



Cambridge IGCSE™

CO-ORDINATED SCIENCES

0654/11

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

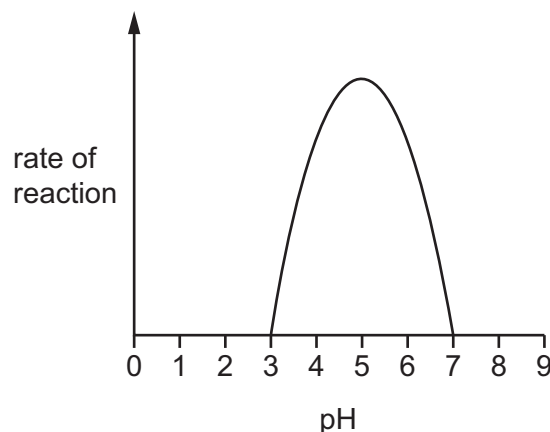
- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.

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



- 1 Which statement about one of the characteristics of living organisms is correct?
- A Excretion is the removal of excess substances and toxic materials.
 - B Movement is the ability to detect and respond to changes in the environment.
 - C Nutrition is the maintenance of a constant internal environment.
 - D Respiration is the manufacture of nutrients from raw materials.
- 2 Which statement about animal cells and plant cells is correct?
- A Only animal cells possess cell membranes.
 - B Only animal cells possess cell walls.
 - C Only plant cells possess cell membranes.
 - D Only plant cells possess cell walls.
- 3 Which small molecules are joined together to make a starch molecule?
- A amino acids
 - B fatty acids
 - C glucose
 - D glycerol
- 4 Fungus can live at the base of human hair where the activity of one of its enzymes can cause dry skin.

The graph shows the action of the fungal enzyme at different pH values.



Different shampoos have different pH values.

Which shampoo causes the greatest amount of dry skin?

- A pH3 B pH5 C pH7 D pH9

- 5 A student places a plant in the dark for 24 hours.

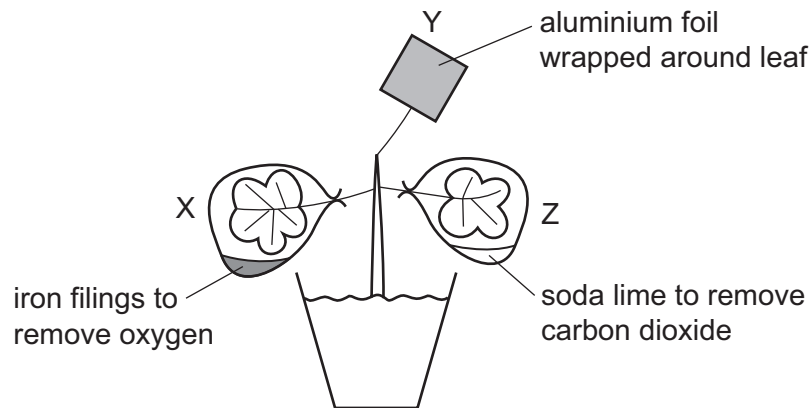
Aluminium foil is then placed around one leaf.

A second leaf is sealed in a bag with soda lime to remove carbon dioxide.

A third leaf is then sealed in a bag with iron filings to remove oxygen.

The plant is then left in the light for a further 24 hours.

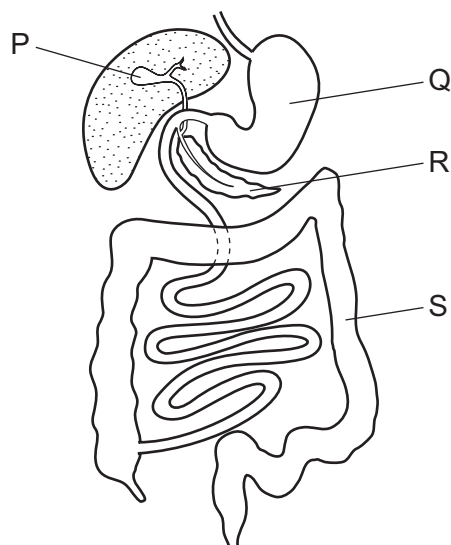
The diagram shows the experiment.



Which leaves would turn blue-black when tested with iodine solution?

- A** X only **B** X and Y **C** Y and Z **D** Z only

6 The diagram shows part of the digestive system.



Which labelled parts produce digestive enzymes, absorb water and store bile?

	produce digestive enzymes	absorb water	store bile
A	P	Q	R
B	Q	R	P
C	R	S	P
D	S	P	R

7 Where does evaporation of water occur during transpiration?

- A** from the air spaces through the stomata
- B** from the phloem
- C** from the surfaces of mesophyll cells
- D** from the xylem

8 What are the products of aerobic respiration?

- 1 carbon dioxide
- 2 glucose
- 3 water

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

- 9 A plant in a pot is placed on its side in a dark cupboard. The shoots grow upwards.

What is this an example of?

- A decomposition
 - B gravitropism
 - C photosynthesis
 - D phototropism
- 10 Which statement about asexual reproduction is correct?
- A It involves the fusion of gametes from one parent.
 - B It involves the fusion of gametes from two parents.
 - C It produces offspring which are genetically different.
 - D It produces offspring which are genetically identical.
- 11 Purple flower colour is dominant to white flower colour.

Which parents must be crossed to make sure all the offspring have white flowers?

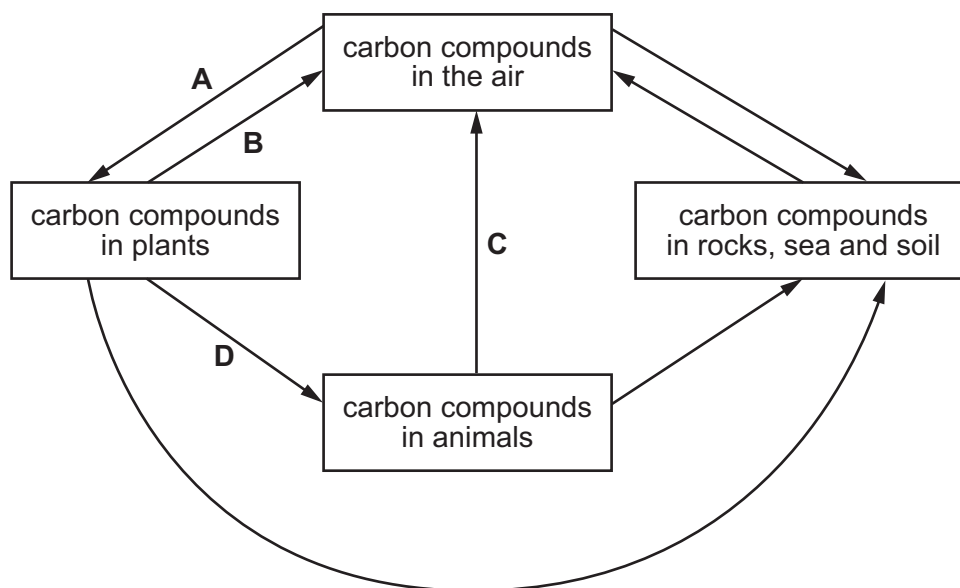
- A homozygous dominant $\times$ heterozygous
 - B homozygous dominant $\times$ homozygous dominant
 - C homozygous recessive $\times$ heterozygous
 - D homozygous recessive $\times$ homozygous recessive
- 12 Which organisms can be described as producers and herbivores in the food chain shown?

diatoms $\rightarrow$ copepods $\rightarrow$ amphipods

	producers	herbivores
A	amphipods	copepods
B	amphipods	diatoms
C	diatoms	amphipods
D	diatoms	copepods

13 The diagram shows part of the carbon cycle.

Which arrow represents plant respiration?



14 A mixture contains solid P dissolved in liquid Q.

Which process is used to obtain a pure sample of liquid Q from this mixture?

- A crystallisation
- B distillation
- C evaporation
- D paper chromatography

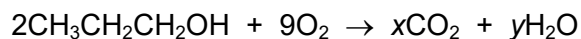
15 Three different processes are listed.

- 1 heating ice to form water
- 2 lighting a match
- 3 removing zinc from sodium chloride solution by filtration

Which processes are physical changes?

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

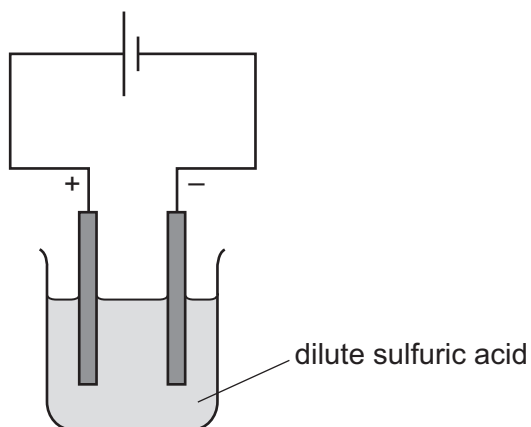
- 16 Propanol, $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$, burns in oxygen to produce carbon dioxide and water.



Which values of x and y balance the equation?

	x	y
A	3	4
B	3	8
C	6	4
D	6	8

- 17 The diagram shows the electrolysis of dilute sulfuric acid using inert electrodes.

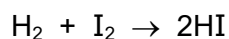


Which row shows the products formed at each electrode and describes the bonding in sulfuric acid?

	anode	cathode	type of bonding
A	oxygen	hydrogen	ionic
B	oxygen	hydrogen	covalent
C	hydrogen	oxygen	ionic
D	hydrogen	oxygen	covalent

- 18** Hydrogen reacts with iodine to form hydrogen iodide.

The equation for this reaction is shown.

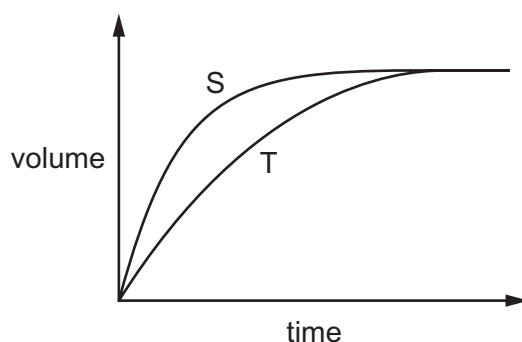


During this reaction the temperature increases.

Which statement explains why the temperature increases?

- A** One molecule of hydrogen is forming two molecules of hydrogen iodide.
 - B** The reaction is exothermic.
 - C** The reaction is very fast.
 - D** The reaction takes in energy.
- 19** A fixed mass of a solid is reacted with a liquid.

The volume of gas given off from the reaction over time is shown by line S.



Which change to the reaction conditions produces line T on the graph?

- A** increasing the amount of catalyst added
 - B** increasing the concentration of the liquid
 - C** increasing the particle size of the solid
 - D** increasing the temperature of the reaction
- 20** Which row shows the flame test colours for lithium and sodium?

	lithium	sodium
A	lilac	blue-green
B	lilac	yellow
C	red	blue-green
D	red	yellow

- 21** A gas is used in welding metals together at high temperatures.

The gas is used to provide an inert atmosphere.

What is the gas?

- A** argon
- B** carbon dioxide
- C** fluorine
- D** oxygen

- 22** Which row does **not** link a general physical property to the type of element?

	type of element	general physical property
A	metal	malleable
B	metal	thermal conductor
C	non-metal	electrical conductor
D	non-metal	low melting point

- 23** Three metals X, Y and Z are added separately to water and to dilute hydrochloric acid.

The results are shown.

metal	result with water	result with dilute hydrochloric acid
X	x	✓
Y	✓	✓
Z	x	x

key

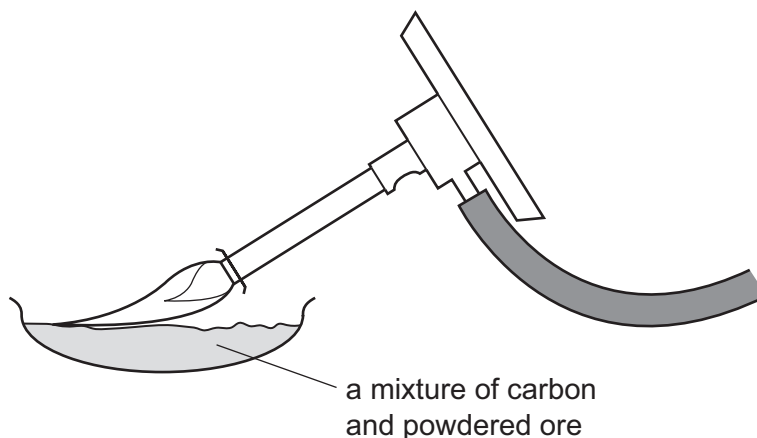
✓ = hydrogen is given off

x = hydrogen is not given off

What is the order of reactivity of X, Y and Z?

	most reactive	→	least reactive
A	X	Z	Y
B	Y	X	Z
C	Y	Z	X
D	Z	X	Y

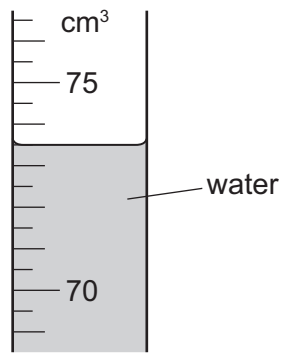
- 24 The diagram shows a metal being extracted from its powdered ore using carbon.



What happens to the ore in this reaction?

- A It burns.
 - B It decomposes.
 - C It is oxidised.
 - D It is reduced.
- 25 Which statement about the treatment of the water supply is correct?
- A Chlorination is used to improve the taste of the water.
 - B Chlorination is used to kill bacteria.
 - C Filtration is used to adjust the pH of the water.
 - D Filtration is used to remove soluble impurities.
- 26 Why do farmers add limestone to soil?
- A It acts as a fertiliser.
 - B It adds nitrogen to the soil.
 - C It decreases the pH of the soil.
 - D It increases the pH of the soil.
- 27 Which method is used to make ethanol?
- A fermentation of sugar by yeast
 - B reacting ethane with bromine
 - C reacting ethene with bromine
 - D reacting methane with steam

28 The diagram shows the level of water in a measuring cylinder.

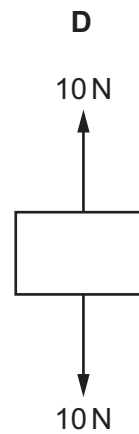
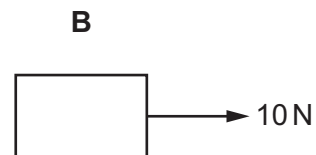
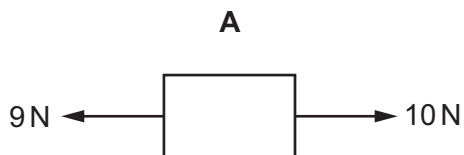


What is the volume of water in the measuring cylinder?

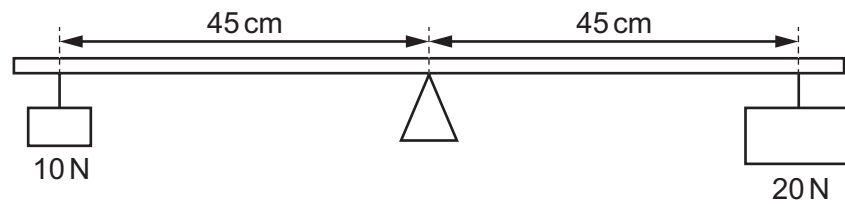
- A** 73.5 cm^3 **B** 74.0 cm^3 **C** 76.5 cm^3 **D** 77.0 cm^3

29 The diagrams show the only forces acting on four moving objects.

Which object is travelling at constant speed?



- 30 A uniform plank is placed on a pivot, with its centre immediately above the pivot. A load of 10 N is suspended on the left, 45 cm from the pivot, and a load of 20 N is suspended on the right, 45 cm from the pivot.

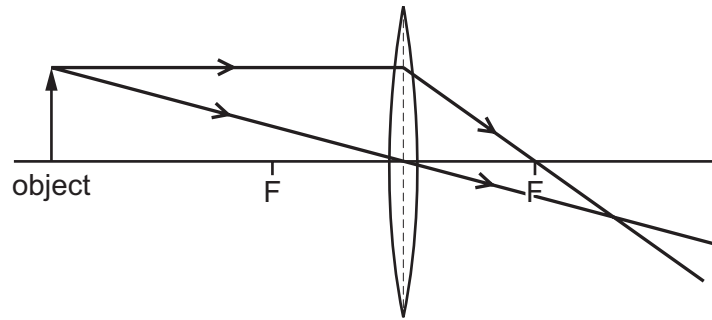


What happens to the plank?

- A** The left-hand side moves down, the right-hand side moves up and the plank does not return to its horizontal position.
- B** The left-hand side moves up, the right-hand side moves down and the plank does not return to its horizontal position.
- C** The plank moves down on one side then returns to its horizontal position.
- D** The plank remains horizontal without moving.
- 31 A student walks up some steps at constant speed.
- Which two quantities provide enough information so that the useful power produced by the student can be calculated?
- A** the weight of the student and the time taken
- B** the weight of the student and the total height of the steps
- C** the work done by the student and the time taken
- D** the work done by the student and the total height of the steps
- 32 Which energy resource does **not** use a turbine and generator to produce electricity?
- A** geothermal
- B** nuclear fission
- C** solar cells
- D** wind
- 33 What happens to the temperature of a substance as it is melting and as it is boiling?

	melting	boiling
A	decreases	increases
B	decreases	no change
C	increases	increases
D	no change	no change

- 34 The diagram shows light from an object passing through a converging lens to form an image.



Which description of the image is correct?

- A diminished and inverted
 - B diminished and upright
 - C enlarged and inverted
 - D enlarged and upright
- 35 Which statement about sound is correct?
- A An echo is produced by refraction of sound waves.
 - B The amplitude of a sound wave affects the pitch of a sound.
 - C The approximate range of audible frequencies for a human is 20 Hz–20 kHz.
 - D Sound waves travel more quickly in a vacuum than in air.
- 36 A plastic rod is rubbed with a cloth and the rod becomes positively charged.
- Why does this happen?
- A Electrons move from the cloth to the rod.
 - B Electrons move from the rod to the cloth.
 - C Protons move from the cloth to the rod.
 - D Protons move from the rod to the cloth.

- 37 Which row shows how lamps are connected in a lighting circuit in a house and gives an advantage of connecting them in this way?

	how lamps are connected	advantage of connecting them in this way
A	in parallel	they can be switched separately
B	in parallel	they share the voltage
C	in series	they can be switched separately
D	in series	they share the voltage

- 38 A 240 V mains lamp operating normally has a working resistance of $480\ \Omega$.

Which rating of fuse is most suitable to use with this lamp?

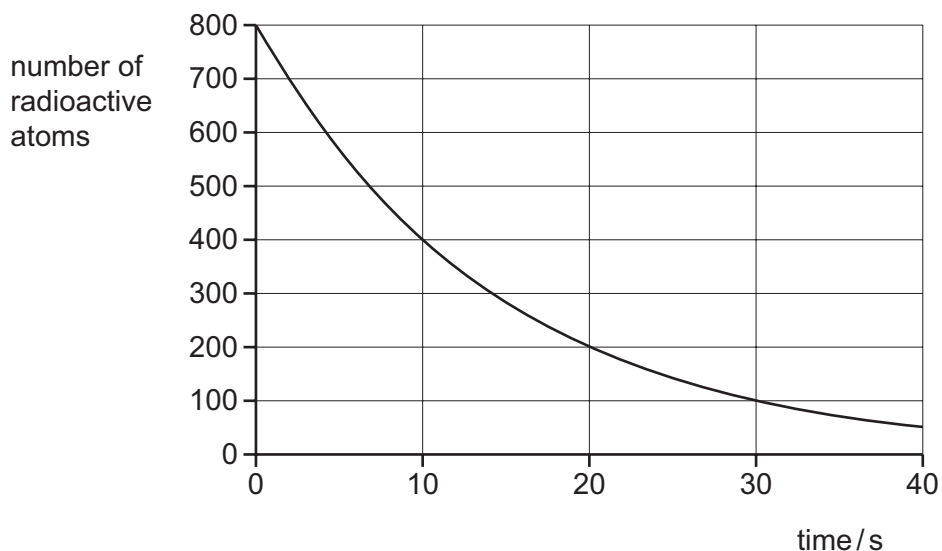
- A** 0.4 A **B** 1 A **C** 2 A **D** 4 A

- 39 An atom of beryllium is represented by ${}^9_4\text{Be}$.

How many neutrons are in the nucleus of this type of beryllium atom?

- A** 4 **B** 5 **C** 9 **D** 13

- 40 A pure sample of a radioactive substance decays. The graph shows how the number of these radioactive atoms in the sample changes with time.



What is the half-life of the substance?

- A** 10 s **B** 20 s **C** 30 s **D** 40 s

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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	Key atomic number atomic symbol name relative atomic mass										1 H hydrogen 1							2 He helium 4
11 Na sodium 23	12 Mg magnesium 24											5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	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	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	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 —	108 Hs hassium —	109 Mt meitnerium —	110 Ds darmstadtium —	111 Rg roentgenium —	112 Cn copernicium —		114 Fl flerovium —		116 Lv livermorium —				

lanthanoids

actinoids

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 —

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).