



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CO-ORDINATED SCIENCES

0654/13

Paper 1 Multiple Choice

May/June 2016

45 minutes

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

* 5 9 8 2 0 3 0 8 5 2 *

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.

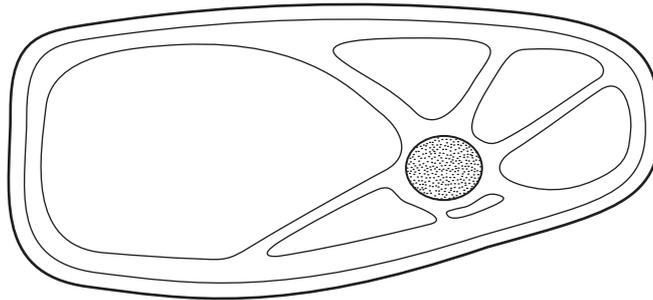
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
A copy of the Periodic Table is printed on page 20.
Electronic calculators may be used.

This document consists of **17** printed pages and **3** blank pages.

1 What is **not** a characteristic of all living organisms?

- A breathing
- B excretion
- C movement
- D reproduction

2 The diagram shows a section through a cell from a leaf, magnified $\times 4000$. The diameter of the nucleus in the diagram is 10 mm.



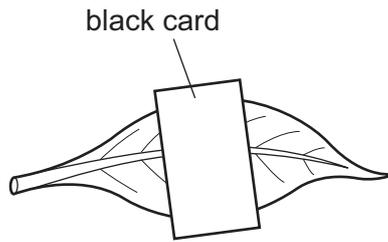
What is the true diameter of the nucleus?

- A 0.0025 mm B 0.0050 mm C 0.0100 mm D 0.0250 mm

3 Which statement about all enzymes is correct?

- A They are used up in the reaction they catalyse.
- B They speed up reactions.
- C They work best above 40°C .
- D They work best at a pH of 7.0.

- 4 A plant is destarched and then one of its leaves is partly covered with black card as shown.



The plant is then put in the light for six hours.

The card is removed and the leaf is tested for starch using iodine solution.

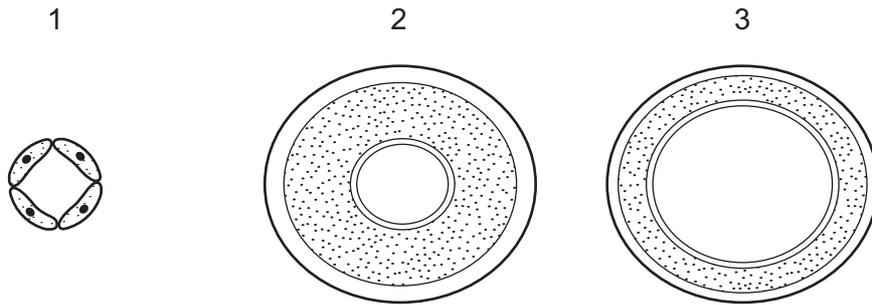
Which colours are seen five minutes after iodine solution is added?

	area of leaf	
	not covered by card	covered by card
A	blue / black	blue / black
B	blue / black	yellow
C	yellow	blue / black
D	yellow	yellow

- 5 Where is the gall bladder situated?

- A** in the pancreas
- B** near the entrance to the urethra
- C** near the kidneys
- D** near the liver

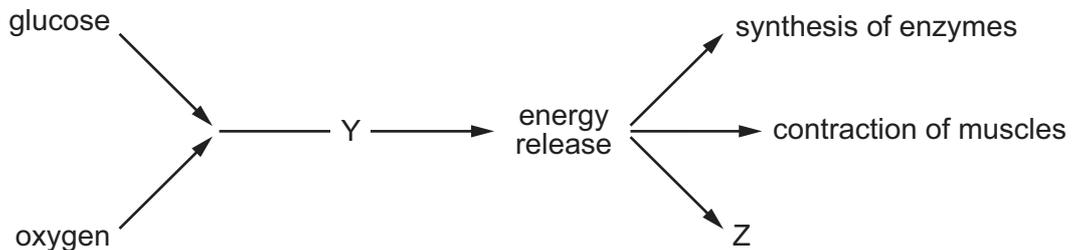
6 The diagrams show the cross-section of three blood vessels, not drawn to the same scale.



What are these vessels?

	1	2	3
A	artery	capillary	vein
B	artery	vein	capillary
C	capillary	artery	vein
D	capillary	vein	artery

7 The diagram shows what happens to glucose in the body.



What are processes Y and Z?

	Y	Z
A	photosynthesis	growth
B	photosynthesis	respiration
C	respiration	growth
D	respiration	photosynthesis

8 What does **not** use energy released by cells?

- A** cell division
- B** diffusion
- C** passage of nerve impulses
- D** protein synthesis

- 9 What is an example of homeostasis?
- A adding acid to food in the stomach
 - B breathing out water vapour from the lungs
 - C keeping the body temperature constant
 - D producing adrenaline in the adrenal glands
- 10 In a reflex arc, which structure carries nerve impulses towards the central nervous system?
- A effector
 - B motor neurone
 - C sensory neurone
 - D spinal cord

- 11 A student placed four sets of seeds in different conditions.

Which set of conditions must be kept constant to show the effect of temperature on germination?

- A temperature and water only
 - B temperature only
 - C temperature, water and oxygen
 - D water and oxygen only
- 12 Which row describes asexual reproduction?

	only one parent	fusion of nuclei	genetically identical offspring	
A	✓	✓	✓	key ✓ = yes ✗ = no
B	✓	✓	✗	
C	✓	✗	✓	
D	✗	✓	✗	

- 13 When raw sewage is discharged into a river, there is
- A a decrease in oxygen concentration caused by a decrease in bacterial activity.
 - B a decrease in oxygen concentration caused by an increase in bacterial activity.
 - C an increase in oxygen concentration caused by a decrease in bacterial activity.
 - D an increase in oxygen concentration caused by an increase in bacterial activity.

- 14 A student adds excess copper oxide powder to warm dilute sulfuric acid.

Copper sulfate solution is formed.

Which method is used to remove the unreacted copper oxide?

- A chromatography
- B crystallisation
- C distillation
- D filtration

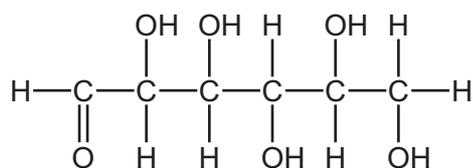
- 15 Hexane is a covalent compound.

Sodium phosphate is an ionic compound.

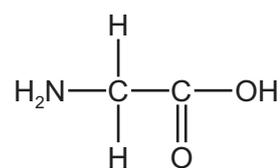
Which row describes the properties of hexane and sodium phosphate?

	hexane	sodium phosphate
A	high electrical conductivity	volatile
B	insoluble in water	non-volatile
C	non-volatile	soluble in water
D	volatile	low electrical conductivity in aqueous solution

- 16 The structures of a carbohydrate and an amino acid are shown.



carbohydrate

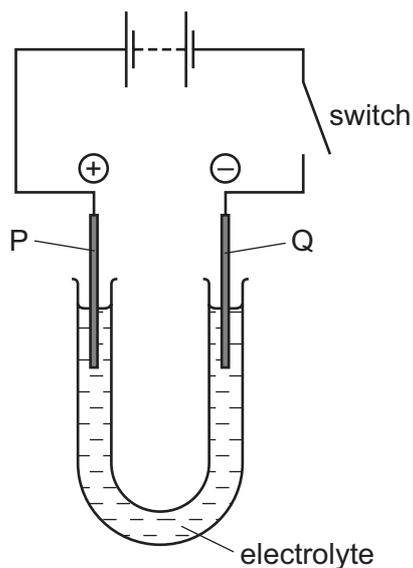


amino acid

Which elements are present in both structures?

- A carbon, hydrogen and nitrogen only
- B carbon, hydrogen and oxygen only
- C carbon, nitrogen and oxygen only
- D carbon, hydrogen, nitrogen and oxygen

17 The diagram shows the electrolysis of a compound.



When the switch is closed, the solution around electrode P turns orange because a halogen is formed.

The positive electrode P is called the1....., and the halogen is2..... .

Which words complete gaps 1 and 2?

	1	2
A	anode	bromine
B	anode	chlorine
C	cathode	bromine
D	cathode	chlorine

18 A metal ore dissolves in hydrochloric acid.

Under which conditions does the ore dissolve most quickly?

	form of ore	concentration of hydrochloric acid	temperature of hydrochloric acid
A	lumps	high	low
B	lumps	low	high
C	powder	high	high
D	powder	low	low

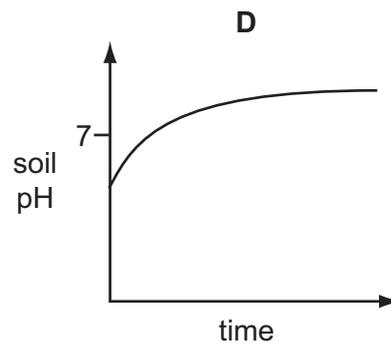
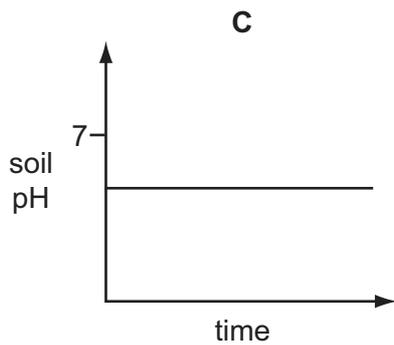
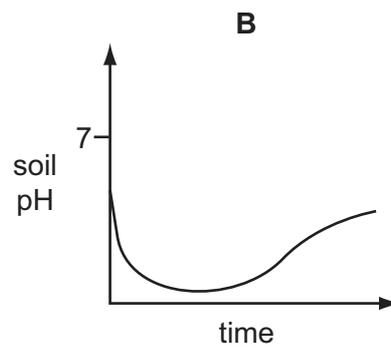
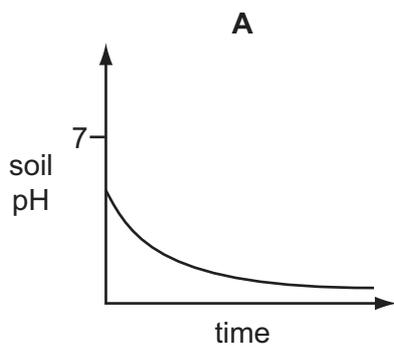
23 Which statement is **not** a reason why aluminium is used in aircraft manufacture?

- A It forms low density alloys.
- B It is malleable.
- C It is more reactive than iron.
- D It is resistant to corrosion.

24 Which gas emitted from a car exhaust contributes to acid rain?

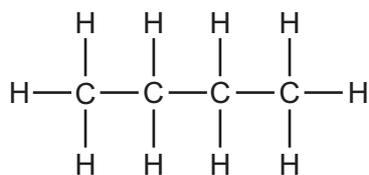
- A carbon monoxide, CO
- B nitrogen, N₂
- C nitrogen monoxide, NO
- D water vapour, H₂O

25 Which graph shows how the pH of soil changes when lime is added?

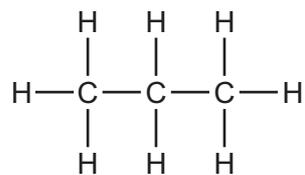


26 Which compound is the main constituent of natural gas?

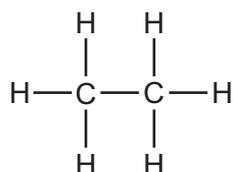
A



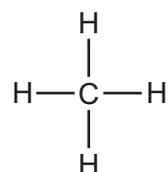
B



C



D

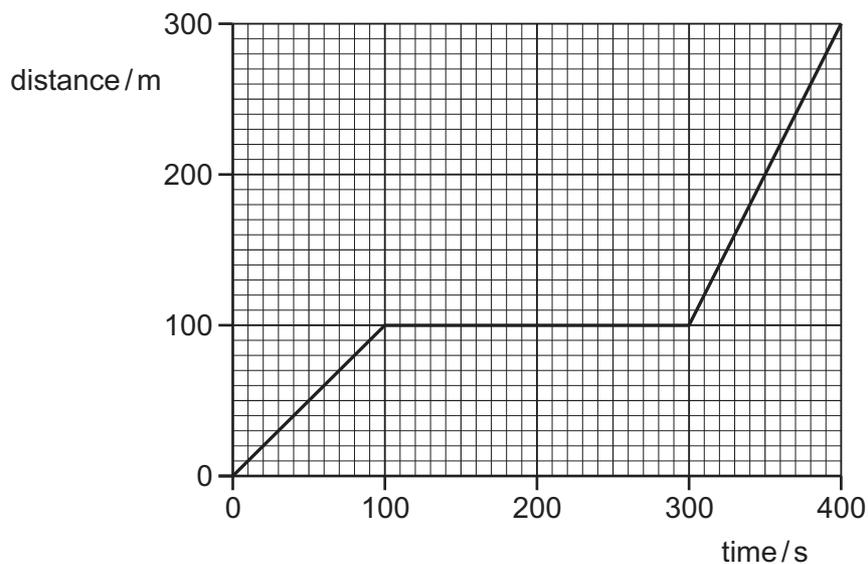


27 Which row describes the industrial manufacture and a use of ethanol?

	manufacture	use
A	cracking large hydrocarbon molecules	food colouring
B	cracking large hydrocarbon molecules	solvent
C	reaction between ethene and steam	food colouring
D	reaction between ethene and steam	solvent

28 A girl rides her bicycle from home to her friend's home.

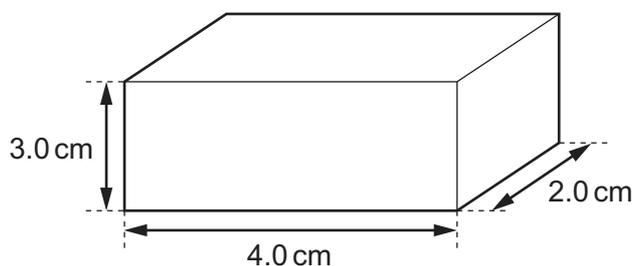
The distance/time graph for the whole journey is shown.



What is the average speed of the girl for the whole journey?

- A** 0.75 m/s **B** 1.00 m/s **C** 1.33 m/s **D** 1.50 m/s

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



What is the density of the metal?

- A** 3.0 g/cm³ **B** 6.0 g/cm³ **C** 9.0 g/cm³ **D** 12 g/cm³

30 Which source of energy is non-renewable?

- A** hydroelectric
B nuclear
C tides
D waves

31 A gas is trapped in a metal cylinder of constant volume. The gas is heated.

Which row describes the changes produced?

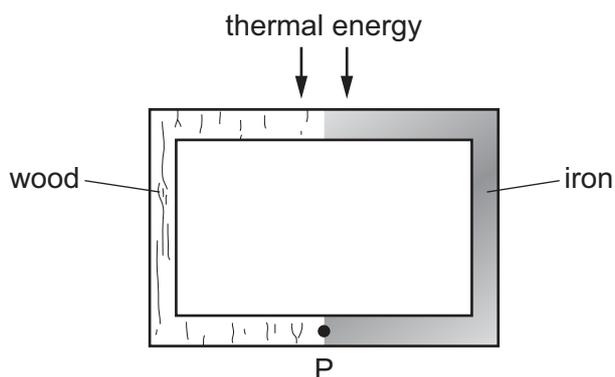
	average speed of gas molecules	pressure of gas
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

32 A substance is a gas when its temperature is 65°C .

How do the boiling point and the melting point of this substance compare with 65°C ?

	boiling point	melting point
A	above 65°C	above 65°C
B	above 65°C	below 65°C
C	below 65°C	above 65°C
D	below 65°C	below 65°C

33 The diagram shows an object made of wood and of iron. Thermal energy is supplied in the position shown. Point P is marked at the bottom of the object.



How does most thermal energy reach point P?

- A** by conduction through the iron
- B** by conduction through the wood
- C** by convection through the iron
- D** by convection through the wood

34 Diagram 1 represents a wave.

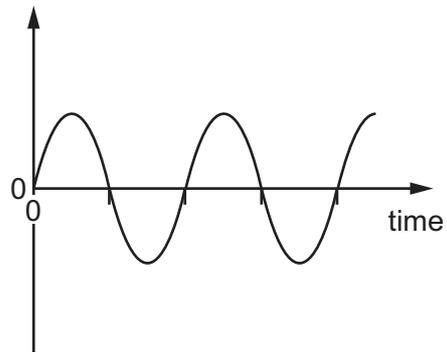
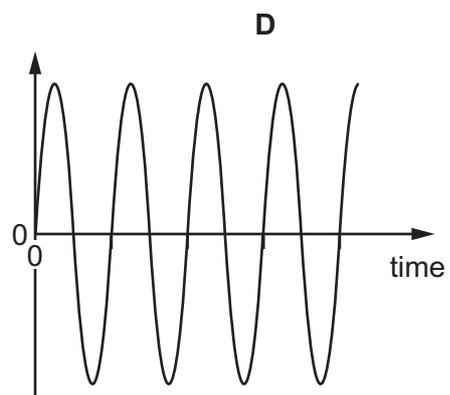
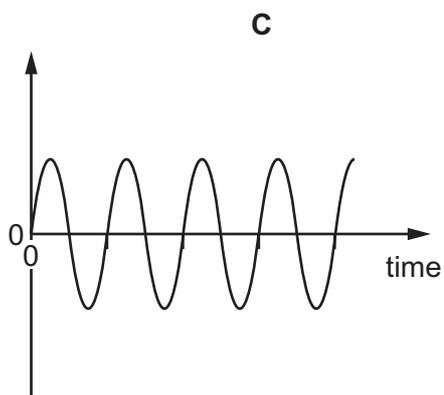
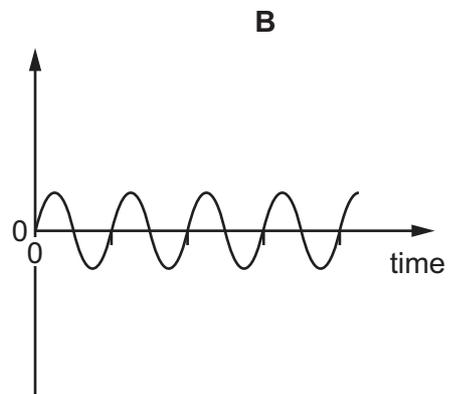
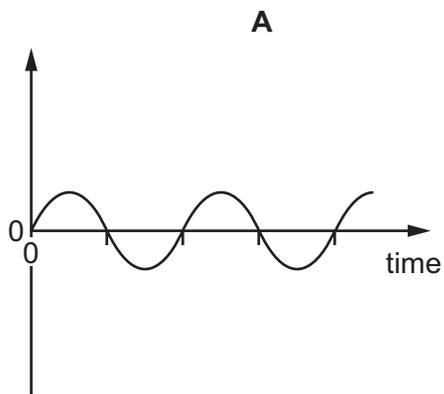


diagram 1

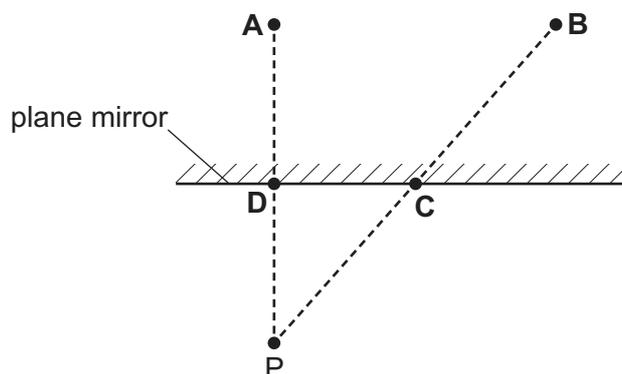
Which diagram below represents a wave with double the frequency and half the amplitude of the wave in diagram 1?

The scales are the same in all the diagrams.



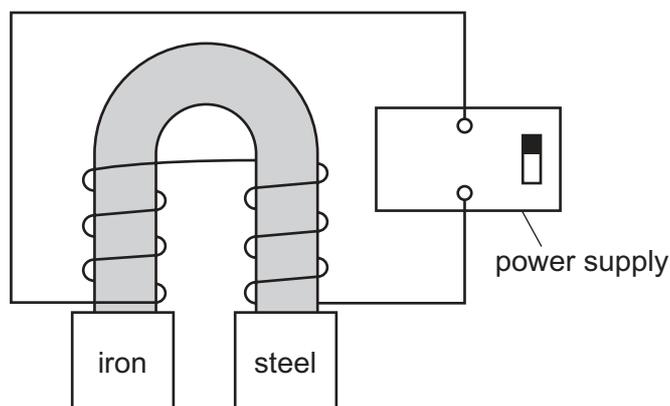
35 A boy stands at point P in front of a plane mirror.

At which labelled point is the boy's image formed?



36 The diagram shows an electromagnet attracting an iron bar and a steel bar.

The iron and the steel have become magnetised by the electromagnet.

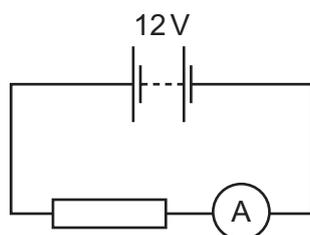


What happens to the iron bar and to the steel bar when the power supply is switched off?

	iron bar	steel bar
A	not magnetised	not magnetised
B	not magnetised	remains magnetised
C	remains magnetised	not magnetised
D	remains magnetised	remains magnetised

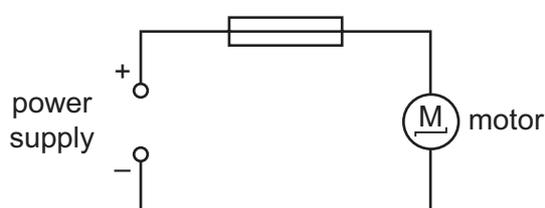
- 37 The diagram shows a 12V battery connected to a resistor and an ammeter.

The reading on the ammeter is 3.0A.



What is the resistance of the resistor?

- A 0.25Ω B 4.0Ω C 15Ω D 36Ω
- 38 An electric motor is connected to a power supply by insulated wires. The circuit is protected by a fuse, but the wires become hot.



How could the wires be prevented from becoming so hot?

- A Connect a second identical fuse in the circuit.
 B Use a fuse with a higher current rating.
 C Use thicker connecting wires.
 D Use thicker insulation on the connecting wires.
- 39 Which row shows how lamps are connected in a lighting circuit and gives an advantage of connecting them in this way?

	how lamps are connected	advantage of connecting them in this way
A	in parallel	they can be switched separately
B	in parallel	they share the voltage
C	in series	they can be switched separately
D	in series	they share the voltage

40 Which row describes the properties of β -particles (beta-particles)?

	they are electromagnetic waves	they are ionising	
A	✓	✓	key
B	✓	x	✓ = yes
C	x	✓	x = no
D	x	x	

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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	<div style="border: 1px solid black; padding: 5px; text-align: center;"> Key atomic number name atomic symbol relative atomic mass </div>										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 —																		

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 —

lanthanoids

actinoids

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.)