Cambridge IGCSE

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

0782314719

COMBINED SCIENCE **0653/32**

Paper 3 (Core) **February/March 2019**

1 hour 15 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.
A copy of the Periodic Table is printed on page 20.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

This document consists of **19** printed pages and **1** blank page.

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1 **(a)** Fig. 1.1 shows diagrams of two plant cells as seen using a light microscope.

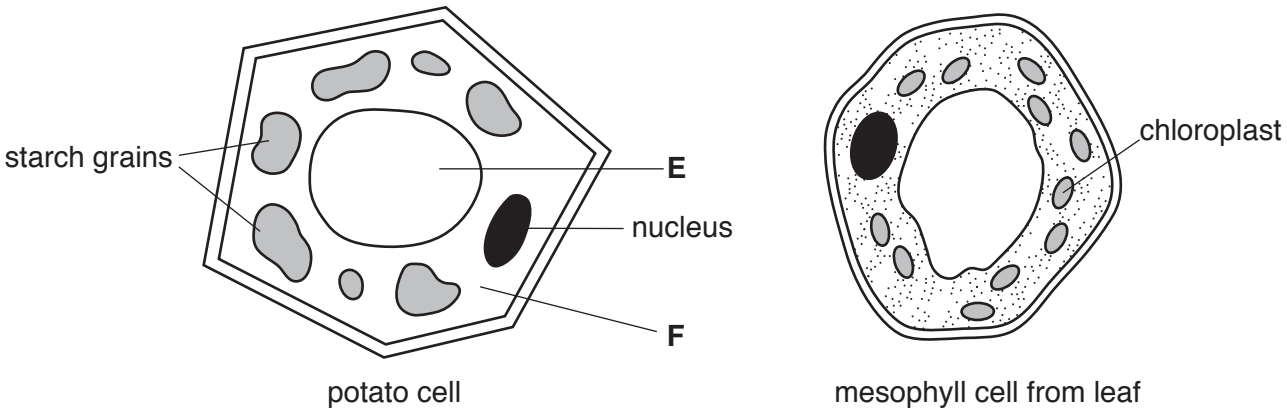


Fig. 1.1

(i) Name parts **E** and **F** in the potato cell.

E .....

F .....
[2]

(ii) Use Fig. 1.1 to describe **one** difference between the starch grains and the chloroplasts.

.....

..... [1]

(iii) Describe a chemical test and the positive result for starch.

test .....

positive result ..... [2]

(b) **(i)** Starch is a carbohydrate.

Name the smaller molecules that join together to make a starch molecule.

..... [1]

(ii) Explain why starch must be broken down by chemical digestion.

.....

.....

..... [2]

(c) Fig. 1.2 shows a food chain in a garden.

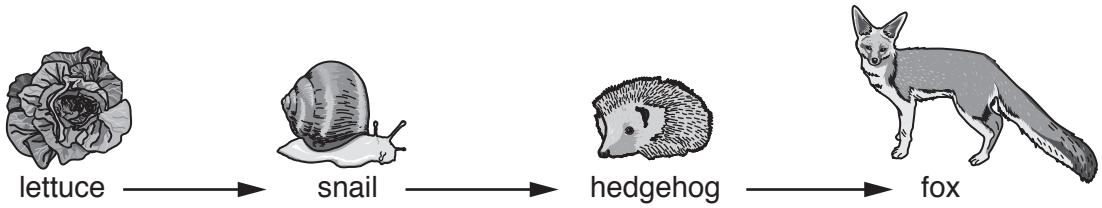


Fig. 1.2

Table 1.1 shows some words to describe some of the organisms in the food chain.

Place a tick (✓) in **all** boxes that correctly describe each organism.

Table. 1.1

organism	carnivore	consumer	herbivore	producer
lettuce				
snail				
hedgehog				

[3]

[Total: 11]

2 **(a)** Petroleum is a fossil fuel.

(i) State the name of **one** other fossil fuel.

..... [1]

(ii) State the name of the industrial process used to separate petroleum into useful products.

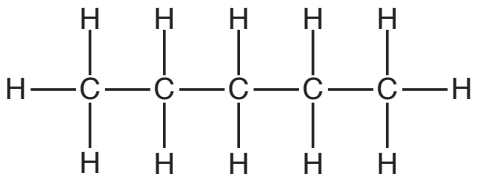
..... [1]

(iii) State **one** use for naptha.

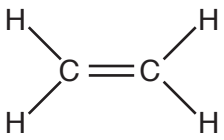
..... [1]

(b) Compound **X** and compound **Y** are obtained from petroleum.

The structures of molecules of these compounds are shown in Fig. 2.1.



compound **X**



compound **Y**

Fig. 2.1

(i) Name the group of saturated hydrocarbons that includes compound **X**.

..... [1]

(ii) Describe the changes, if any, that occur when compound **X** and compound **Y** are added to separate samples of aqueous bromine.

compound **X** .....

.....

compound **Y** .....

..... [3]

[Total: 7]

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3 Fig. 3.1 shows a boy throwing a ball up in the air.

The ball moves vertically upwards, then falls down and the boy catches it.

Fig. 3.1

Fig. 3.2 shows a graph of the motion of the ball from the time it leaves the boy's hand until he catches it.

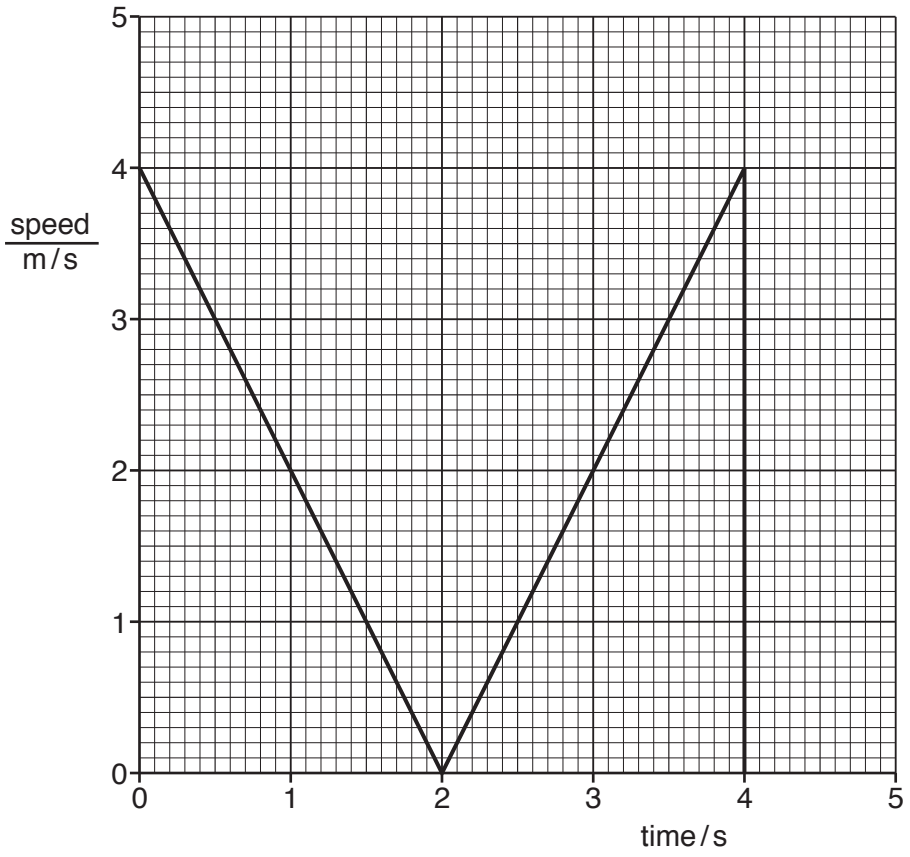

Fig. 3.2

(a) On Fig. 3.2, label with a letter **X** a point when the ball is moving upwards. [1]

(b) (i) Use Fig. 3.2 to state how much time passes from when the ball is thrown to when it is caught.

..... s [1]

(ii) Use Fig. 3.2 to describe the motion of the ball between 3.0 s and 4.0 s.

.....

.....

.....

.....

..... [2]

(c) The ball has a mass of 0.62 kg.

Calculate the weight of the ball.

Gravitational field strength, g = 10 N / kg

weight = ... N [1]

(d) Complete the sequence of energy transfers from when the boy throws the ball to when the ball reaches its maximum height.

..... energy in the boy

→ kinetic ..... energy as the ball moves upwards

→ ..... energy of the ball at its maximum height.

[2]

[Total: 7]

4 Fig. 4.1 shows a diagram of the internal structure of the heart.

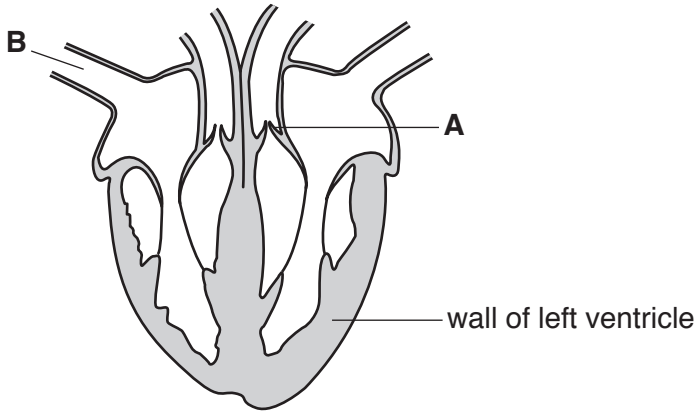

Fig. 4.1

(a) (i) Name structure **A** and state its function.

A .....

function .....

.....

[2]

(ii) Name blood vessel **B**.

..... [1]

(b) (i) The blood in the left side of the heart contains more oxygen than blood in the right side of the heart.

Explain why there is this difference.

.....

..... [1]

(ii) Describe how oxygen is transported by the blood.

.....

.....

..... [2]

(c) A person's pulse can be taken to measure their heart rate.

(i) State what causes a person's pulse rate to increase when they are frightened.

.....

..... [1]

(ii) Suggest **one other** situation when a person's pulse rate increases.

..... [1]

[Total: 8]

5 **(a)** Sodium is a Group I metal.

An atom of sodium is represented by the symbol

$$^{23}_{11}Na$$

(i) State the numbers of electrons, neutrons and protons in this atom.

electrons .....

neutrons .....

protons .....

[2]

(ii) The electronic structure of a sodium atom is shown in Fig. 5.1a.

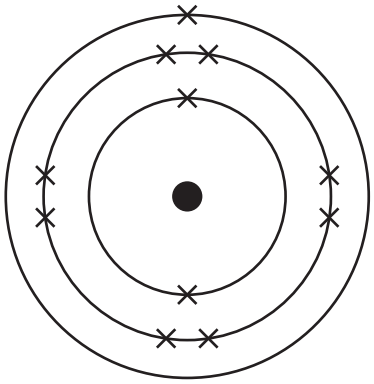

Fig. 5.1a

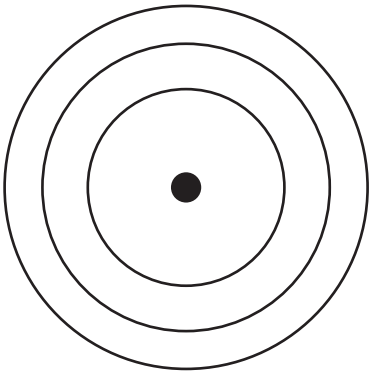

Fig. 5.1b

Complete Fig. 5.1b to show the electronic structure of a sodium **ion**. [1]

(b) Apparatus used in the electrolysis of concentrated aqueous sodium chloride is shown in Fig. 5.2.

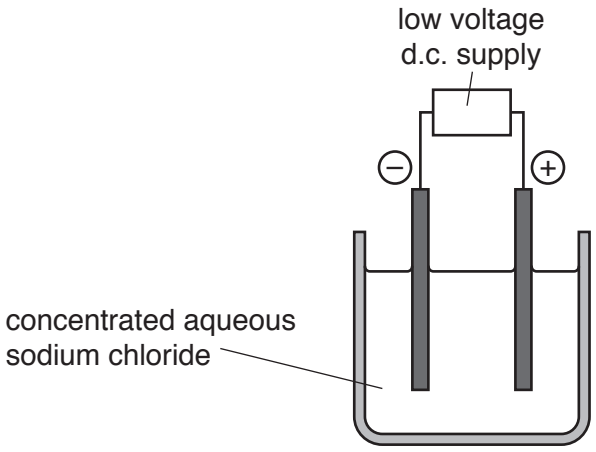

Fig. 5.2

Complete the sentences about the electrolysis of concentrated aqueous sodium chloride.

The concentrated aqueous sodium chloride is known as the

..... .

The positive electrode is called the ..... , and the negative

electrode is called the ..... .

At the positive electrode ..... forms and at the negative

electrode ..... forms.

[5]

(c) When a teacher adds a piece of sodium to a bowl of water, an exothermic reaction occurs.

The teacher uses Universal Indicator to test the solution in the bowl after the reaction.

(i) Describe a simple method that the teacher can use to show that the reaction is exothermic.

.....

.....

..... [2]

(ii) Describe and explain the effect of the solution in the bowl on the Universal Indicator.

effect.....

explanation.....

.....

[2]

[Total: 12]

6 The bathroom in a house has an electric heater under the floor.

(a) Fig. 6.1 shows part of the circuit used for the heater.

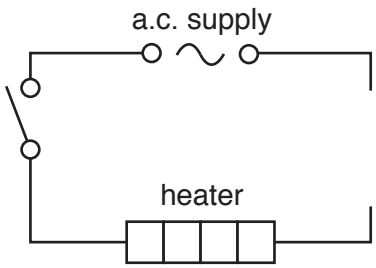

Fig. 6.1

A small lamp is connected in parallel with the heater to show that the circuit is switched on.

(i) Complete the circuit diagram in Fig. 6.1 using circuit symbols to show:

1. a fuse to protect the circuit from overload
2. the small lamp connected in parallel with the heater. [3]

(ii) When the circuit is switched on, the current in the heater is 3A.

The current in the small lamp is 0.1A.

Draw a circle around the most suitable fuse to use in this circuit.

1A 3A 10A 13A

[1]

(b) The heater is placed underneath a wooden floor.

The heater is switched on, and the temperature of the heater quickly reaches 70 °C.

The temperature of the upper surface of the wooden floor increases slowly from 20 °C to 25 °C.

The temperature of the air in the bathroom also increases slowly from 20 °C to 25 °C.

Name the method of thermal energy transfer:

(i) through the wooden floor

..... [1]

(ii) in the air in the bathroom.

..... [1]

(c) The floor of the bathroom gets wet.

When the heater is switched on, the floor dries quickly.

Describe in terms of moving molecules how the floor dries.

.....

.....

..... [2]

(d) When the heater is switched off and the temperature drops, a small gap slowly appears between the edge of the wooden floor and the walls of the bathroom.

Predict what will happen when the heater is switched on again.

Explain your answer.

prediction .....

explanation .....

..... [2]

[Total: 10]

7 **(a)** Fig. 7.1 shows two diagrams of insect-pollinated flowers of the same species.

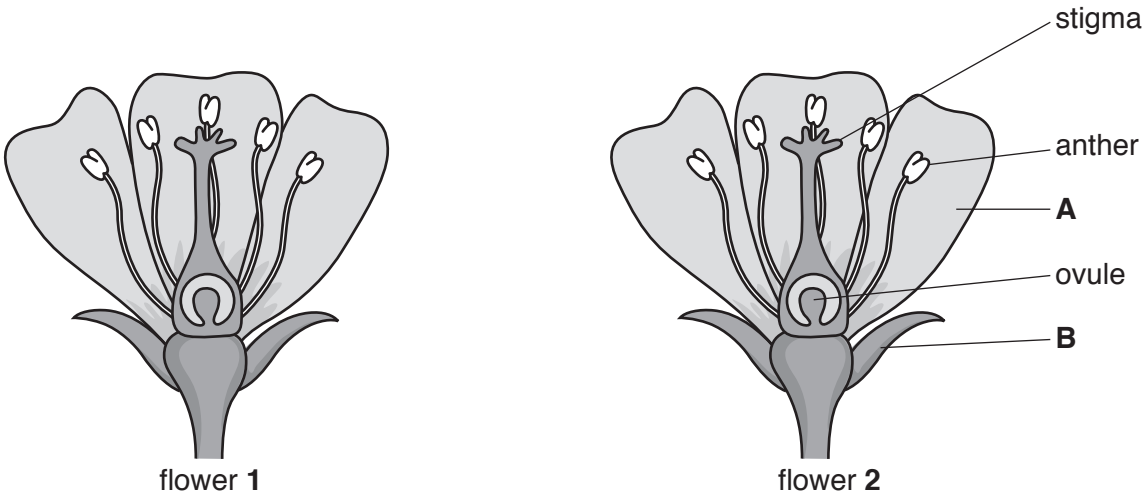

Fig. 7.1

(i) Name structures **A** and **B**.

A .....

B .....

[2]

(ii) During pollination, an insect takes pollen from flower **1** to flower **2**.

On Fig. 7.1 draw an arrow (——►) to show a possible path of the pollen from where it is produced in flower **1** to where it lands on flower **2**. [2]

(iii) If pollination is successful fertilisation can follow.

State where fertilisation takes place in the flower.

..... [1]

(b) Seeds produced after fertilisation can germinate and produce new plants.

Fig. 7.2 shows the environmental conditions of three dishes **D**, **E** and **F**. Each dish contains cress seeds, on damp cotton wool.

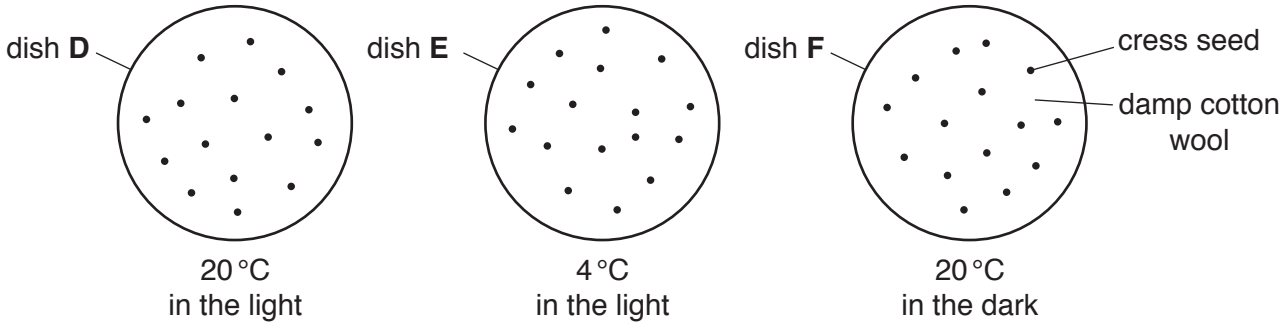

Fig. 7.2

After a few days the seeds in dish **D** germinate.

Predict whether the seeds germinate in dishes **E** and **F**.

Explain your answers.

dish **E**

prediction .....

explanation .....

.....

dish **F**

prediction .....

explanation .....

..... [2]

(c) The germinated seeds in dish **D** are allowed to grow for a few days. They develop into seedlings as shown in Fig. 7.3.

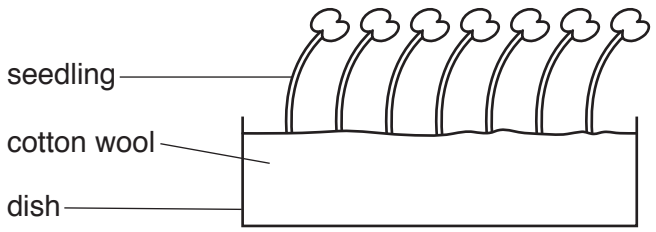

Fig. 7.3

Suggest why the seedlings do not grow straight upwards.

.....

.....

..... [1]

[Total: 8]

8 **(a)** Air is a mixture of elements and compounds.

(i) Describe the difference between an element and a compound. Use ideas about the atoms they contain in your answer.

element .....

.....

compound .....

..... [2]

(ii) Name **one** common pollutant in air.

State **one** adverse effect of this pollutant.

pollutant.....

effect..... [2]

(b) Iron nails rust when they are not protected from the air.

(i) Identify **two** substances in clean air required for iron to rust.

..... and ..... [2]

(ii) Suggest **one** change that increases the rate of rusting of an iron nail.

.....

..... [1]

[Total: 7]

9 In many cities, sodium street lamps are used at night. These lamps produce an intense yellow light.

(a) A sodium lamp is lit using mains voltage of 240 V. The current in the lamp is 0.5 A.

Calculate the resistance of the lamp.

Show your working, and state the unit of your answer.

resistance = ... unit ..... [3]

(b) A street is lit by four identical sodium lamps all connected to the same electricity supply. Three of the lamps are working, but one of the lamps is not.

Deduce the type of circuit connection used to connect the lamps to the electricity supply. Give a reason for your answer.

type of circuit connection: .....

reason: .....

..... [2]

(c) A sodium street lamp emits yellow light with a single wavelength.

(i) State the meaning of the term *wavelength*.

.....

..... [1]

(ii) Complete the sentences below using phrases from the list.

greater than **less than** **the same as**

Each phrase may be used once, more than once or not at all.

The frequency of visible light from the sodium lamp is ..... than the frequency of infra-red radiation.

The speed of this visible light is ..... the speed of infra-red radiation. [2]

(d) Fig. 9.1 shows a man looking at the reflection of a street lamp in a large puddle of water.

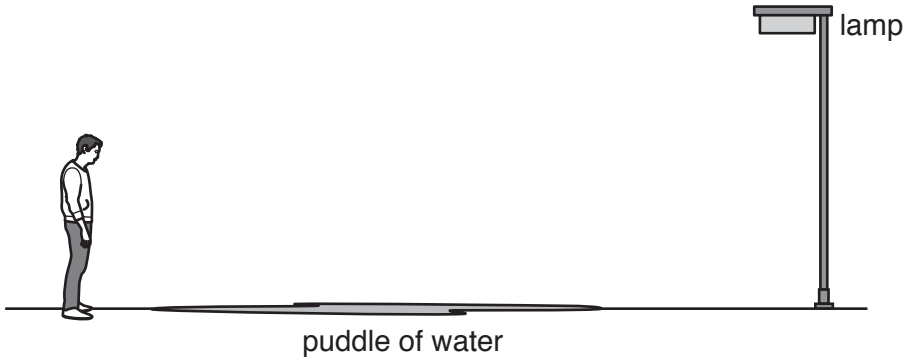

Fig. 9.1

On Fig. 9.1, use a ruler and protractor to draw a light ray travelling from the lamp to the man's eye to show how the light ray is reflected by the puddle. [2]

[Total: 10]

The Periodic Table of Elements

Key

atomic number atomic symbol name relative atomic mass

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 –		

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.).