



Cambridge IGCSE™ (9–1)

CO-ORDINATED SCIENCES

0973/12

Paper 1 Multiple Choice (Core)

May/June 2024

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.

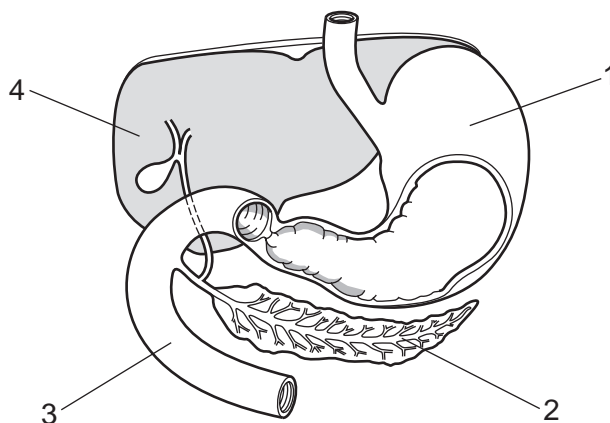
INFORMATION

- 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 **16** pages. Any blank pages are indicated.



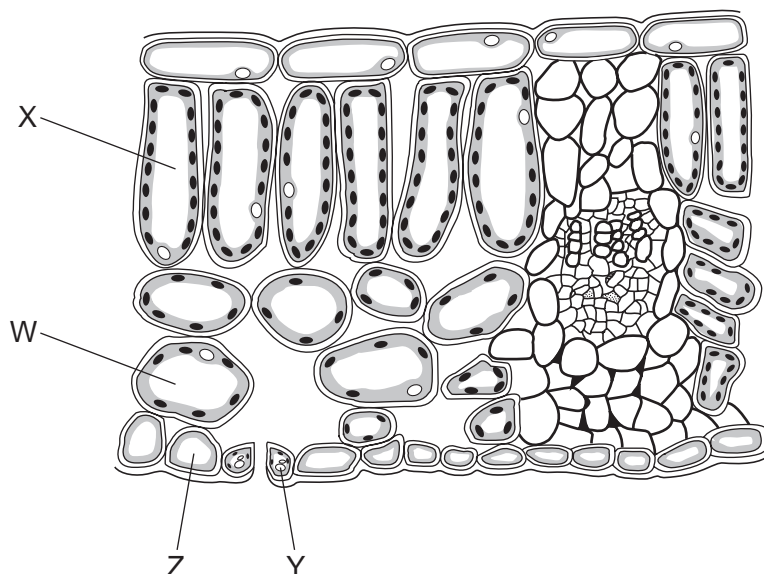
- 1 Which two characteristics of living organisms are demonstrated by gravitropism?
- A** growth and nutrition
B growth and sensitivity
C respiration and nutrition
D respiration and sensitivity
- 2 By which process does oxygen pass from the alveoli to the blood capillaries in the lungs?
- A** diffusion
B osmosis
C secretion
D transpiration
- 3 What are the products when oils are digested?
- A** amino acids and glycerol
B fats and amino acids
C fatty acids and glycerol
D fatty acids and sugars
- 4 The diagram shows part of the human alimentary canal and associated organs.



Which labels identify the liver, pancreas and stomach?

| | liver | pancreas | stomach |
|----------|-------|----------|---------|
| A | 2 | 1 | 3 |
| B | 2 | 3 | 1 |
| C | 4 | 2 | 3 |
| D | 4 | 2 | 1 |

- 5 The diagram shows the cross-section of part of a leaf with cells labelled W, X, Y and Z.



Which cells lose most water and which cells absorb most carbon dioxide during the daytime?

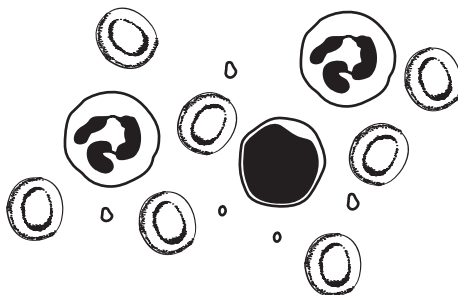
- A** W and X **B** X and Y **C** Y and Z **D** W and Z
- 6 A scientist places equal volumes of starch and saliva into a test-tube.

After 30 minutes, the mixture in the test-tube is tested with iodine solution.

The iodine solution remains brown.

Which process does this experiment demonstrate?

- A** absorption
B assimilation
C digestion
D ingestion
- 7 The diagram shows some blood viewed under a light microscope.



How many red blood cells are shown?

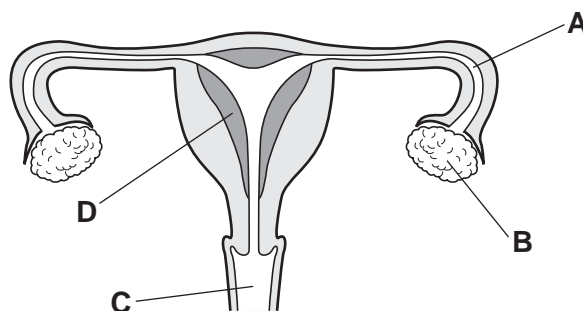
- A** 1 **B** 2 **C** 5 **D** 7

- 8 Which statement about the composition of expired air, compared with inspired air, is correct?
- A** The percentage of carbon dioxide is decreased and the percentage of water vapour is increased.
- B** The percentage of carbon dioxide is increased and the percentage of water vapour is increased.
- C** The percentage of oxygen is decreased and the percentage of carbon dioxide is decreased.
- D** The percentage of oxygen is increased and the percentage of carbon dioxide is decreased.
- 9 Which row about hormones is correct?

| | means of transport | where produced | site of action |
|----------|--------------------|----------------|----------------|
| A | alimentary canal | glands | target organs |
| B | alimentary canal | organs | all organs |
| C | blood | glands | target organs |
| D | blood | organs | all organs |

- 10 The diagram shows the human female reproductive system.

Where is the embryo normally implanted to enable it to develop into a healthy fetus?

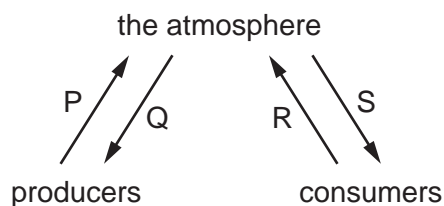


- 11 Which statement describes a heterozygous genotype?
- A** not pure breeding with two different alleles
- B** not pure breeding with two identical alleles
- C** pure breeding with two different alleles
- D** pure breeding with two identical alleles

12 Which statement about organisms in a food chain is correct?

- A A carnivore is an organism that gets its energy by eating plants.
- B A consumer is an organism that gets its energy by eating other organisms.
- C A herbivore is an organism that gets its energy by eating animals.
- D A producer is an organism that gets its energy from dead or waste matter.

13 The diagram shows gas exchange by two groups of organisms during the hours of darkness.



Which letters represent gases that are part of the carbon cycle?

- A P and Q B P and R C P and S D Q and S

14 Which statement about atoms is correct?

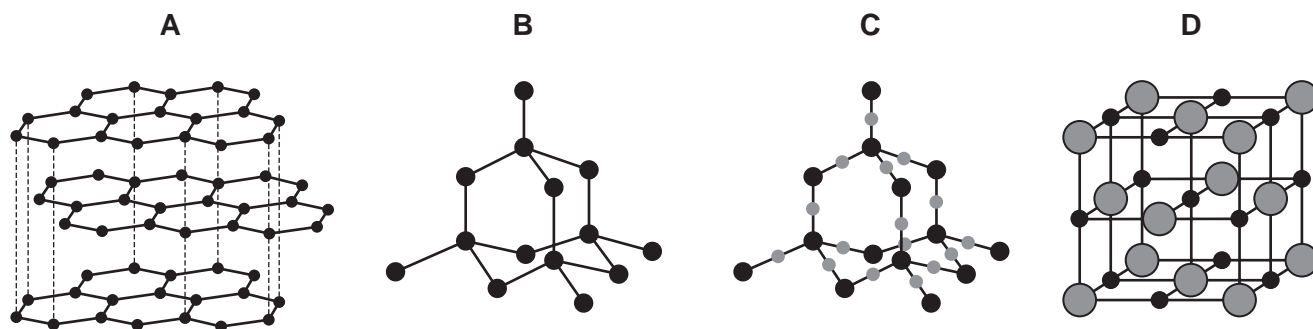
- A All atoms contain equal numbers of neutrons and protons.
- B All atoms of the same element have the same number of neutrons.
- C The Periodic Table lists atoms in order of increasing mass number.
- D The smallest unit of an element is an atom.

15 Which substances exist as covalent molecules?

- 1 helium
- 2 chlorine
- 3 sodium chloride
- 4 ethanol

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

16 Which diagram shows the structure of graphite?



17 Which oxides of nitrogen have the same ratio of nitrogen atoms to oxygen atoms?

1 N_2O

2 NO

3 NO_2

4 N_2O_4

A 1 and 2

B 1 and 3

C 2 and 4

D 3 and 4

18 Hydrogen gas is given off when zinc reacts with dilute sulfuric acid.

Which piece of apparatus is used to collect the hydrogen gas and measure its volume?

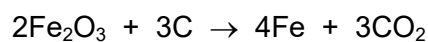
A balance

B gas syringe

C pipette

D test-tube

19 The equation for the reaction between iron(III) oxide, Fe_2O_3 , and carbon is shown.



Which statement about this reaction is correct?

A C is oxidised.

B CO_2 is reduced.

C Fe is oxidised.

D Fe_2O_3 is oxidised.

- 20** The waste from a factory is acidic. The factory treats the waste with limestone.

Which row shows the pH of the waste before and after treatment?

| | before | after |
|----------|--------|-------|
| A | 6 | 5 |
| B | 6 | 7 |
| C | 8 | 7 |
| D | 8 | 9 |

- 21** White solid X reacts with dilute hydrochloric acid. A gas is produced which turns limewater milky.

A flame test is done on solid X and produces a red coloured flame.

What is X?

- A** lithium carbonate
- B** lithium chloride
- C** potassium carbonate
- D** potassium chloride

- 22** Different minerals contain different elements.

Which mineral contains three non-metallic elements?

| | mineral | formula |
|----------|--------------|---|
| A | chalcopyrite | CuFeS_2 |
| B | cryolite | Na_3AlF_6 |
| C | gypsum | $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ |
| D | ilmenite | FeTiO_3 |

- 23** Manganese is a transition element.

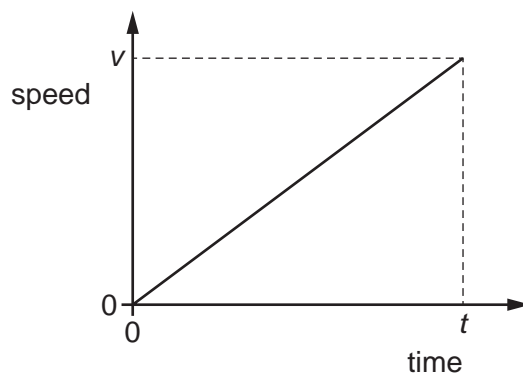
What is a property of manganese?

- A** high melting point
- B** low density
- C** thermal insulator
- D** transparent

- 24** Which process is used to increase the hardness of a metal?
- A** Mix the metal with a gas.
 - B** Mix the metal with another element.
 - C** Mix the metal with a polymer.
 - D** Mix the metal with its ore.
- 25** Which compound contains two of the three elements needed in a fertiliser used for plant growth?
- A** potassium carbonate
 - B** potassium chloride
 - C** potassium nitrate
 - D** potassium sulfate
- 26** Which type of reaction is used to manufacture lime from limestone?
- A** addition polymerisation
 - B** cracking
 - C** neutralisation
 - D** thermal decomposition
- 27** Poly(ethene) is made from ethene by addition polymerisation.
- Which word describes ethene in this process?
- A** fuel
 - B** catalyst
 - C** monomer
 - D** solvent

- 28 The graph shows how the speed of an object varies with time.

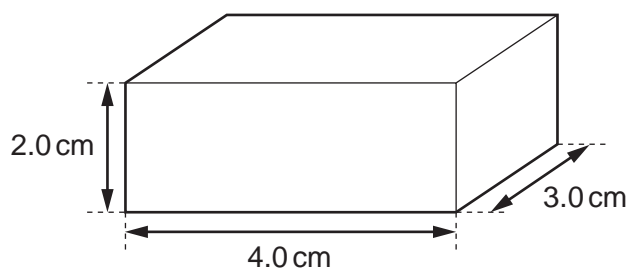
The speed of the object is v at time t .



Which expression gives the distance travelled by the object in time t ?

- A** $\frac{1}{2}\left(\frac{v}{t}\right)$ **B** $\frac{v}{t}$ **C** $\frac{1}{2}vt$ **D** vt

- 29 The diagram shows a block of metal of mass 72 g.



What is the density of the metal?

- A** 3.0 g/cm^3 **B** 6.0 g/cm^3 **C** 9.0 g/cm^3 **D** 12 g/cm^3

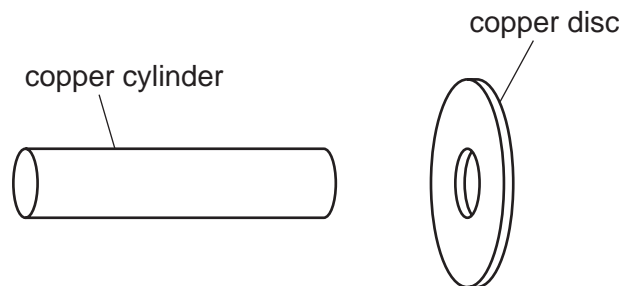
- 30 Which statement about a resultant force is correct?

- A** An object must have a resultant force acting on it if it is moving.
B An object must have a resultant force acting on it if it is slowing down.
C Two forces must be in the same direction to produce a resultant force.
D Two forces must have the same magnitude to produce a resultant force.

- 31 What is the energy source for a wind turbine that is producing electricity?

- A** chemical potential energy of wind
B gravitational potential energy of wind
C kinetic energy of wind
D thermal energy of wind

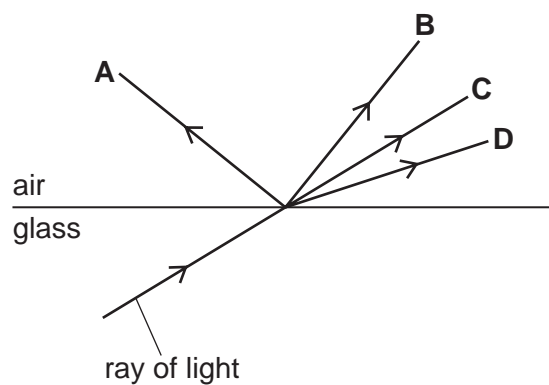
- 32** A copper disc has a hole at its centre that is slightly too small to fit over a copper cylinder.



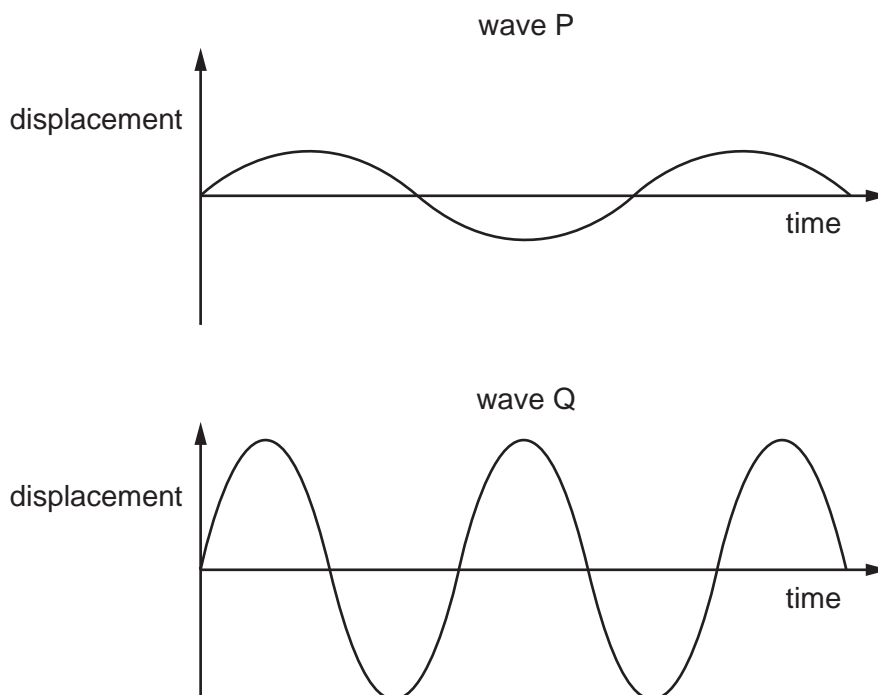
How can the disc be fitted over the cylinder?

- A** Cool the disc and then fit it over the cylinder.
 - B** Cool the disc, heat the cylinder and then fit the disc over the cylinder.
 - C** Heat the cylinder and then fit it through the hole in the disc.
 - D** Heat the disc and then fit it over the cylinder.
- 33** The diagram shows a ray of light travelling from glass into air.

Which labelled arrow shows the path of the light in the air?



- 34 The diagrams represent two different sound waves, P and Q, drawn to the same scale.



How do the loudness and the pitch of the sounds compare?

| | louder sound | higher-pitched sound |
|----------|--------------|----------------------|
| A | P | P |
| B | P | Q |
| C | Q | P |
| D | Q | Q |

- 35 When two different, uncharged, insulating materials are rubbed together, one becomes positively charged and the other becomes negatively charged.

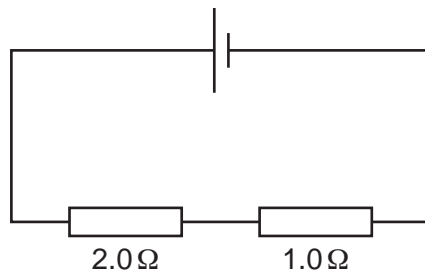
What happens to cause the materials to become charged?

| | positively charged material | negatively charged material |
|----------|-----------------------------|-----------------------------|
| A | gains protons | gains electrons |
| B | gains protons | loses protons |
| C | loses electrons | gains electrons |
| D | loses electrons | loses protons |

36 For which quantities is the unit the volt?

- A current and potential difference (p.d.)
- B electromotive force (e.m.f.) and potential difference (p.d.)
- C electromotive force (e.m.f.) and resistance
- D potential difference (p.d.) and resistance

37 A $2.0\ \Omega$ resistor and a $1.0\ \Omega$ resistor are connected in series with a cell.



Which statement about current in the circuit is correct?

- A The current in the $2.0\ \Omega$ resistor is double the current in the $1.0\ \Omega$ resistor.
- B The current in the $2.0\ \Omega$ resistor is equal to the current in the $1.0\ \Omega$ resistor.
- C The current in the $2.0\ \Omega$ resistor is half the current in the $1.0\ \Omega$ resistor.
- D The current in the cell is larger than the current in either resistor.

38 A coil lies between the poles of a magnet. There is a current in the coil and this causes a turning effect.

Which change does **not** increase the turning effect on the coil?

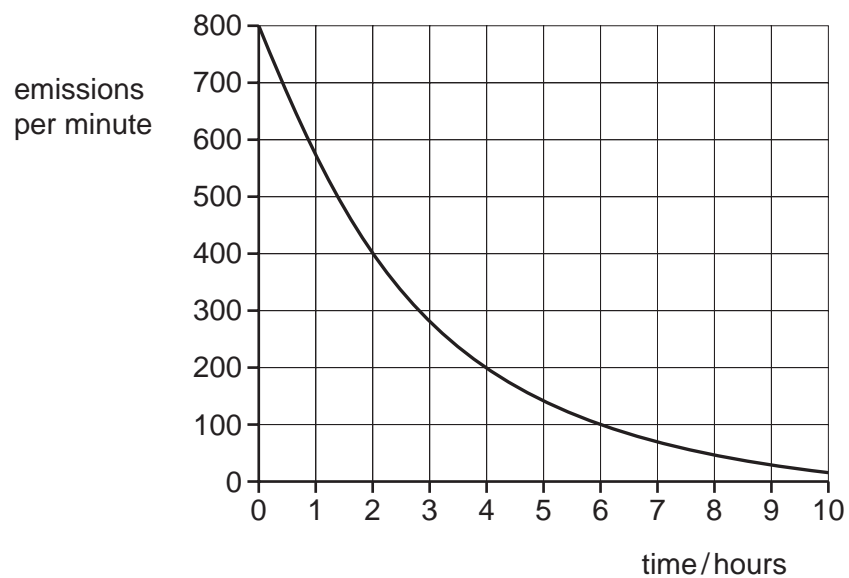
- A changing the direction of the current
- B increasing the current
- C using a stronger magnet
- D using more turns in the coil

39 An atom of an isotope of strontium (Sr) has a proton number of 38 and contains 52 neutrons.

What is the nuclide notation for this isotope?

- A $^{52}_{38}\text{Sr}$ B $^{90}_{38}\text{Sr}$ C $^{38}_{52}\text{Sr}$ D $^{90}_{52}\text{Sr}$

40 The graph shows the decay curve for a radioactive substance.



What is the half-life of this substance?

- A 2.0 hours
- B 3.2 hours
- C 5.0 hours
- D 10 hours

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The Periodic Table of Elements

| Group | | | | | | | | | | | | | | | | | | | | |
|----------------------------|-----------------------------|---|-----------------------------|---------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|--------------------------------|-------------------------------|-------------------------------|-----------------------------|-----------------------------|-----------------------------|-------------------------------|------------------------------|-----------------------------|------------------------------|-------------------------|--|
| I | II | | | | | | | | | | | III | IV | V | VI | VII | VIII | | | |
| | | <div>1 H hydrogen 1</div> | | | | | | | | | | | | | | | | | | |
| | | <div>Key</div> <div>atomic number atomic symbol name relative atomic mass</div> | | | | | | | | | | | | | | | | | | |
| 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 | | |
| 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 | 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 — | 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 — | | | |

| | | | | | | | | | | | | | | | |
|-------------|------------------------------|----------------------------|---------------------------------|------------------------------|-----------------------------|-----------------------------|-----------------------------|-------------------------------|----------------------------|-------------------------------|------------------------------|---------------------------|-------------------------------|------------------------------|------------------------------|
| 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 |
| | 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 24dm³ at room temperature and pressure (r.t.p.).