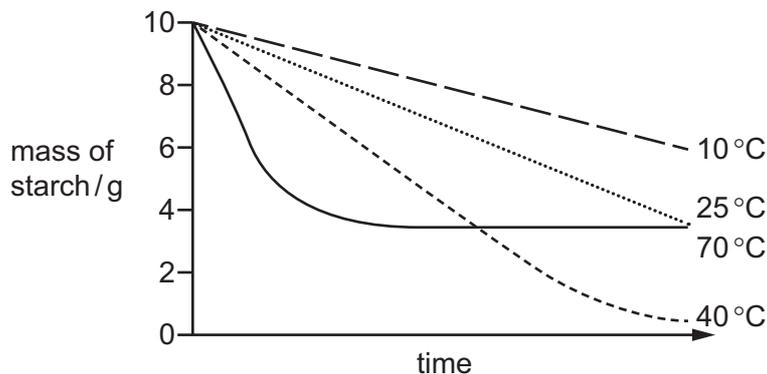
2 Which statement about cells is correct?

- A** Cell membranes are found only in animal cells.
- B** Cell membranes are found only in plant cells.
- C** Cell walls are found only in animal cells.
- D** Cell walls are found only in plant cells.

3 Which line shows the structures in increasing size?

- A** chromosome → gamete → gene → nucleus
- B** chromosome → nucleus → gene → gamete
- C** gene → chromosome → gamete → nucleus
- D** gene → chromosome → nucleus → gamete

4 The graph shows the rate at which 10g of starch is broken down by amylase at four temperatures.



Which is the optimum temperature?

- A** 10°C
- B** 25°C
- C** 40°C
- D** 70°C

- 5 Tests were carried out on a colourless liquid, with the following results.

| test | colour obtained |
|------------|-----------------|
| Benedict's | blue |
| biuret | purple |
| iodine | blue/black |

What did the colourless liquid contain?

- A** protein only
- B** protein and reducing sugar only
- C** protein and starch only
- D** protein, reducing sugar and starch
- 6 Which statement is correct?
- A** The pulmonary artery carries deoxygenated blood away from the left ventricle.
- B** The pulmonary artery carries deoxygenated blood away from the right ventricle.
- C** The pulmonary vein carries oxygenated blood away from the left ventricle.
- D** The pulmonary vein carries oxygenated blood away from the right ventricle.
- 7 By which process does oxygen pass from the alveoli to the blood capillaries in the lungs?
- A** diffusion
- B** evaporation
- C** secretion
- D** transpiration
- 8 What happens when the human body temperature drops below normal?

| | arterioles near skin surface | sweat secreted |
|----------|------------------------------|----------------|
| A | constrict | no |
| B | constrict | yes |
| C | dilate | no |
| D | dilate | yes |

9 Which row is true of asexual reproduction?

| | number of parents | offspring |
|----------|-------------------|------------------------|
| A | 1 | genetically dissimilar |
| B | 1 | genetically identical |
| C | 2 | genetically dissimilar |
| D | 2 | genetically identical |

10 What is a function of the stigma of a flower?

- A** to make female gametes
- B** to make male gametes
- C** to produce nectar to attract insects
- D** to secrete a sugary solution to aid the germination of pollen grains

11 In a plant, blue flower colour is dominant to red flower colour. A heterozygous blue-flowered plant is crossed with another heterozygous blue-flowered plant.

What are the expected proportions of the flower colour of the offspring?

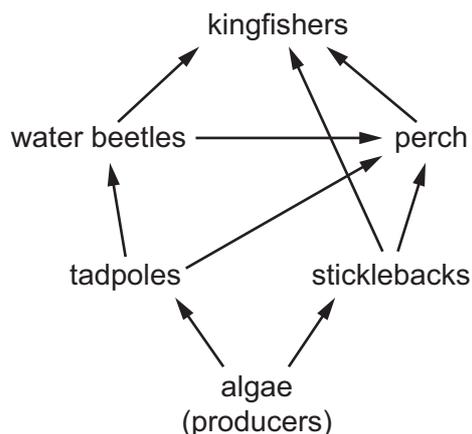
- A** 25% blue, 75% red
- B** 50% blue, 50% red
- C** 75% blue, 25% red
- D** 100% blue, 0% red

12 Cows have been bred to produce much greater yields of milk than cows from a century ago.

What is this an example of?

- A** artificial selection
- B** conservation
- C** inheritance
- D** natural selection

13 The diagram shows a food web.



Which of the animals are carnivores?

- A kingfishers only
 - B kingfishers, perch and water beetles
 - C perch and water beetles only
 - D tadpoles and sticklebacks
- 14 Pure copper chloride can be obtained from a mixture of powdered copper and solid copper chloride.

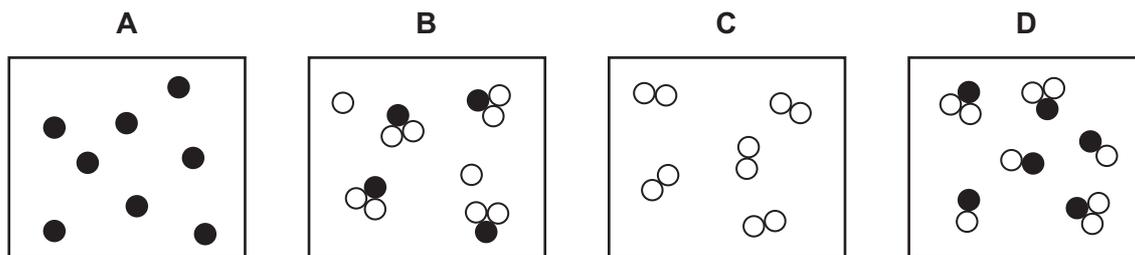
Three stages in the method are listed.

- P add water and stir
- Q crystallise
- R filter

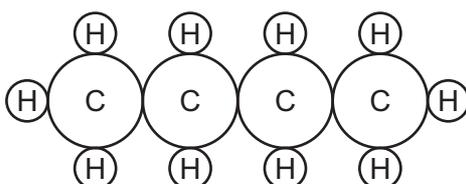
In which order are these stages carried out in order to obtain pure copper chloride from the mixture?

- A P → Q → R
- B P → R → Q
- C R → P → Q
- D R → Q → P

15 Which diagram represents a mixture of an element and a compound?



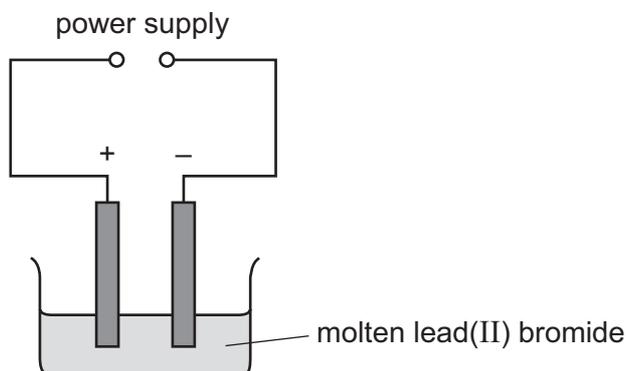
16 The diagram represents a molecule of butane.



What is the formula of butane?

- A** C_2H_5 **B** C_4H_8 **C** C_4H_{10} **D** $C_{10}H_4$

17 Molten lead(II) bromide is electrolysed as shown.



An element is produced at the negative electrode.

What is the name of the element and of the negative electrode?

| | element | negative electrode |
|----------|---------|--------------------|
| A | bromine | anode |
| B | bromine | cathode |
| C | lead | anode |
| D | lead | cathode |

18 Which statement about electroplating iron with chromium is correct?

- A A catalyst is used.
- B The anode is chromium.
- C The electrolyte contains aqueous iron ions.
- D The electrolyte contains solid chromium ions.

19 Calcium carbonate reacts with dilute hydrochloric acid.

Equal masses of different-sized pieces of calcium carbonate are placed in four test-tubes, as shown.

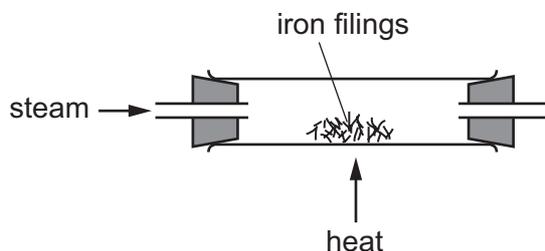
| test-tube | 1 | 2 | 3 | 4 |
|---------------------------|---------------|--------|--------------|--------------|
| size of calcium carbonate | medium pieces | powder | small pieces | large pieces |

Equal volumes of the same concentration of dilute hydrochloric acid are added to each test-tube.

Which test-tube shows the lowest rate of reaction?

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

20 When iron is heated with steam, a black solid is formed.



The equation for the reaction is shown.



Which statement about this reaction is correct?

- A Iron has been oxidised because it has gained oxygen.
- B Iron has been reduced because it removed oxygen from water.
- C Iron oxide has been reduced because it contains oxygen.
- D Water has been oxidised because it contains oxygen.

21 Magnesium and hydrochloric acid react together.

What is the correct word equation?

- A magnesium + hydrochloric acid → magnesium chloride + hydrogen
- B magnesium + hydrochloric acid → magnesium chloride + hydrogen chloride
- C magnesium + hydrochloric acid → magnesium chloride + hydrogen + chlorine
- D magnesium + hydrochloric acid → magnesium chloride + hydrogen chloride + hydrogen

22 Some properties of elements are listed.

- 1 conduct electricity
- 2 form coloured compounds
- 3 high boiling point

What are the properties of a transition element?

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

23 Metal X reacts rapidly with steam but only very slowly with cold water.

What is X?

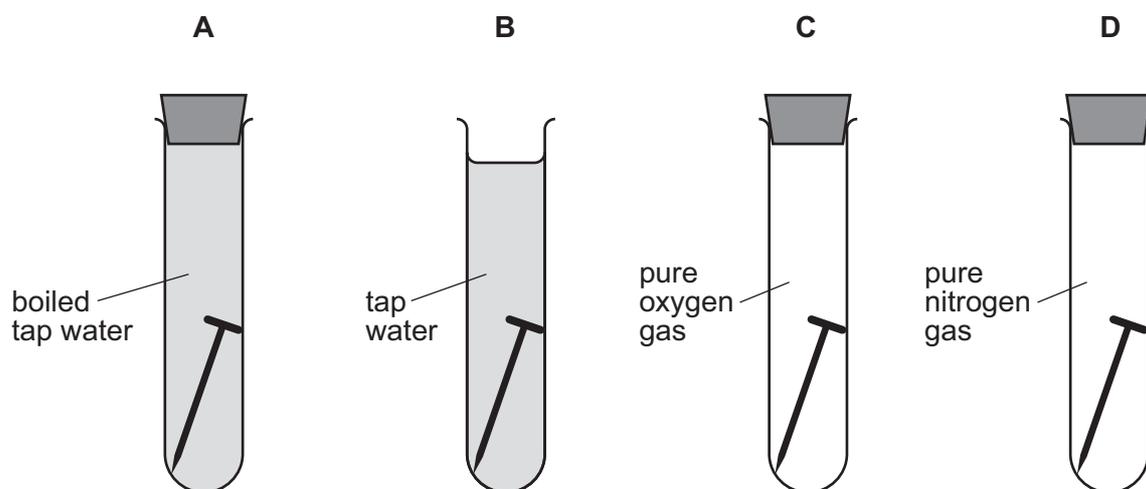
- A calcium
- B copper
- C magnesium
- D sodium

24 Which gas is **not** a common air pollutant?

- A water vapour
- B carbon monoxide
- C nitrogen dioxide
- D sulfur dioxide

25 Four iron nails are placed in four test-tubes as shown.

In which test-tube does the iron nail rust most quickly?



26 Calcium carbonate is decomposed by heating in an industrial process.

The equation for this reaction is shown.



Which statement is **not** correct?

- A The common name for calcium carbonate is limestone.
- B The common name for calcium oxide is lime.
- C Calcium oxide is used to neutralise alkaline soil.
- D Calcium oxide is used to neutralise industrial waste products.

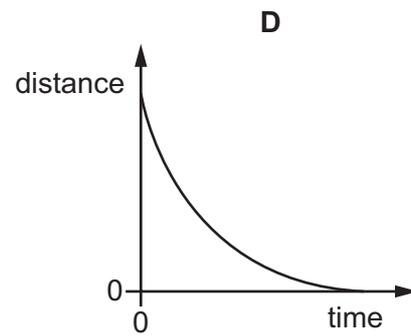
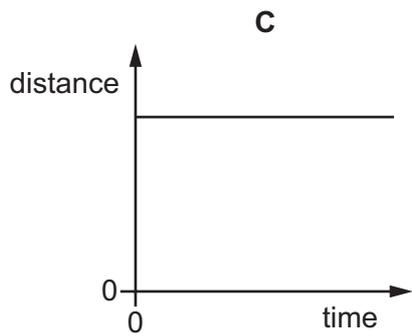
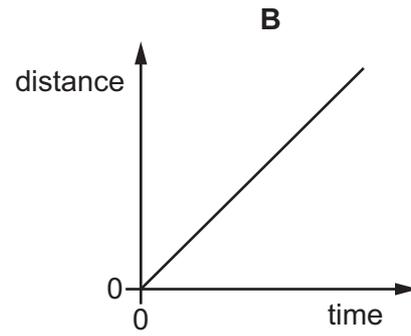
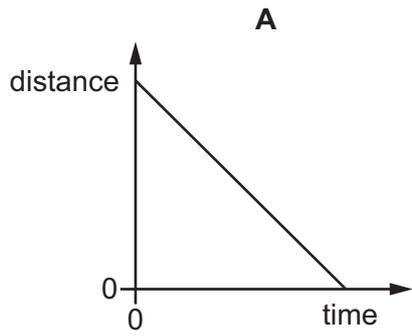
27 Ethene is used to make poly(ethene).

Which words describe ethene?

- 1 hydrocarbon
- 2 saturated
- 3 monomer

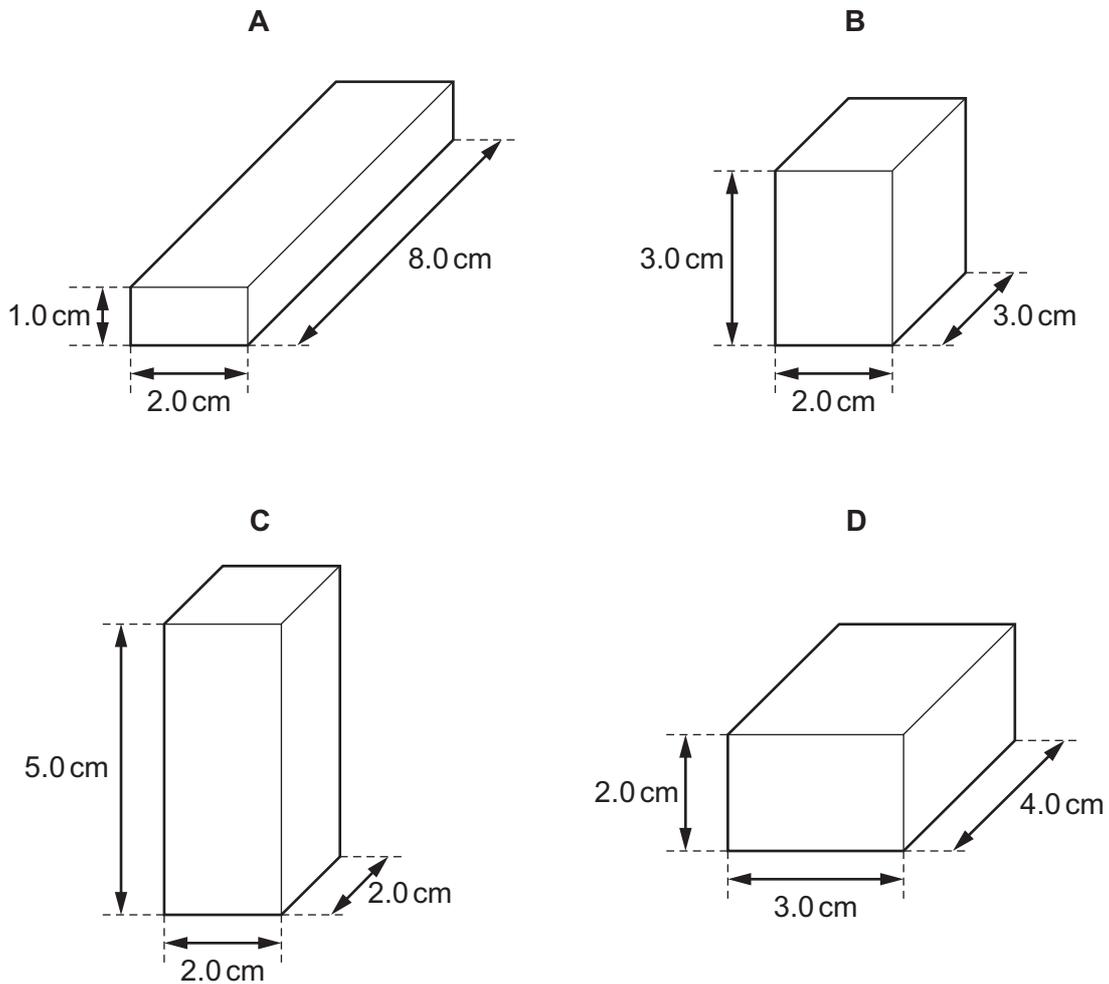
- A 1 and 2 only
- B 1 and 3 only
- C 2 and 3 only
- D 1, 2 and 3

28 Which distance-time graph represents a body moving with a changing speed?



29 The diagrams show four solid blocks with the same mass.

Which block is made from the **least** dense material?



30 A boy carries out an experiment to demonstrate pressure and its relationship to force and area.

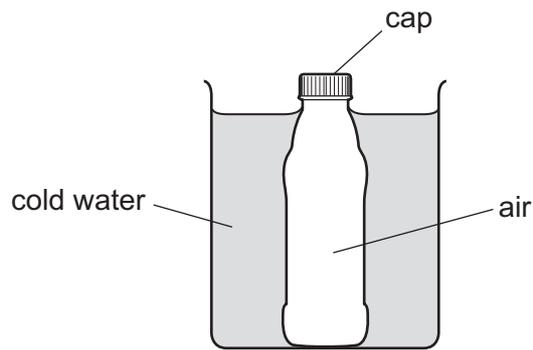
Which experiment produces the highest pressure on the classroom floor?

- A standing with one foot on the floor
- B standing with two feet on the floor
- C standing with one foot on the floor, holding a 5.0 kg mass
- D standing with two feet on the floor, holding a 5.0 kg mass

31 Which energy resource does **not** use a turbine and generator to produce electricity?

- A geothermal
- B nuclear fission
- C solar cells
- D wind

32 A glass bottle containing warm air is sealed with a screw cap and then cooled in cold water.



The contraction of the glass bottle can be ignored.

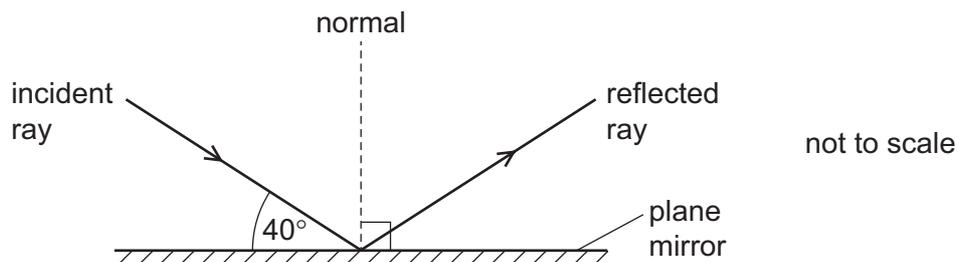
What remains the same during the cooling?

- A the air pressure inside the bottle
 - B the energy of the air molecules in the bottle
 - C the force on the cap made by the air molecules in the bottle
 - D the volume of air in the bottle
- 33 Which type of heat transfer is the main method in liquid water?
- A conduction
 - B convection
 - C evaporation
 - D radiation
- 34 A girl is sitting on a rock in the sea looking at passing waves. She notices that five complete wavelengths pass her in 20 s.

What is the frequency of this wave?

- A 0.25 Hz B 4.0 Hz C 15 Hz D 100 Hz

35 The diagram shows light hitting a plane mirror.



What is the angle of reflection?

- A** 40° **B** 50° **C** 80° **D** 100°

36 White light is dispersed by a glass prism into the colours of the spectrum.

Which colour of light is refracted the most and which is refracted the least?

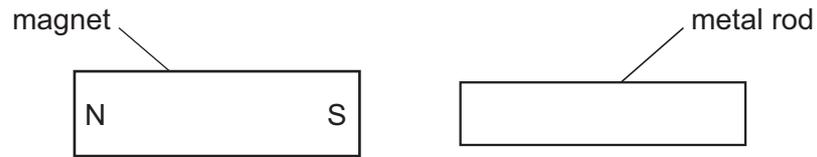
| | refracted most | refracted least |
|----------|----------------|-----------------|
| A | green | red |
| B | red | green |
| C | red | violet |
| D | violet | red |

37 The electromagnetic spectrum includes radio waves, infra-red and X-rays.

What is the correct sequence of these waves in order of increasing wavelength (smallest wavelength first)?

- A** infra-red, radio waves, X-rays
B infra-red, X-rays, radio waves
C X-rays, infra-red, radio waves
D X-rays, radio waves, infra-red

- 38 A bar magnet is brought near to a metal rod.



The magnet is now turned around so that the N-pole is on the right. The magnet is again brought near to the metal rod.

In both cases the metal rod is attracted to the magnet.

What could the metal rod be?

- A another bar magnet
 - B a piece of aluminium
 - C a piece of copper
 - D a piece of iron
- 39 Which row correctly states whether the unit for electromotive force (e.m.f.), mass and weight is the newton?

| | electromotive force (e.m.f.) | mass | weight |
|---|------------------------------|------|--------|
| A | no | no | yes |
| B | no | yes | yes |
| C | yes | no | no |
| D | yes | yes | no |

- 40 Which changes **both** result in an increase in the resistance of a metal wire?
- A decreasing the length and decreasing the diameter of the wire
 - B decreasing the length and increasing the diameter of the wire
 - C increasing the length and decreasing the diameter of the wire
 - D increasing the length and increasing the diameter of the wire

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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 | <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> Key atomic number atomic symbol name relative atomic mass </div> | | | | | | | | | | | | | |
| 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 B boron 11 | 32 Ga gallium 70 | 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 oganesson — | 119 Uue unbinilium — | 120 Uub unbinilium — | 121 Uut ununilium — |

| | | | | | | | | | | | | | | | |
|-------------|------------------------------|----------------------------|---------------------------------|------------------------------|-----------------------------|-----------------------------|-----------------------------|-------------------------------|----------------------------|-------------------------------|------------------------------|---------------------------|-------------------------------|------------------------------|------------------------------|
| 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 dm³ at room temperature and pressure (r.t.p.).