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Cambridge Assessment International Education

Cambridge IGCSE™

COMBINED SCIENCE **0653/13**

Paper 1 Multiple Choice (Core) **May/June 2022**

45 minutes

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.

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1 What is the outermost layer of an animal cell and a plant cell?

	animal cell	plant cell
A	cell membrane	cell membrane
B	cell membrane	cell wall
C	cell wall	cell membrane
D	cell wall	cell wall

2 Most cars burn fossil fuels to release energy for their movement.

Which characteristic of living organisms is similar to this?

A excretion

B growth

C nutrition

D respiration

3 What is the definition of diffusion?

A the downward movement of particles in the atmosphere

B the movement of particles down a concentration gradient

C the movement of molecules against a concentration gradient

D the movement of particles from a hotter to a cooler region

4 Which large molecules are made from smaller molecules of glucose?

A amino acids and fatty acids

B glycogen and glycerol

C glycerol and fatty acids

D starch and glycogen

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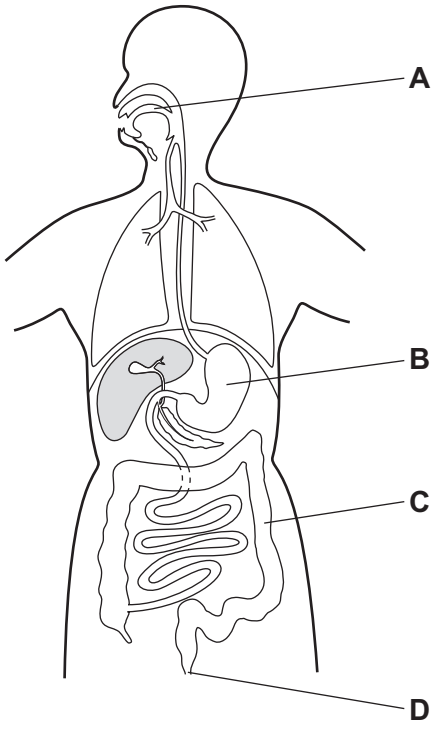
5 A plant that lives in water is exposed to sunlight. After a short period of time, bubbles of gas are given off from the plant.

Which gas do the bubbles contain, and which process produces this gas?

	gas	process
A	carbon dioxide	photosynthesis
B	carbon dioxide	respiration
C	oxygen	photosynthesis
D	oxygen	respiration

6 The diagram shows the human alimentary canal and associated organs.

Where does egestion occur?



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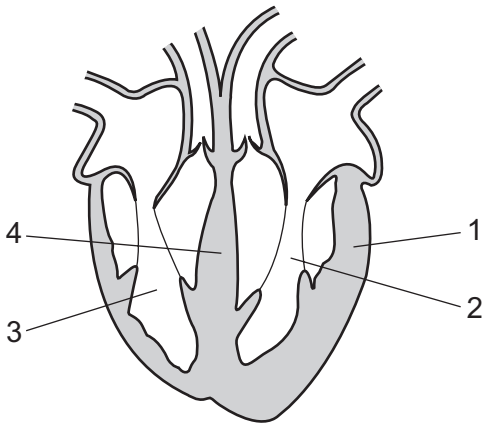
7 The diagram shows a cross-section of a human heart.



Which numbers correctly identify the parts of the heart?

	muscular wall	septum	left ventricle
A	1	4	2
B	1	4	3
C	4	1	2
D	4	1	3

8 Which route does inspired air take to reach the alveoli?

A larynx → trachea → bronchi → bronchioles

B larynx → trachea → bronchioles → bronchi

C trachea → larynx → bronchi → bronchioles

D trachea → larynx → bronchioles → bronchi

9 Physical activity affects our rate and depth of breathing.

What happens during **increased** physical activity?

	rate of breathing	depth of breathing
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

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10 Some statements about adrenaline are listed.

1 It has one target organ.

2 It is a hormone.

3 It is produced by a gland.

4 It is transported in the blood.

Which statements are correct?

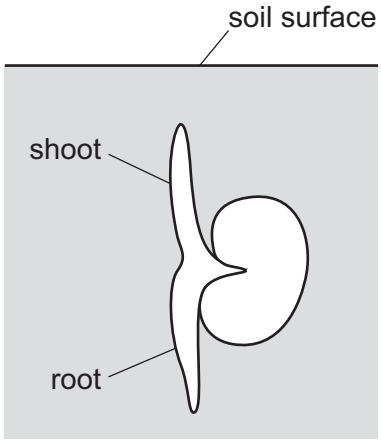
A 1, 2 and 3 only

B 1, 2 and 4 only

C 2, 3 and 4 only

D 1, 2, 3 and 4

11 The diagram shows a seed germinating in soil.



Which tropic responses are taking place in the shoot and root while they are still underground?

	shoot	root
A	gravitropism	gravitropism
B	gravitropism	phototropism
C	phototropism	gravitropism
D	phototropism	phototropism

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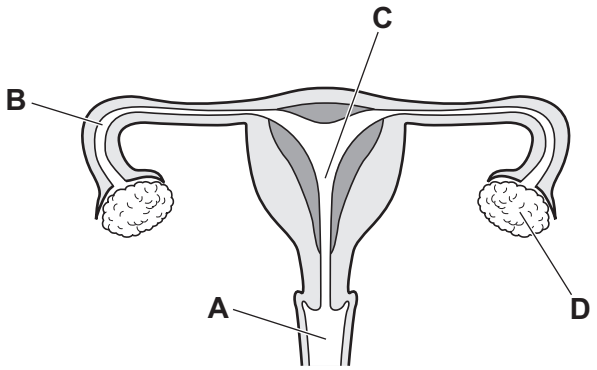
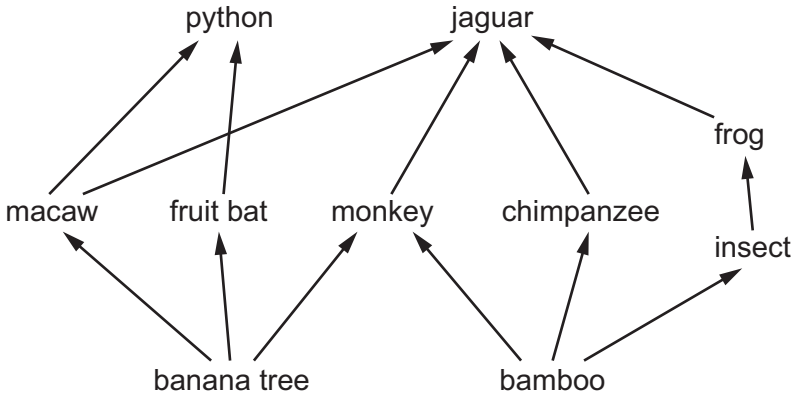
12 In which part of the female reproductive system does fertilisation usually take place?



13 The diagram shows part of a food web.



Which type of organism is a fruit bat?

A carnivore

B decomposer

C herbivore

D producer

14 Which statement describes a molecule?

A It consists of one nucleus surrounded by electrons.

B It consists of two or more atoms bonded together.

C It has a negative charge because it has gained electrons.

D It has a positive charge because it has lost electrons.

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15 When solid sodium carbonate is added to dilute hydrochloric acid, it dissolves and carbon dioxide is given off.

Which statement is correct?

A This is a chemical change because sodium carbonate dissolves.

B This is a chemical change because the acid reacts with sodium carbonate.

C This is a physical change because sodium carbonate dissolves.

D This is a physical change because the acid reacts with sodium carbonate.

16 Which statement about non-metallic elements is correct?

A They are hard.

B They are malleable.

C They conduct electricity.

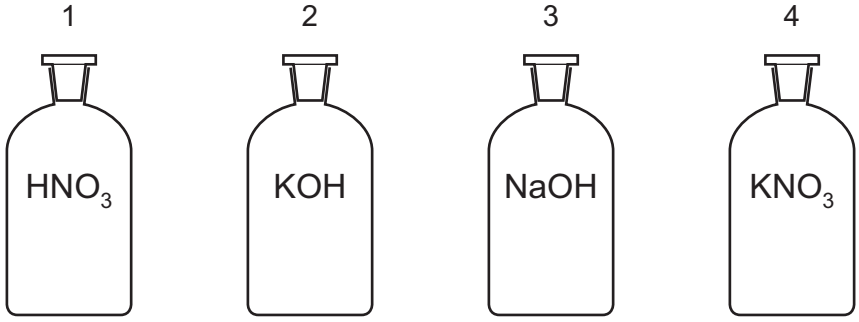
D They have low densities.

17 Which compound contains covalent bonds?

A HCl **B** NaCl **C** KCl **D** CaCl_2

18 Potassium nitrate can be made by the reaction of dilute nitric acid and aqueous potassium hydroxide.

Bottles containing four different aqueous solutions are shown.



Which aqueous solutions are used to make potassium nitrate?

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

19 What is **not** needed for electrolysis?

A a bulb

B a power supply

C an electrolyte

D electrodes

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20 Which change occurs during an endothermic reaction?

A The mass of a solid changes from 2.0 g to 2.5 g.

B The pH of a mixture changes from 5 to 7.

C The temperature of a mixture changes from 22 °C to 18 °C.

D The volume of a gas changes from 2.0 dm^3 to 1.0 dm^3.

21 Carbon reacts with carbon dioxide at high temperatures.

$$\text{carbon} + \text{carbon dioxide} \rightarrow \text{carbon monoxide}$$

Which statement about the reaction is correct?

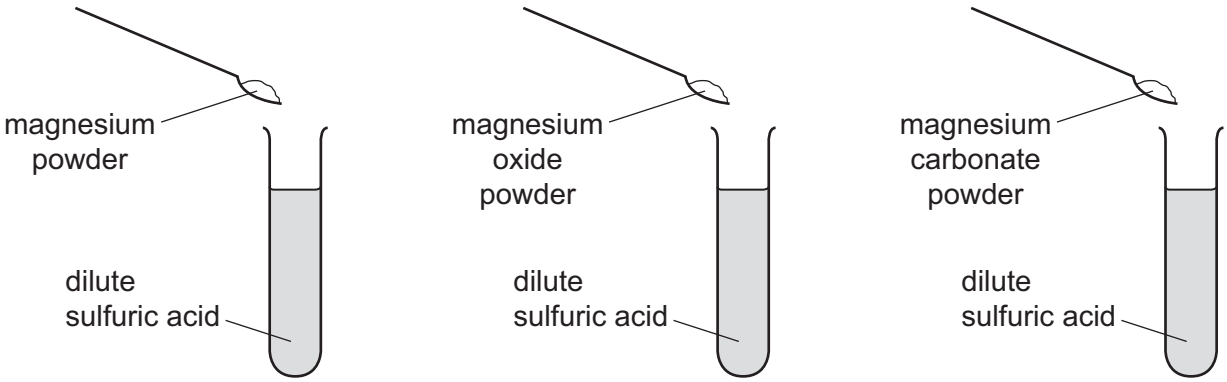
A Both carbon and carbon dioxide are oxidised.

B Both carbon and carbon dioxide are reduced.

C The carbon is oxidised and the carbon dioxide is reduced.

D The carbon is reduced and the carbon dioxide is oxidised.

22 Three powders are added to dilute sulfuric acid, as shown.



Which powders react to produce water?

	magnesium	magnesium oxide	magnesium carbonate
A	✓	✓	✗
B	✓	✗	✗
C	✗	✓	✓
D	✗	✗	✓

key

✓ = does produce water

✗ = does not produce water

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23 The results of two tests on substance Q are shown.

test	result
add dilute hydrochloric acid to solid Q	bubbles of colourless gas, R, which turns limewater milky
add aqueous sodium hydroxide to a solution of Q	green precipitate

Which cation is present in Q and what is gas R?

	cation present in Q	gas R
A	iron(II)	carbon dioxide
B	iron(II)	chlorine
C	iron(III)	carbon dioxide
D	iron(III)	chlorine

24 Which substance does **not** react with chlorine?

A H_2 **B** Kr **C** Li **D** NaBr

25 Which statement about the treatment of the water supply is correct?

A After filtration and chlorination, the water contains no impurities.

B Chlorine is added to remove dissolved impurities.

C Water is filtered and chlorinated to remove solids and kill bacteria.

D Water is filtered to remove dissolved impurities.

26 A large quantity of damp iron filings is added to clean air in a sealed container.

The container is left for several weeks.

The composition of the air in the container changes.

Which gas decreases in composition?

A argon

B carbon dioxide

C nitrogen

D oxygen

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27 Methane, ethane and propane are all alkanes. Their formulae are shown.

methane, CH_4

ethane, C_2H_6

propane, C_3H_8

Which statement is **not** correct?

A All three compounds are hydrocarbons.

B All three compounds burn.

C Methane is the main constituent of natural gas.

D Propane burns completely to form carbon dioxide and hydrogen.

28 A student has 50 identical sheets of paper.

Which procedure is used to find the thickness of one sheet of paper?

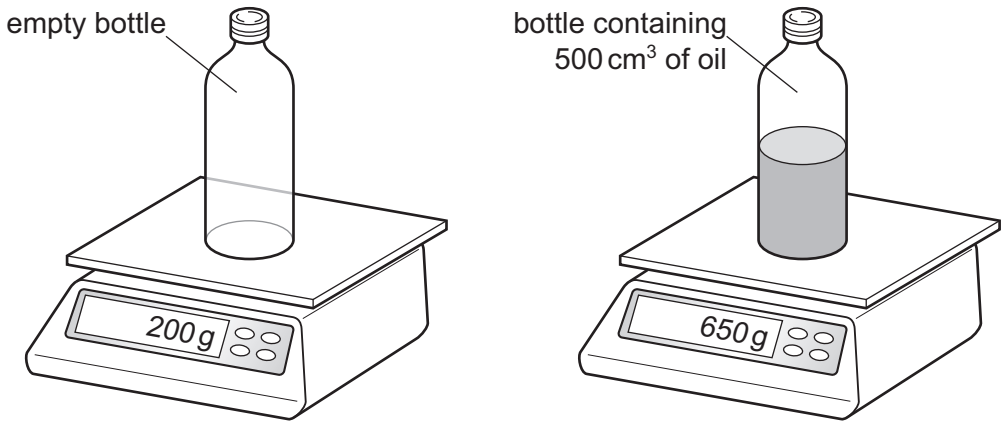
A Measure the thickness of 50 sheets and then add the thickness of 49 sheets.

B Measure the thickness of 50 sheets and then divide by 50.

C Measure the thickness of 50 sheets and then multiply by 50.

D Measure the thickness of 50 sheets and then multiply by the thickness of 49 sheets.

29 The mass of an empty bottle is 200 g. The mass of the bottle when it contains 500 cm^3 of oil is 650 g.



What is the density of the oil?

A 0.40 g / cm^3 **B** 0.90 g / cm^3 **C** 1.3 g / cm^3 **D** 1.7 g / cm^3

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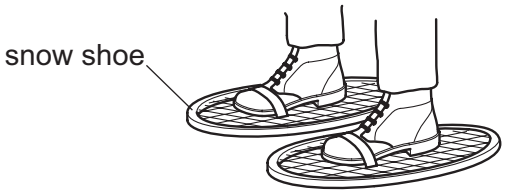
30 A man walking on snow in normal shoes sinks into the snow. The man puts on snow shoes and does not sink into the snow.



Which row explains why this happens?

	area of contact with snow	weight of man
A	decreased	decreased
B	decreased	unchanged
C	increased	decreased
D	increased	unchanged

31 A man lifts four heavy boxes from the ground onto a high shelf, one at a time.

When does he develop the greatest power?

A lifting a box of mass 20 kg in 3.0 s

B lifting a box of mass 20 kg in 4.0 s

C lifting a box of mass 30 kg in 3.0 s

D lifting a box of mass 30 kg in 4.0 s

32 Which two energy resources are both non-renewable?

A coal and tides

B coal and wind

C oil and coal

D oil and tides

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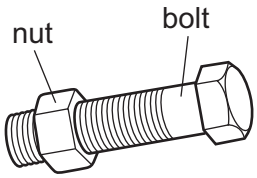
33 A mechanic cannot remove a large steel nut from a steel bolt because it is too tight.



What does the mechanic do to help remove the nut?

A cool the nut and heat the bolt

B heat the bolt only

C heat the nut and the bolt through the same temperature rise

D heat the nut only

34 A tank is full of water. The water at the bottom of the tank is heated.

Eventually all the water in the tank becomes hot.

What is the main method of energy transfer in the water?

A conduction

B convection

C evaporation

D radiation

35 A boat uses sound to find the depth of the ocean.

A sound wave is directed from the boat towards the ocean floor, and 4.4 s later an echo is received back at the boat.

The speed of sound in water is 1500 m / s.

How deep is the ocean under the boat?

A 340 m **B** 680 m **C** 3300 m **D** 6600 m

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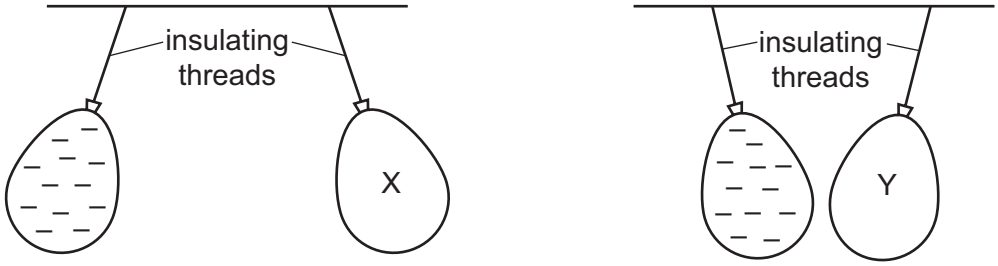
36 Two balloons X and Y are suspended by insulating threads. They are each held near a negatively charged balloon. The balloons hang as shown.



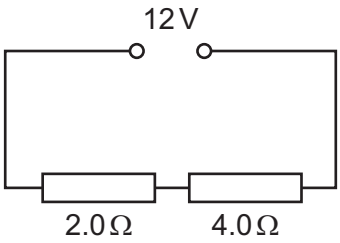
What is the charge on balloon X and what is the charge on balloon Y?

	balloon X	balloon Y
A	negative	negative
B	negative	positive
C	positive	negative
D	positive	positive

37 Which row gives the unit for potential difference (p.d.) and the unit for electromotive force (e.m.f.)?

	p.d.	e.m.f.
A	ampere	newton
B	ampere	volt
C	volt	newton
D	volt	volt

38 A 2.0 Ω resistor and a 4.0 Ω resistor are connected in series to a 12 V power supply.



What is the current in the 2.0 Ω resistor?

A 0.50 A **B** 2.0 A **C** 3.0 A **D** 6.0 A

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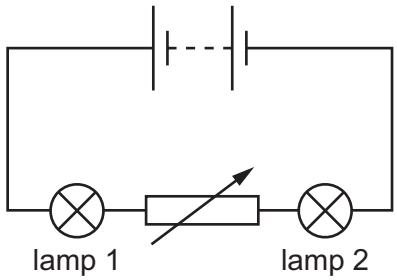
39 A circuit contains two lamps and a variable resistor.



The resistance of the variable resistor is increased.

What happens to the brightness of lamp 1 and what happens to the brightness of lamp 2?

	brightness of lamp 1	brightness of lamp 2
A	decreases	decreases
B	decreases	increases
C	no change	decreases
D	no change	increases

40 What is the purpose of a fuse in an electric circuit?

A to disconnect the circuit if the current becomes too large

B to increase the voltage if the current becomes too small

C to prevent someone cutting the insulation of the wiring

D to stop water getting into the circuit

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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.).

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