



**Cambridge Assessment International Education**  
Cambridge International General Certificate of Secondary Education

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**COMBINED SCIENCE**

**0653/12**

Paper 1 Multiple Choice (Core)

**October/November 2019**

**45 minutes**

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

\* 7 2 5 6 0 7 4 0 9 8 \*

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**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 16.

Electronic calculators may be used.

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This document consists of **15** printed pages and **1** blank page.

1 Which characteristic of living organisms describes the taking in of materials for energy, growth and development?

- A absorption
- B nutrition
- C photosynthesis
- D respiration

2 What is osmosis?

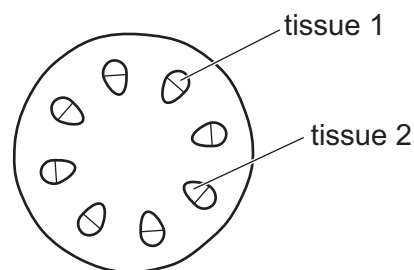
- A the movement of salt across a cell wall
- B the movement of salt across a partially permeable membrane
- C the movement of water across a cell wall
- D the movement of water across a partially permeable membrane

3 Nitrates in the soil are taken up by the roots of a plant.

What are the nitrates used to make?

- A fat
- B glucose
- C protein
- D starch

4 The diagram shows a cross section of a stem.



Which row shows the correct names and functions of the tissues?

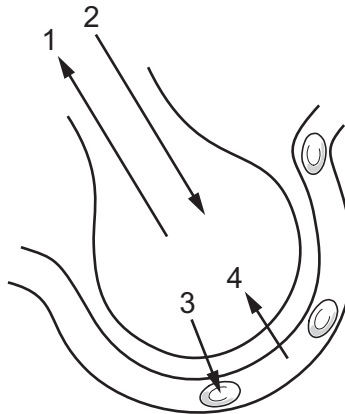
	tissue 1		tissue 2	
	name	function	name	function
<b>A</b>	phloem	support only	phloem	transport only
<b>B</b>	phloem	transport only	xylem	support and transport
<b>C</b>	xylem	transport only	phloem	support and transport
<b>D</b>	xylem	support only	xylem	transport only

5 Which statements about the site of valves are correct?

- 1 present between atria and ventricles
- 2 present between ventricles and arteries
- 3 present between arteries and lungs

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

6 The diagram shows an alveolus and a blood capillary.



Which two arrows represent gas exchange by diffusion only?

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

7 Glucose is involved in the reaction in the body shown below.



What are P, Q and R?

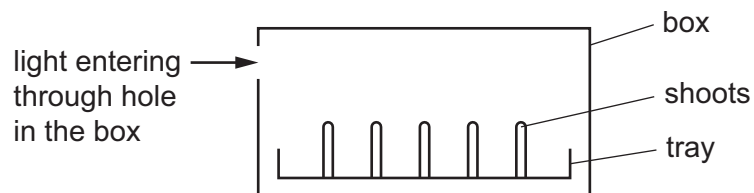
	P	Q	R
<b>A</b>	carbon dioxide	oxygen	water
<b>B</b>	carbon dioxide	water	oxygen
<b>C</b>	oxygen	water	carbon dioxide
<b>D</b>	water	carbon dioxide	oxygen

8 A biologist keeps a potted plant in a laboratory.

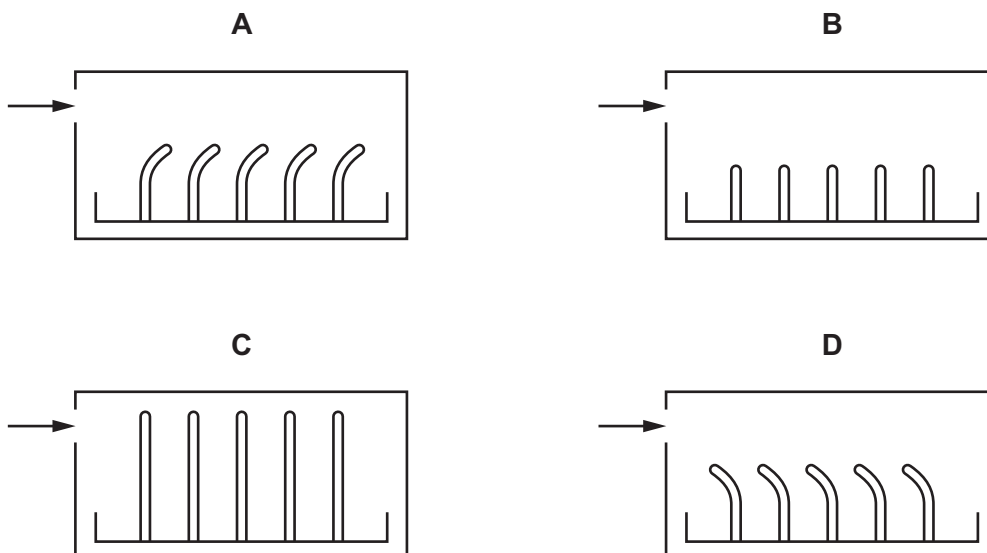
Which feature of the potted plant shows that it is a living organism?

- A It grows larger over time.
- B It has green leaves.
- C The compost in the pot dries after he waters it.
- D The stems contain xylem.

9 The diagram shows the shoots of a tray of seedlings in a box. Light enters the box as shown.



Which diagram shows the phototropic response of the shoots after 48 hours?



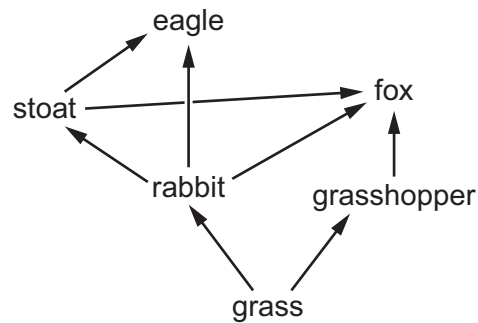
10 Which statement about sexual reproduction is **always** correct?

- A It involves only one parent.
- B It involves the fusion of nuclei.
- C It produces genetically identical offspring.
- D It takes place only in animals.

11 What is the function of the human ovaries?

- A place where the fetus develops
- B release of eggs
- C site of fertilisation
- D transfer of egg to the uterus

12 The diagram shows a food web.



Which statement about this food web is correct?

- A It has five carnivores.
- B It has five consumers.
- C It has one herbivore.
- D It has two producers.

13 Which row shows the effects of deforestation?

	amount of photosynthesis	concentration of carbon dioxide in atmosphere
<b>A</b>	less	more
<b>B</b>	less	less
<b>C</b>	more	less
<b>D</b>	more	more

14 Four changes are listed.

- 1 solid carbon dioxide → carbon dioxide gas
- 2 the rusting of iron
- 3 the electrolysis of molten sodium chloride
- 4 the fractional distillation of crude oil

Which row identifies the chemical changes and physical changes?

	chemical change	physical change
<b>A</b>	1 and 2	3 and 4
<b>B</b>	1 and 4	2 and 3
<b>C</b>	2 and 3	1 and 4
<b>D</b>	3 and 4	1 and 2

15 A white solid X is formed when magnesium reacts with oxygen.

What is X?

- A** a compound
- B** a mixture
- C** an alloy
- D** an element

16 Which row describes the fluorine atom,  ${}^{19}_{9}\text{F}$ ?

	number of protons	number of neutrons	number of electrons
<b>A</b>	9	9	10
<b>B</b>	9	10	9
<b>C</b>	10	9	10
<b>D</b>	10	19	9

17 The fertiliser ammonium sulfate has the formula  $(\text{NH}_4)_2\text{SO}_4$ .

How many atoms of each element are present in the formula?

	number of hydrogen atoms	number of nitrogen atoms	number of oxygen atoms	number of sulfur atoms
<b>A</b>	4	1	1	1
<b>B</b>	4	2	4	1
<b>C</b>	8	1	4	1
<b>D</b>	8	2	4	1

18 Element X is a non-metal used in the treatment of the water supply.

It is made during the electrolysis of a metal salt.

What is the colour of X and at which electrode is it made?

	colour	electrode
<b>A</b>	red	anode
<b>B</b>	red	cathode
<b>C</b>	yellow-green	anode
<b>D</b>	yellow-green	cathode

19 The initial and the final temperatures of four different reactions are recorded.

Which reaction is the **most** exothermic?

	initial temperature /°C	final temperature /°C
<b>A</b>	19	16
<b>B</b>	20	19
<b>C</b>	22	24
<b>D</b>	24	25

20 Limestone chips react with dilute hydrochloric acid.

Which change decreases the speed of the reaction?

- A adding a catalyst
- B decreasing the temperature
- C increasing the concentration of hydrochloric acid
- D using limestone powder

21 What are the products of the reaction between dilute hydrochloric acid and copper carbonate?

- A copper chloride + carbon dioxide + water
- B copper chloride + hydrogen carbonate
- C copper oxide + carbon dioxide + water
- D copper oxide + chlorine + water

22 Two non-metallic elements, X and Y, are in the same group of the Periodic Table.

X is higher in the group than Y.

Which row shows the group number that includes elements X and Y and which element is lighter in colour?

	group number	lighter in colour
<b>A</b>	I	X
<b>B</b>	I	Y
<b>C</b>	VII	X
<b>D</b>	VII	Y

23 Which row describes the reactivity and the electronic structure of a noble gas?

	reactivity	electronic structure
<b>A</b>	reactive	full outer shell
<b>B</b>	reactive	incomplete outer shell
<b>C</b>	unreactive	incomplete outer shell
<b>D</b>	unreactive	full outer shell

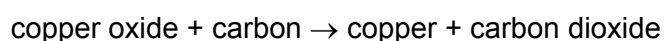


24 Which statement about alloys is correct?

- A They are made from metals because metals are poor electrical conductors.
- B They are mixtures of compounds that contain metals.
- C They have all the same properties as the metals from which they are made.
- D They have different properties to the metals from which they are made.

25 Copper oxide reacts with carbon.

The equation is shown.



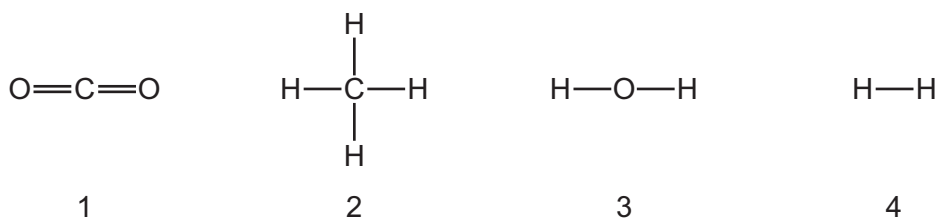
What is the role of carbon in this reaction?

- A It is a catalyst.
- B It is an electrolyte.
- C It neutralises the copper oxide.
- D It reduces the copper oxide.

26 What is the composition of clean air?

- A 78% nitrogen, 21% carbon dioxide and small amounts of other gases
- B 78% nitrogen, 21% oxygen and small amounts of other gases
- C 78% oxygen, 21% carbon dioxide and small amounts of other gases
- D 78% oxygen, 21% nitrogen and small amounts of other gases

27 Which two substances are formed during the complete combustion of hydrocarbons?

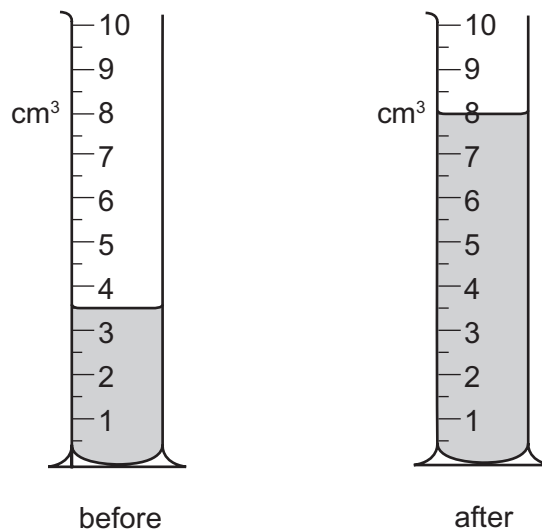


- A 1 and 3
- B 1 and 4
- C 2 and 3
- D 2 and 4

28 A measuring cylinder contains liquid.

More liquid is now poured into the measuring cylinder.

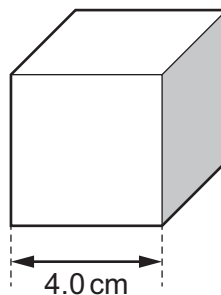
The diagrams show the measuring cylinder before and after the liquid is poured into it.



What volume of liquid is **poured** into the measuring cylinder?

- A** 3.5 cm<sup>3</sup>      **B** 4.0 cm<sup>3</sup>      **C** 4.5 cm<sup>3</sup>      **D** 8.0 cm<sup>3</sup>

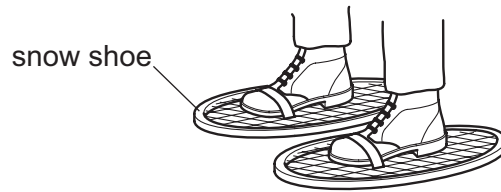
29 A solid metal cube of side 4.0 cm has a mass of 640 g.



What is the density of the metal?

- A** 10 g/cm<sup>3</sup>      **B** 40 g/cm<sup>3</sup>      **C** 160 g/cm<sup>3</sup>      **D** 2560 g/cm<sup>3</sup>

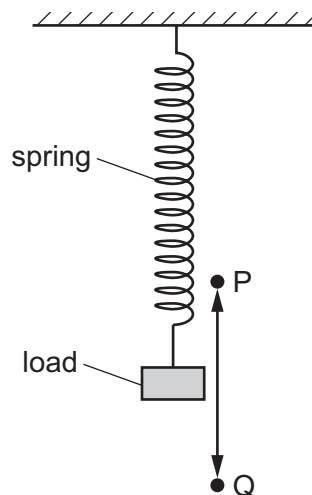
- 30 A man walking on snow in normal shoes sinks into the snow. The man puts on snow shoes and does not sink into the snow.



Which row explains why this happens?

	area of contact with snow	weight of man
<b>A</b>	decreased	decreased
<b>B</b>	decreased	unchanged
<b>C</b>	increased	decreased
<b>D</b>	increased	unchanged

- 31 The diagram shows a load attached to a spring.



The load is pulled down and then released so that it oscillates between point P (highest point) and point Q (lowest point).

Which form of energy does the load have at point P?

- A** gravitational potential energy only
- B** kinetic energy only
- C** kinetic energy and gravitational potential energy
- D** neither kinetic energy nor gravitational potential energy

32 A girl runs up some stairs.

Which two quantities need to be known to calculate the power she produces?

- A her weight and the height of the stairs
- B her weight and the time she takes to run up the stairs
- C the work she does and the height of the stairs
- D the work she does and the time she takes to run up the stairs

33 A liquid is evaporating but **not** boiling.

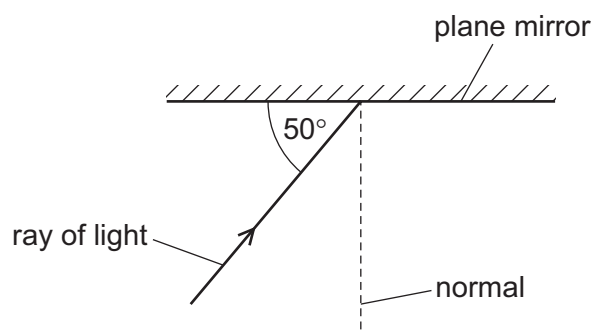
Which statement about evaporation of the liquid is correct?

- A Bubbles of vapour are formed beneath the surface of the liquid during evaporation.
- B Evaporation only takes place at a specific temperature.
- C Evaporation only takes place from the surface of the liquid.
- D The temperature of the liquid increases during evaporation.

34 Which row describes the separation and motion of the molecules in solids and gases?

	solids	gases
A	close together and changing positions	close together and changing positions
B	close together and changing positions	far apart and moving freely
C	close together and vibrating about fixed positions	close together and vibrating about fixed positions
D	close together and vibrating about fixed positions	far apart and moving freely

35 The diagram shows light striking a plane mirror.



What is the angle of reflection of the ray when it is reflected from the mirror?

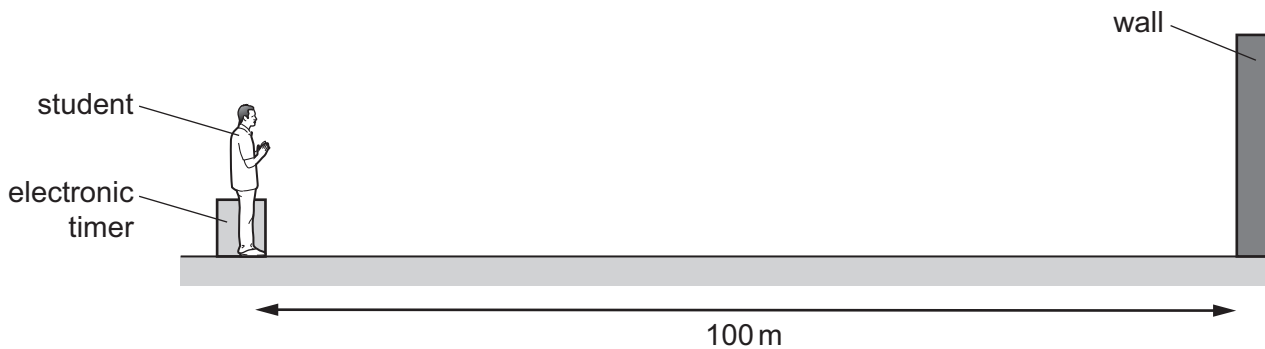
- A 40°
- B 50°
- C 80°
- D 100°

- 36 Gamma rays and microwaves are both regions of the electromagnetic spectrum.

How do the speed and frequency of gamma rays in a vacuum compare with the speed and frequency of microwaves in a vacuum?

	speed of gamma rays	frequency of gamma rays
<b>A</b>	greater than for microwaves	greater than for microwaves
<b>B</b>	greater than for microwaves	smaller than for microwaves
<b>C</b>	the same as for microwaves	greater than for microwaves
<b>D</b>	the same as for microwaves	smaller than for microwaves

- 37 A student measures the speed of sound. He claps his hands and the sound reflects from a wall that is 100 m away from him.



An electronic timer next to the student detects the echo of the sound 0.60 s after it is made.

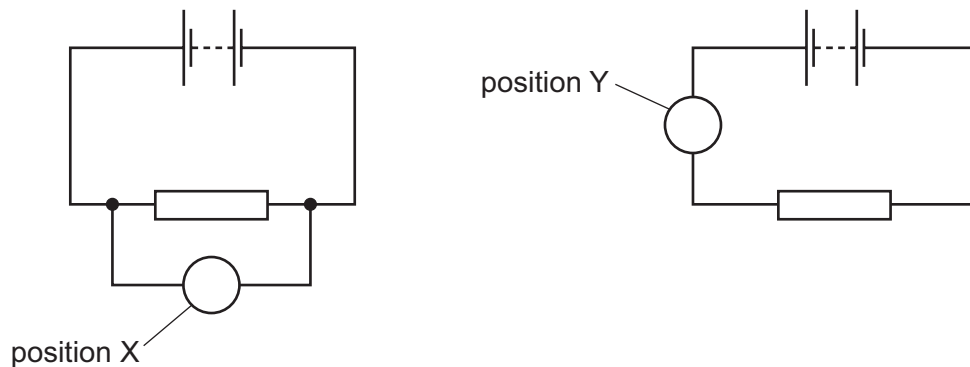
Which calculation gives the speed of sound?

- A**  $\frac{200}{0.30}$  m/s      **B**  $\frac{200}{0.60}$  m/s      **C**  $\frac{100}{0.60}$  m/s      **D**  $\frac{100}{1.2}$  m/s
- 38 A plastic rod becomes positively charged when it is rubbed with a cloth.

What happens during the charging process?

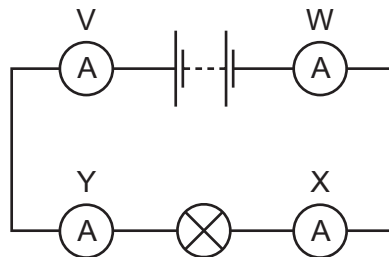
- A** Electrons and protons move from the rod to the cloth, but more electrons move than protons.  
**B** Electrons move from the rod to the cloth and protons move from the cloth to the rod.  
**C** Only protons move, from the cloth to the rod.  
**D** Only electrons move, from the rod to the cloth.

- 39 A student wants to measure the potential difference across a resistor. The circuits show two different positions in which a meter can be connected.



What meter is used, and where is it connected in the circuit?

- A an ammeter in position X
  - B an ammeter in position Y
  - C a voltmeter in position X
  - D a voltmeter in position Y
- 40 Four ammeters V, W, X and Y are connected in the circuit shown.



Which ammeters have the same reading as each other?

- A V and W only
- B V and Y only
- C X and Y only
- D V, W, X and Y

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## The Periodic Table of Elements

Group										
I	II	III	IV	V	VI	VII	VIII			
		1 H hydrogen 1								
<b>Key</b> atomic number atomic symbol name relative atomic mass										
3 Li lithium 7	4 Be beryllium 9					9 F fluorine 19				
11 Na sodium 23	12 Mg magnesium 24	5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16		10 Ne neon 20			
		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	30 Zn zinc 65	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79		36 Kr krypton 84			
37 Rb rubidium 85	38 Sr strontium 88	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128		54 Xe xenon 131			
55 Cs caesium 133	56 Ba barium 137	80 Hg mercury 201	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium —		86 Rn radon —			
87 Fr francium —	88 Ra radium —	81 Tl thallium 204	114 Fl flerovium —		116 Lv livermorium —					
		29 Cu copper 64	29 Cu copper 64	29 Cu copper 64	29 Cu copper 64					
		26 Fe iron 56	28 Ni nickel 59	27 Co cobalt 59	28 Ni nickel 59					
		25 Mn manganese 55	46 Ag silver 108	45 Rh rhodium 103	46 Pd palladium 106					
		43 Tc —	47 Zn zinc 65	44 Ru ruthenium 101	46 Pd palladium 106					
		44 Ru ruthenium 101	79 Au gold 197	77 Ir iridium 192	78 Pt platinum 195					
		75 Re rhenium 186	110 Dg darmstadtium —	109 Mt meitnerium —	110 Ds darmstadtium —					
		74 W tungsten 184	108 Hs hassium —	107 Bh bohrium —	108 Hs hassium —					
		73 Ta tantalum 181	111 Rg roentgenium —	109 Mt meitnerium —	111 Rg roentgenium —					
		72 Hf hafnium 178	112 Cn copernicium —	111 Rg roentgenium —	112 Cn copernicium —					
		71 La lanthanoids 139								
		89-103 Ac actinoids —								

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<sup>3</sup> at room temperature and pressure (r.t.p.).