



Cambridge O Level

COMBINED SCIENCE

5129/11

Paper 1 Multiple Choice

October/November 2021

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.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.

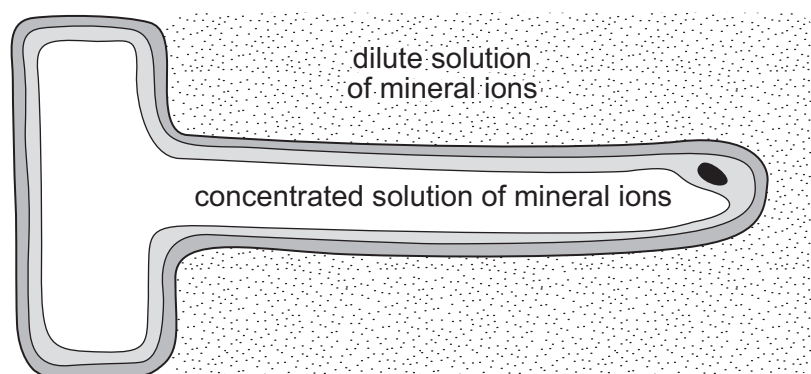
This document has **16** pages. Any blank pages are indicated.



- 1 Which features of a red blood cell help the cell to transport oxygen?

	absence of a nucleus	presence of haemoglobin
A	no	no
B	no	yes
C	yes	no
D	yes	yes

- 2 The diagram shows a root hair cell surrounded by a dilute solution of mineral ions.



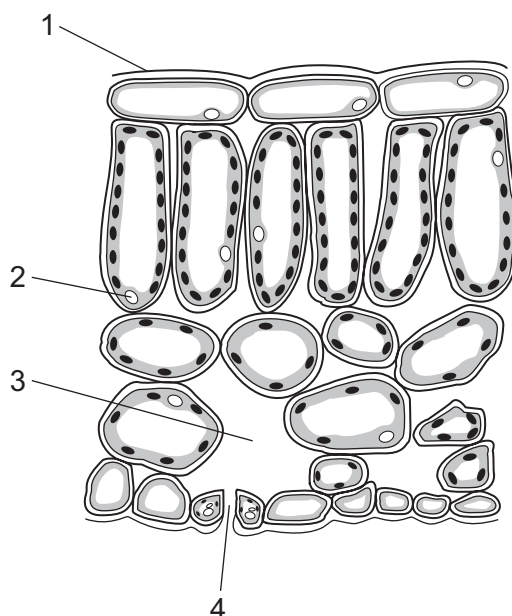
Which statement describes what happens?

- A** Water molecules move into the root hair because their concentration is lower inside.
 - B** Water molecules move into the root hair because their concentration is lower outside.
 - C** Water molecules move out of the root hair because their concentration is lower inside.
 - D** Water molecules move out of the root hair because their concentration is lower outside.
- 3 Amylase is an enzyme which is important in the germination of seeds.

What is the role of amylase in germination?

- A** to allow entry of glucose into the seed
- B** to allow entry of water into the seed
- C** to break down starch into sugar
- D** to break down sugar into starch

- 4 The diagram shows the cross section of a dicotyledonous leaf.



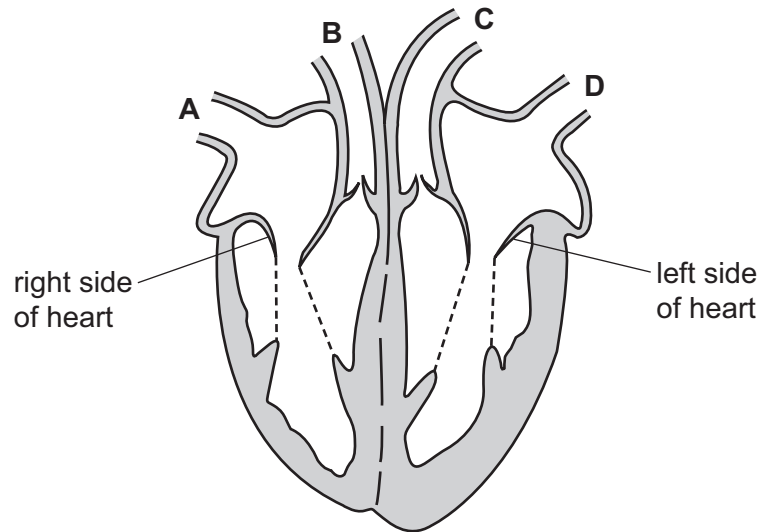
Which labels show features of a leaf that are directly involved in gas transport into and out of the leaf?

- A** 1 and 2 **B** 1 and 4 **C** 2 and 3 **D** 3 and 4
- 5 What causes tooth decay?
- A** acidic materials produced by bacteria
B alkaline materials produced by salivary glands
C brushing teeth twice a day
D drinking water
- 6 Which row describes the function of xylem and phloem?

	xylem	phloem
A	transports food from the leaves to other parts of the plant	transports water from the roots to the leaves
B	transports food from the roots to other parts of the plant	transports water from the leaves to the roots
C	transports water from the leaves to the roots	transports food from the roots to other parts of the plant
D	transports water from the roots to the leaves	transports food from the leaves to other parts of the plant

- 7 The diagram shows the heart.

Which label is an artery carrying deoxygenated blood?



- 8 An athlete begins a race by running too fast and is soon forced to stop running due to pain in her muscles.

Which statement explains what happens?

- A The athlete begins to respire aerobically and carbon dioxide builds up in her muscles.
- B The athlete begins to respire aerobically and lactic acid builds up in her muscles.
- C The athlete begins to respire anaerobically and carbon dioxide builds up in her muscles.
- D The athlete begins to respire anaerobically and lactic acid builds up in her muscles.

- 9 Which organ of the body excretes urea?

- A kidney
- B liver
- C lungs
- D rectum

- 10 Which statements about hormones are correct?

- 1 Hormones are carried by the blood.
- 2 Hormones are destroyed by the kidneys.
- 3 Hormones are destroyed by the liver.
- 4 Hormones are produced by a gland.

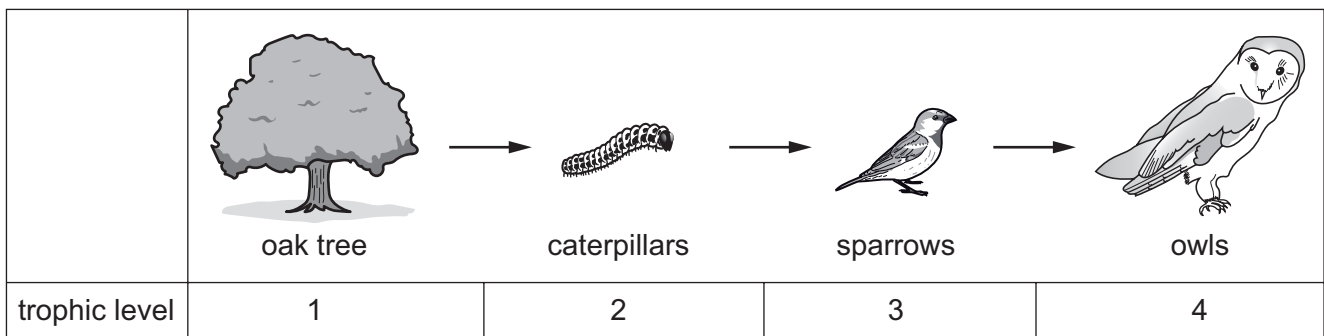
- A 1, 2 and 4 B 1, 3 and 4 C 1 and 3 only D 2 and 4 only

11 A person moves from a dark room into the sunlight.

Which change occurs in the eye?

- A The lens becomes thinner.
- B The lens becomes fatter.
- C The pupil becomes larger.
- D The pupil becomes smaller.

12 The diagram shows a food chain.

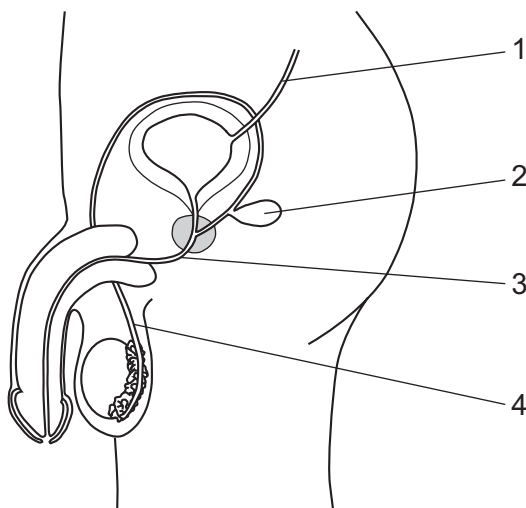


The tree has 100 000 kJ of energy.

Which row indicates the likely energy transfer between each trophic level in this food chain?

	between 1–2 /kJ	between 2–3 /kJ	between 3–4 /kJ
A	500	10 000	100 000
B	10 000	500	50
C	10 000	500	500
D	100 000	50 000	10 000

13 The diagram shows the male reproductive system.



How is surgical contraception carried out?

- A cutting and tying tube 1
- B cutting and tying tube 3
- C cutting and tying tube 4
- D removing gland 2

14 Which method is used to obtain the water from a salt solution?

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

15 A nucleus is represented by the symbol ${}_{37}^{81}\text{X}$.

What does this nucleus contain?

- A 37 electrons and 44 neutrons
- B 37 neutrons and 81 protons
- C 37 protons and 44 neutrons
- D 37 protons and 81 neutrons

16 Which electronic diagram for calcium oxide is correct?



17 Which row describes the properties of a covalent compound?

	melting point / °C	solubility in water	electrical conductivity of aqueous solution
A	216	insoluble	does not conduct
B	447	soluble	conducts
C	547	soluble	conducts
D	825	insoluble	does not conduct

18 What is the total number of atoms in a $(C_2H_5)_2O$ molecule?

- A** 3 **B** 9 **C** 13 **D** 15

19 A colourless solution is added to solid sodium carbonate.

A colourless gas is given off.

Which statement about the colourless solution is correct?

- A** It is a salt.
B It is acidic.
C It is alkaline.
D It is neutral.

20 The table shows the melting point and boiling point of some Group I elements.

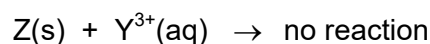
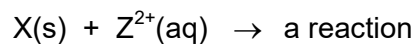
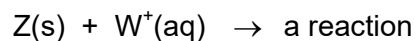
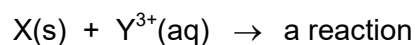
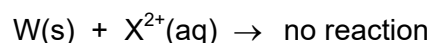
element	melting point / °C	boiling point / °C
Li	180	1330
K	64	759
Rb	39	688

Which row gives the melting point and boiling point of sodium?

	melting point / °C	boiling point / °C
A	58	750
B	98	883
C	102	1525
D	196	1210

- 21** A more reactive metal displaces a less reactive metal from an aqueous solution of its ions.

Four unknown metals W, X, Y and Z react as shown.



What is the correct order of reactivity, putting the most reactive first?

- A** $W \rightarrow X \rightarrow Y \rightarrow Z$
- B** $X \rightarrow W \rightarrow Z \rightarrow Y$
- C** $X \rightarrow Y \rightarrow Z \rightarrow W$
- D** $Z \rightarrow X \rightarrow W \rightarrow Y$
- 22** Which substance is an alloy and is used to make cutlery?
- A** brass
- B** copper
- C** mild steel
- D** stainless steel
- 23** Which row shows the volume of the gases in a sample of clean air?

	volume of air sample / cm ³	volume of nitrogen / cm ³	volume of oxygen / cm ³	volume of other gases / cm ³
A	50	39	10.5	0.50
B	50	40	5.0	5.0
C	100	71	21	8.0
D	100	78	16	6.0

- 24** Which three elements are required in the Haber process for the manufacture of ammonia?
- A** iron, phosphorus and potassium
- B** iron, nitrogen and hydrogen
- C** hydrogen, nitrogen and oxygen
- D** phosphorus, potassium and nitrogen

25 Which statements about petroleum (crude oil) are correct?

- 1 It is used as a fuel.
- 2 It is used as a polish.
- 3 It is a mixture of hydrocarbons.
- 4 It is separated by fractional distillation.

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

26 Which statement about alkenes is correct?

- A** They are unsaturated hydrocarbons.
- B** They burn in air to form carbon dioxide, sulfur dioxide and water.
- C** They turn aqueous bromine orange.
- D** They undergo addition reactions with oxygen to form alkanes.

27 Ethanol is produced by the catalytic addition of steam to ethene.

What are the correct conditions for this process?

- A** 300 °C temperature and 60 atm pressure only
- B** phosphoric acid catalyst, 300 °C temperature and 60 atm pressure
- C** phosphoric acid catalyst and 60 atm pressure only
- D** phosphoric acid catalyst and 300 °C temperature only

28 The table shows how the velocity of an object changes with time.

time / s	<u>velocity</u> m/s
0	25
1.0	20
2.0	15
3.0	10

Which statement describes the acceleration of the object?

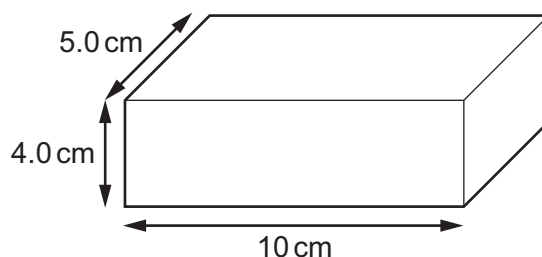
- A** It is constant.
- B** It is decreasing.
- C** It is increasing.
- D** It is zero.

- 29 When astronauts visit the Moon they find that they can jump higher than on Earth.

Why is this?

- A The lack of an atmosphere removes air resistance.
- B Their masses are lower on the Moon.
- C Their weights are lower on the Moon.
- D They have more energy on the Moon.

- 30 A rectangular metal block measures $4.0\text{ cm} \times 5.0\text{ cm} \times 10\text{ cm}$. The mass of the block is 800 g.



What is the density of the metal?

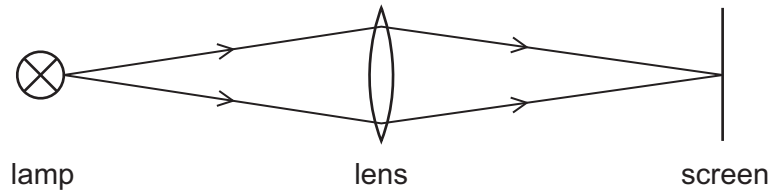
- A 0.25 g/cm^3 B 2.5 g/cm^3 C 4.0 g/cm^3 D 40 g/cm^3
- 31 A solar cell is used to charge a battery.
- Which energy conversion occurs in the solar cell?
- A electrical energy $\rightarrow$ chemical energy
 - B electrical energy $\rightarrow$ light energy
 - C light energy $\rightarrow$ chemical energy
 - D light energy $\rightarrow$ electrical energy
- 32 A rod made of pure copper is heated.

Which statement is correct?

- A The average distance between atoms decreases at the heated end.
- B The average distance between atoms increases at the heated end.
- C The atoms expand as the temperature increases at the heated end.
- D The atoms move away from the heated end.

33 Which diagram shows an example of a longitudinal wave?

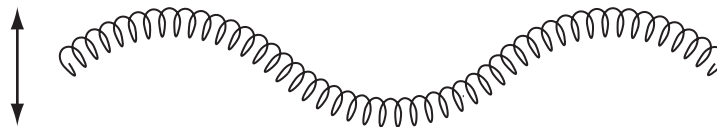
A light travelling from a lamp to a screen



B a spring pulled backwards and pushed forwards repeatedly



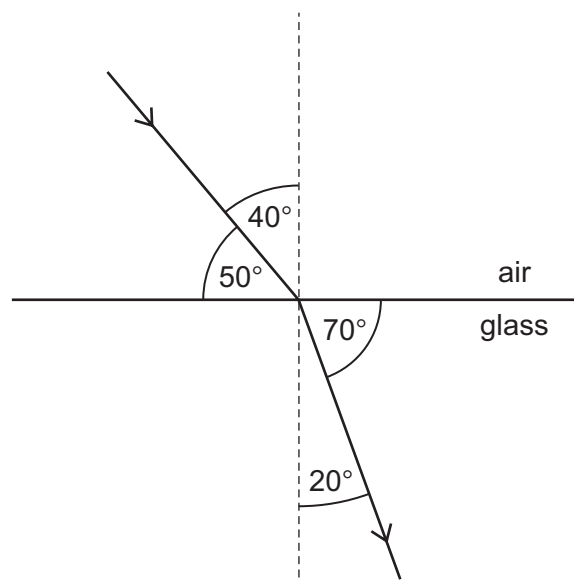
C a spring moved up and down repeatedly



D a water ripple caused by a dipper moving up and down repeatedly



34 The diagram shows a ray of light passing from air into glass.



What is the refractive index of the glass?

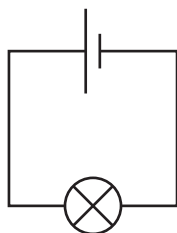
A $\frac{\sin 40^\circ}{\sin 20^\circ}$

B $\frac{\sin 40^\circ}{\sin 70^\circ}$

C $\frac{\sin 50^\circ}{\sin 20^\circ}$

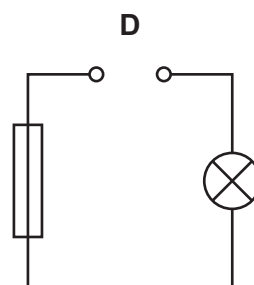
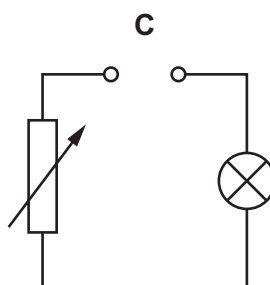
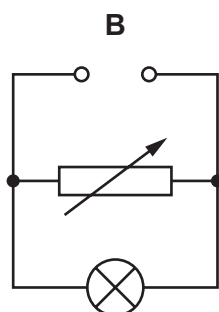
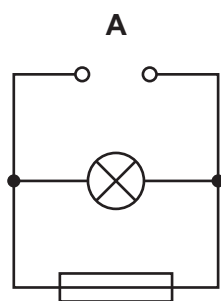
D $\frac{\sin 50^\circ}{\sin 70^\circ}$

- 35** In the circuit shown, 20 J of energy is dissipated by the cell in driving 8.0 C of charge round the circuit.

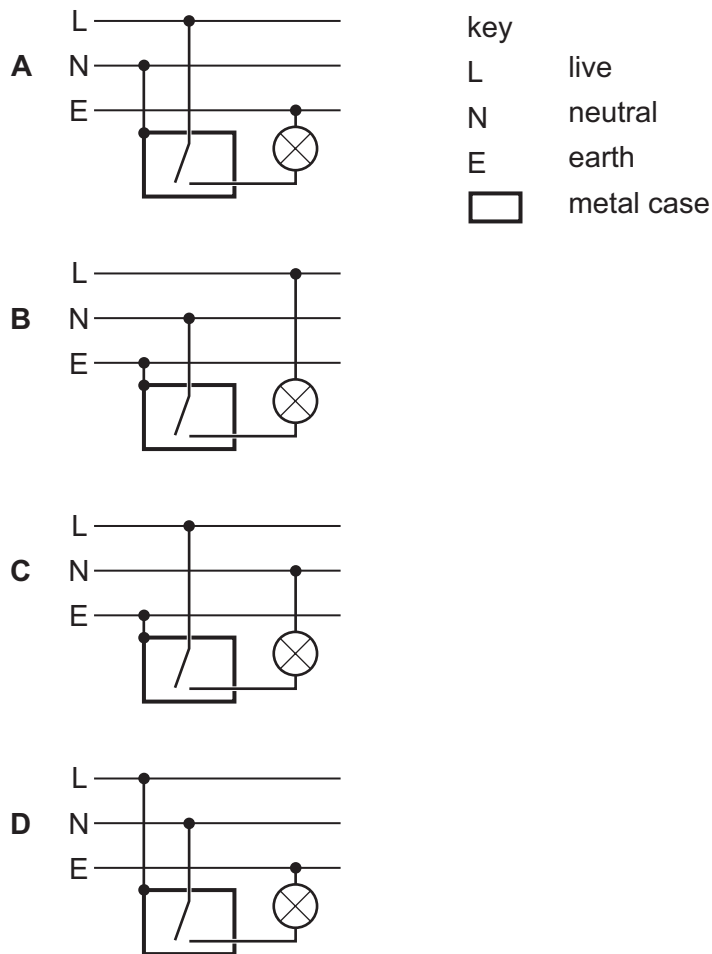


What is the value of the e.m.f. of the cell?

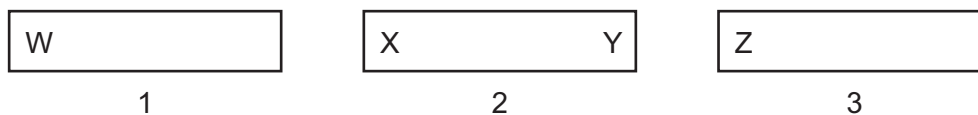
- A** 0.40 V **B** 2.5 V **C** 28 V **D** 160 V
- 36** In which circuit is a fuse connected in series with a lamp?



37 Which diagram shows the correct connections for a switch and a lamp in a lighting circuit?



38 Three metal bars are shown in the diagram.

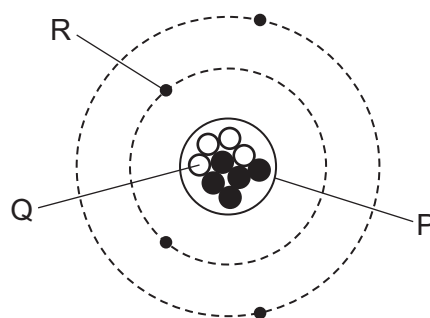


It is found that the end W attracts both end X and end Y but repels end Z.

Which of the bars are permanent magnets?

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

39 The diagram shows a simple model of an atom.

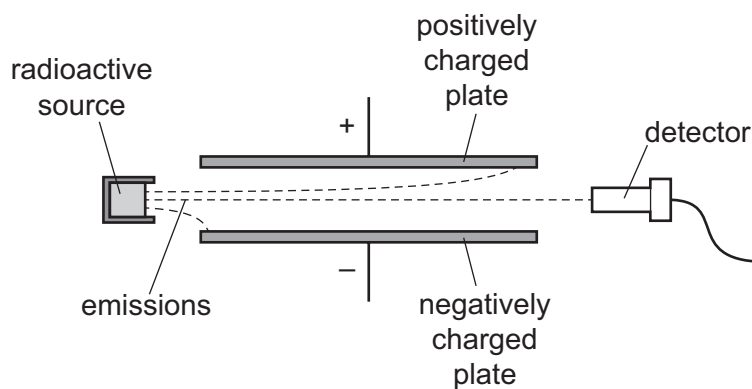


What are the names of P, Q and R?

	P	Q	R
A	neutron	electron	proton
B	neutron	proton	electron
C	nucleus	electron	proton
D	nucleus	proton	electron

40 The diagram shows the emissions from a radioactive source passing between two charged plates.

One plate is positively charged and one is negatively charged.



Which types of radiation reach the detector?

- A** alpha-particles only
- B** beta-particles only
- C** beta-particles and gamma-rays
- D** gamma-rays only

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The Periodic Table of Elements

lanthanoids																													
57	La	58	Ce	59	Pr	60	Nd	61	Pm	62	Sm	63	Eu	64	Gd	65	Tb	66	Dy	67	Ho	68	Er	69	Tm	70	Yb	71	Lu
lanthanum	139	cerium	140	praseodymium	141	neodymium	144	—	promethium	150	samarium	152	euroium	157	gadolinium	159	terbium	163	dysprosium	165	holmium	167	erbium	169	thulium	173	ytterbium	175	lutetium
actinoids																													
89	Ac	90	Th	91	Pa	92	U	93	Np	94	Pu	95	Am	96	Cm	97	Bk	98	Cf	99	Es	100	Fm	101	Md	102	No	103	Lr
actinium	231	thorium	232	protactinium	231	uranium	238	—	neptunium	239	plutonium	239	americium	237	curium	237	berkelium	237	californium	237	einsteinium	237	femium	237	merendeium	237	nobelium	—	lawrencium

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