Cambridge Assessment International Education

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

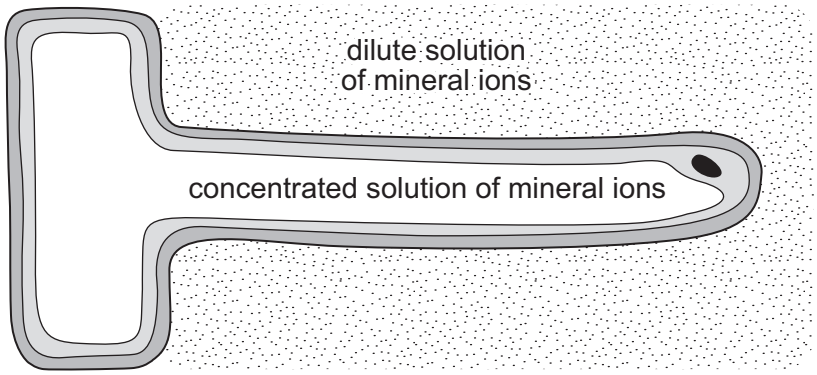
- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.

IB21 11_5129_11/3RP

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?

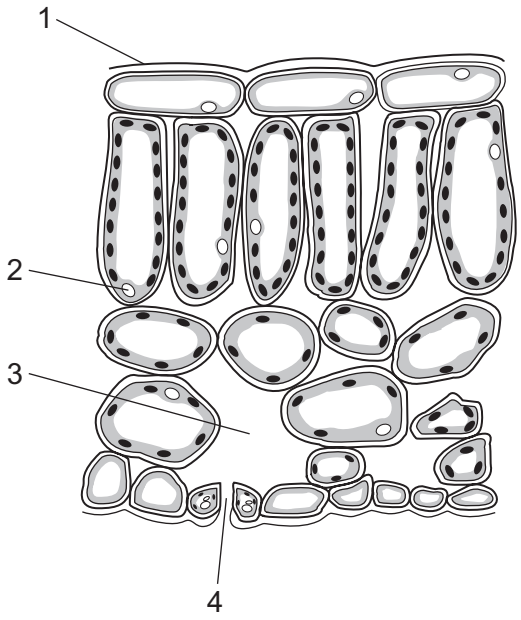
A to allow entry of glucose into the seed

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

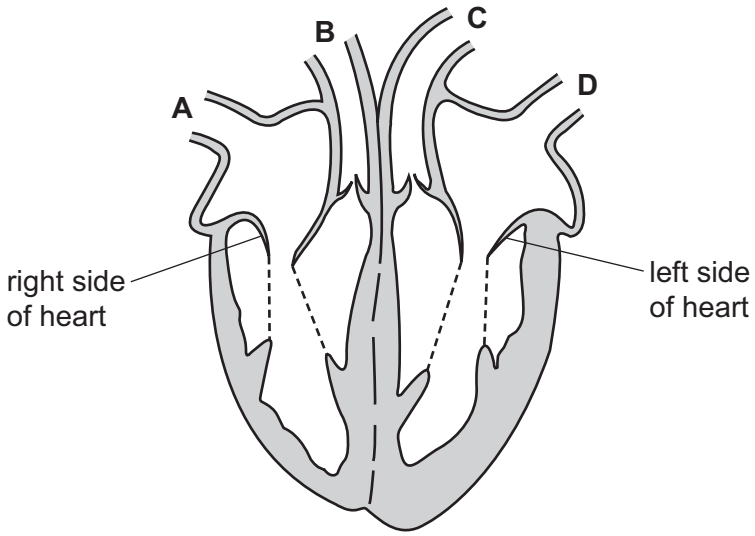
D drinking water

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?

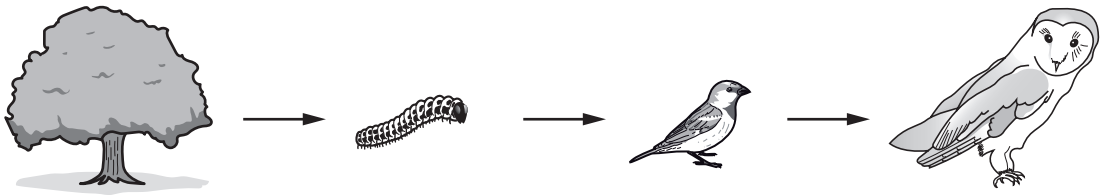
A The lens becomes thinner.

B The lens becomes fatter.

C The pupil becomes larger.

D The pupil becomes smaller.

12 The diagram shows a food chain.



trophic level	1	2	3	4

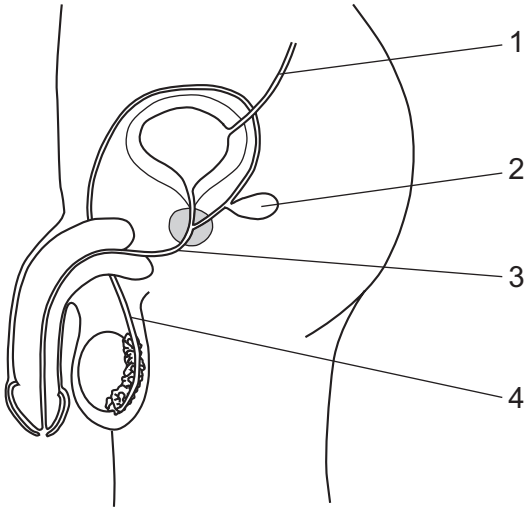
The tree has 100 000 kJ of energy.

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

[Turn over

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 $^{81}_{37}X$.

What does this nucleus contain?

A 37 electrons and 44 neutrons

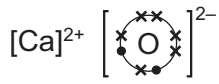
B 37 neutrons and 81 protons

C 37 protons and 44 neutrons

D 37 protons and 81 neutrons

16 Which electronic diagram for calcium oxide is correct?

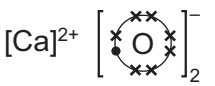
A



B

C

D



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.

$$W(s) + X^{2+}(aq) \rightarrow \text{no reaction}$$

$$X(s) + Y^{3+}(aq) \rightarrow \text{a reaction}$$

$$Z(s) + W^{+}(aq) \rightarrow \text{a reaction}$$

$$X(s) + Z^{2+}(aq) \rightarrow \text{a reaction}$$

$$Z(s) + Y^{3+}(aq) \rightarrow \text{no reaction}$$

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	velocity / 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?

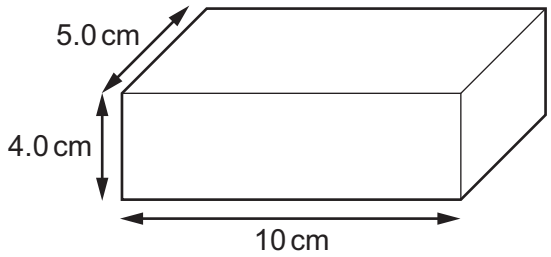
A The lack of an atmosphere removes air resistance.

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 cm × 5.0 cm × 10 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 → chemical energy

B electrical energy → light energy

C light energy → chemical energy

D light energy → 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.

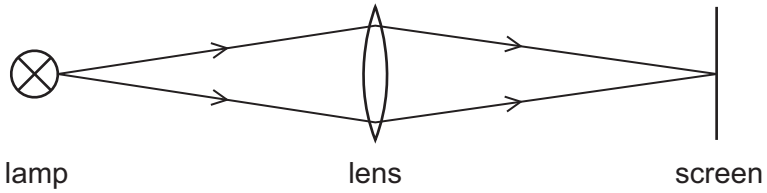
B The average distance between atoms increases at the heated end.

C The atoms expand as the temperature increases at the heated end.

D The atoms move away from the heated end.

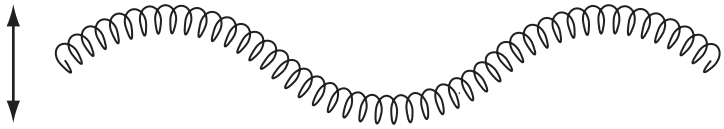
33 Which diagram shows an example of a longitudinal wave?

A light travelling from a lamp to a screen

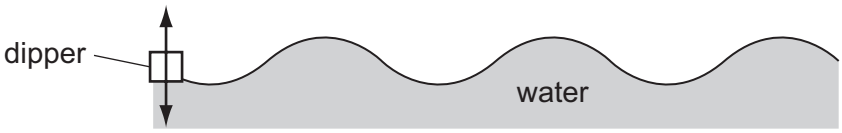


B a spring pulled backwards and pushed forwards repeatedly

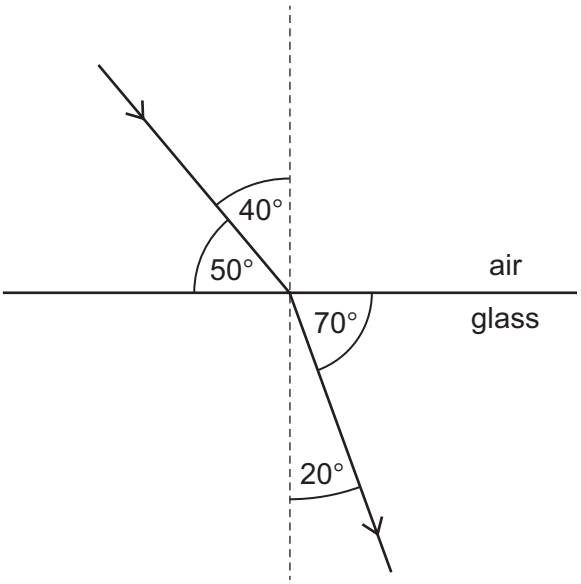
C a spring moved up and down repeatedly



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.

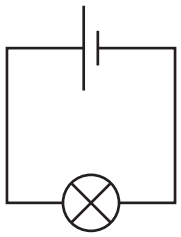


What is the refractive index of the glass?

A $\frac{\sin 40°}{\sin 20°}$ **B** $\frac{\sin 40°}{\sin 70°}$ **C** $\frac{\sin 50°}{\sin 20°}$ **D** $\frac{\sin 50°}{\sin 70°}$

[Turn over

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

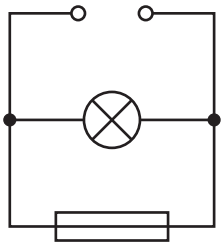


What is the value of the e.m.f. of the cell?

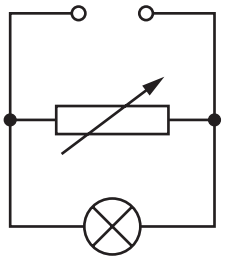
A 0.40 V **B** 2.5 V **C** 28 V **D** 160 V

36 In which circuit is a fuse connected in series with a lamp?

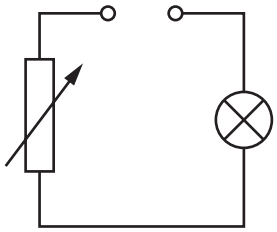
A



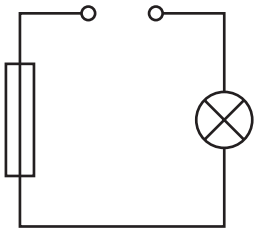
B



C

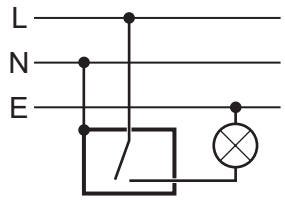


D



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

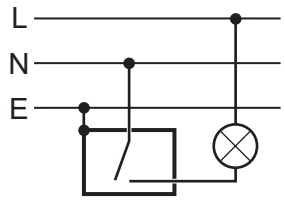
A



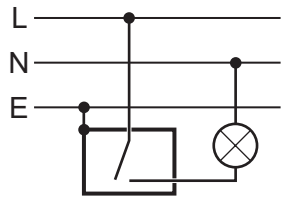
key

L	live
N	neutral
E	earth
▭	metal case

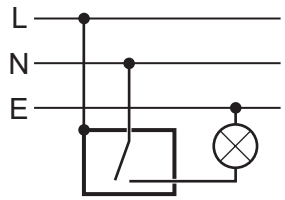
B



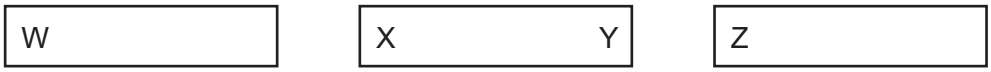
C



D



38 Three metal bars are shown in the diagram.

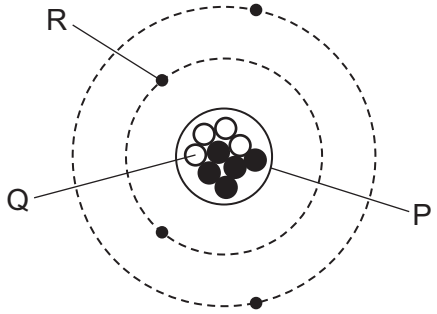


It is found that the end W attracts both end X and end Y but repels end Z.

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.

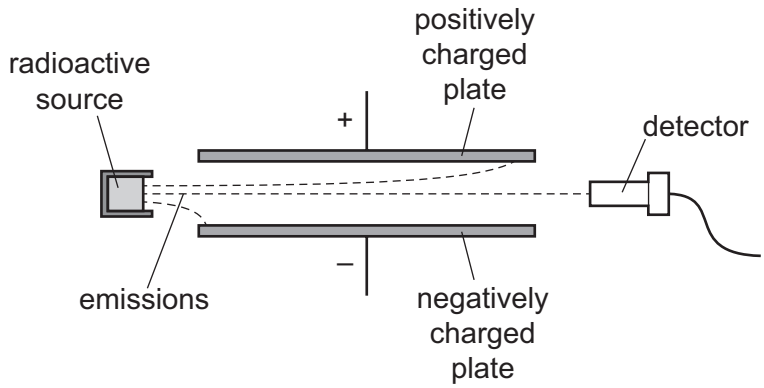


What are the names of P, Q and R?

	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

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 –		114 Fl flerovium –		116 Lv livermorium –		

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.).