



CANDIDATE
NAME

--

CENTRE
NUMBER

--	--	--	--	--

CANDIDATE
NUMBER

--	--	--	--

0653/31

May/June 2020

1 hour 15 minutes

No additional materials are needed.

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [].
- The Periodic Table is printed in the question paper.

This document has **24** pages. Blank pages are indicated.

- 1 (a) Fig. 1.1 shows the structure of a human heart.

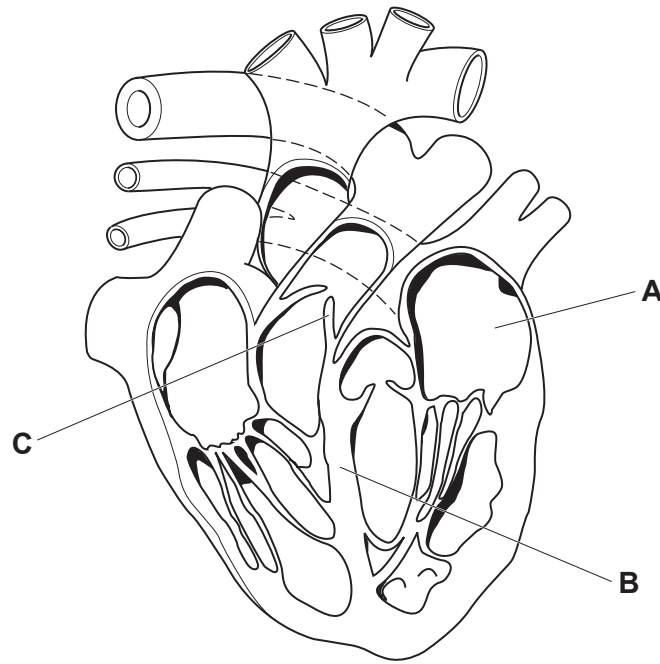


Fig. 1.1

- (i) Identify parts **A** and **B** shown in Fig. 1.1.

A

B

[2]

- (ii) Identify part **C** shown in Fig. 1.1.

..... [1]

- (iii) Describe the importance of part **C** to the flow of blood through the heart.

.....

..... [1]

(b) Complete Table 1.1 to show the function of different components of blood.

Table 1.1

components of blood	function
	produces antibodies
	transport hormones
platelets	

[3]

(c) Blood transports carbon dioxide around the body.

(i) Name the process in the body that produces carbon dioxide.

..... [1]

(ii) Carbon dioxide moves from the cells into the blood.

Complete the sentences to describe how carbon dioxide **moves out** of a cell into the blood.

The concentration of carbon dioxide is inside the cell than in the blood.

This causes carbon dioxide to move out of the cell by [2]

[Total: 10]

- 2 (a) A teacher uses the apparatus shown in Fig. 2.1.

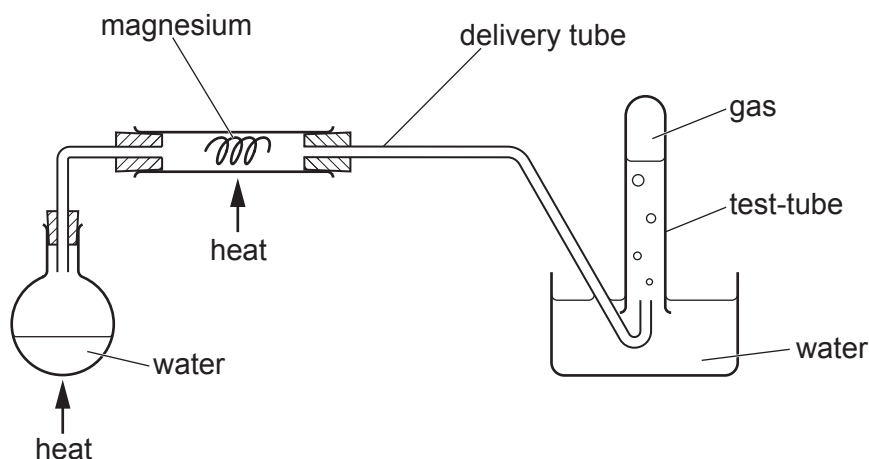


Fig. 2.1

The teacher heats the water to make steam.

The steam passes over heated magnesium.

The magnesium burns brightly. A white solid and a gas form.

The gas is collected in a test-tube. The teacher tests the gas using a lighted splint. It burns with a squeaky pop.

- (i) Identify **one** chemical change and **one** physical change in the teacher's experiment.

chemical change

physical change

[2]

- (ii) Give the chemical names for the white solid and the gas that form.

white solid

gas

[2]

- (b) An atom of sodium can be represented by the symbol shown.



Deduce the number of protons and the number of neutrons in this atom.

protons

neutrons

[2]

- (c) The electronic structure of a sodium atom is shown in Fig. 2.2.

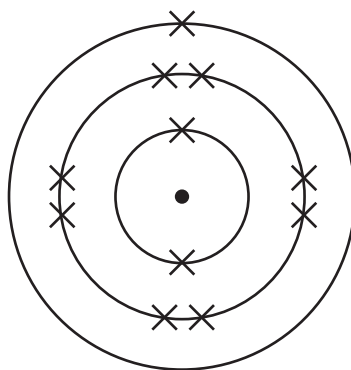


Fig. 2.2

Sodium reacts with chlorine to make sodium chloride.

Sodium chloride contains sodium ions, Na^+ , and chloride ions, Cl^- .

- (i) State the change to the electronic structure of sodium atoms when sodium reacts with chlorine.

..... [1]

- (ii) State which feature of the electronic structure of the sodium ion, Na^+ , makes the ion stable.

.....
..... [1]

[Total: 8]

- 3 Fig. 3.1 shows a rocket about to transport a large mirror into orbit around the Earth.

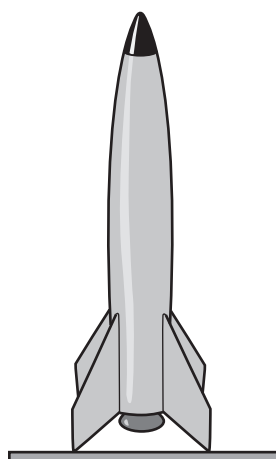


Fig. 3.1

- (a) The total mass of the rocket is 750 000 kg.
- (i) The Earth's gravitational field strength is 10 N/kg.

Calculate the weight of the rocket.

weight = N [1]

- (ii) When the rocket is launched, the force exerted on the rocket is 12 000 000 N vertically upwards.

Calculate the resultant force on the rocket.

State the direction of the resultant force.

resultant force = N

direction is [2]

- (iii) Describe the motion of the rocket as it leaves the Earth.

..... [1]

- (b) The rocket is powered by a fuel. The fuel is a store of chemical potential energy.

As the rocket moves upwards, large flames can be seen coming out of the back of the rocket.

The ground crew wear ear protection for their hearing as the rocket rises off the ground.

Use this information to identify **three** forms of energy resulting from the launch of the rocket.

1. energy
 2. energy
 3. energy
- [3]

- (c) In space, the rocket places a large mirror in orbit so that it reflects sunlight down to a solar panel on Earth.

Fig. 3.2 shows how the mirror is placed to reflect sunlight to a solar panel on Earth at night.

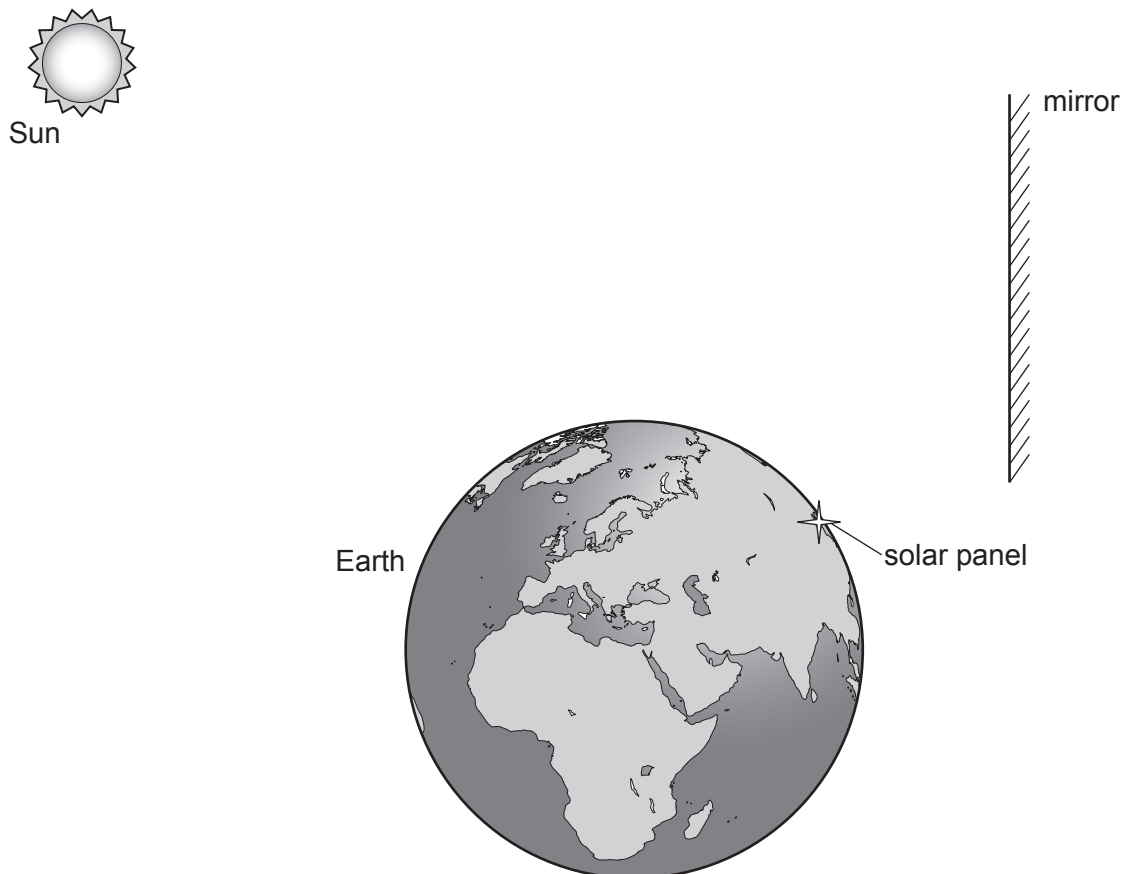


Fig. 3.2 (not to scale)

On Fig. 3.2, draw a ray to show how the mirror can reflect sunlight to the solar panel. [2]

[Total: 9]

- 4 (a) Fig. 4.1 is a graph showing the vitamin C content in 100 g of different foods.

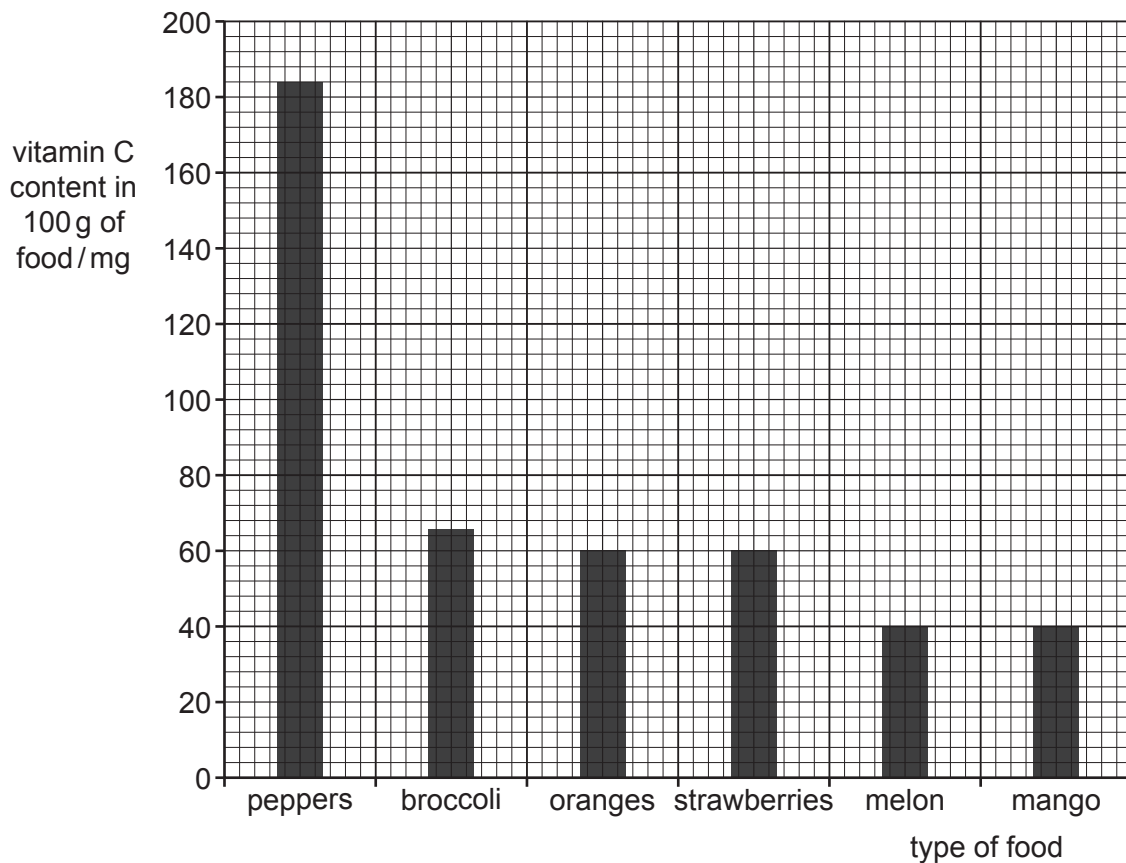


Fig. 4.1

- (i) Name **two** foods from Fig. 4.1 that contain exactly 60 mg of vitamin C in 100 g of the food.

..... and [1]

- (ii) Calculate the mass of mango needed to provide 80 mg of vitamin C.

mass =g [2]

(b) Fig. 4.2 shows the names and functions of some parts of the human alimentary canal.

Draw **one** line from the name of each part to its correct function.

name	function
anus	absorption
liver	ingestion
mouth	produces bile
small intestine	egestion

Fig. 4.2

[3]

(c) (i) Proteins and carbohydrates are made up of chemical elements.

List the chemical elements found in **both** proteins and carbohydrates.

..... [1]

- (ii) Proteins are digested by the enzyme pepsin.

Pepsin works best in the stomach.

The pH of the stomach is pH 2.

Complete Fig. 4.3 by sketching a curve to show how the activity of the enzyme pepsin changes with pH.

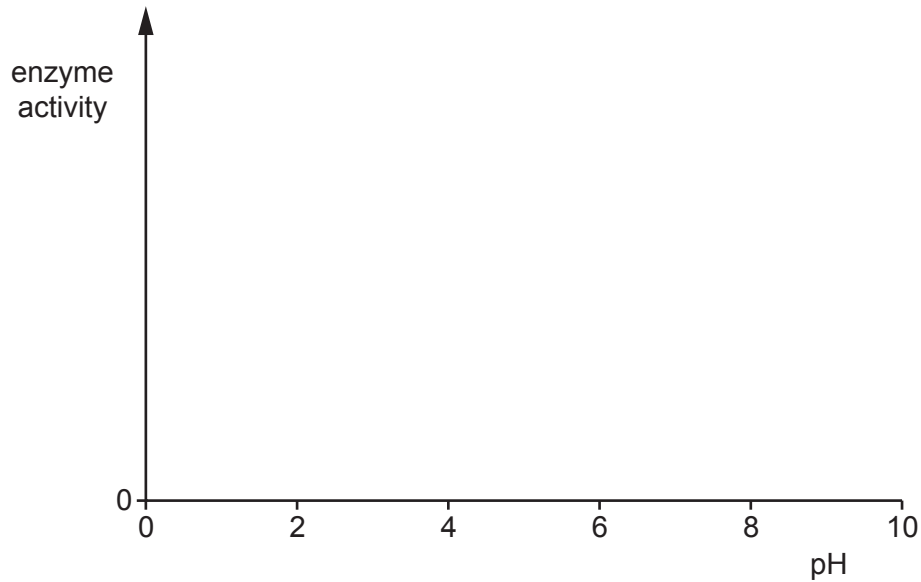


Fig. 4.3

[2]

- (iii) Proteins are made from small molecules that have reacted together.

Name these small molecules.

..... [1]

[Total: 10]

BLANK PAGE

- 5 (a) Petroleum is separated using the process shown in Fig. 5.1.

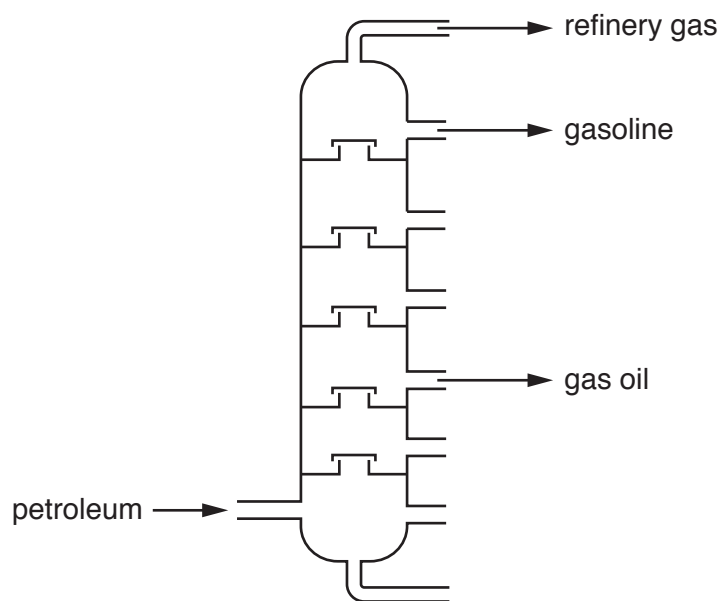


Fig. 5.1

- (i) Name the process shown in Fig. 5.1.

..... [1]

- (ii) Refinery gas and gas oil can be used as fuels.

State **one** use for each of these fuels.

refinery gas

gas oil

[2]

- (iii) Identify the greenhouse gas that forms during the complete combustion of gasoline.

..... [1]

- (b) Petroleum is a mixture of hydrocarbon molecules called alkanes.

- (i) Explain what is meant by *hydrocarbon*.

.....

..... [2]

- (ii) State the name of a process used to produce alkenes.

..... [1]

- (iii) Describe the difference between the bonding in alkanes and in alkenes.

.....

..... [1]

- (iv) Many ethene molecules combine to form poly(ethene).

State the type of addition reaction that occurs.

..... [1]

[Total: 9]

- 6 Fig. 6.1 shows a bucket of crushed ice used to cool drinks.

A thermometer is placed in the ice to check the temperature, and a glass bottle containing a drink is placed in the ice to cool.

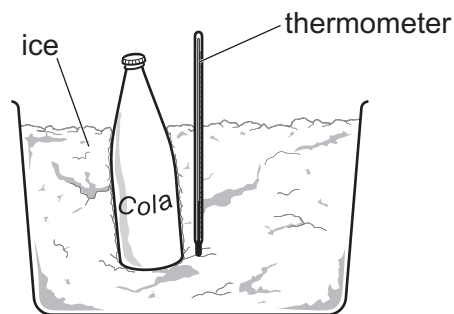


Fig. 6.1

The temperature of the ice when it is put in the bucket is -15°C .

The temperature of the drink before it is placed in the ice is 20°C .

- (a) Calculate the temperature difference between the ice and the drink at the start.

temperature difference = $^{\circ}\text{C}$ [1]

- (b) After 5 minutes the contents of the bucket are stirred and the temperature of the ice is taken again. The thermometer reading is -10°C .

State the names of **two** ways in which thermal energy has been transferred from the drink inside the bottle to the ice.

1.

2.

[2]

- (c) Fig. 6.2 shows a graph of how the temperature of the ice in the bucket changes over 30 minutes as the drink is cooled.

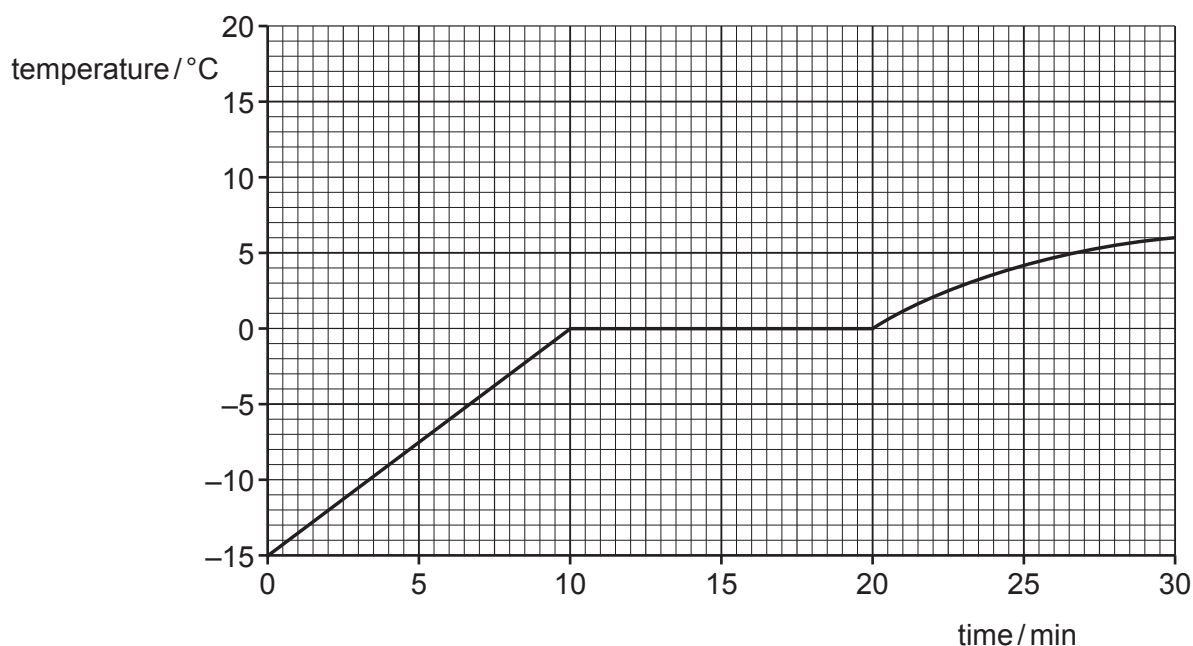


Fig. 6.2

- (i) State what is happening to the ice in the bucket between 10 and 20 minutes.
 [1]
- (ii) On Fig. 6.2, sketch a graph to show how the temperature of the drink in the bottle changes over the 30 minutes it is cooling in the ice bucket. [2]
- (d) At the start, the total mass of the bucket, ice and bottle of drink is 2.25 kg.
- (i) Predict the total mass of the bucket, ice and bottle of drink after 30 minutes.
 Give a reason for your answer.
 total mass = kg
 reason
 [1]
- (ii) The ice placed in the bucket is made from a block of mass 400 g.
 The volume of the block of ice is 436 cm³.
 Calculate the density of the ice.

density = g/cm³ [2]

[Total: 9]

[Turn over]

7 (a) Fig. 7.1 shows a food web.

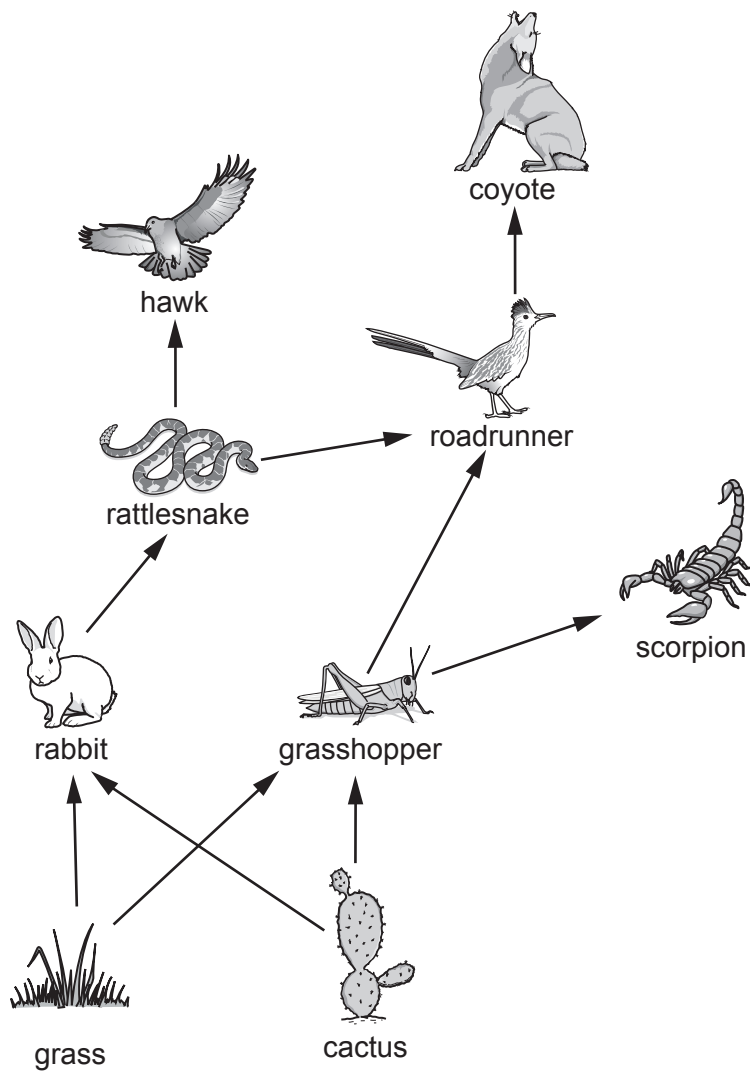


Fig. 7.1

(i) The food web is **not** complete.

Scorpions are eaten by roadrunners.

Use this information to complete the food web in Fig. 7.1 by drawing **one** arrow. [1]

(ii) Identify **one** tertiary consumer from the food web in Fig. 7.1.

..... [1]

- (iii) One year the number of rattlesnakes decreases.

This leads to a decrease in the number of grasshoppers.

Explain why using the information in Fig. 7.1.

.....

.....

.....

..... [2]

- (b) Fig. 7.2 is a diagram of a cactus growing in a desert.

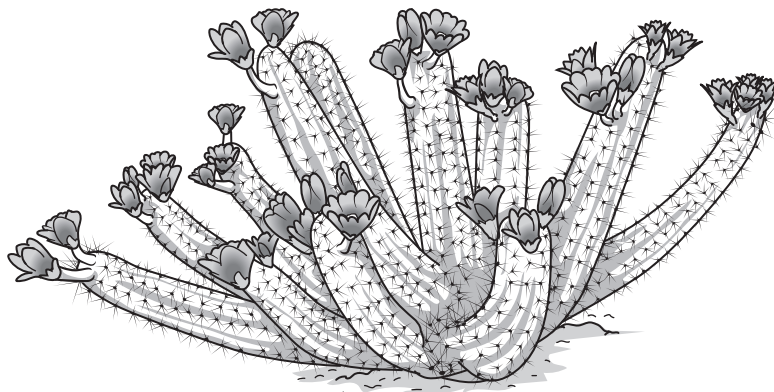


Fig. 7.2

The cactus is a flowering plant.

A bird feeds on the nectar produced by the flowers. As it feeds, pollen sticks to the bird and can be moved from one flower to another.

Complete the sentences using words from the list.

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

agent

anther

catalyst

ovule

petals

sepals

stigma

The cactus flower is pollinated when pollen is transferred to the

The bird is the of pollination.

The flower has nectar and coloured to attract the bird. [3]

[Total: 7]

- 8 Period 4 of the Periodic Table is shown in Fig. 8.1. It contains the elements from potassium, K, to krypton, Kr.

Group																	
I	II											III	IV	V	VI	VII	VIII
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

Key

atomic number
atomic symbol
name
relative atomic mass

Fig. 8.1

- (a) State the trend in the metallic character of the elements from potassium to krypton.

..... to [1]

- (b) Iron is in a collection of elements between calcium, Ca, and gallium, Ga, in period 4.

These elements have high densities and form coloured compounds.

- (i) State the name of this collection of elements.

..... [1]

- (ii) Describe **one** other property shown by these elements.

..... [1]

- (c) Chlorine is a gas in Group VII.

It is made by passing electricity through an aqueous salt.

- (i) Name the process which uses electricity to break down an aqueous salt.

..... [1]

- (ii) Suggest **one** aqueous salt that is used to make chlorine in this process.

..... [1]

- (iii) Describe a chemical test for chlorine and the positive result for this test.

test

result

[2]

- (iv) State the name of the collection of elements in Group VII.

..... [1]

(d) Krypton is a gas in Group VIII (Group 0) in the Periodic Table.

Complete the sentence about this group.

The Group VIII (Group 0) gases are known as the gases. [1]

[Total: 9]

- 9 Fig. 9.1 shows a mobile (cell) phone and a loudspeaker.

The mobile phone transmits a signal to the loudspeaker.

The loudspeaker converts the signal into sound.

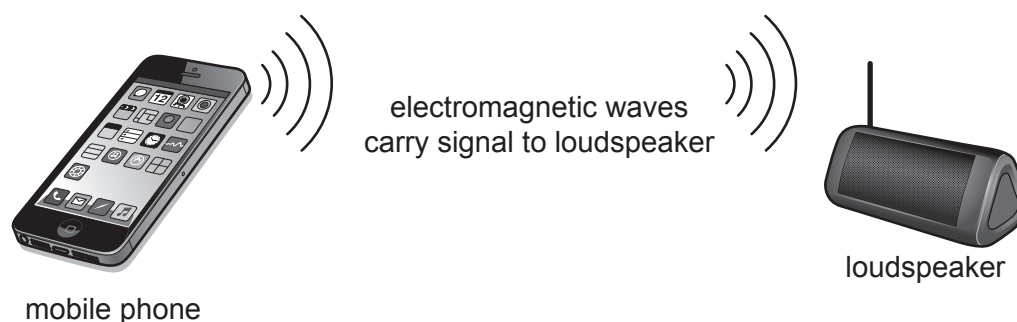


Fig. 9.1

- (a) Electromagnetic waves of frequency 2.4×10^9 Hz are used to carry the signal from the mobile phone to the loudspeaker.
- (i) Fig. 9.2 shows the approximate ranges of frequency for each type of electromagnetic wave.

more than 10^{19} Hz	10^{19} to 10^{17} Hz	10^{17} to 10^{15} Hz	10^{15} to 10^{14} Hz	10^{14} to 10^{11} Hz	10^{11} to 10^9 Hz	less than 10^9 Hz
gamma radiation	X-rays	ultraviolet	visible light	infrared	microwaves	radio waves

Fig. 9.2

Use the information in Fig. 9.2 to identify the type of electromagnetic wave used to carry the signal to the loudspeaker.

..... [1]

- (ii) The loudspeaker can be switched on and off using a remote controller.

State the type of electromagnetic wave transmitted by a remote controller.

..... [1]

- (b) The loudspeaker is operated by an alternating current (a.c.) supply.

A lamp is connected in parallel with the loudspeaker.

A switch is used to switch on both the lamp and the loudspeaker.

- (i) On Fig. 9.3, complete the circuit diagram to show how the loudspeaker, lamp and switch are connected.

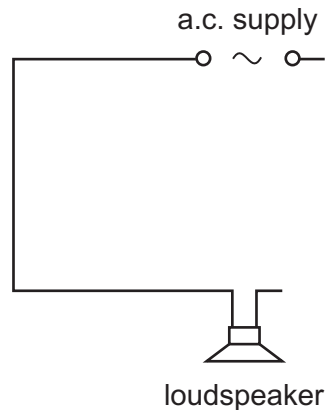


Fig. 9.3

[3]

- (ii) The loudspeaker requires a current of 0.80 A.

The power supply provides a voltage of 20 V across the loudspeaker.

Calculate the resistance of the loudspeaker.

Give the unit of your answer.

resistance = unit [3]

- (c) The alternating current supply has a frequency of 50 Hz.

When the speaker is switched on, but no signal is being received, sound waves of frequency 50 Hz are emitted from the loudspeaker.

Suggest whether a person near the loudspeaker will hear these sound waves.

Give a reason for your answer.

.....

 [1]

[Total: 9]

BLANK PAGE

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge Assessment International Education Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cambridgeinternational.org after the live examination series.

Cambridge Assessment International Education is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of the University of Cambridge Local Examinations Syndicate (UCLES), which itself is a department of the University of Cambridge.

The Periodic Table of Elements

Group																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
I	II	1 H hydrogen 1						III	IV	V	VI	VII	VIII																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
		Key atomic number atomic symbol name relative atomic mass																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
3 Li lithium 7	4 Be beryllium 9																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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 actinoids	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	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 —	117 Ts tennessine —	118 Og oganeson —	119 Nh nihonium —	120 Dl dubnium —	121 Uu unbinilium —	122 Uub unbibium —	123 Uut untrium —	124 Uuq unquadium —	125 Uup unpentium —	126 Uuh unhexium —	127 Uus unseptium —	128 Uuo unoctium —	129 Uuhc unhennium —	130 Uuhs unhassium —	131 Uusl unseptilium —	132 Uuhl unhassium —	133 Uufl unflifornium —	134 Uuql unquadium —	135 Uupl unpentilium —	136 Uuhl unhexilium —	137 Uusl unseptilium —	138 Uuhl unhassium —	139 Uusl unseptilium —	140 Uuhl unhassium —	141 Uusl unseptilium —	142 Uuhl unhassium —	143 Uusl unseptilium —	144 Uuhl unhassium —	145 Uusl unseptilium —	146 Uuhl unhassium —	147 Uusl unseptilium —	148 Uuhl unhassium —	149 Uusl unseptilium —	150 Uuhl unhassium —	151 Uusl unseptilium —	152 Uuhl unhassium —	153 Uusl unseptilium —	154 Uuhl unhassium —	155 Uusl unseptilium —	156 Uuhl unhassium —	157 Uusl unseptilium —	158 Uuhl unhassium —	159 Uusl unseptilium —	160 Uuhl unhassium —	161 Uusl unseptilium —	162 Uuhl unhassium —	163 Uusl unseptilium —	164 Uuhl unhassium —	165 Uusl unseptilium —	166 Uuhl unhassium —	167 Uusl unseptilium —	168 Uuhl unhassium —	169 Uusl unseptilium —	170 Uuhl unhassium —	171 Uusl unseptilium —	172 Uuhl unhassium —	173 Uusl unseptilium —	174 Uuhl unhassium —	175 Uusl unseptilium —	176 Uuhl unhassium —	177 Uusl unseptilium —	178 Uuhl unhassium —	179 Uusl unseptilium —	180 Uuhl unhassium —	181 Uusl unseptilium —	182 Uuhl unhassium —	183 Uusl unseptilium —	184 Uuhl unhassium —	185 Uusl unseptilium —	186 Uuhl unhassium —	187 Uusl unseptilium —	188 Uuhl unhassium —	189 Uusl unseptilium —	190 Uuhl unhassium —	191 Uusl unseptilium —	192 Uuhl unhassium —	193 Uusl unseptilium —	194 Uuhl unhassium —	195 Uusl unseptilium —	196 Uuhl unhassium —	197 Uusl unseptilium —	198 Uuhl unhassium —	199 Uusl unseptilium —	200 Uuhl unhassium —	201 Uusl unseptilium —	202 Uuhl unhassium —	203 Uusl unseptilium —	204 Uuhl unhassium —	205 Uusl unseptilium —	206 Uuhl unhassium —	207 Uusl unseptilium —	208 Uuhl unhassium —	209 Uusl unseptilium —	210 Uuhl unhassium —	211 Uusl unseptilium —	212 Uuhl unhassium —	213 Uusl unseptilium —	214 Uuhl unhassium —	215 Uusl unseptilium —	216 Uuhl unhassium —	217 Uusl unseptilium —	218 Uuhl unhassium —	219 Uusl unseptilium —	220 Uuhl unhassium —	221 Uusl unseptilium —	222 Uuhl unhassium —	223 Uusl unseptilium —	224 Uuhl unhassium —	225 Uusl unseptilium —	226 Uuhl unhassium —	227 Uusl unseptilium —	228 Uuhl unhassium —	229 Uusl unseptilium —	230 Uuhl unhassium —	231 Uusl unseptilium —	232 Uuhl unhassium —	233 Uusl unseptilium —	234 Uuhl unhassium —	235 Uusl unseptilium —	236 Uuhl unhassium —	237 Uusl unseptilium —	238 Uuhl unhassium —	239 Uusl unseptilium —	240 Uuhl unhassium —	241 Uusl unseptilium —	242 Uuhl unhassium —	243 Uusl unseptilium —	244 Uuhl unhassium —	245 Uusl unseptilium —	246 Uuhl unhassium —	247 Uusl unseptilium —	248 Uuhl unhassium —	249 Uusl unseptilium —	250 Uuhl unhassium —	251 Uusl unseptilium —	252 Uuhl unhassium —	253 Uusl unseptilium —	254 Uuhl unhassium —	255 Uusl unseptilium —	256 Uuhl unhassium —	257 Uusl unseptilium —	258 Uuhl unhassium —	259 Uusl unseptilium —	260 Uuhl unhassium —	261 Uusl unseptilium —	262 Uuhl unhassium —	263 Uusl unseptilium —	264 Uuhl unhassium —	265 Uusl unseptilium —	266 Uuhl unhassium —	267 Uusl unseptilium —	268 Uuhl unhassium —	269 Uusl unseptilium —	270 Uuhl unhassium —	271 Uusl unseptilium —	272 Uuhl unhassium —	273 Uusl unseptilium —	274 Uuhl unhassium —	275 Uusl unseptilium —	276 Uuhl unhassium —	277 Uusl unseptilium —	278 Uuhl unhassium —	279 Uusl unseptilium —	280 Uuhl unhassium —	281 Uusl unseptilium —	282 Uuhl unhassium —	283 Uusl unseptilium —	284 Uuhl unhassium —	285 Uusl unseptilium —	286 Uuhl unhassium —	287 Uusl unseptilium —	288 Uuhl unhassium —	289 Uusl unseptilium —	290 Uuhl unhassium —	291 Uusl unseptilium —	292 Uuhl unhassium —	293 Uusl unseptilium —	294 Uuhl unhassium —	295 Uusl unseptilium —	296 Uuhl unhassium —	297 Uusl unseptilium —	298 Uuhl unhassium —	299 Uusl unseptilium —	300 Uuhl unhassium —	301 Uusl unseptilium —	302 Uuhl unhassium —	303 Uusl unseptilium —	304 Uuhl unhassium —	305 Uusl unseptilium —	306 Uuhl unhassium —	307 Uusl unseptilium —	308 Uuhl unhassium —	309 Uusl unseptilium —	310 Uuhl unhassium —	311 Uusl unseptilium —	312 Uuhl unhassium —	313 Uusl unseptilium —	314 Uuhl unhassium —	315 Uusl unseptilium —	316 Uuhl unhassium —	317 Uusl unseptilium —	318 Uuhl unhassium —	319 Uusl unseptilium —	320 Uuhl unhassium —	321 Uusl unseptilium —	322 Uuhl unhassium —	323 Uusl unseptilium —	324 Uuhl unhassium —	325 Uusl unseptilium —	326 Uuhl unhassium —	327 Uusl unseptilium —	328 Uuhl unhassium —	329 Uusl unseptilium —	330 Uuhl unhassium —	331 Uusl unseptilium —	332 Uuhl unhassium —	333 Uusl unseptilium —	334 Uuhl unhassium —	335 Uusl unseptilium —	336 Uuhl unhassium —	337 Uusl unseptilium —	338 Uuhl unhassium —	339 Uusl unseptilium —	340 Uuhl unhassium —	341 Uusl unseptilium —	342 Uuhl unhassium —	343 Uusl unseptilium —	344 Uuhl unhassium —	345 Uusl unseptilium —	346 Uuhl unhassium —	347 Uusl unseptilium —	348 Uuhl unhassium —	349 Uusl unseptilium —	350 Uuhl unhassium —	351 Uusl unseptilium —	352 Uuhl unhassium —	353 Uusl unseptilium —	354 Uuhl unhassium —	355 Uusl unseptilium —	356 Uuhl unhassium —	357 Uusl unseptilium —	358 Uuhl unhassium —	359 Uusl unseptilium —	360 Uuhl unhassium —	361 Uusl unseptilium —	362 Uuhl unhassium —	363 Uusl unseptilium —	364 Uuhl unhassium —	365 Uusl unseptilium —	366 Uuhl unhassium —	367 Uusl unseptilium —	368 Uuhl unhassium —	369 Uusl unseptilium —	370 Uuhl unhassium —	371 Uusl unseptilium —	372 Uuhl unhassium —	373 Uusl unseptilium —	374 Uuhl unhassium —	375 Uusl unseptilium —	376 Uuhl unhassium —	377 Uusl unseptilium —	378 Uuhl unhassium —	379 Uusl unseptilium —	380 Uuhl unhassium —	381 Uusl unseptilium —	382 Uuhl unhassium —	383 Uusl unseptilium —	384 Uuhl unhassium —	385 Uusl unseptilium —	386 Uuhl unhassium —	387 Uusl unseptilium —	388 Uuhl unhassium —	389 Uusl unseptilium —	390 Uuhl unhassium —	391 Uusl unseptilium —	392 Uuhl unhassium —	393 Uusl unseptilium —	394 Uuhl unhassium —	395 Uusl unseptilium —	396 Uuhl unhassium —	397 Uusl unseptilium —	398 Uuhl unhassium —	399 Uusl unseptilium —	400 Uuhl unhassium —	401 Uusl unseptilium —	402 Uuhl unhassium —	403 Uusl unseptilium —	404 Uuhl unhassium —	405 Uusl unseptilium —	406 Uuhl unhassium —	407 Uusl unseptilium —	408 Uuhl unhassium —	409 Uusl unseptilium —	410 Uuhl unhassium —	411 Uusl unseptilium —	412 Uuhl unhassium —	413 Uusl unseptilium —	414 Uuhl unhassium —	415 Uusl unseptilium —	416 Uuhl unhassium —	417 Uusl unseptilium —	418 Uuhl unhassium —	419 Uusl unseptilium —	420 Uuhl unhassium —	421 Uusl unseptilium —	422 Uuhl unhassium —	423 Uusl unseptilium —	424 Uuhl unhassium —	425 Uusl unseptilium —	426 Uuhl unhassium —	427 Uusl unseptilium —	428 Uuhl unhassium —	429 Uusl unseptilium —	430 Uuhl unhassium —	431 Uusl unseptilium —	432 Uuhl unhassium —	433 Uusl unseptilium —	434 Uuhl unhassium —	435 Uusl unseptilium —	436 Uuhl unhassium —	437 Uusl unseptilium —	438 Uuhl unhassium —	439 Uusl unseptilium —	440 Uuhl unhassium —	441 Uusl unseptilium —	442 Uuhl unhassium —	443 Uusl unseptilium —	444 Uuhl unhassium —	445 Uusl unseptilium —	446 Uuhl unhassium —	447 Uusl unseptilium —	448 Uuhl unhassium —	449 Uusl unseptilium —	450 Uuhl unhassium —	451 Uusl unseptilium —	452 Uuhl unhassium —	453 Uusl unseptilium —	454 Uuhl unhassium —	455 Uusl unseptilium —	456 Uuhl unhassium —	457 Uusl unseptilium —	458 Uuhl unhassium —	459 Uusl unseptilium —	460 Uuhl unhassium —	461 Uusl unseptilium —	462 Uuhl unhassium —	463 Uusl unseptilium —	464 Uuhl unhassium —	465 Uusl unseptilium —	466 Uuhl unhassium —	467 Uusl unseptilium —	468 Uuhl unhassium —	469 Uusl unseptilium —	470 Uuhl unhassium —	471 Uusl unseptilium —	472 Uuhl unhassium —	473 Uusl unseptilium —	474 Uuhl unhassium —	475 Uusl unseptilium —	476 Uuhl unhassium —	477 Uusl unseptilium —	478 Uuhl unhassium —	479 Uusl unseptilium —	480 Uuhl unhassium —	481 Uusl unseptilium —	482 Uuhl unhassium —	483 Uusl unseptilium —	484 Uuhl unhassium —	485 Uusl unseptilium —	486 Uuhl unhassium —	487 Uusl unseptilium —	488 Uuhl unhassium —	489 Uusl unseptilium —	490 Uuhl unhassium —	491 Uusl unseptilium —	492 Uuhl unhassium —	493 Uusl unseptilium —	494 Uuhl unhassium —	495 Uusl unseptilium —	496 Uuhl unhassium —	497 Uusl unseptilium —	498 Uuhl unhassium —	499 Uusl unseptilium —	500 Uuhl unhassium —	501 Uusl unseptilium —	502 Uuhl unhassium —	503 Uusl unseptilium —	504 Uuhl unhassium —	505 Uusl unseptilium —	506 Uuhl unhassium —	507 Uusl unseptilium —	508 Uuhl unhassium —	509 Uusl unseptilium —	510 Uuhl unhassium —	511 Uusl unseptilium —	512 Uuhl unhassium —	513 Uusl unseptilium —	514 Uuhl unhassium —	515 Uusl unseptilium —	516 Uuhl unhassium —	517 Uusl unseptilium —	518 Uuhl unhassium —	519 Uusl unseptilium —	520 Uuhl unhassium —	521 Uusl unseptilium —	522 Uuhl unhassium —	523 Uusl unseptilium —	524 Uuhl unhassium —	525 Uusl unseptilium —	526 Uuhl unhassium —	527 Uusl unseptilium —	528 Uuhl unhassium —	529 Uusl unseptilium —	530 Uuhl unhassium —	531 Uusl unseptilium —	532 Uuhl unhassium —	533 Uusl unseptilium —	534 Uuhl unhassium —	535 Uusl unseptilium —	536 Uuhl unhassium —	537 Uusl unseptilium —	538 Uuhl unhassium —	539 Uusl unseptilium —	540 Uuhl unhassium —	541 Uusl unseptilium —	542 Uuhl unhassium —	543 Uusl unseptilium —	544 Uuhl unhassium —	545 Uusl unseptilium —	546 Uuhl unhassium —	547 Uusl unseptilium —	548 Uuhl unhassium —	549 Uusl unseptilium —	550 Uuhl unhassium —	551 Uusl unseptilium —	552 Uuhl unhassium —	553 Uusl unseptilium —	554 Uuhl unhassium —	555 Uusl unseptilium —	556 Uuhl unhassium —	557 Uusl unseptilium —	558 Uuhl unhassium —	559 Uusl unseptilium —	560 Uuhl unhassium —	561 Uusl unseptilium —	562 Uuhl unhassium —	563 Uusl unseptilium —	564 Uuhl unhassium —	565 Uusl unseptilium —	566 Uuhl unhassium —	567 Uusl unseptilium —	568 Uuhl unhassium —	569 Uusl unseptilium —	570 Uuhl unhassium —	571 Uusl unseptilium —	572 Uuhl unhassium —	573 Uusl unseptilium —	574 Uuhl unhassium —	575 Uusl unseptilium —	576 Uuhl unhassium —	577 Uusl unseptilium —	578 Uuhl unhassium —	579 Uusl unseptilium —	580 Uuhl unhassium —	581 Uusl unseptilium —	582 Uuhl unhassium —	583 Uusl unseptilium —	584 Uuhl unhassium —	585 Uusl unseptilium —	586 Uuhl unhassium —	587 Uusl unseptilium —	588 Uuhl unhassium —	589 Uusl unseptilium —	590 Uuhl unhassium —	591 Uusl unseptilium —	592 Uuhl unhassium —	593 Uusl unseptilium —	594 Uuhl unhassium —	595 Uusl unseptilium —	596 Uuhl unhassium —	597 Uusl unseptilium —	598 Uuhl unhassium —	599 Uusl unseptilium —	600 Uuhl unhassium —	601 Uusl unseptilium —	602 Uuhl unhassium —	603 Uusl unseptilium —	604 Uuhl unhassium —	605 Uusl unseptilium —	606 Uuhl unhassium —	607 Uusl unseptilium —	608 Uuhl unhassium —	609 Uusl unseptilium —	610 Uuhl unhassium —	611 Uusl unseptilium —	612 Uuhl unhassium —	613 Uusl unseptilium —	614 Uuhl unhassium —	615 Uusl unseptilium —	616 Uuhl unhassium —	617 Uusl unseptilium —	618 Uuhl unhassium —	619 Uusl unseptilium —	620 Uuhl unhassium —	621 Uusl unseptilium —	622 Uuhl unhassium —	623 Uusl unseptilium —	624 Uuhl unhassium —	625 Uusl unseptilium —	626 Uuhl unhassium —	627 Uusl unseptilium —	628 Uuhl unhassium —	629 Uusl un

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 dm³ at room temperature and pressure (r.t.p.).