



# Cambridge O Level

**COMBINED SCIENCE**

**5129/12**

Paper 1 Multiple Choice

**October/November 2020**

**1 hour**

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. A mark will not be deducted for a wrong answer.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.

This document has **16** pages. Blank pages are indicated.

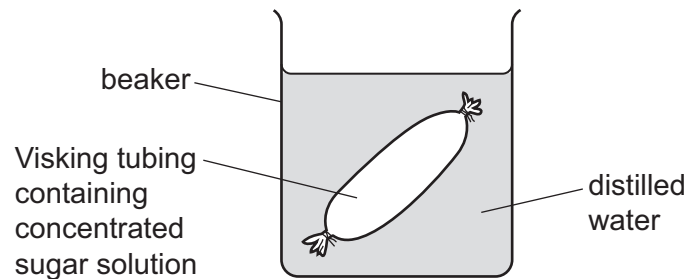


1 Which cell structure is found in plant cells but **not** in animal cells?

- A cell membrane
- B cell wall
- C cytoplasm
- D nucleus

2 Visking tubing is a partially permeable membrane.

Some Visking tubing containing a concentrated sugar solution is weighed and placed in distilled water, as shown.

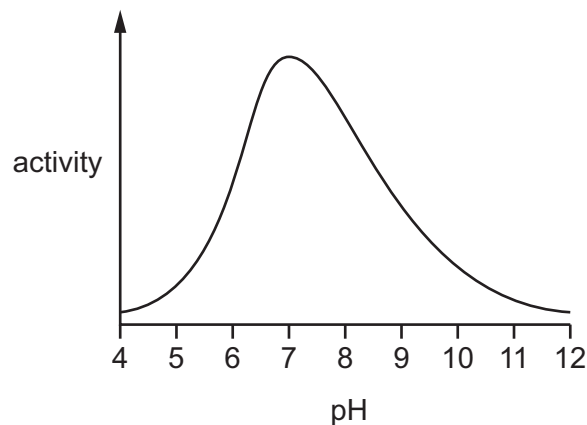


After two hours the Visking tubing is removed and re-weighed.

What happens to the mass and why?

- A It decreases because sugar moves out.
- B It decreases because water moves out.
- C It increases because sugar moves in.
- D It increases because water moves in.

3 The graph shows the activity of an enzyme at different pH values.

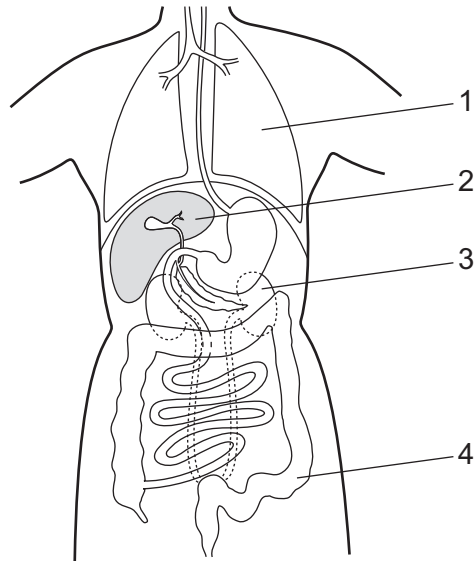


What is the pH value at which this enzyme works most quickly?

- A 4
- B 6
- C 7
- D 9

- 4 Which statement about chewing is correct?
- A It absorbs the products of digestion.
  - B It adds amino acids to the food.
  - C It destroys microbes in the food.
  - D It reduces the size of the food particles.
- 5 Why do plants wilt?
- A Sugars are made by photosynthesis faster than water is lost by transpiration.
  - B Sugars move down the phloem faster than water is absorbed through root hair cells.
  - C Water is lost by transpiration faster than water is absorbed by root hair cells.
  - D Water moves up the xylem faster than sugars move down the phloem.
- 6 Which change in lifestyle is most likely to increase the risk of coronary heart disease?
- A drinking more alcohol
  - B eating more fruit and vegetables
  - C exercising more frequently
  - D giving up smoking
- 7 In a 10 km race, an athlete runs steadily for most of the distance to keep up with the other athletes. In the final 400 m, the athlete runs as fast as possible to win the race.
- Which substances are produced by respiration in the athlete's muscles during this race?
- A carbon dioxide and water only
  - B lactic acid only
  - C lactic acid and carbon dioxide only
  - D water, carbon dioxide and lactic acid

- 8 The diagram shows a body outline with some of the organs labelled 1, 2, 3 and 4.



Urea, carbon dioxide and water are excreted from the body.

Which row correctly shows where urea and carbon dioxide are excreted?

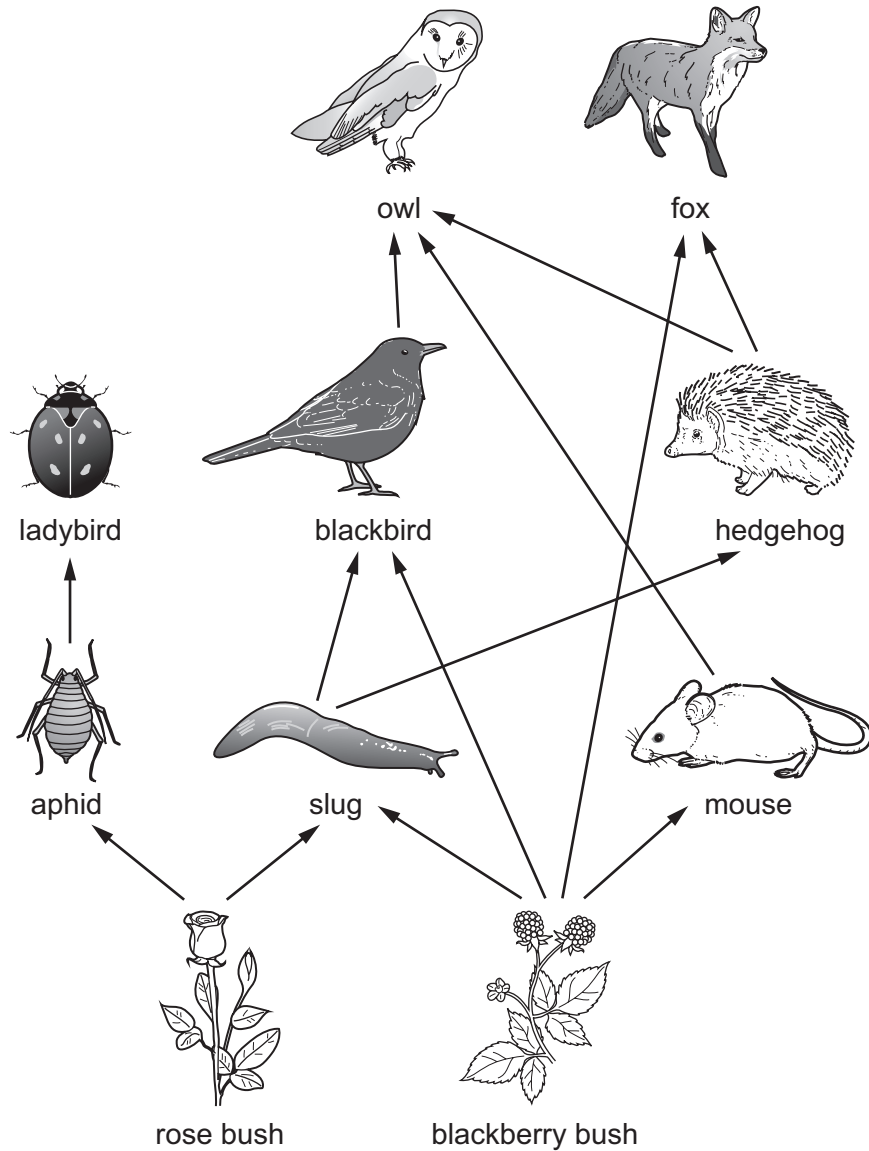
	urea	carbon dioxide
<b>A</b>	2	1
<b>B</b>	2	4
<b>C</b>	3	1
<b>D</b>	3	4

- 9 Which organ destroys hormones released within the body?
- A** duodenum
  - B** kidney
  - C** liver
  - D** pancreas

- 10 What are the effects of alcohol and heroin on the body?

	alcohol	heroin
<b>A</b>	depressant	depressant
<b>B</b>	depressant	stimulant
<b>C</b>	stimulant	depressant
<b>D</b>	stimulant	stimulant

11 The diagram shows an example of a woodland food web.



There are two different organisms at the first trophic level (producers).

How many different organisms are found at the third trophic level?

- A** 2                      **B** 3                      **C** 4                      **D** 5

12 Which row describes asexual reproduction?

	number of parents	offspring are genetically identical
<b>A</b>	1	no
<b>B</b>	1	yes
<b>C</b>	2	no
<b>D</b>	2	yes

13 What do seeds need for germination to occur?

- A cold, dry conditions and oxygen
- B cold, wet conditions and carbon dioxide
- C warm, dry conditions and carbon dioxide
- D warm, wet conditions and oxygen

14 Which methods are used to test the purity of a substance?

- 1 filtration
- 2 measurement of boiling point
- 3 distillation
- 4 chromatography

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

15 The compositions of the nuclei of four different atoms are shown. The letters are not the symbols of the elements.



Which atoms are isotopes?

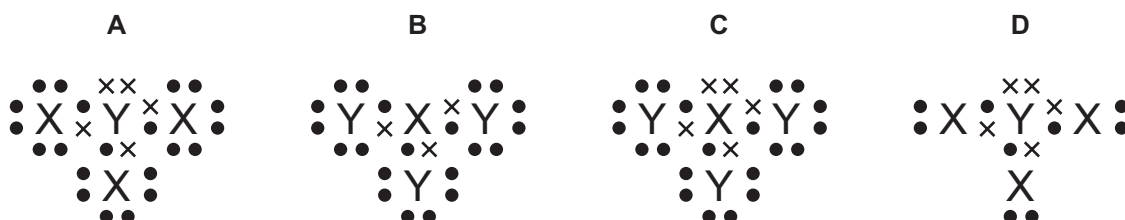
- A W and X      B W and Z      C X and Y      D Y and Z

16 Which particle contains the same number of electrons as an atom of neon?

- A  $\text{Cl}^{-}$       B Li      C  $\text{Li}^{+}$       D  $\text{O}^{2-}$

17 X is an element in Group III and Y is an element in Group VII of the Periodic Table.

Which diagram shows the outer electron arrangement of the covalent compound formed between X and Y?



18 The equation for the decomposition of calcium carbonate is shown.



Which mass of calcium oxide is produced from 10.0 g of calcium carbonate?

- A 4.4 g                      B 5.0 g                      C 5.6 g                      D 10.0 g

19 Carbon dioxide emitted by burning fossil fuels dissolves in rain.

The rainwater turns universal indicator yellow.

What is the pH of the rainwater?

- A 2                              B 5                              C 7                              D 9

20 Which statement about the elements in Group VII is **not** correct?

- A Their boiling point increases down the group.  
 B Their colour gets darker down the group.  
 C They are all diatomic non-metals.  
 D They become more reactive down the group.

21 Four different metals are reacted separately with cold water, steam and dilute hydrochloric acid.

The results are shown.

metal	reaction with cold water	reaction with steam	reaction with dilute hydrochloric acid
W	no reaction	reacts slowly	reacts vigorously
X	no reaction	no reaction	reacts slowly
Y	reacts slowly	reacts vigorously	reacts explosively
Z	reacts slowly	reacts slowly	reacts vigorously

What is the order of reactivity of the four metals?

	least reactive $\longrightarrow$ most reactive			
<b>A</b>	X	W	Z	Y
<b>B</b>	X	Z	W	Y
<b>C</b>	Y	W	Z	X
<b>D</b>	Y	Z	W	X

22 Which row shows why copper is used for electrical wiring?

	melting point	conductivity	reactivity
<b>A</b>	high	high	low
<b>B</b>	high	low	high
<b>C</b>	low	high	high
<b>D</b>	low	low	low

23 Why is chlorine used to purify water supplies?

- A** It kills any bacteria in the water.
- B** It neutralises any acidity in the water.
- C** It removes solids from the water.
- D** It removes tastes and smells.

24 Magnesium reacts with dilute sulfuric acid. A gas is made in the reaction.

Which row shows the correct test and result for the gas?

	test	result
<b>A</b>	glowing splint	pops
<b>B</b>	glowing splint	relights
<b>C</b>	lighted splint	goes out
<b>D</b>	lighted splint	pops

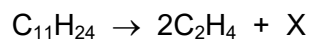
25 Petroleum is separated into useful fractions by fractional distillation.

Which row about the fractions is correct?

	fraction	use
<b>A</b>	bitumen	making waxes
<b>B</b>	gasoline	for oil stoves
<b>C</b>	kerosene	fuel for buses and lorries
<b>D</b>	oils	making polishes



26 The equation shows the cracking of a hydrocarbon.



What is X?

- A  $\text{C}_9\text{H}_{20}$       B  $\text{C}_7\text{H}_{20}$       C  $\text{C}_7\text{H}_{16}$       D  $\text{C}_2\text{H}_4$

27 Ethanol is made by reacting ethene with steam.

Ethanol is also made by the fermentation of sugar obtained from plants.

Which statement is correct?

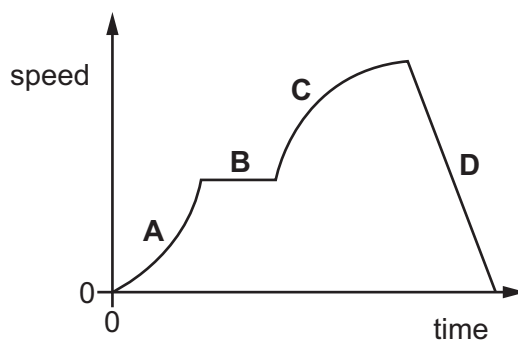
- A Fermentation is a faster process than reacting ethene and steam.  
B Fermentation produces ethanol from a renewable source.  
C Reacting ethene with steam produces impure ethanol.  
D Reacting ethene with steam uses very little energy.

28 A car accelerates steadily from rest at  $2.0 \text{ m/s}^2$  for 8.0 seconds.

What is the **average** velocity of the car?

- A 2.0 m/s      B 4.0 m/s      C 8.0 m/s      D 16.0 m/s

29 Which part of the speed–time graph shows constant non-zero acceleration?



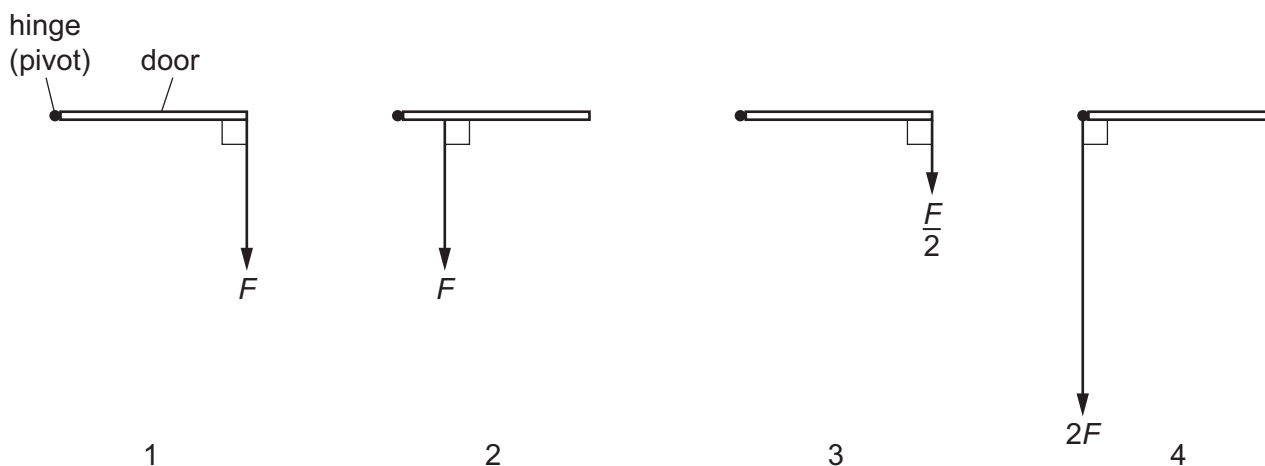
30 A man has a mass of 60 kg on Earth. The Earth's gravitational field strength is  $10 \text{ N/kg}$ .

The Moon's gravitational field strength is  $1.6 \text{ N/kg}$ .

What is the man's weight on the Moon?

- A 60 kg      B 60 N      C 96 kg      D 96 N

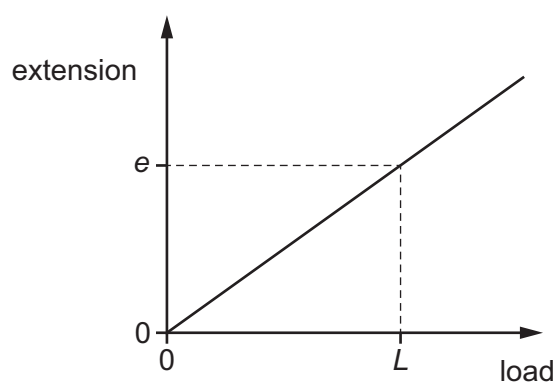
- 31 The diagrams show four possible arrangements of different forces applied to open the same door.



Which row compares the turning effect of each force correctly?

	greatest turning effect		least turning effect	
	→			
<b>A</b>	1	2	3	4
<b>B</b>	1	3	2	4
<b>C</b>	4	1	2	3
<b>D</b>	4	1	3	2

- 32 The diagram shows an extension–load graph for an elastic object.



A load of  $L$  produces an extension of  $e$ .

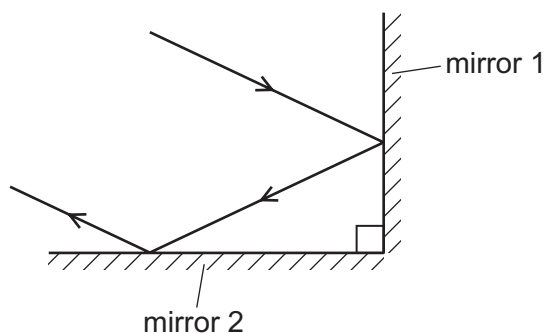
What happens when the load  $L$  is removed?

- A** The extension continues to increase.
- B** The extension reduces but does not return to zero.
- C** The extension stays at  $e$ .
- D** The extension returns to zero.

33 What is **not** a consequence of thermal expansion?

- A the cracking of a cold plate when put into a very hot oven
- B the distortion of metal train tracks in very hot weather
- C the distortion suffered by a football when kicked
- D the water circulation in a heated saucepan

34 A ray of light is incident on mirror 1 as shown. Mirror 2 is at right angles to mirror 1.



The path of the ray reflected from mirror 2 is parallel to the incident ray.

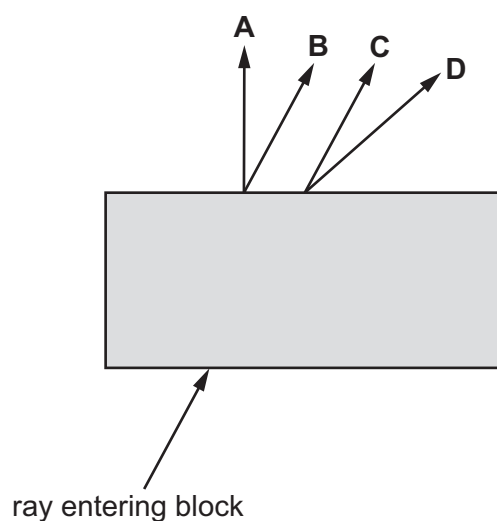
The angle of incidence at mirror 1 is  $25^\circ$ .

What is the angle of reflection from mirror 2?

- A  $25^\circ$
- B  $65^\circ$
- C  $90^\circ$
- D  $130^\circ$

35 The diagram shows a ray of light incident on a rectangular glass block.

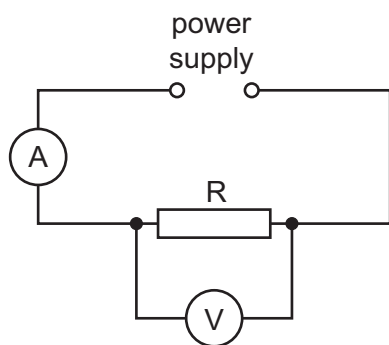
Which arrow shows the correct path for the ray of light leaving the block?



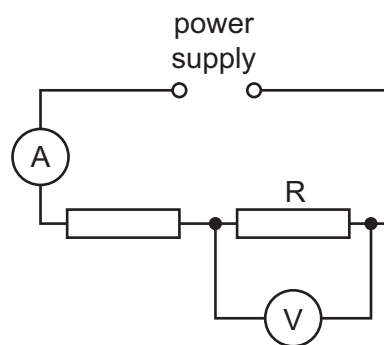
36 Which units are suitable for measuring e.m.f.?

- A C/J
- B C/s
- C J/C
- D J/s

37 Identical power supplies are used in the circuits shown.



circuit 1



circuit 2

Which statement is correct?

- A The current in circuit 2 is equal to the current in circuit 1.
- B The current in circuit 2 is lower than the current in circuit 1.
- C The voltmeter reading is larger in circuit 2.
- D The voltmeter reading is the same in both circuits.

38 A lighting circuit used in a house contains 15 lamps connected in parallel.

This is the maximum number of lamps that can be used safely.

When more lamps are connected in parallel, the circuit stops working.

Why does the circuit stop working?

- A The circuit is doubly insulated.
- B The connecting wires melt.
- C The fuse wire melts.
- D The lamps burn out.

39 How many electrons are there in an atom of  ${}_{53}^{127}\text{I}$ ?

- A 53
- B 74
- C 127
- D 180

40 How do the ionising abilities of beta-particles and gamma-rays compare with the ionising ability of alpha-particles?

	beta-particles	gamma-rays
<b>A</b>	less	less
<b>B</b>	less	more
<b>C</b>	more	less
<b>D</b>	more	more



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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	11 Na sodium 23	12 Mg magnesium 24	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	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 Ac actinium —	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 —	114 Fl flerovium —	116 Lv livermorium —								
		<b>Key</b> atomic number atomic symbol name relative atomic mass		1 H hydrogen 1																		

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
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 —

actinoids

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).