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Cambridge Assessment International Education

Cambridge IGCSE™

COMBINED SCIENCE **0653/12**

Paper 1 Multiple Choice (Core) **February/March 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)

* 6 8 2 1 4 3 7 4 9 6 *

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.

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1 Which characteristics help to define a living organism?

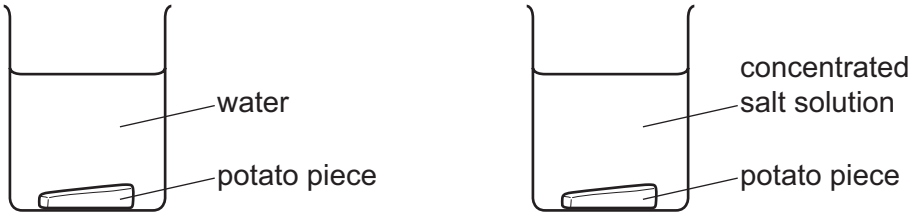
A diffusion, movement, respiration

B excretion, nutrition, sensitivity

C excretion, reproduction, transpiration

D growth, inspiration, nutrition

2 Two pieces of potato are cut to have exactly the same mass and shape. The mass is measured and recorded.



One piece of potato is placed in water and the other piece is placed in concentrated salt solution.

They are both left for one hour.

The mass of each piece of potato is then measured again.

What happens to the mass of each piece of potato?

	mass of potato placed in water	mass of potato placed in concentrated salt solution
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

3 The results of tests carried out on four food samples are shown.

sample	Benedict's test	iodine test	biuret test
1	✓	✓	✗
2	✓	✗	✓
3	✗	✓	✗
4	✗	✗	✓

key

✓ = positive result

✗ = negative result

Which two samples contain protein?

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

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4 Which type of molecule is an enzyme?

A carbohydrate

B fat

C protein

D vitamin

5 What is the word equation for photosynthesis?

A carbon dioxide + water → glucose + oxygen

B glucose + oxygen → carbon dioxide + water

C oxygen + carbon dioxide → glucose + water

D water + oxygen → glucose + carbon dioxide

6 Which two nutrients are needed for healthy bone and tooth development?

A calcium and iron

B fibre and vitamin C

C fibre and vitamin D

D vitamin D and calcium

7 Which statement about all arteries is correct?

A They always contain oxygenated blood.

B They have many valves on their inner walls.

C They have a wide lumen.

D They transport blood away from the heart.

8 The table shows the differences in the composition of carbon dioxide, oxygen and water vapour for inspired and expired air.

Which row shows the most likely composition for human inspired and expired air?

	carbon dioxide %		oxygen %		water vapour %	
	inspired	expired	inspired	expired	inspired	expired
A	4	0.04	21	16	1	1
B	0.04	4	21	16	1	6
C	0.04	4	16	21	6	1
D	4	0.04	16	21	6	6

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9 Which descriptions of food molecules before and after chemical digestion are correct?

	food molecules before chemical digestion	food molecules after chemical digestion
A	large and insoluble	small and soluble
B	large and soluble	small and insoluble
C	small and insoluble	large and soluble
D	small and soluble	large and insoluble

10 In which situations does the secretion of adrenaline increase?

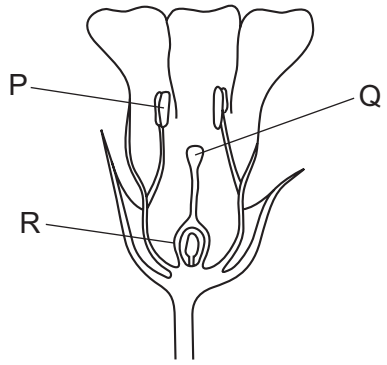
1 an athlete waiting for the starting signal at the beginning of a race

2 a mother zebra seeing a lion moving towards her offspring

3 a child about to fall asleep

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

11 The diagram shows a section through a flower.



Which row identifies the labelled parts of the flower?

	P	Q	R
A	anther	ovary	stigma
B	anther	stigma	ovary
C	stamen	carpel	sepal
D	stamen	sepal	carpel

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12 The diagram shows a food chain.

oak tree → caterpillar → robin → hawk

Which term is correct for the hawk in this food chain?

A primary consumer

B producer

C secondary consumer

D tertiary consumer

13 Some of the processes involved in the carbon cycle are listed.

1 combustion

2 decomposition

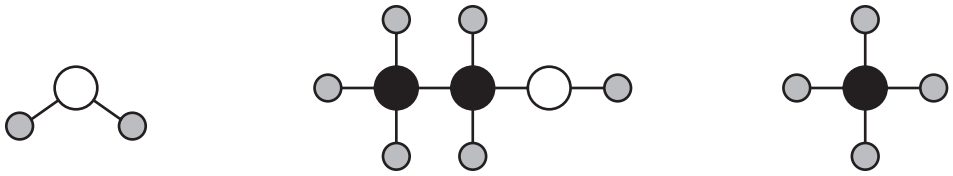
3 fossilisation

4 photosynthesis

Which processes release carbon dioxide into the atmosphere?

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

14 The structures of three molecules are shown.



water ethanol methane

How many atoms are in each molecule?

	water	ethanol	methane
A	2	3	2
B	2	4	5
C	3	3	2
D	3	9	5

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15 Which symbol equation is balanced?

A $H_2 + Cl_2 \rightarrow HCl$

B $Mg + 2HCl \rightarrow MgCl_2 + H_2$

C $CH_4 + O_2 \rightarrow CO_2 + 2H_2O$

D $Mg + O_2 \rightarrow 2MgO$

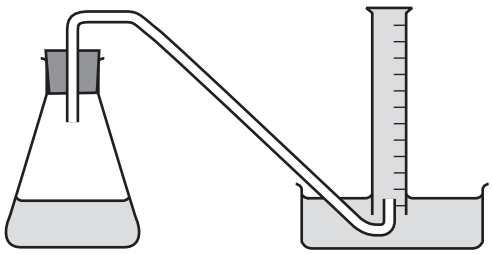
16 A student measures the initial temperature and the final temperature in four different reactions.

Which row shows the results for the most endothermic reaction?

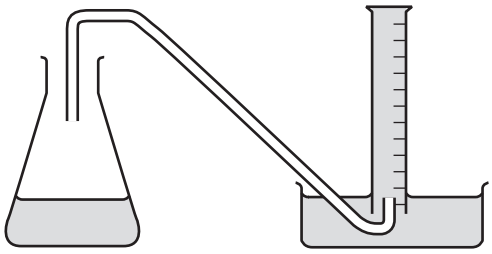
	initial temperature / °C	final temperature / °C
A	19	29
B	20	16
C	22	17
D	22	26

17 Which apparatus is used to determine the rate of reaction when magnesium reacts with dilute hydrochloric acid?

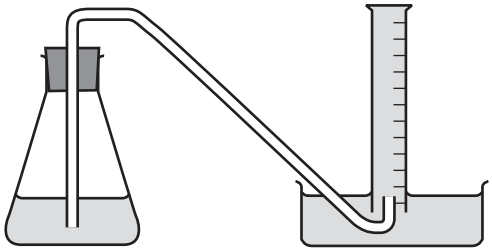
A



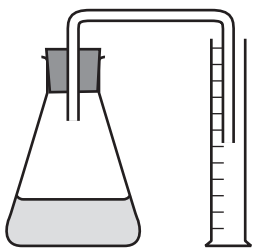
B



C



D



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18 Which statement describes a redox reaction?

A An acid reacts with a base.

B Only oxidation takes place.

C Oxygen is transferred from one substance to another.

D Two substances are both reduced.

19 Which solid reacts with sulfuric acid to produce a gas?

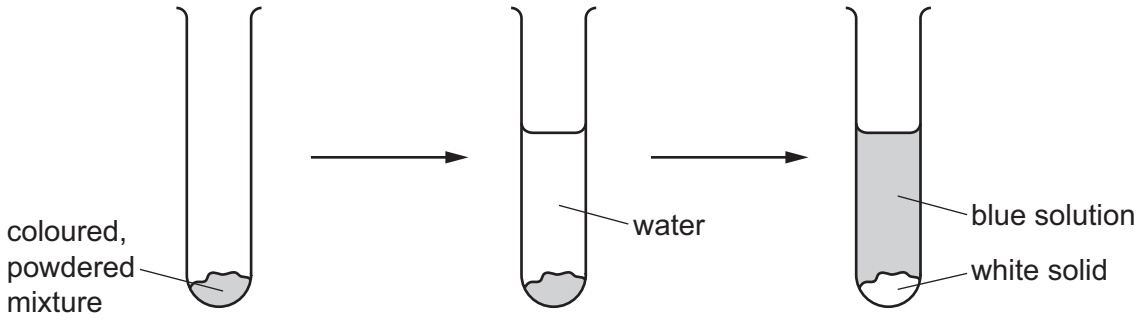
A copper

B copper carbonate

C copper oxide

D copper sulfate

20 Some water is added to a coloured, powdered mixture. After shaking, a blue solution and a white solid are seen.



What does the powder contain?

A sodium chloride and copper(II) oxide

B sodium chloride and copper(II) sulfate

C barium sulfate and copper(II) oxide

D barium sulfate and copper(II) sulfate

21 Which trend is shown by the elements across a complete period of the Periodic Table, from left to right?

A metals → non-metals

B metals → non-metals → metals

C non-metals → metals

D non-metals → metals → non-metals

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22 Which row describes a noble gas?

	type of particle	reactivity
A	diatomic	high
B	diatomic	low
C	monatomic	high
D	monatomic	low

23 Which statement about the extraction of metals is correct?

A Aluminium is extracted from aluminium oxide by heating with carbon.

B Aluminium is less reactive than copper so aluminium can be extracted by electrolysis.

C Carbon can be used to remove oxygen from copper(II) oxide.

D Copper is extracted from the ore bauxite.

24 Which colour change is seen when water is added to anhydrous cobalt(II) chloride?

A white to blue

B pink to blue

C blue to white

D blue to pink

25 Which statements about air pollutants are correct?

1 Sulfur dioxide can damage buildings.

2 Oxides of nitrogen are harmful to health.

3 Carbon monoxide is a poisonous gas.

4 Carbon monoxide can damage buildings.

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

26 Ethane is a hydrocarbon.

What are the products of the complete combustion of ethane?

A carbon dioxide and hydrogen

B carbon dioxide and water

C carbon monoxide and hydrogen

D carbon monoxide and water

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27 What is produced by cracking?

A alkenes

B fractions

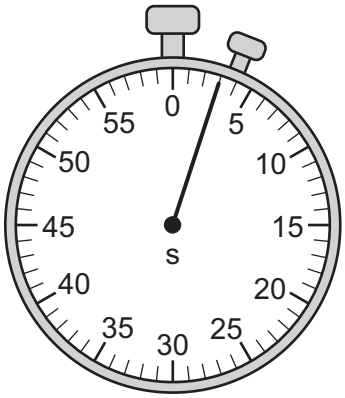
C naphtha

D polymers

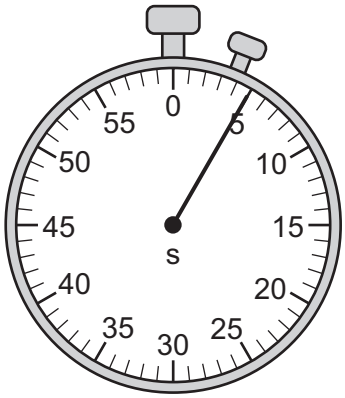
28 The period of a pendulum is 3.0 s.

Which stop-watch shows the time for 15 periods of the pendulum?

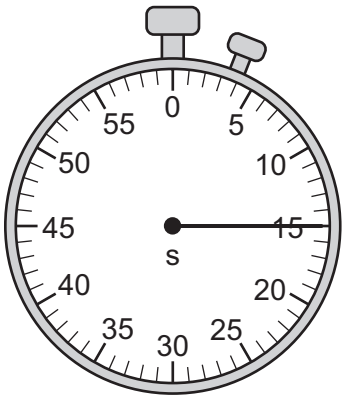
A



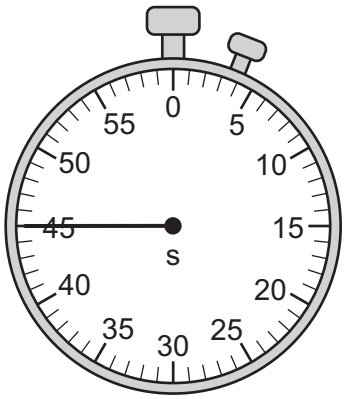
B



C



D



29 A feather is falling through the air. Air resistance acts on the feather.

In which unit is air resistance measured?

A Ω **B** kg **C** m/s **D** N

30 A solid object floats on a liquid if its density is less than that of the liquid.

A solid object has a mass of 350 g and a volume of 500 cm^3.

The densities of three liquids are shown.

liquid	density / g/cm^3
diesel	0.86
ethanol	0.79
petrol (gasoline)	0.68

On which liquids does the solid object float?

A diesel and ethanol only

B diesel and petrol only

C ethanol and petrol only

D diesel, ethanol and petrol

31 Which object has a resultant force acting on it?

A a book at rest on a table

B a car travelling up a hill in a straight line at constant speed

C a football moving upwards freely after being kicked

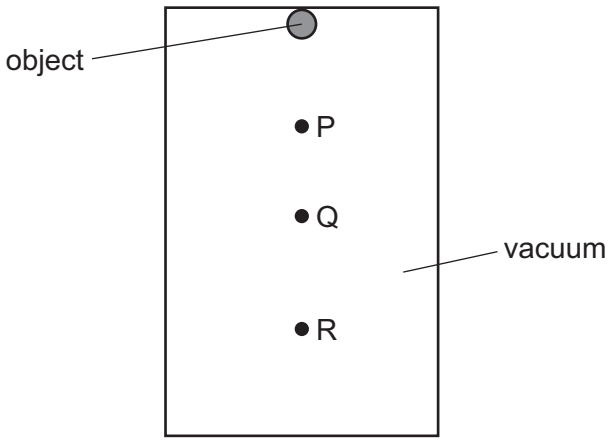
D a parachutist descending vertically at constant speed

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32 An object is falling in a vacuum.

As the object falls, it passes through points P, Q and R.



Which statement describes the total quantity of energy of the object as it falls?

A It is greatest at point P.

B It is greatest at point Q.

C It is greatest at point R.

D It is the same at points P, Q and R.

33 Which statement explains why wind energy is called a renewable source of energy?

A It is continuously replaced from natural sources.

B It does not cause pollution.

C It is only available at certain times.

D It provides a large quantity of energy.

34 A girl holds a thick glass beaker and pours hot water into it.

There is a noticeable delay before she feels the thermal energy from the water reaching her hand.

Which statement explains this delay?

A Glass is a bad thermal conductor.

B Glass is a good thermal conductor.

C Water is a bad thermal conductor.

D Water is a good thermal conductor.

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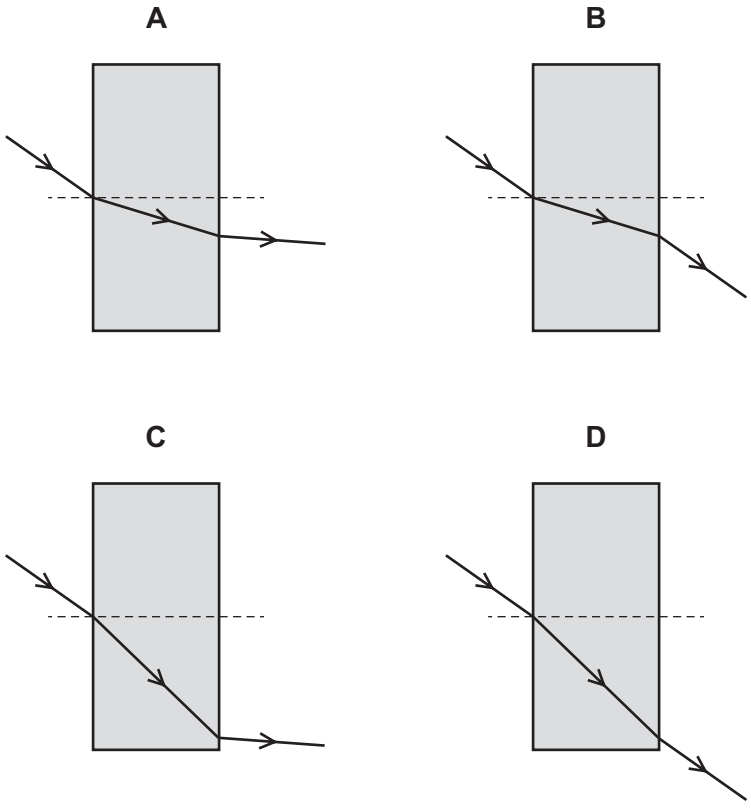
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35 In which states of matter can convection occur?

	in a solid	in a liquid	in a gas
A	no	no	yes
B	no	yes	yes
C	yes	no	no
D	yes	yes	no

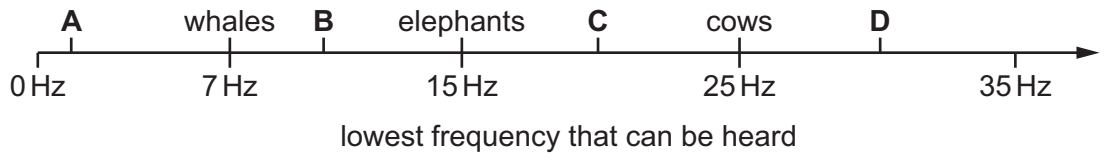
36 A ray of light in air is incident on a glass block. The ray of light is refracted as it enters the glass block and as it emerges from the glass block.

Which diagram shows the complete path of the light ray?



37 The diagram shows the order of the lowest frequency of sound that can be heard by some animals.

Which labelled position shows the lowest frequency that can be heard by humans with healthy ears?



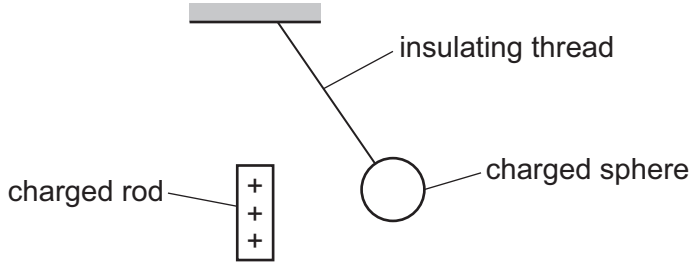
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38 A charged sphere is suspended by an insulating thread.

A positively charged rod is moved close to the sphere.

The sphere is deflected as shown.

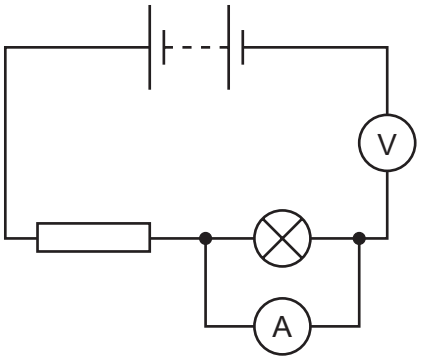


What is the charge on the sphere and why is the sphere deflected?

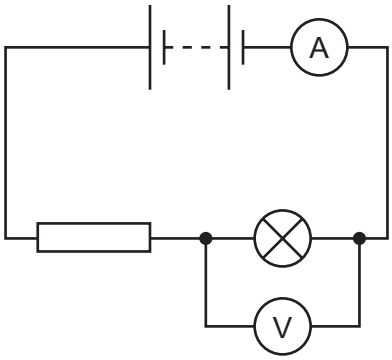
	charge on the sphere	reason for deflection
A	negative	like charges repel
B	negative	unlike charges repel
C	positive	like charges repel
D	positive	unlike charges repel

39 Which circuit is used to measure the current in a lamp and the potential difference (p.d.) across the lamp?

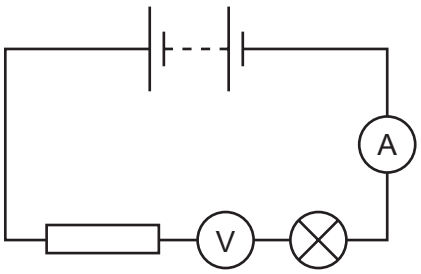
A



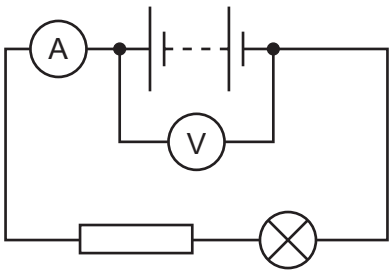
B



C



D



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40 When a computer is switched on, the current increases quickly to 3.1 A and then decreases slowly to a steady value of 1.0 A when the computer is in use.

The cable connecting the computer to the power supply can safely carry a current of 10.0 A.

The circuit contains a fuse.

Which fuse rating is used to provide suitable protection?

A 1 A **B** 3 A **C** 5 A **D** 13 A

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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.).

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