Cambridge Assessment International Education

Cambridge IGCSE™

CO-ORDINATED SCIENCES **0654/13**

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.

IB23 11_0654_13/4RP

[Turn over

1 A person throws a ball which their dog runs after and brings back to them.

Which characteristics of living things is the dog showing by this action?

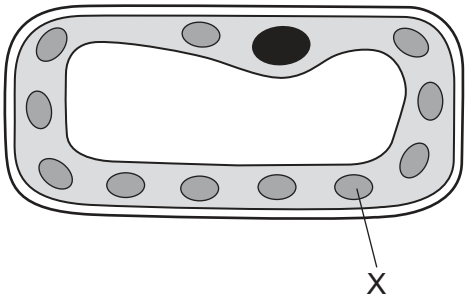
A growth and nutrition

B movement and nutrition

C movement and sensitivity

D sensitivity and growth

2 The diagram shows a palisade cell from a leaf magnified ×250.



The chloroplast labelled X measures 5 mm on the diagram.

What is its actual length?

A 0.25 mm **B** 0.05 mm **C** 0.02 mm **D** 0.01 mm

3 Which food test requires heating?

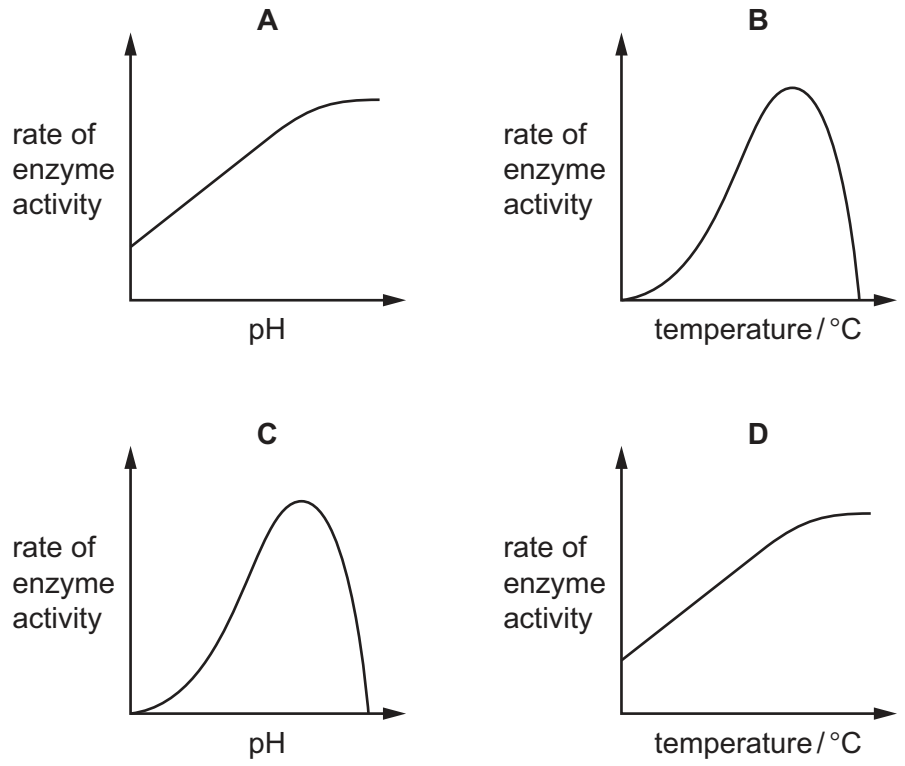
A fat

B protein

C reducing sugar

D starch

4 Which graph is correct?



5 Plants require various ions to manufacture other molecules.

Which row shows the molecules that plants make from magnesium ions and nitrate ions?

	magnesium ions	nitrate ions
A	chlorophyll	chlorophyll
B	chlorophyll	protein
C	protein	chlorophyll
D	protein	protein

6 What is a good source of vitamin C?

A citrus fruits

B liver

C meat

D milk

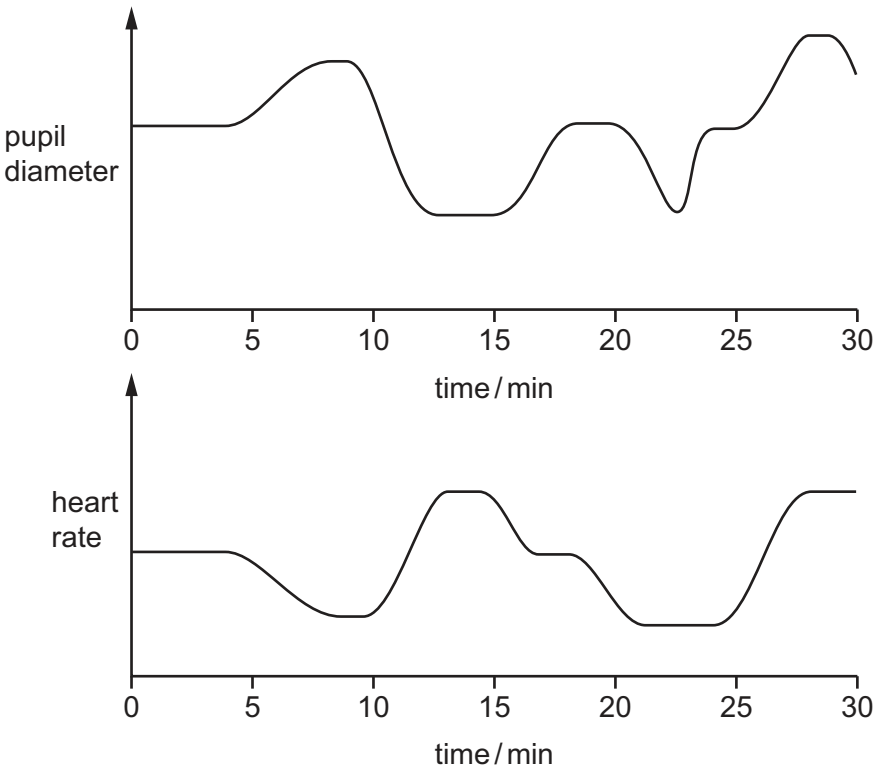
7 Which row names the substances carried by xylem vessels and the direction of travel?

	substances	direction of travel
A	sucrose only	leaves to roots
B	sucrose only	roots to leaves
C	water and dissolved minerals	leaves to roots
D	water and dissolved minerals	roots to leaves

8 What is the expected concentration of oxygen and the water vapour content in expired air?

	oxygen / %	water vapour
A	16	saturated
B	16	variable
C	21	saturated
D	21	variable

9 The graphs show the pupil diameter and heart rate of a person over a period of 30 minutes. The person was given an unexpected shock at one point during the 30 minutes.



At which time did the person experience a shock causing them to release adrenaline?

A 5 minutes

B 10 minutes

C 15 minutes

D 25 minutes

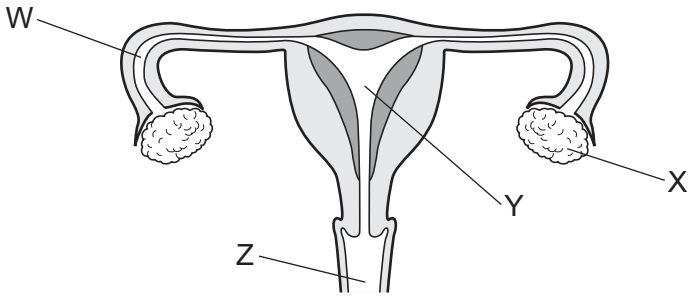
10 There are different conditions which may prevent a successful pregnancy.

1 failure of ovulation

2 failure of embryo to implant into uterus lining

3 blockage of oviducts preventing fertilisation

The diagram shows the human female reproductive system.



Which locations are involved in each condition?

	1	2	3
A	W	X	Z
B	W	Y	X
C	X	Y	W
D	X	Z	W

11 Which combination of sex chromosomes are present in the body cells of a human male?

A XX **B** XY **C** Y only **D** YY

12 The diagram shows a food chain.

mahogany tree → caterpillar → songbird → hawk

What is the mahogany tree in this food chain?

A carnivore

B consumer

C herbivore

D producer

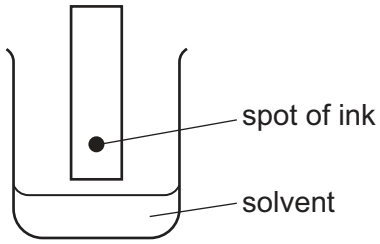
13 Which row describes the effects of deforestation?

	level of carbon dioxide in the air	risk of flooding
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

14 The colours in an ink are separated by chromatography.

Which diagram shows the assembled apparatus?

A



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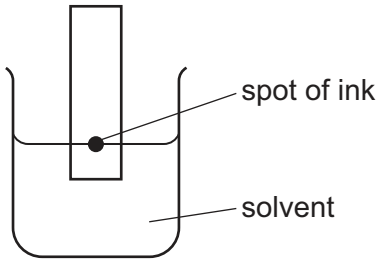

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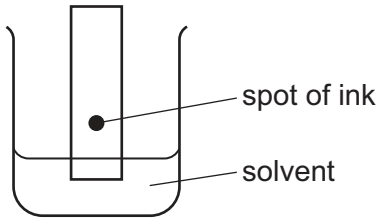

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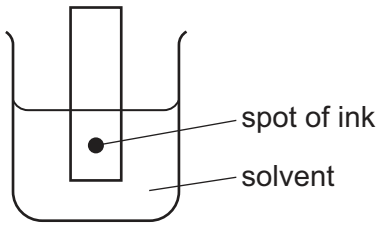
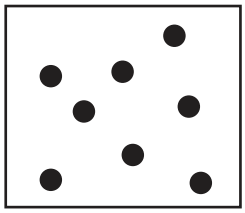


15 Which diagram represents a mixture of an element and a compound?

A



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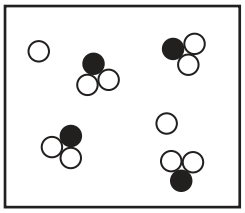

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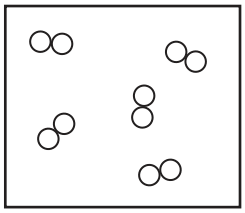
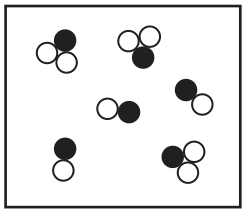


D



16 X and Y are isotopes of the same element.

Which statement about X and Y is correct?

A They have the same nucleon number but different numbers of protons.

B They have the same number of neutrons but different numbers of electrons.

C They have the same atomic number but different numbers of electrons.

D They have the same number of protons but different numbers of neutrons.

17 Dilute hydrochloric acid reacts with sodium carbonate to form sodium chloride, carbon dioxide and water.

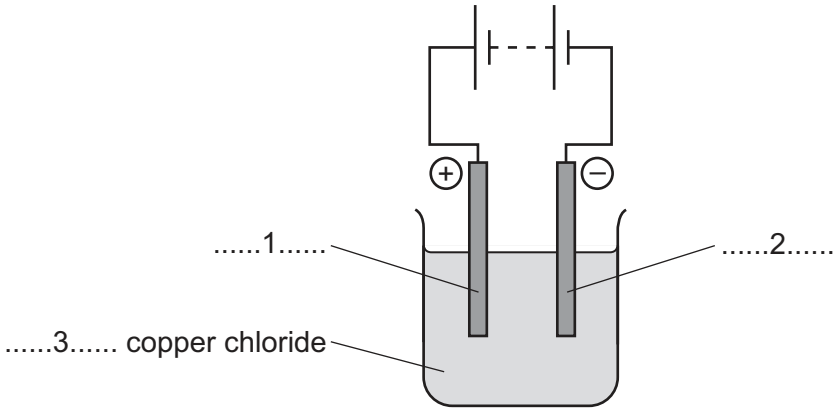
The equation for the reaction is shown.

$$w\mathrm{HC}l + \mathrm{Na_2CO_3} \rightarrow x\mathrm{NaC}l + y\mathrm{CO_2} + z\mathrm{H_2O}$$

What are the values of *w*, *x*, *y* and *z*?

	w	*x*	*y*	*z*
A	1	1	3	1
B	2	1	1	1
C	2	2	3	2
D	2	2	1	1

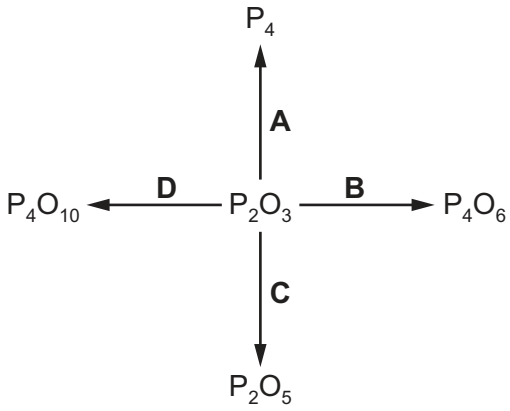
18 The apparatus used for the electrolysis of copper chloride is shown.



Which words complete labels 1, 2 and 3?

	1	2	3
A	anode	cathode	aqueous
B	anode	cathode	solid
C	cathode	anode	aqueous
D	cathode	anode	solid

19 In which change is the oxide of phosphorus, P_2O_3, reduced?



20 A piece of damp blue litmus paper is put in a test-tube of a gas. The litmus paper turns red and then changes to white.

What is the gas?

A ammonia

B carbon dioxide

C chlorine

D oxygen

21 Element X burns in air to produce an oxide.

A solution of the oxide has a pH value of 10.

What is X?

A argon

B carbon

C magnesium

D phosphorus

22 The elements in Group I of the Periodic Table are metals.

What are the trends as the group is descended?

A decrease in melting point and less reactive with water

B decrease in melting point and more reactive with water

C increase in melting point and less reactive with water

D increase in melting point and more reactive with water

23 Why is argon used in lamps?

A It is heavier than air.

B It is lighter than air.

C It is reactive.

D It is unreactive.

24 Which statement explains why carbon is used in the extraction of copper from its ore?

A It is in Group IV of the Periodic Table.

B It is more reactive than copper.

C It is a non-metal.

D It forms a giant covalent molecule.

25 Which substances are needed for iron to rust?

A oxygen and water

B nitrogen and water

C oxygen only

D water only

26 Which energy source is an example of a fossil fuel?

A hydrogen

B methane

C the Sun

D wood

27 Molecules of ethene react together to form long chain molecules.

What is the name of this type of reaction?

A addition polymerisation

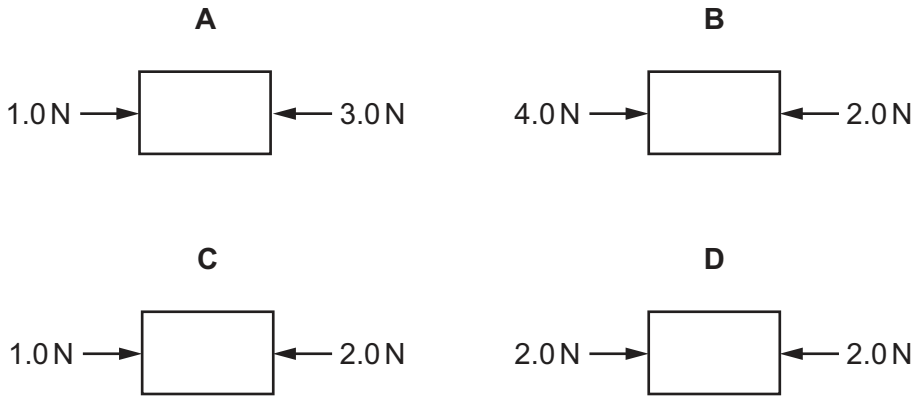
B cracking

C fermentation

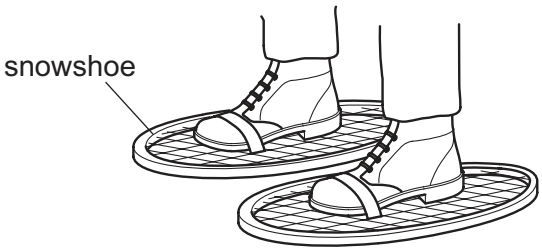
D thermal decomposition

28 The diagrams show four objects, each acted on by only two forces.

Which object is in equilibrium?



29 A person wearing snowshoes is walking on snow.



How do snowshoes decrease the pressure on the snow?

A by applying the person's weight over a larger area

B by applying the person's weight over a smaller area

C by decreasing the person's weight

D by increasing the person's weight

30 A machine does a certain quantity of work in a certain time.

Which changes to the quantity of work done and to the time taken **both** decrease the power produced by the machine?

	work done	time taken
A	decrease	decrease
B	decrease	increase
C	increase	decrease
D	increase	increase

31 A sample of liquid cools for 20 minutes. Its temperature is recorded every 2 minutes.

The results are shown.

time / minutes	0	2	4	6	8	10	12	14	16	18	20
temperature / °C	90.8	80.9	74.1	67.4	61.9	57.0	53.0	50.2	48.5	47.3	46.1

How should the sample be described at the end of 18 minutes?

A all liquid

B all solid

C in the process of boiling

D in the process of solidifying

32 In which of the three states of matter is convection the main method of thermal energy transfer?

A liquids and gases

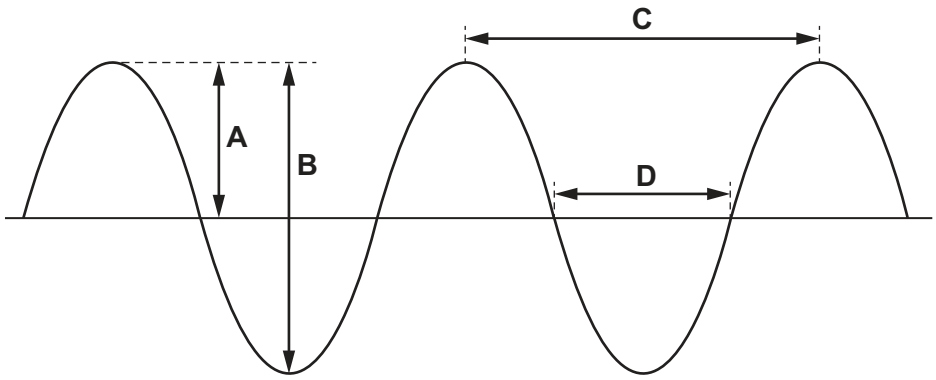
B liquids only

C solids and liquids

D solids only

33 The diagram represents a transverse wave.

Which labelled arrow represents the wavelength of the wave?

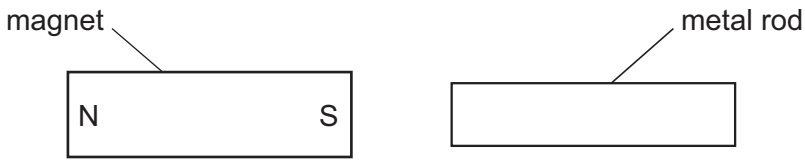


34 The sound heard from the siren of a police car becomes quieter and lower pitched as the car moves away from an observer.

Which row describes what happens to the amplitude and frequency of the sound wave heard by the observer?

	amplitude	frequency
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

35 A bar magnet is brought near to a metal rod. The metal rod is attracted to the magnet.



The magnet is then turned around so that the N-pole is on the right.

The magnet is again brought near to the metal rod and is again 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

36 Four resistors are connected into circuits. The current in each resistor and the potential difference (p.d.) across each resistor are shown.

Which resistor has a resistance of 2.0 Ω?

	current / A	p.d. / V
A	2.0	1.0
B	4.0	2.0
C	12	6.0
D	4.0	8.0

37 Two lamps can be connected to a battery either in series or in parallel.

Which statement is **not** a benefit of connecting two lamps in parallel rather than in series?

A If one lamp breaks, the other lamp stays lit.

B The lamps are brighter.

C The lamps can be controlled individually using switches.

D There is a smaller current in the battery.

38 What is the purpose of a fuse in an electric circuit?

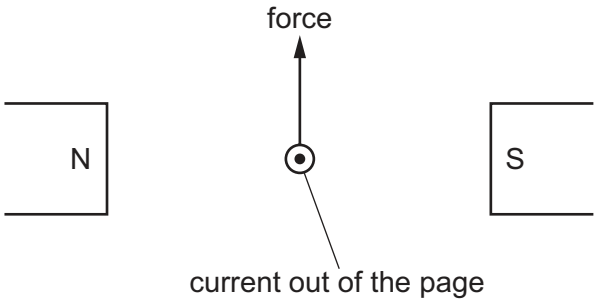
A to make the circuit more efficient

B to protect the circuit from damage by a large current

C to provide a constant current in the circuit

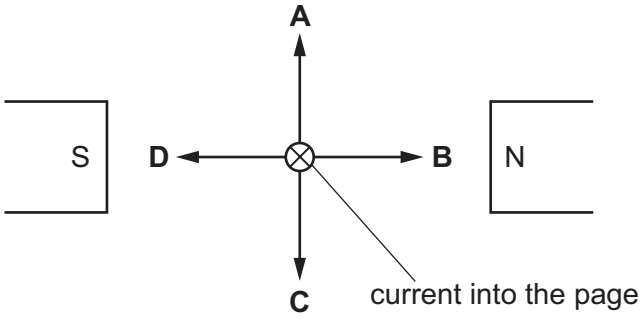
D to provide a constant potential difference (p.d.) across the circuit

39 The diagram shows a current-carrying wire placed between the poles of a magnet. The direction of the current is out of the page. The direction of the force on the wire is shown by the arrow.



Both the direction of the current and the poles of the magnet are now reversed.

Which arrow shows the direction of the force on the wire after these changes?



40 The nucleus of an atom emits an α-particle.

How do the number of protons and the number of neutrons in the nucleus change?

	number of protons	number of neutrons
A	decreases by 2	decreases by 2
B	decreases by 2	decreases by 4
C	increases by 2	increases by 2
D	increases by 2	increases by 4

The Periodic Table of Elements

Group																	
I	II											III	IV	V	VI	VII	VIII
							1 H hydrogen 1										2 He helium 4
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	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
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	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.).