Cambridge Assessment International Education

Cambridge O Level

COMBINED SCIENCE **5129/12**

Paper 1 Multiple Choice **May/June 2024**

1 hour

You must answer on the multiple choice answer sheet.

4353782065

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 row identifies diffusion?

	description of movement of molecules	net movement of molecules
A	all molecules move in the same direction	from higher concentration to lower concentration
B	all molecules move in the same direction	from lower concentration to higher concentration
C	molecules move randomly in all directions	from lower concentration to higher concentration
D	molecules move randomly in all directions	from higher concentration to lower concentration

2 Amylase in the mouth breaks starch down to maltose. The pH in the mouth is 6.5 and the temperature is 37 °C.

What would reduce the rate of production of maltose?

1 changing the pH to 12

2 increasing the amount of starch

3 raising the temperature to 45 °C

4 removing the maltose as it forms

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

3 Which plant tissues are responsible for the transport of amino acids and which are responsible for the transport of sucrose?

	amino acids	sucrose
A	phloem	phloem
B	phloem	xylem
C	xylem	xylem
D	xylem	phloem

4 Which statements about physical digestion are correct?

1 It makes food particles smaller.

2 It makes the molecules smaller.

3 It occurs in the colon.

4 It occurs in the mouth.

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

5 How is the composition of expired air different to the composition of inspired air?

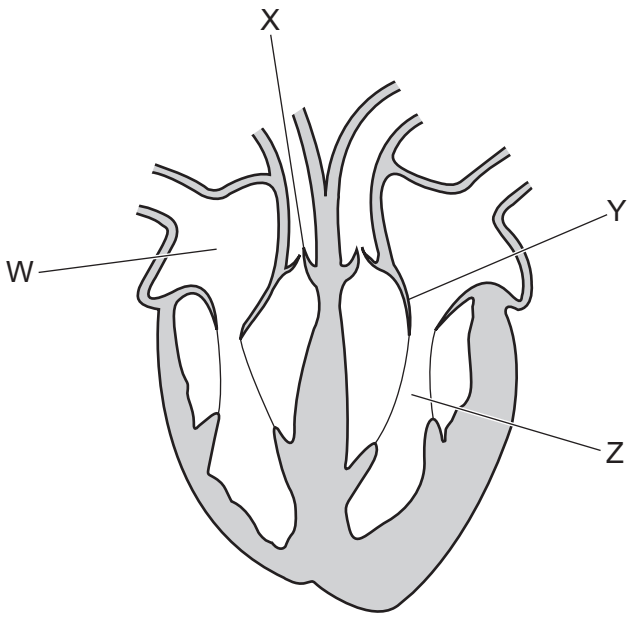
	percentage which is carbon dioxide	percentage which is nitrogen	percentage which is oxygen	percentage which is water vapour
A	smaller	larger	smaller	smaller
B	larger	smaller	larger	the same
C	smaller	the same	larger	smaller
D	larger	the same	smaller	larger

6 Which row completes the sentence?

.....X..... is the chemical reaction in all living cells that releases .....Y..... from .....Z..... .

	X	Y	Z
A	assimilation	energy	starch
B	assimilation	glucose	starch
C	respiration	energy	glucose
D	respiration	glucose	energy

7 What are the parts of the heart indicated by W, X, Y and Z?



	W	X	Y	Z
A	left atrium	semilunar valve	atrioventricular valve	right ventricle
B	left atrium	atrioventricular valve	semilunar valve	right ventricle
C	right atrium	semilunar valve	atrioventricular valve	left ventricle
D	right atrium	atrioventricular valve	semilunar valve	left ventricle

8 Smoking can damage the alveoli.

What can be a result of this damage?

A The rate of breathing is decreased.

B The rate of respiration is increased.

C The volume of air breathed in is increased.

D The volume of oxygen absorbed is decreased.

9 What describes the effect of a stimulus in reflex actions?

A The stimulus produces a slow automatic response.

B The stimulus produces a slow voluntary response.

C The stimulus produces a rapid automatic response.

D The stimulus produces a rapid voluntary response.

10 A cell with a nucleus containing 8 chromosomes undergoes meiosis.

What describes the cells produced by this process?

A 2 cells each containing 4 chromosomes

B 2 cells each containing 8 chromosomes

C 4 cells each containing 4 chromosomes

D 4 cells each containing 8 chromosomes

11 What is the main source of energy input to most biological systems?

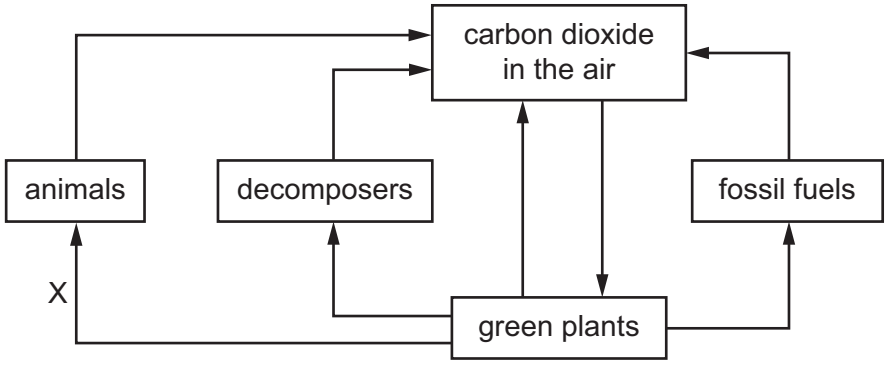
A bacteria

B plants

C soil

D Sun

12 The diagram shows part of the carbon cycle.



Which process is represented by the arrow labelled X?

A decomposition

B feeding

C photosynthesis

D respiration

13 Which statements about deforestation are correct?

1 Deforestation reduces habitats for wild animals.

2 Deforestation causes an increase of carbon dioxide in the atmosphere.

3 Farming, mining and human population growth all increase deforestation.

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

14 Which statement describes a liquid?

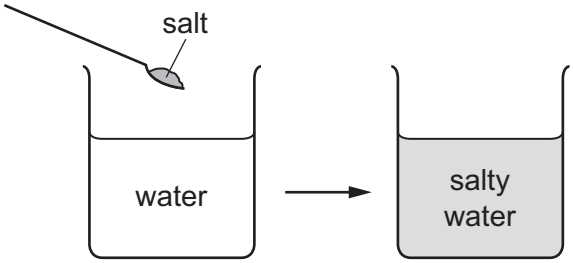
A Closely spaced particles able to move freely.

B Closely spaced particles vibrate about a fixed point.

C Particles are far apart and unable to move freely.

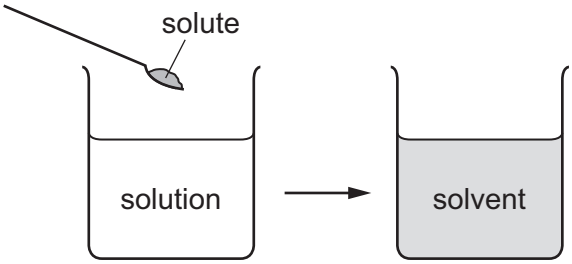
D Particles are far apart with large amounts of kinetic energy.

15 The diagram shows salt being added to water in a beaker.

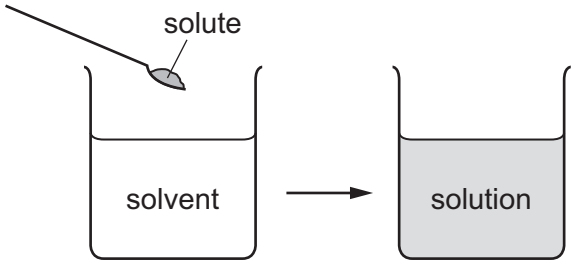


On which diagram are the labels correct?

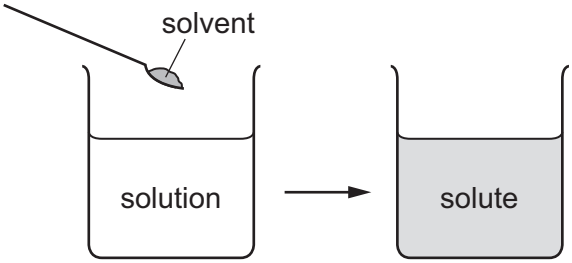
A



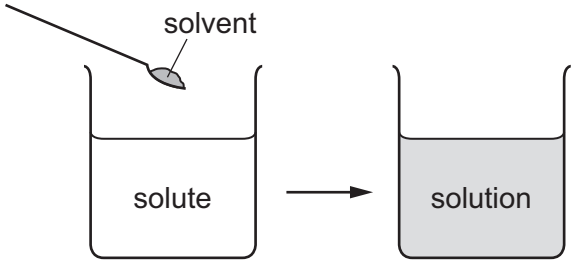
B



C



D



16 An atom of element X contains 7 electrons.

Which statements about atom X are correct?

1 X has a mass number greater than 7.

2 X is in Group VII of the Periodic Table.

3 X is in Period 2 of the Periodic Table.

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

17 Which statement about magnesium chloride, $MgCl_2$, is correct?

A When it is melted it becomes an electrical conductor because its electrons are free to move.

B It consists of anions and cations which have completely filled outer electron shells.

C It has a high melting point because its covalent bonds are very strong.

D The magnesium and chlorine atoms are bonded strongly together by sharing electrons.

18 Sodium metal reacts with water to produce hydrogen and a solution of sodium hydroxide.

In which balanced equation are the state symbols correct?

A $2Na(s) + 2H_2O(aq) \rightarrow 2NaOH(aq) + H_2(g)$

B $2Na(s) + 2H_2O(aq) \rightarrow 2NaOH(l) + H_2(g)$

C $2Na(s) + 2H_2O(l) \rightarrow 2NaOH(aq) + H_2(g)$

D $2Na(s) + 2H_2O(l) \rightarrow 2NaOH(l) + H_2(g)$

19 The equation for the combustion of hydrogen is shown.

$$2H_2 + O_2 \rightarrow 2H_2O$$

Which mass of oxygen reacts when 2 g of hydrogen is burned in excess air?

A 1 g **B** 16 g **C** 32 g **D** 64 g

20 Which statements about the reaction between methane and oxygen are correct?

1 It is a cracking reaction.

2 It is an endothermic reaction.

3 It is an exothermic reaction.

4 It is a redox reaction.

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

21 1 g of solid zinc is reacted with excess dilute sulfuric acid in four different experiments under different conditions.

The results are shown.

experiment	type of zinc	temperature / °C
1	small pieces	20
2	small pieces	50
3	large pieces	50
4	large pieces	20

Which row identifies the experiments taking the longest time and the shortest time for all the zinc to react?

	experiment taking the longest time	experiment taking the shortest time
A	1	3
B	2	4
C	3	1
D	4	2

22 Which test result identifies oxygen?

A bleaches damp litmus paper

B ‘pops’ with a lighted splint

C relights a glowing splint

D turns limewater milky

23 What is the colour of universal indicator in a neutral solution?

A blue

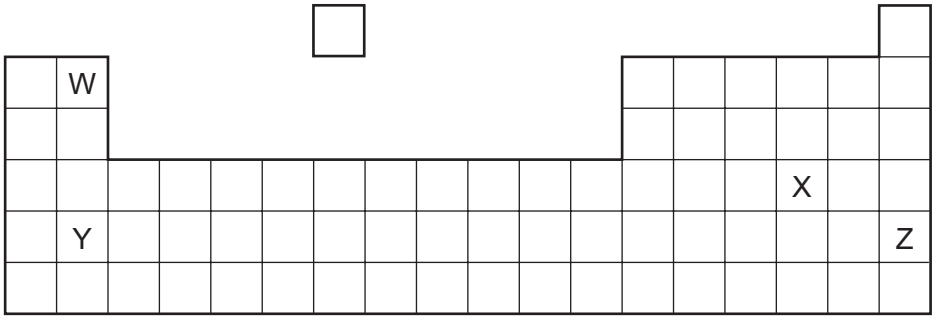
B green

C orange

D red

24 Part of the Periodic Table is shown.

The letters in the table are **not** the usual symbols of the elements.



Which statement is correct?

A W is a metal and X is a non-metal.

B X has more electrons than Y.

C Y and Z are both non-metals.

D Z has fewer electron shells than W.

25 Four metals, P, Q, R and S, are tested with water, steam and dilute hydrochloric acid.

The results are shown.

P does not react with cold water or steam and only reacts slowly with dilute hydrochloric acid.

S reacts slowly with cold water, reacts moderately fast with steam and reacts rapidly with dilute hydrochloric acid.

R reacts vigorously with cold water.

Q does not react with cold water, reacts very slowly with steam and reacts moderately fast with dilute hydrochloric acid.

What is the order of reactivity of the metals?

	most reactive → least reactive			
A	P	Q	S	R
B	P	S	Q	R
C	R	Q	S	P
D	R	S	Q	P

[Turn over

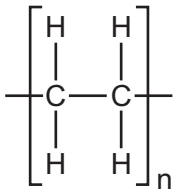
26 Different fractions are obtained from the fractional distillation of petroleum.

Which row identifies a correct use of a fraction?

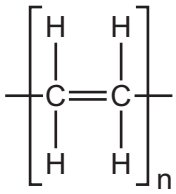
	fraction	use
A	kerosene	as chemical feedstock
B	petrol	fuel for planes
C	gas oil	fuel for diesel engines
D	bitumen	waxes and polishes

27 Which structure represents poly(ethene)?

A



B



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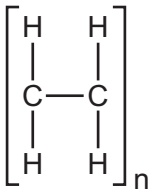

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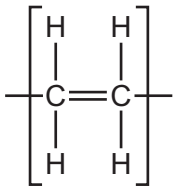


28 Which apparatus is used when determining the volume of a small, irregularly shaped object?

A a digital timer

B a measuring cylinder

C a metre rule

D a tape measure

29 It takes 8.0 minutes for light travelling at a speed of $3.0 \times 10^8\,\text{m/s}$ to reach the Earth from the Sun.

What is the distance of the Earth from the Sun?

A $6.25 \times 10^5\,\text{m}$

B $3.75 \times 10^7\,\text{m}$

C $2.40 \times 10^9\,\text{m}$

D $1.44 \times 10^{11}\,\text{m}$

30 What is the name for the size of the turning effect of a force?

A moment

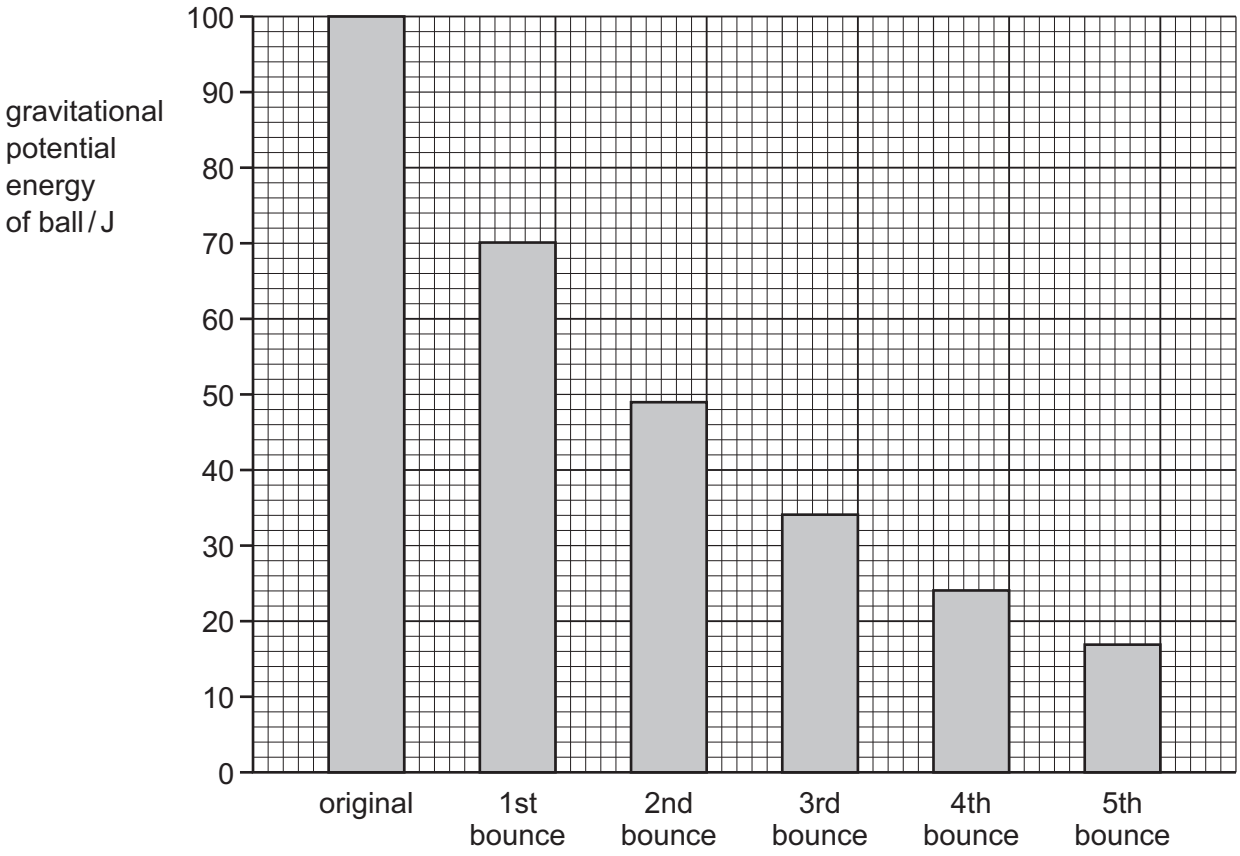
B pivot

C power

D weight

31 A ball is dropped from a certain height above a hard smooth floor and it bounces many times.

The bar chart shows the original gravitational potential energy of the ball and the gravitational potential energy at the top of the following bounces.



At the top of the 5th bounce, what percentage of the ball's original gravitational potential energy has been transferred to other stores?

A 17% **B** 30% **C** 83% **D** 100%

32 Which statement describes the particles in a gas?

A They are held together by strong forces of attraction.

B They are always in contact with each other.

C They move around freely in all directions.

D They vibrate and slide over each other very quickly.

33 Why do white clothes keep people cooler when they are standing in the Sun?

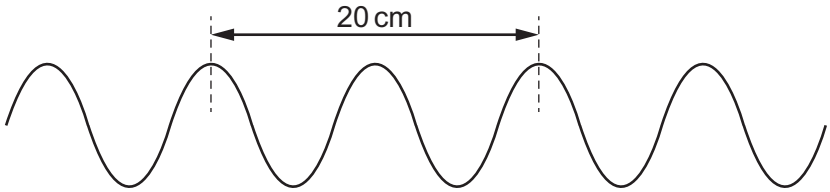
A White clothes are good absorbers of infrared radiation.

B White clothes are good emitters of infrared radiation.

C White clothes are poor absorbers of infrared radiation.

D White clothes are poor emitters of infrared radiation.

34 The diagram shows a water wave in a ripple tank.

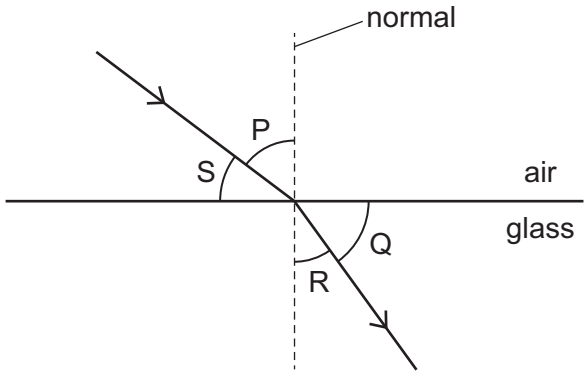


The speed of the wave is 40 cm / s.

What is the frequency of the wave?

A 0.25 Hz **B** 0.50 Hz **C** 2.0 Hz **D** 4.0 Hz

35 A ray of light in air enters a glass block.



Which row identifies the angle of incidence and the angle of refraction?

	angle of incidence	angle of refraction
A	P	Q
B	P	R
C	S	Q
D	S	R

36 Four metal spheres W, X, Y and Z are charged.

W repels X.

Y repels Z.

W attracts Z.

X is positively charged.

Which statement is correct?

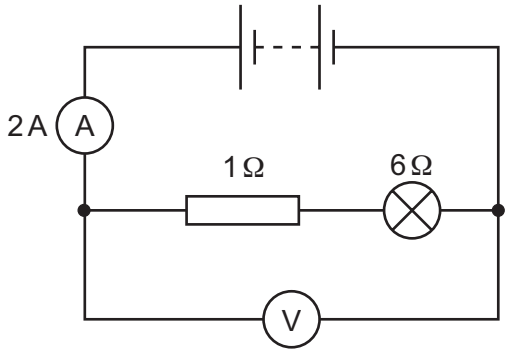
A W has a negative charge.

B X attracts Y.

C Y has a positive charge.

D Z repels X.

37 A series circuit consists of a battery, an ammeter, a lamp and a resistor. A voltmeter is placed across the lamp and the resistor.



What is the voltmeter reading?

A 2 V **B** 10 V **C** 12 V **D** 14 V

38 A 2000 W electric vacuum cleaner is plugged into a 250 V wall socket using a cable designed to carry a maximum of 5 A.

The plug of the vacuum cleaner contains a 13 A fuse.

What would be the result of using this arrangement?

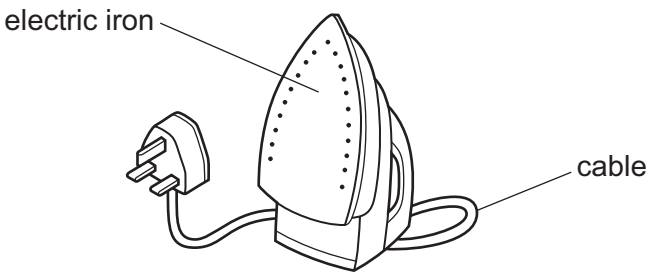
A The cable would overheat.

B The fuse in the plug would ‘blow’.

C The vacuum cleaner would not work.

D There would be no effect.

39 The cable connected to an electric iron contains an earth wire.



Why does the electric iron need an earth wire to make it safe?

A The current sometimes decreases.

B The iron has a plastic handle.

C The iron has a metal base.

D The iron becomes hot.

40 When using a radioactive source, what is **not** a safety precaution?

A checking the level of background radiation

B handling the source with long forceps

C keeping the exposure time to a minimum

D shielding the source from observers

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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.).