AQA GCSE Chemistry | 8462

SPECIFICATION POINT 4.1.2.4

Group 0

Past-paper questions

Tier	**Foundation**
Question groups	**41**
Available paper years	**2007–2025**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

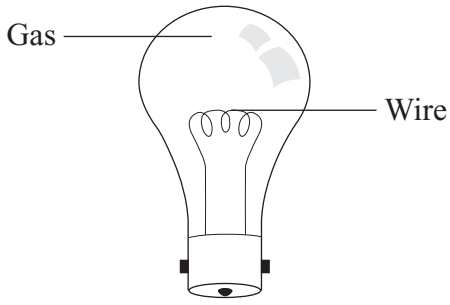
4.1.2.4 Group 0

Question 01

January 2007 | CHY1F | Original Q3 | Legacy

3 When electricity passes through a thin wire, the wire gets hot. If the wire gets very hot, it may glow. This idea is used in filament lamps.

Filament lamp



(a) The table shows some metals and their melting points.

Metal	Melting point in °C
Aluminium	660
Copper	1084
Iron	1540
Tungsten	3410

Which metal in the table should be used to make the wire in a filament lamp?

Give a reason for your answer.

.....

.....

.....

.....

(2 marks)

4.1.2.4 Group 0

Question 01 · continued

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(b) The table shows some gases.

Gas
Argon
Carbon dioxide
Oxygen
Sulfur dioxide

Which gas in the table should be used in a filament lamp?

Give a reason for your answer.

.....

.....

.....

.....

(2 marks)

4

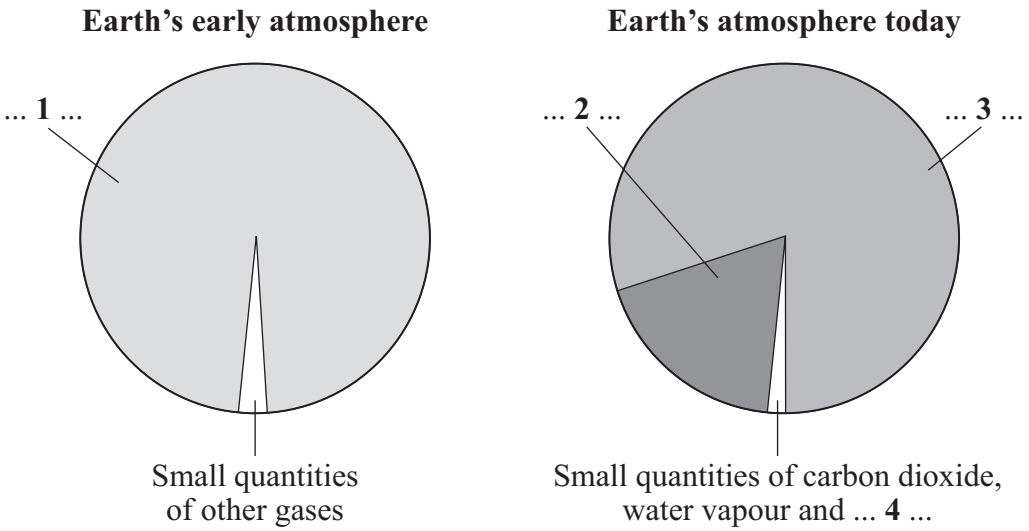
4.1.2.4 Group 0

Question 02

March 2007 | CHY1B | Original Q2 | Legacy

QUESTION TWO

The pie charts show the gases in Earth's early atmosphere and in Earth's atmosphere today.



Match gases, **A**, **B**, **C** and **D**, with the labels **1–4** on the pie charts.

A carbon dioxide

B nitrogen

C noble gases

D oxygen

4.1.2.4 Group 0

Question 03

March 2007 | CHY1B | Original Q3 | Legacy

QUESTION THREE

This question is about four chemical substances.

Match substances, **A**, **B**, **C** and **D**, with the numbers **1–4** in the table.

A ethanol

B ethene

C helium

D poly(propene)

	What we can say about the substance
1	It is an unreactive gas.
2	It is produced when an alkene reacts with steam.
3	It is a polymer.
4	It belongs to a group of hydrocarbons with the general formula C_nH_{2n}

4.1.2.4 Group 0

Question 04

June 2007 | CHY1B | Original Q4 | Legacy

QUESTION FOUR

The list below shows the first five noble gases, in the order in which they appear in Group 0 of the periodic table, and their boiling points.

Noble gas	Boiling point in °C
Helium	–269
Neon	–246
Argon	–186
Krypton	–152
Xenon	–107

Match words, **A**, **B**, **C** and **D**, with the numbers **1–4** in the sentences.

A boiling point

B colour

C density

D reactivity

Argon is used in filament lamps because of its low chemical . . . **1** . . . .

In electric discharge tubes, used for advertisement signs, each noble gas glows with a different . . . **2** . . . .

Helium is used in balloons because it has a low . . . **3** . . . .

Xenon is the noble gas in the list that has the highest . . . **4** . . . .

4.1.2.4 Group 0

Question 05

June 2007 | CHY1F | Original Q1 | Legacy

1 Helium is used to fill party balloons.



(a) Tick **two** properties that make helium suitable for filling party balloons.

Property	Suitable (✓)
Colourless	
Low density	
Small atoms	
Unreactive	

(2 marks)

(b) Complete the sentence by drawing a ring around the correct line in the box.

The material used to make balloons is

a metal
a polymer
an element

.

(1 mark)

(c) One environmental problem is that balloons are non-biodegradable.

What does *non-biodegradable* mean?

.....

.....

(1 mark)

4

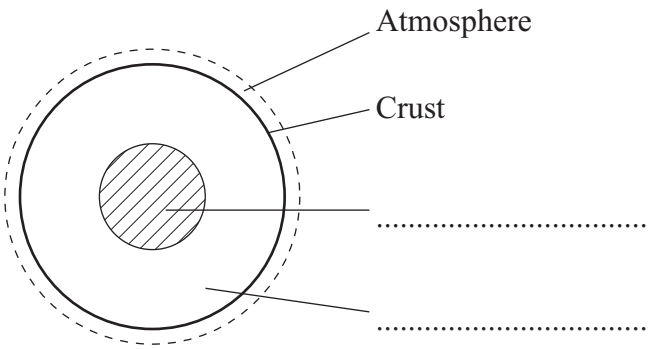
4.1.2.4 Group 0

Question 06

June 2007 | CHY1F | Original Q5 | Legacy

5 The Earth is shaped like a ball and is surrounded by an atmosphere.

(a) The diagram shows the layered structure of the Earth.



Choose words from the box to complete the labels on the diagram.

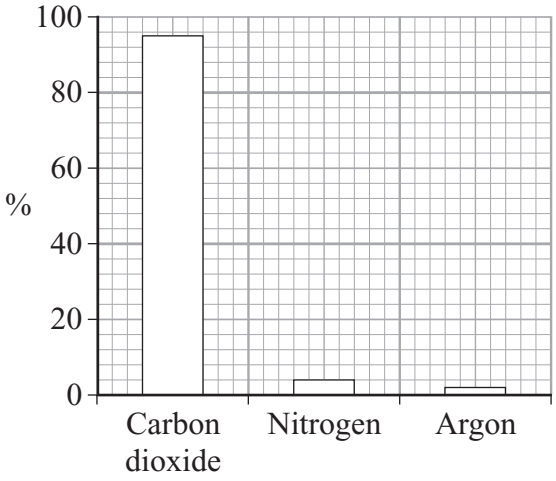
core	**mantle**	**plate**

(2 marks)

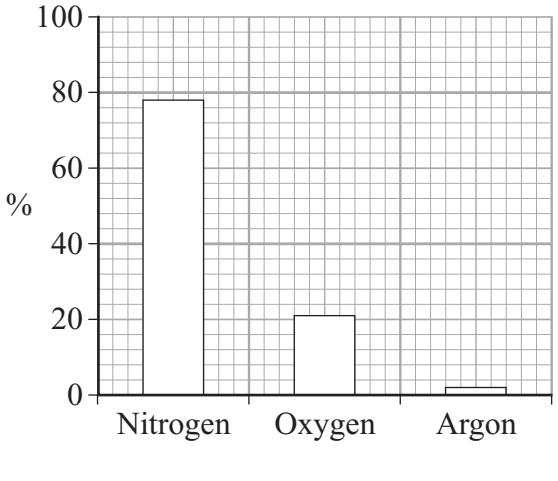
(b) Some theories suggest that the Earth's early atmosphere was like the atmosphere of Mars today.

The bar charts show the three most common gases in each atmosphere today.

The atmosphere of Mars today



The atmosphere of Earth today



4.1.2.4 Group 0

Question 06 · continued

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(i) Use the bar charts to complete the sentence by writing in the correct gases.

In the atmosphere of Mars today there is mainly ..... and no ..... . *(2 marks)*

(ii) Use the bar charts to complete the sentence by writing in the correct number.

These theories suggest that there was about ..... % nitrogen in the Earth's early atmosphere. *(1 mark)*

(iii) The atmosphere of the Earth today has much more nitrogen than in the early atmosphere. Denitrifying bacteria released most of this nitrogen into the atmosphere.

There are other differences between the Earth's early atmosphere and the atmosphere of the Earth today.

Use the bar charts to describe and explain **two** of these other differences.

.....

.....

.....

.....

.....

..... *(3 marks)*

8

4.1.2.4 Group 0

Question 07

November 2007 | CHY1B | Original Q4 | Legacy

QUESTION FOUR

This question is about gases in the Earth's atmosphere.

In the Earth's early atmosphere	In the Earth's atmosphere today
Carbon dioxide Small amounts of: ammonia, NH_3 methane, CH_4 Water vapour	Nitrogen Oxygen Small amounts of: carbon dioxide noble gases Water vapour

Match gases, **A**, **B**, **C** and **D**, with the numbers **1–4** in the table below.

A ammonia

B helium

C methane

D oxygen

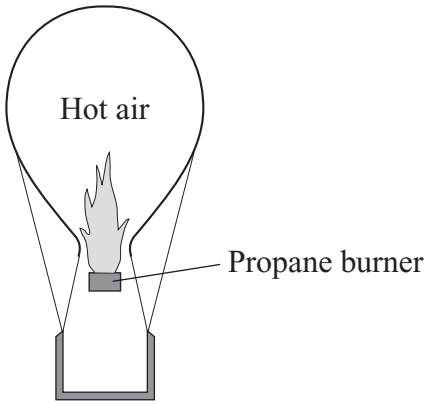
	What we can say about the gas
1	It is a hydrocarbon.
2	It is a noble gas.
3	It is a compound of nitrogen and hydrogen.
4	It is produced in the atmosphere by the activity of plants.

4.1.2.4 Group 0

Question 08

January 2008 | CHY1F | Original Q1 | Legacy

1 Hot air balloons burn hydrocarbons to heat the air.



(a) The hot air contains these gases:

nitrogen, N_2
oxygen, O_2
argon, Ar
carbon dioxide, CO_2
water vapour, H_2O

(i) Argon is an *element*.

What is an *element*?

.....

.....

(1 mark)

(ii) Name **one** other gas in the hot air that is also an element.

.....

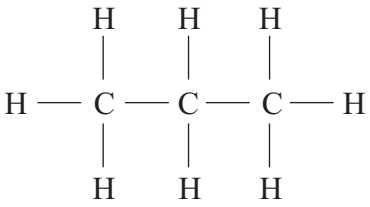
(1 mark)

4.1.2.4 Group 0

Question 08 · continued

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(b) Propane, C_3H_8, can be represented as:



Use the correct words from the box to complete the sentences.

bond	**carbon**	**compound**	**element**	**mixture**

(i) Propane is a ..... and is made up of atoms of hydrogen and ..... .

(2 marks)

(ii) Each line between the atoms in propane represents a chemical ..... .

(1 mark)

5

4.1.2.4 Group 0

Question 09

March 2008 | CHY1BP | Original Q1 | Legacy

QUESTION ONE

This question is about gases found in the atmosphere.

Match gases, **A**, **B**, **C** and **D**, with the numbers **1–4** in the table.

A argon (noble gas)

B carbon dioxide

C nitrogen

D oxygen

1	It makes up the largest percentage of today's atmosphere.
2	It is used in electric discharge tubes.
3	It is released into the atmosphere when fossil fuels burn.
4	It is given out by plants during photosynthesis.

4.1.2.4 Group 0

Question 10

November 2008 | CHY1BP | Original Q3 | Legacy

QUESTION THREE

This question is about four substances.

Match substances, **A**, **B**, **C** and **D**, with the numbers **1–4** in the table.

A argon

B bromine

C ethanol

D nickel

1	It is an unreactive gas.
2	It is produced when ethene reacts with steam.
3	It will be turned from red-brown to colourless by unsaturated oils.
4	It acts as a catalyst in the reaction to hydrogenate unsaturated oils.

4.1.2.4 Group 0

Question 11

November 2008 | CHY1BP | Original Q5 | Legacy

QUESTION FIVE

This question is about some gases found in the Earth's atmosphere.

Match gases, **A**, **B**, **C** and **D**, with the numbers **1–4** in the table.

A carbon dioxide

B helium

C nitrogen

D oxygen

1	It is in Group 0 of the periodic table.
2	It makes up about 80% of the atmosphere.
3	It is found in today's atmosphere in much smaller amounts than in Earth's early atmosphere.
4	It is used when fossil fuels burn.

4.1.2.4 Group 0

Question 12

March 2009 | CHY1BP | Original Q1 | Legacy

QUESTION ONE

This question is about gases.

Match gases, **A**, **B**, **C** and **D**, with the numbers **1–4** in the table.

A oxygen

B noble gas

C air

D water vapour

1	It condensed to form the Earth's oceans.
2	It is a mixture.
3	It makes up about 20 % of the Earth's atmosphere.
4	It is used in discharge tubes.

4.1.2.4 Group 0

Question 13

June 2009 | CHY1BP | Original Q3 | Legacy

QUESTION THREE

The most abundant gases in the Earth's atmosphere are nitrogen and oxygen.

The table shows the next four most abundant gases, three of which are noble gases.

	Gas	Percentage (%) in atmosphere by volume	Boiling point in °C
1	Argon	0.930	–185
2	Carbon dioxide	0.030	–78
3	Neon	0.018	–246
4	Helium	0.005	–269

Match sentences, **A**, **B**, **C** and **D**, with the numbers **1–4** in the table.

A It is the gas that is a compound.

B It is the most abundant of the noble gases.

C It is the noble gas with the lowest boiling point.

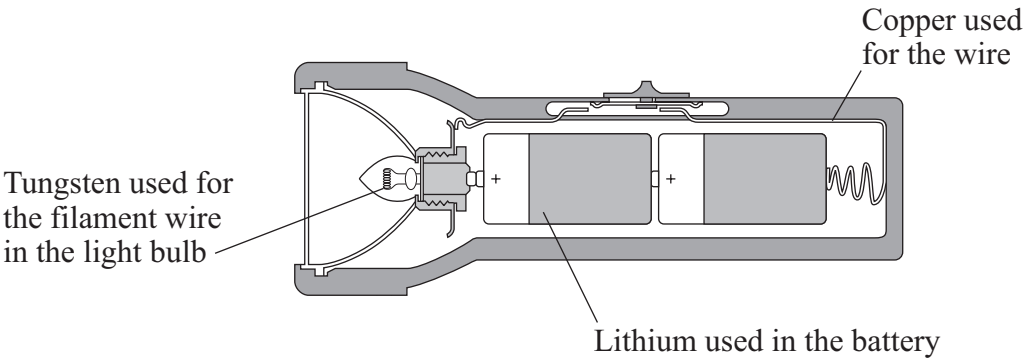
D There are 18 cm^3 of this gas in 100 litres of air.

4.1.2.4 Group 0

Question 14

June 2009 | CHY1F | Original Q1 | Legacy

1 The diagram shows a circuit that is used in a torch. Electrons flow through this circuit.

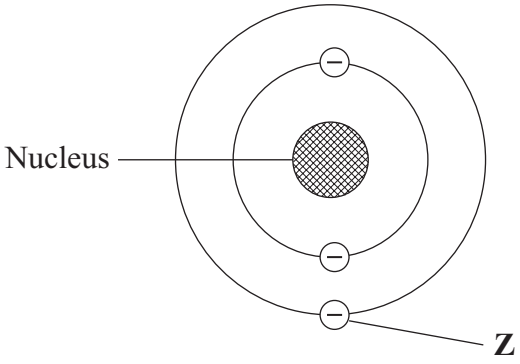


1 (a) Why is copper used for the wire?

.....

(1 mark)

1 (b) The diagram shows the structure of an atom of lithium.



Name the particle labelled **Z**.

.....

(1 mark)

4.1.2.4 Group 0

Question 14 · continued

for mark

1 (c) The table shows some properties of the metals used in the electrical circuit.

Metal	Melting point in °C	Boiling point in °C	Reaction with oxygen
Copper	1083	2582	Reacts **slowly** to form a thin oxide layer on surface
Lithium	179	1317	Reacts **rapidly** to form oxide
Tungsten	3370	5930	Reacts **only** when very hot to form oxide

1 (c) (i) Use information from the table to suggest the order of reactivity for copper, lithium and tungsten.

most reactive .....

.....

least reactive .....

(2 marks)

1 (c) (ii) The filament wire glows because it gets very hot.

Use information from the table to suggest **one** reason why tungsten is used for the filament wire in the light bulb.

.....

.....

(1 mark)

1 (d) The gas used in the light bulb is argon.

Draw a ring around the correct word in the box to complete the sentence.

Argon is used in the light bulb because it is

dense.
solid.
unreactive.

(1 mark)

6

4.1.2.4 Group 0

Question 15

4 Billions of years ago, the Earth's early atmosphere was probably like the atmosphere of Venus today.

The table shows a comparison of the atmospheres of the Earth and Venus today.

	Percentage composition of atmosphere	
Name of gas	**Earth today**	**Venus today**
Nitrogen	78	3.5
Oxygen	21	a trace
Argon	0.97	a trace
Carbon dioxide	0.03	96.5
Average surface temperature	20 °C	460 °C

4 (a) Use the names of gases from the table to complete the sentences.

4 (a) (i) In the Earth's atmosphere today, the main gas is ..... .

(1 mark)

4 (a) (ii) In the Earth's atmosphere billions of years ago, the main gas was

..... .

(1 mark)

4 (b) (i) Scientists do **not** know the accurate composition of the Earth's early atmosphere. Suggest why.

.....

.....

(1 mark)

4 (b) (ii) Use information from the table to answer this question.

Water vapour is present in the atmospheres of the Earth and Venus today.
The Earth's surface is mainly covered by water.

Suggest why there is no water on the surface of Venus.

.....

.....

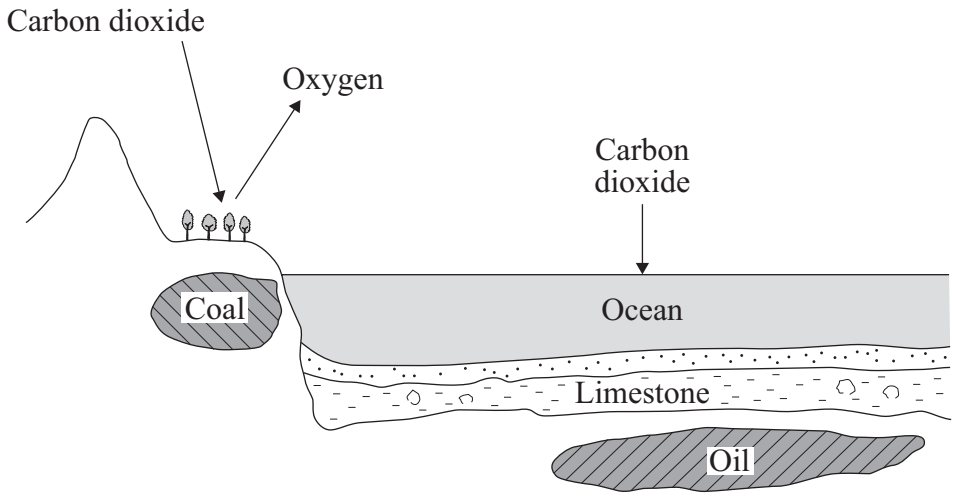
(1 mark)

4.1.2.4 Group 0

Question 15 · continued

for mark

4 (c) The diagram shows how carbon dioxide is removed from the Earth's atmosphere.



Describe what happened to the carbon dioxide in the Earth's early atmosphere.
Use the diagram to help you.

.....

.....

.....

.....

.....

.....

.....

(3 marks)

7

4.1.2.4 Group 0

Question 16

November 2009 | CHY1BP | Original Q2 | Legacy

QUESTION TWO

This question is about some of the gases in the Earth's atmosphere.

Match gases, **A**, **B**, **C** and **D**, with the numbers **1–4** in the sentences.

A oxygen

B nitrogen

C carbon dioxide

D helium

The most abundant gas in the Earth's atmosphere is . . . **1** . . . .

The gas used to fill party balloons because it is less dense than air is . . . **2** . . . .

The burning of fossil fuels uses . . . **3** . . . gas from the air, and releases . . . **4** . . . gas into the air.

Turn over for the next question

4.1.2.4 Group 0

Question 17

March 2010 | CHY1BP | Original Q1 | Legacy

QUESTION ONE

This question is about gases.

Match gases, **A**, **B**, **C** and **D**, with the numbers **1–4** in the table.

A oxygen

B nitrogen

C carbon dioxide

D helium

1	It makes up about 20% of the Earth's atmosphere today.
2	It is locked up as carbonates in sedimentary rocks.
3	It is found in Group 0 of the periodic table.
4	It makes up about 80% of the Earth's atmosphere today.

4.1.2.4 Group 0

Question 18

June 2010 | CHY1BP | Original Q1 | Legacy

QUESTION ONE

The table shows some information about four of the gases, **A**, **B**, **C** and **D**, in the Earth's atmosphere.

	Gas	Percentage (%) in the atmosphere	Melting point in °C	Boiling point in °C	Density in g per litre
A	Nitrogen	78	−210	−196	1.25
B	Oxygen	20	−218	−183	1.43
C	Carbon dioxide	0.04	−57	−78	1.98
D	Argon	1	−189	−186	1.78

Match gases, **A**, **B**, **C** and **D**, with the numbers **1–4** in the sentences.

The gas with the highest density is . . . **1** . . . .

The gas that makes up the largest percentage of the atmosphere is . . . **2** . . . .

The gas with the lowest melting point is . . . **3** . . . .

The gas with the smallest difference between its melting point and its boiling point is . . . **4** . . . .

4.1.2.4 Group 0

Question 19

November 2010 | CHY1BP | Original Q2 | Legacy

QUESTION TWO

This question is about some of the noble gases found in the Earth's atmosphere.

	Gas	Percentage (%) in the atmosphere	Melting point in ºC	Boiling point in ºC	Density in g per cm^3
A	Argon	0.9	–189	–186	0.0037
B	Helium	0.0005	–272	–269	0.0002
C	Neon	0.002	–248	–246	0.0009
D	Xenon	0.000009	–112	–109	0.0059

Match gases, **A**, **B**, **C** and **D**, with the numbers **1–4** in the sentences.

The noble gas with the highest density is . . . **1** . . . .

The most abundant noble gas is . . . **2** . . . .

The noble gas with the smallest temperature range between melting point and boiling point is . . . **3** . . . .

The noble gas with the lowest boiling point is . . . **4** . . . .

4.1.2.4 Group 0

Question 20

November 2010 | CHY1BP | Original Q4 | Legacy

QUESTION FOUR

This question is about four planets, **A**, **B**, **C** and **D**, in the Solar System.

	Planet	Atmosphere	Average surface temperature in °C
A	Venus	97 % carbon dioxide, 3 % nitrogen	460
B	Earth	78 % nitrogen, 21 % oxygen, 1 % noble gases	14
C	Mars	96 % carbon dioxide, 2 % nitrogen, 2 % noble gases	–46
D	Jupiter	87 % hydrogen, 13 % helium	–121

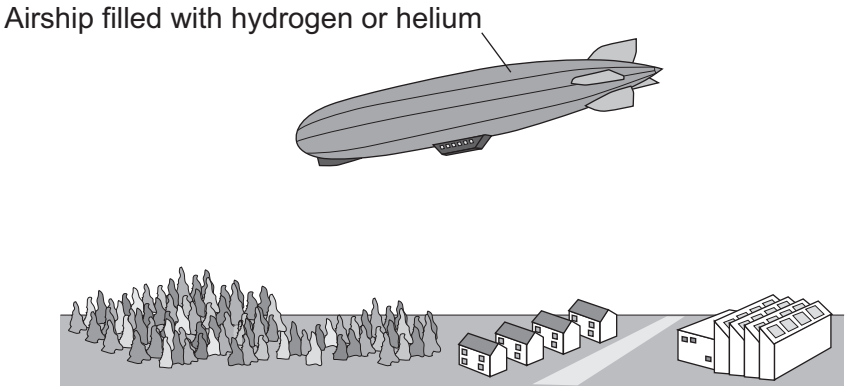
Match planets, **A**, **B**, **C** and **D**, with the numbers **1–4** in the table below.

1	Its atmosphere has the highest percentage of carbon dioxide.
2	It has green plants growing on its surface.
3	It has the lowest surface temperature.
4	Its atmosphere contains nitrogen, but at the lowest percentage.

4.1.2.4 Group 0

Question 21

1 Hydrogen and helium have both been used in airships.



1 (a) Tick (✓) the property which both hydrogen and helium have that makes an airship float in air.

Property	Tick (✓)
Colourless	
Less dense than air	
More dense than air	

(1 mark)

1 (b) (i) Hydrogen is no longer used in airships because it burns in oxygen.

The chemical equation for this reaction is shown.

$$2H_2 \quad + \quad O_2 \quad \rightarrow \quad 2H_2O$$

Complete the word equation for this reaction.

hydrogen + oxygen → .....

(1 mark)

4.1.2.4 Group 0

Question 21 · continued

1 (b) (ii) Helium is safer than hydrogen because it does **not** burn in oxygen.

Draw a ring around the correct answer to complete the sentence.

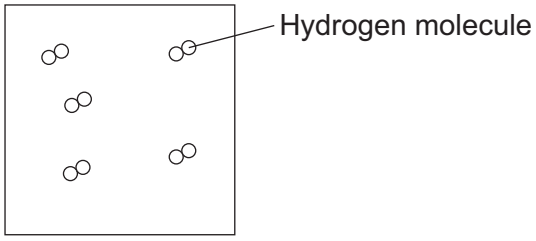
Helium is now used in airships because it is

- a fuel.
- already in the air.
- unreactive.

(1 mark)

1 (c) **Diagram 1** represents hydrogen molecules.

Diagram 1



Draw a ring around the correct answer to complete the sentence.

Each hydrogen molecule is made up of two hydrogen

- atoms.
- compounds.
- elements.

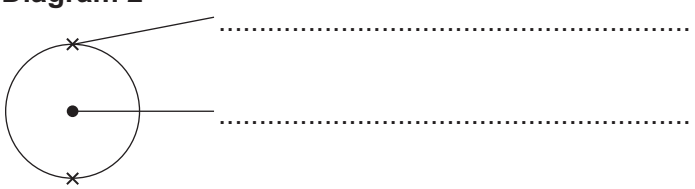
(1 mark)

1 (d) **Diagram 2** shows the parts of a helium atom.

Use words from the box to label **diagram 2**.

bond	**electron**	**nucleus**

Diagram 2



(2 marks)

6

4.1.2.4 Group 0

Question 22

March 2011 | CHY1BP | Original Q1 | Legacy

QUESTION ONE

The Earth's atmosphere is made up of 78 % nitrogen.

The table shows the next four most abundant gases, two of which are noble gases.

	Gas	Percentage (%) in the atmosphere by volume	Boiling point in ºC
A	Oxygen	21.0	–183
B	Argon	0.930	–185
C	Carbon dioxide	0.030	–78
D	Neon	0.005	–246

Match gases, **A**, **B**, **C** and **D**, with the numbers **1–4** in the table below.

1	It is the gas that is a compound.
2	It is the most abundant noble gas.
3	It is the gas with the lowest boiling point.
4	It is the gas needed for fuels to burn.

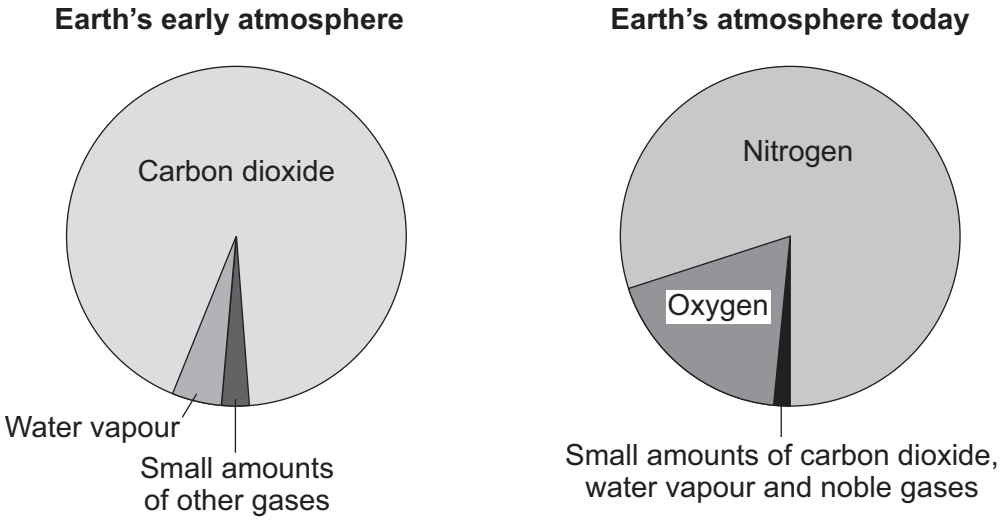
4.1.2.4 Group 0

Question 23

June 2011 | CHY1BP | Original Q8 | Legacy

QUESTION EIGHT

The pie charts show the amounts of gases in the Earth's early atmosphere and in the Earth's atmosphere today.



8A Very small amounts of a hydrocarbon gas are thought to have been in the Earth's early atmosphere.

This gas is . . .

1 ammonia, NH_3

2 helium, He

3 methane, CH_4

4 oxygen, O_2

8B As the Earth's early atmosphere was forming, it contained water vapour.

Which row in the table shows where the water vapour came from **and** why the quantity in the atmosphere reduced?

	Water vapour came from	Water vapour reduced because
1	evaporation from the ground.	it condensed to form the oceans.
2	evaporation from the ground.	there was less rainfall.
3	volcanic activity.	it condensed to form the oceans.
4	volcanic activity.	there was less rainfall.

4.1.2.4 Group 0

Question 23 · continued

8C Why was there no oxygen in the Earth's early atmosphere?

1 There was no carbon dioxide for the plants to use to make oxygen.

2 Living organisms had used up the oxygen.

3 There were no plants on Earth.

4 Oxygen is a very reactive gas.

8D The quantity of carbon dioxide in the Earth's atmosphere today is very different from the quantity that was in the Earth's early atmosphere.

One of the reasons why it is very different is that . . .

1 there are a lot of cars on our roads today.

2 it is locked up as carbon in fossil fuels.

3 most homes use fossil fuels for central heating.

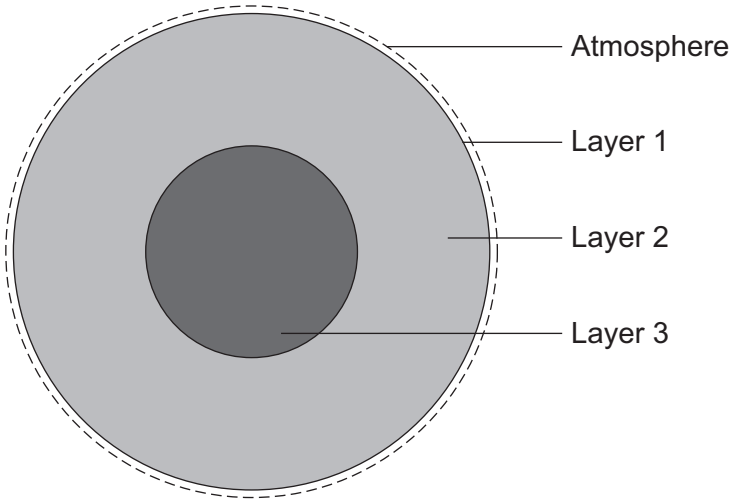
4 plants produce carbon dioxide by photosynthesis.

4.1.2.4 Group 0

Question 24

June 2011 | CHY1F | Original Q1 | Legacy

1 The Earth is made up of several layers.



1 (a) Draw **one** straight line from each layer to its correct name.

Layer 1	core
Layer 2	crust
Layer 3	mantle
	nucleus

(3 marks)

4.1.2.4 Group 0

Question 24 · continued

1 (b) The table shows the main gases in the Earth's atmosphere.

Gas	Percentage (%) in the atmosphere
Nitrogen	78.0
Oxygen	21.0
Argon	
Carbon dioxide	0.03

Use information in the table to help you to complete the sentences.

1 (b) (i) Draw a ring around the correct answer to complete the sentence.

The percentage of argon in the Earth's atmosphere is [0.97 / 9.7 / 97.0] %.

(1 mark)

1 (b) (ii) Complete the sentence.

The gas in the Earth's atmosphere that

is a compound is ..... .

(1 mark)

5

4.1.2.4 Group 0

Question 25

November 2011 | CHY1BP | Original Q5 | Legacy

QUESTION FIVE

The table shows the abundance in the Earth's atmosphere of each of four noble gases.

Noble gas	Abundance (percentage in the atmosphere by volume)
Argon	0.9300
Neon	0.0018
Helium	0.0005
Krypton	0.0001

Match properties, **A**, **B**, **C** and **D**, with the numbers **1–4** in the sentences.

A abundance

B colour

C density

D reactivity

Argon is used in filament lamps because of its low chemical . . . **1** . . . .

Neon is used in electric discharge tubes for advertising signs because it produces a bright . . . **2** . . . .

Helium is used in balloons because it has a low . . . **3** . . . .

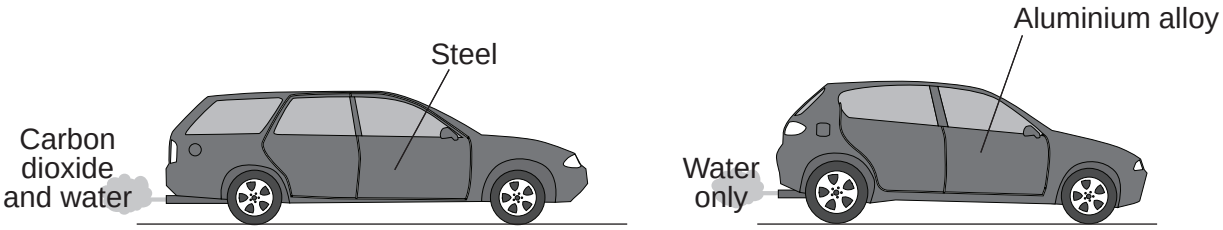
Krypton is the noble gas in the table with the lowest . . . **4** . . . .

4.1.2.4 Group 0

Question 26

June 2012 | CH1FP | Original Q3 | Legacy

3 The picture shows two different cars.



3 (a) Some properties of aluminium are given below.

Tick (✓) **two** reasons why aluminium is better than steel for car bodies.

Reason	Tick (✓)
Aluminium is not a transition metal.	
Aluminium has a low density.	
Aluminium is expensive to extract.	
Aluminium is resistant to corrosion.	

(2 marks)

3 (b) Each car body is made from an *alloy*.

3 (b) (i) What is an *alloy*?

.....

.....

(1 mark)

3 (b) (ii) An alloy is used to make a car body. A pure metal is **not** used to make a car body.

Suggest why.

.....

.....

(1 mark)

4.1.2.4 Group 0

Question 26 · continued

3 (c) The car with a steel body uses petrol for fuel.

Draw a ring around the correct answer to complete each sentence.

3 (c) (i) Petrol is made from

air.

crude oil.

metal ores.

(1 mark)

3 (c) (ii) Petrol is a mixture of

carbonates

hydrocarbons

polymers

including C_8H_{18}

(1 mark)

3 (c) (iii) In the car engine petrol reacts with

argon

nitrogen

oxygen

to produce carbon dioxide and water.

(1 mark)

3 (d) Look at the substances coming out of each car's exhaust.

3 (d) (i) Suggest the name of the fuel used in the car with the aluminium alloy body.

Name of fuel .....

(1 mark)

3 (d) (ii) Why is the fuel burned in the car with the aluminium alloy body better for the environment than petrol?

.....

.....

(1 mark)

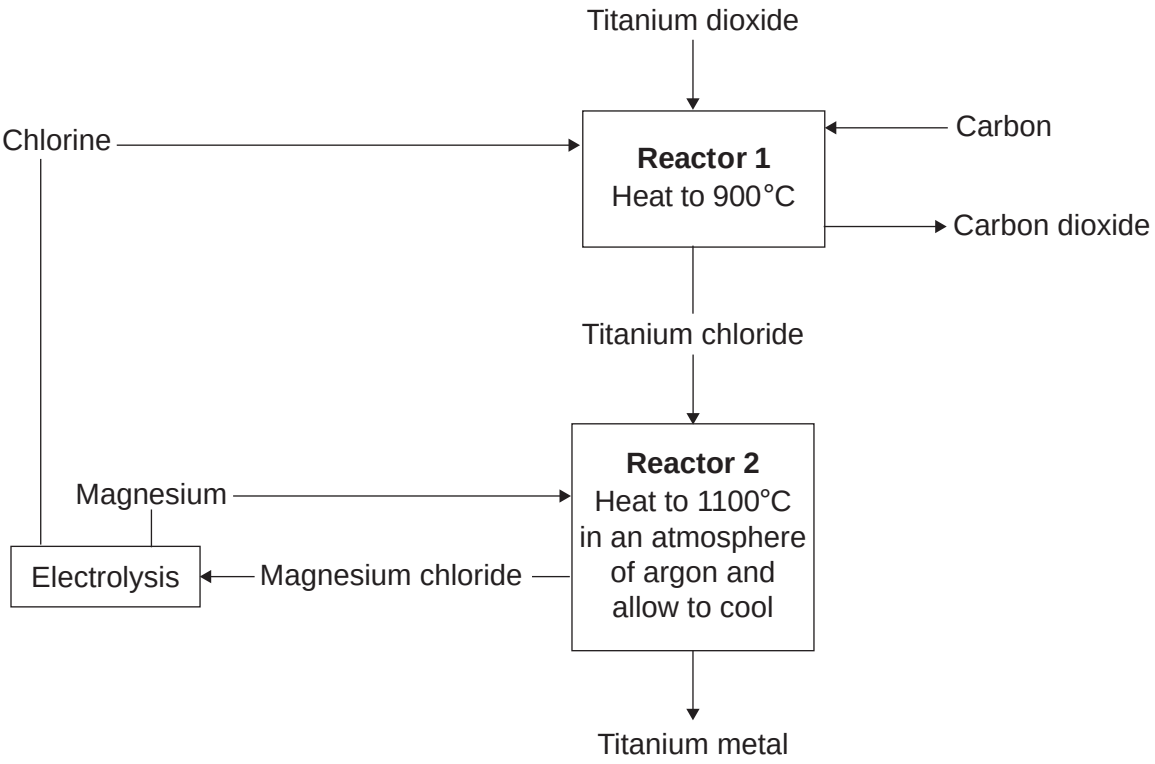
9

4.1.2.4 Group 0

Question 27

June 2012 | CH1FP | Original Q7 | Legacy

7 Rutile is an ore of titanium. Rutile contains titanium dioxide.
The flow chart shows how titanium metal is extracted from titanium dioxide.



7 (a) Titanium is much more expensive than iron.

Give **one** reason why.

.....

.....

(1 mark)

7 (b) Name the only waste product shown on the flow chart.

.....

(1 mark)

4.1.2.4 Group 0

Question 27 · continued

7 (c) Describe the example of recycling shown on the flow chart.

.....

.....

.....

.....

(2 marks)

7 (d) The air is removed from **Reactor 2**. An atmosphere of argon is used for the reaction between titanium chloride and magnesium metal.

Explain why.

.....

.....

.....

.....

(2 marks)

Question 7 continues on the next page

4.1.2.4 Group 0

Question 27 · continued

7 (e) Titanium metal is produced by reacting titanium chloride with magnesium.

950 kg of titanium chloride was mixed with 240 kg of magnesium metal. The mixture was heated and produced 950 kg of magnesium chloride.

Calculate the mass of titanium metal produced.

.....

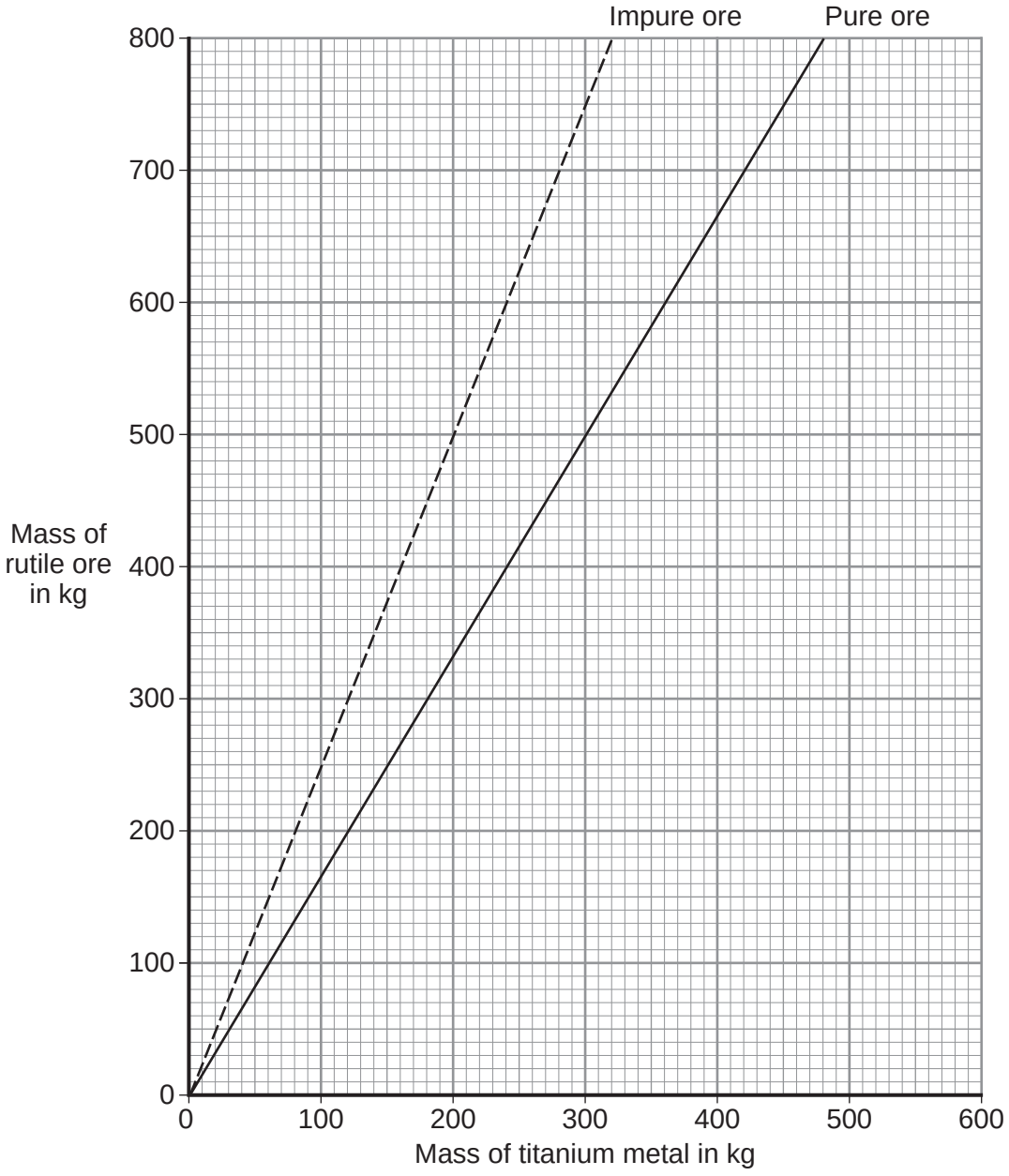
Mass = ... kg

(1 mark)

4.1.2.4 Group 0

Question 27 · continued

7 (f) The graph shows the mass of titanium metal produced from a pure rutile ore and from an impure rutile ore.



The difference between the two lines represents the amount of waste rock in the impure ore.

300 kg of titanium metal was produced from the impure ore.

Calculate the mass of waste rock in the impure ore.

.....

Mass = ... kg

(1 mark)

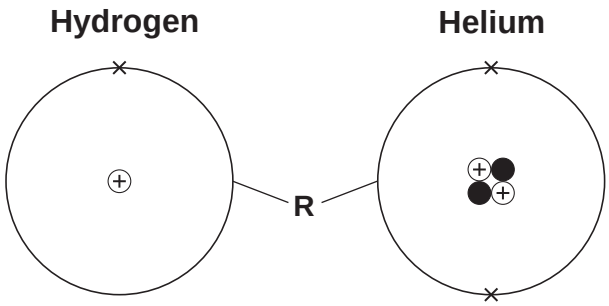
8

4.1.2.4 Group 0

Question 28

January 2013 | CH1FP | Original Q1 | Legacy

1 The Sun is mainly hydrogen and helium.
The diagrams show an atom of hydrogen and an atom of helium.



1 (a) Draw a ring around the correct answer to complete each sentence.

1 (a) (i) The centre of each atom is called the

molecule.

nucleus.

shell.

(1 mark)

1 (a) (ii) The circle (labelled **R**) around the centre of each atom is called

a bond.

an electrical charge.

an energy level (shell).

(1 mark)

4.1.2.4 Group 0

Question 28 · continued

1 (b) Use the diagrams on page 2 to help you to answer these questions.

Draw **one** line from each question to its correct answer.

Question	Answer
How many protons are there in the hydrogen atom?	1
How many electrons are there in the helium atom?	2
What is the mass number of the helium atom?	3
	4

(3 marks)

1 (c) The Sun is 73% hydrogen and 25% helium. The rest is other elements.

What is the percentage of other elements in the Sun? ..... %

(1 mark)

1 (d) One of the other elements in the Sun is neon.
Neon is in the same group of the periodic table as helium.

Use the Chemistry Data Sheet to help you to answer these questions.

1 (d) (i) How many protons are there in a neon atom?

.....

(1 mark)

1 (d) (ii) Which group of the periodic table are helium and neon in?

.....

(1 mark)

8

4.1.2.4 Group 0

Question 29

June 2013 | CH3FP | Original Q3 | Legacy

3 This question is about the periodic table.

Use the Chemistry Data Sheet to help you answer these questions.

3 (a) Complete the sentences.

Elements in the periodic table are arranged in order of atomic ..... .

The elements in Group ..... are called the noble gases.

(2 marks)

3 (b) Calcium (Ca) is in Group 2.

Name **one** other element in Group 2.

.....

(1 mark)

3 (c) Draw a ring around the correct answer to complete each sentence.

3 (c) (i) Sodium (Na) is

an alkali metal.

a non-metal.

a transition metal.

(1 mark)

3 (c) (ii) Nickel (Ni) is

an alkali metal.

a non-metal.

a transition metal.

(1 mark)

3 (d) In 1869 Mendeleev produced his periodic table.

Why did Mendeleev leave gaps in his periodic table?

.....

.....

(1 mark)

6

4.1.2.4 Group 0

Question 30

2 Some theories suggest that the Earth's early atmosphere was the same as Mars' atmosphere today.

Table 1 shows the percentage of four gases in the atmosphere of Mars today and the atmosphere of Earth today.

Table 1

Gases	The atmosphere of	
	Mars today	**Earth today**
Carbon dioxide	95.00%	0.04%
Nitrogen	3.50%	78.00%
Argon	1.00%	0.96%
Oxygen	0.50%	21.00%

2 (a) Which **one** of the gases in **Table 1** is a noble gas?

[1 mark]

.....

2 (b) Draw a ring around the correct answer to complete each sentence.

2 (b) (i) Noble gases are in Group

0

1

7

[1 mark]

2 (b) (ii) Noble gases are

slightly reactive.

unreactive.

very reactive.

[1 mark]

4.1.2.4 Group 0

Question 30 · continued

2 (c) The percentage of carbon dioxide in the Earth's early atmosphere was 95.00%.
It is 0.04% in the Earth's atmosphere today.

2 (c) (i) Calculate the decrease in the percentage of carbon dioxide in the Earth's atmosphere.

[1 mark]

.....

.....

Decrease in percentage = ...%

2 (c) (ii) Give **two** reasons for this decrease.

[2 marks]

.....

.....

.....

.....

6

4.1.2.4 Group 0

Question 31

June 2014 | CH3FP | Original Q1 | Legacy

1 This question is about the periodic table of elements.

Use the Chemistry Data Sheet to help you to answer these questions.

In 1869 Dmitri Mendeleev produced an early version of the periodic table.

1 (a) Draw a ring around the correct answer to complete each sentence.

1 (a) (i) Mendeleev first arranged the elements in order of their

atomic weight.

date of discovery.

electron number.

[1 mark]

1 (a) (ii) Mendeleev then placed elements with similar properties in columns called

groups.

periods.

shells.

[1 mark]

1 (a) (iii) When the next element did not fit the pattern,

Mendeleev

ignored the element.

left a gap.

put the element at the end of the row.

[1 mark]

1 (a) (iv) Mendeleev was not able to include the noble gases (Group 0) in his periodic table

because the noble gases

are not elements.

are not reactive.

had not been discovered by 1869.

[1 mark]

4.1.2.4 Group 0

Question 31 · continued

1 (b) Use the correct word from the box to complete each sentence.

[2 marks]

electrons	molecules	neutrons	protons

In the modern periodic table elements are arranged in order of the number of ..... in their nucleus. Elements in the same group have the same number of ..... in their highest energy level (outer shell).

1 (c) Sodium (Na) is in Group 1 of the periodic table.

Nickel (Ni) is a transition element.

Tick (✓) **two** correct statements about sodium and nickel.

[2 marks]

Statement	Tick (✓)
Sodium and nickel are both metals.	
Sodium has a higher melting point than nickel.	
Sodium is more reactive than nickel.	
Sodium is harder than nickel.	

1 (d) Chlorine, bromine and iodine are in Group 7 of the periodic table.

Chlorine is more reactive than bromine.

1 (d) (i) Complete the word equation for the reaction between chlorine and sodium bromide.

[1 mark]

chlorine + sodium bromide ⟶ ..... + sodium chloride

1 (d) (ii) Why does iodine **not** react with sodium bromide solution?

[1 mark]

.....

.....

10

4.1.2.4 Group 0

Question 32

1 This question is about carbon and gases in the air.

1 (a) Carbon atoms have protons, neutrons and electrons.

Complete **Table 1** by writing the relative mass of a neutron and an electron.

[2 marks]

Table 1

Name of particle	Relative mass
proton	1
neutron	
electron	

1 (b) What is the total number of protons and neutrons in an atom called?

[1 mark]

Tick (✓) **one** box.

The atomic number ☐

The mass number ☐

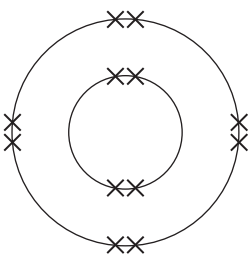
One mole of the atom ☐

1 (c) An atom of carbon has six electrons.

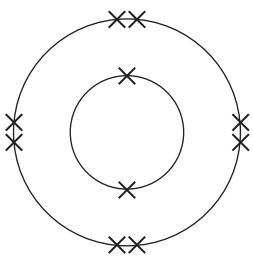
Which structure, **A**, **B** or **C**, represents the electronic structure of the carbon atom?

[1 mark]

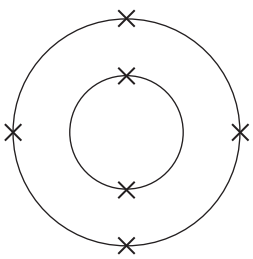
Structure A



Structure B



Structure C



The carbon atom is structure ☐.

4.1.2.4 Group 0

Question 32 · continued

1 (d) Carbon reacts with oxygen to produce carbon dioxide (CO_2).

1 (d) (i) How many different elements are in one molecule of carbon dioxide?

[1 mark]

.....

1 (d) (ii) What is the total number of atoms in one molecule of carbon dioxide?

[1 mark]

.....

1 (e) Sometimes carbon reacts with oxygen to produce carbon monoxide (CO).

1 (e) (i) Calculate the relative formula mass (M_r) of carbon monoxide.

Relative atomic masses (A_r): C = 12; O = 16

[1 mark]

.....

.....

M_r of carbon monoxide = ...

1 (e) (ii) Calculate the percentage by mass of carbon in carbon monoxide.

[1 mark]

.....

.....

Percentage by mass of carbon in carbon monoxide = ...%

Question 1 continues on the next page

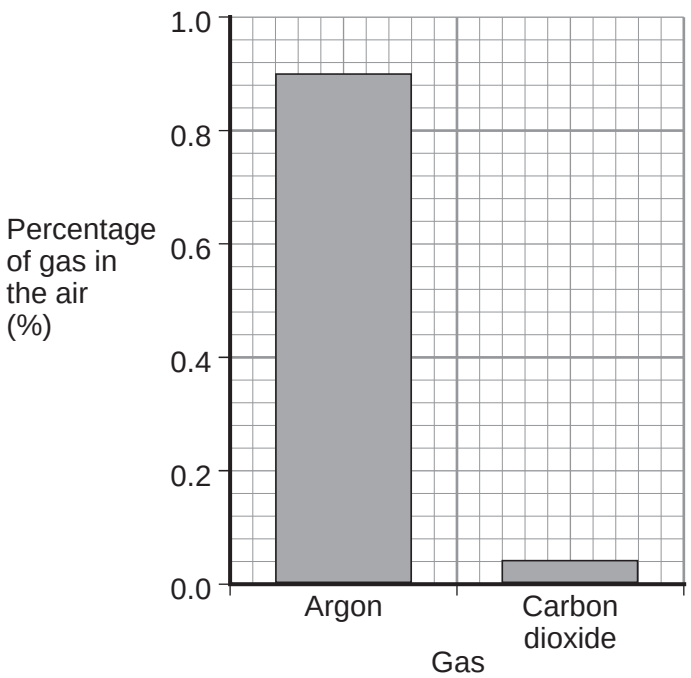
4.1.2.4 Group 0

Question 32 · continued

1 (f) Carbon dioxide is one of the gases in the air.

1 (f) (i) **Figure 1** shows the percentage of argon and the percentage of carbon dioxide in the air.

Figure 1



What is the percentage of argon in the air?

[1 mark]

Percentage of argon = ... %

1 (f) (ii) An instrumental method is used to measure the amount of carbon dioxide in the air.

Give **one** reason for using an instrumental method.

[1 mark]

.....

.....

10

4.1.2.4 Group 0

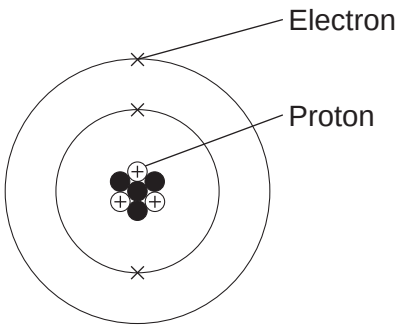
Question 33

June 2016 | CH1FP | Original Q1 | Legacy

1 There are eight elements in the second row (lithium to neon) of the periodic table.

1 (a) **Figure 1** shows a lithium atom.

Figure 1



1 (a) (i) What is the mass number of the lithium atom in **Figure 1**?

[1 mark]

Tick (✓) **one** box.

3 ☐

4 ☐

7 ☐

1 (a) (ii) What is the charge of an electron?

[1 mark]

Tick (✓) **one** box.

–1 ☐

0 ☐

+1 ☐

4.1.2.4 Group 0

Question 33 · continued

1 (a) (iii) Protons are in the nucleus.

Which other sub-atomic particles are in the nucleus?

[1 mark]

Tick (✓) **one** box.

ions ☐

molecules ☐

neutrons ☐

1 (b) What is **always** different for atoms of different elements?

[1 mark]

Tick (✓) **one** box.

number of neutrons ☐

number of protons ☐

number of shells ☐

Question 1 continues on the next page

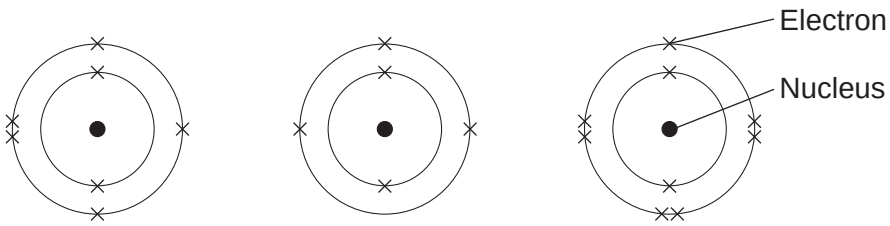
4.1.2.4 Group 0

Question 33 · continued

1 (c) **Figure 2** shows the electron arrangements of three different atoms, **X**, **Y** and **Z**.

These atoms are from elements in the second row (lithium to neon) of the periodic table.

Figure 2



Atom X **Atom Y** **Atom Z**

Which atom is from an element in Group 3 of the periodic table?

[1 mark]

Tick (✓) **one** box.

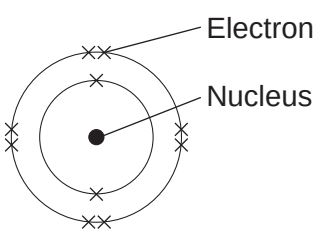
Atom X ☐

Atom Y ☐

Atom Z ☐

1 (d) **Figure 3** shows the electron arrangement of a different atom from an element in the second row of the periodic table.

Figure 3



1 (d) (i) Give the chemical symbol of this element.

[1 mark]

_____

1 (d) (ii) Why is this element unreactive?

[1 mark]

_____

_____

7

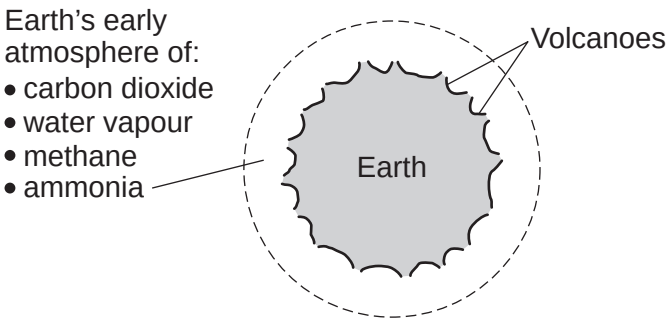
4.1.2.4 Group 0

Question 34

2 This question is about the Earth and its atmosphere.

2 (a) **Figure 4** shows the Earth and its atmosphere billions of years ago.

Figure 4



2 (a) (i) The boiling point of water is 100 °C.

Suggest **one** reason why there was no liquid water on the Earth's surface billions of years ago.

[1 mark]

_____

_____

2 (a) (ii) Complete the sentence.

[1 mark]

On the Earth today, volcanic eruptions happen at the boundaries between

tectonic _____ .

Question 2 continues on the next page

4.1.2.4 Group 0

Question 34 · continued

2 (b) The Earth's atmosphere today contains nitrogen, oxygen, argon, carbon dioxide and other gases.

2 (b) (i) Draw **one** line from each substance to a description of the substance.

[3 marks]

Substance	Description of the substance
air	compound
carbon dioxide	element
argon	hydrocarbon
	metal
	mixture

2 (b) (ii) Which gas in the Earth's atmosphere is used when hydrocarbons burn?

[1 mark]

Tick (✓) **one** box.

- carbon dioxide ☐
- nitrogen ☐
- oxygen ☐

2 (b) (iii) What percentage of the Earth's atmosphere is nitrogen?

[1 mark]

Tick (✓) **one** box.

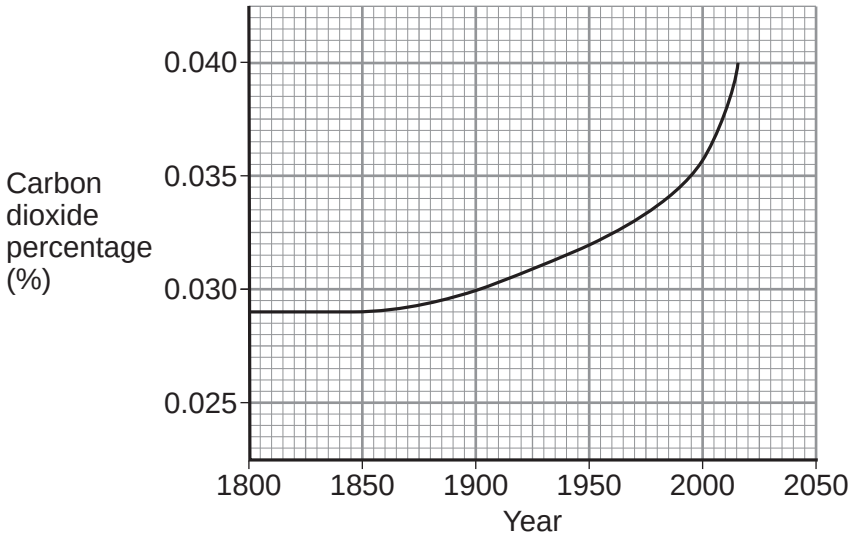
- about 40% ☐
- about 60% ☐
- about 80% ☐

4.1.2.4 Group 0

Question 34 · continued

2 (c) **Figure 5** shows the carbon dioxide percentage (%) in the Earth's atmosphere since the year 1800.

Figure 5



2 (c) (i) What was the carbon dioxide percentage in 1900?

[1 mark]

_____ %

2 (c) (ii) Describe, in detail, how the carbon dioxide percentage changed from 1900 to 2015.

[2 marks]

_____

_____

_____

_____

2 (c) (iii) Suggest **two** reasons for the change in the carbon dioxide percentage from 1900 to 2015.

[2 marks]

1 _____

_____

2 _____

_____

12

4.1.2.4 Group 0

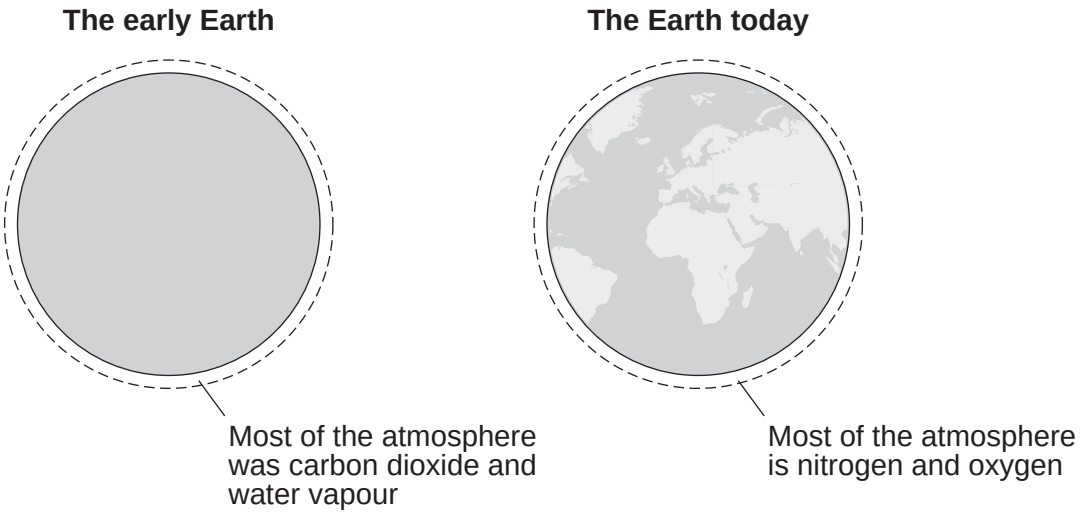
Question 35

June 2017 | CH1FP | Original Q1 | Legacy

1 This question is about gases in the Earth's atmosphere.

Figure 1 shows the atmospheres of the early Earth and of the Earth today.

Figure 1



1 (a) (i) Use the correct answers from the box to complete the sentence.

[2 marks]

dissolved	**evaporated**
locked up	**released**

The amount of carbon dioxide in the early Earth's atmosphere decreased because

carbon dioxide was _____ in the oceans

and gradually became _____ in sedimentary rocks as carbonates.

1 (a) (ii) Plants and algae used carbon dioxide and water vapour in the early Earth's atmosphere to produce oxygen.

Give the name of this process.

[1 mark]

_____

4.1.2.4 Group 0

Question 35 · continued

1 (b) The Earth's atmosphere today contains about 0.04% carbon dioxide.

1 (b) (i) Draw **one** line from each gas to the approximate percentage of gas in the Earth's atmosphere today.

[3 marks]

Gas	Approximate percentage of gas in the Earth's atmosphere today
	1
Argon	10
	20
Nitrogen	
	50
Oxygen	80
	90

1 (b) (ii) Give **one** reason why the amount of carbon dioxide in the Earth's atmosphere has increased in the last 50 years.

[1 mark]

_____

_____

7

4.1.2.4 Group 0

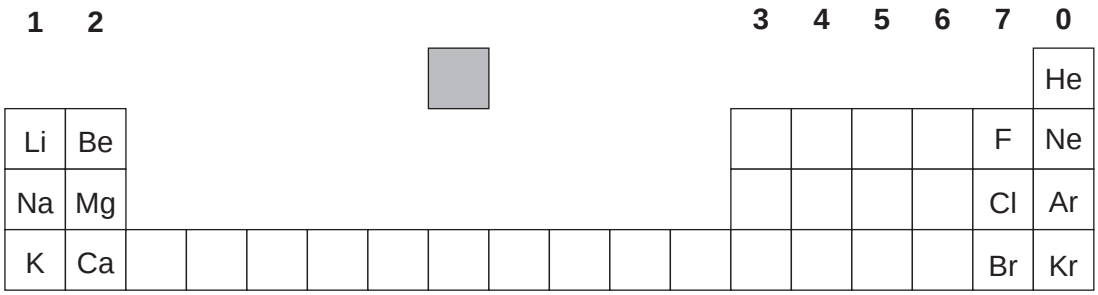
Question 36

June 2017 | CH1FP | Original Q2 | Legacy

2 Use the Chemistry Data Sheet to help you answer this question.

Figure 2 shows part of the periodic table.

Figure 2



2 (a) Give the name of the element that should be in the shaded box.

[1 mark]

2 (b) How many different elements are there in the complete periodic table?

[1 mark]

Tick (✓) **one** box.

About 36 ☐

About 100 ☐

About 500 ☐

4.1.2.4 Group 0

Question 36 · continued

2 (c) What are **two** reasons why lithium, sodium and potassium are in the same group of the periodic table?

[2 marks]

Tick (✓) **two** boxes.

- Low melting points ☐
- Same number of electrons in the outer shell ☐
- Similar atomic (proton) numbers ☐
- Similar chemical reactions ☐
- Two electrons in the innermost shell ☐

2 (d) Complete each sentence.

[2 marks]

The elements in Group 0 are called _____ gases.

The elements in the central block are known as _____ metals.

2 (e) Use the correct word from the box to complete each sentence.

[2 marks]

alloys	ions	molecules	polymers	protons

Atoms of fluorine gain electrons to form fluoride _____ .

Atoms of fluorine share electrons to form fluorine _____ .

8

4.1.2.4 Group 0

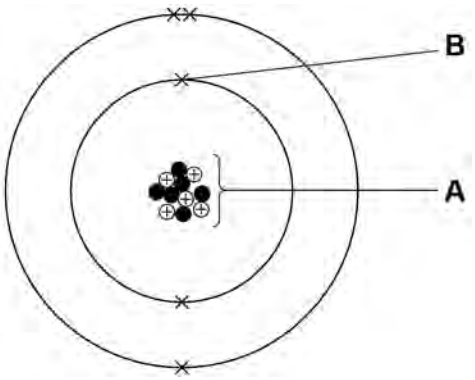
Question 37

June 2019 | 8462/1F | Original Q1

0 1 This question is about atomic structure.

Figure 1 represents an atom of element **Z**.

Figure 1



0 1 . 1 Name the parts of the atom labelled **A** and **B**.

Choose answers from the box.

[2 marks]

electron	**neutron**	**nucleus**	**proton**

A _____

B _____

4.1.2.4 Group 0

Question 37 · continued

0 1 . 2 Which particle has the lowest mass?

Choose the answer from the box.

[1 mark]

electron	**neutron**	**nucleus**	**proton**

0 1 . 3 Which group of the periodic table contains element **Z**?

Use **Figure 1**.

[1 mark]

Group _____

0 1 . 4 Give the atomic number and the mass number of element **Z**.

Use **Figure 1**.

Choose answers from the box.

[2 marks]

1	**5**	**6**	**11**	**16**

Atomic number _____

Mass number _____

Question 1 continues on the next page

4.1.2.4 Group 0

Question 37 · continued

Bromine has two different types of atom.

The atoms have a different number of neutrons but the same number of protons.

0 1 . 5 What is the name for this type of atom?

[1 mark]

Tick (✓) **one** box.

Compound ☐

Ion ☐

Isotope ☐

Molecule ☐

0 1 . 6 The different types of bromine atom can be represented as $^{79}_{35}Br$ and $^{81}_{35}Br$

The relative atomic mass (A_r) of bromine is 80

Which statement is true about the number of each type of atom in bromine?

[1 mark]

Tick (✓) **one** box.

There are fewer $^{79}_{35}Br$ atoms than $^{81}_{35}Br$ atoms. ☐

There are more $^{79}_{35}Br$ atoms than $^{81}_{35}Br$ atoms. ☐

There are the same number of $^{79}_{35}Br$ atoms and $^{81}_{35}Br$ atoms. ☐

8

4.1.2.4 Group 0

Question 38

0 4 Titan is a moon of the planet Saturn.

Table 2 shows the percentages of some gases in the atmosphere of Titan and in the atmosphere of the Earth.

Table 2

Gas	Percentage of gas in atmosphere (%)	
	Titan	Earth
Nitrogen	98	78
Oxygen	Zero	21
Methane	1.4	0.0002
Argon	0.14	0.9
Carbon dioxide	0.0001	0.04

0 4 . 1 Which **two** gases are present in smaller percentages on the Earth than on Titan?

[1 mark]

_____ and _____

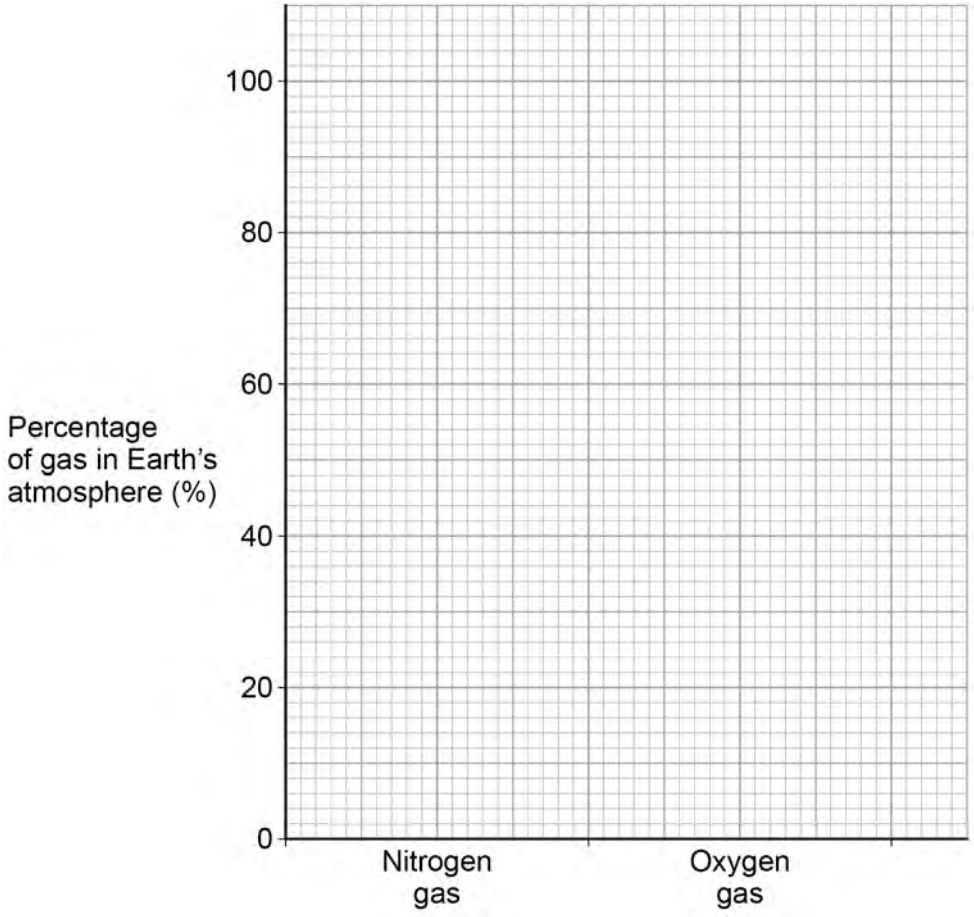
4.1.2.4 Group 0

Question 38 · continued

0 4 . 2 Complete the bar chart in **Figure 2** to show the percentages of nitrogen gas and oxygen gas in the Earth's atmosphere.

[2 marks]

Figure 2



0 4 . 3 Why are algae less likely to photosynthesise on Titan than Earth?

Use **Table 2**.

[1 mark]

Tick (✓) **one** box.

Titan's atmosphere contains too little argon. ☐

Titan's atmosphere contains too little carbon dioxide. ☐

Titan's atmosphere contains too little methane. ☐

Titan's atmosphere contains too little nitrogen. ☐

4.1.2.4 Group 0

Question 38 · continued

0 4 . 4 Titan is warmer than the other moons of Saturn because of the greenhouse effect.

How do greenhouse gases trap energy from the sun?

[1 mark]

Tick (✓) **one** box.

All wavelengths of radiation are reflected back to the surface of Titan. ☐

Long wavelength radiation is reflected back to the surface of Titan. ☐

Short wavelength radiation is reflected back to the surface of Titan. ☐

As well as methane, the atmosphere of Titan contains small amounts of propene gas. Methane is an alkane and propene is an alkene.

0 4 . 5 Bromine water is an orange solution used to identify alkenes.

Draw **one** line from each gas to its effect on bromine water.

[2 marks]

Gas	Effect on bromine water
	Forms a blue solution
Methane	Forms a colourless solution
	Forms a green solution
Propene	Forms a white precipitate
	No effect

4.1.2.4 Group 0

Question 38 · continued

0 4 . 6 Propene reacts with water (steam) to make propanol.

The ratio of the masses of propene and water that react is:

propene : water

7 : 3

Calculate the mass of propene that reacts with 21 g water.

[2 marks]

Mass = _____ g

9

Turn over for the next question

4.1.2.4 Group 0

Question 39

November 2021 | 8462/1F | Original Q1

0 1 This question is about elements, compounds and mixtures.

0 1 . 1 Substance **A** contains only one type of atom.

Substance **A** does **not** conduct electricity.

Which type of substance is **A**?

[1 mark]

Tick (✓) **one** box.

- Compound ☐
- Metallic element ☐
- Mixture ☐
- Non-metallic element ☐

0 1 . 2 Substance **B** contains two types of atoms.

The atoms are chemically combined together in fixed proportions.

Which type of substance is **B**?

[1 mark]

Tick (✓) **one** box.

- Compound ☐
- Metallic element ☐
- Mixture ☐
- Non-metallic element ☐

4.1.2.4 Group 0

Question 39 · continued

0 1 . 3 What is the name of the elements in Group 0 of the periodic table?

[1 mark]

Tick (✓) **one** box.

- Alkali metals ☐
- Halogens ☐
- Noble gases ☐
- Transition metals ☐

0 1 . 4 Which statement about the elements in Group 0 is correct?

[1 mark]

Tick (✓) **one** box.

- All elements in the group are very reactive. ☐
- All elements in the group form negative ions. ☐
- The boiling points increase down the group. ☐
- The relative atomic masses (A_r) decrease down the group. ☐

4.1.2.4 Group 0

Question 39 · continued

0 1 . 5 Neon is in Group 0.

What type of particles are in a sample of neon?

[1 mark]

Tick (✓) **one** box.

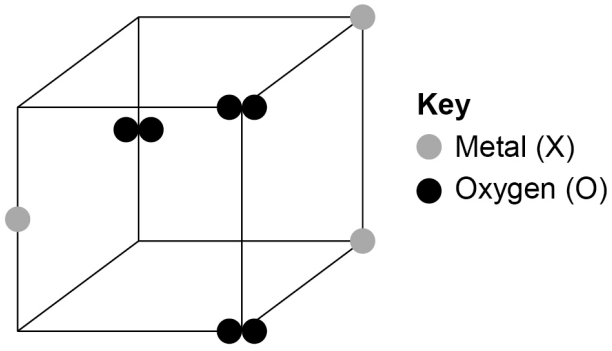
Atoms ☐

Ions ☐

Molecules ☐

0 1 . 6 **Figure 1** represents part of the structure of an oxide of a metal.

Figure 1



Determine the empirical formula of this oxide.

[1 mark]

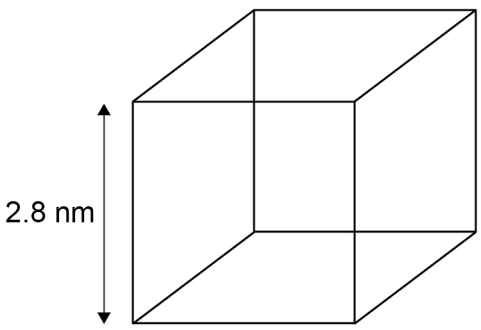
Empirical formula = XO

Question 39 · continued

A nanoparticle of a metallic element is a cube.

Figure 2 shows a diagram of the nanoparticle.

Figure 2



0 1 . 7 The surface area of a cube is given by the equation:

surface area = (length of side)^2 × 6

Calculate the surface area of the cube in **Figure 2**.

Give your answer to 2 significant figures.

[3 marks]

Surface area (2 significant figures) = _____ nm^2

4.1.2.4 Group 0

Question 39 · continued

0 1 . 8 Fine and coarse particles of the metallic element are also cubes.

The length of a fine particle cube is 10 times smaller than the length of a coarse particle cube.

How does the surface area to volume ratio of the fine particle cube compare with that of the coarse particle cube?

[1 mark]

Tick (✓) **one** box.

Both surface area to volume ratios are the same. ☐

The surface area to volume ratio of the fine particle is 10 times greater. ☐

The surface area to volume ratio of the fine particle is 10 times smaller. ☐

10

Turn over for the next question

4.1.2.4 Group 0

Question 40

June 2024 | 8462/1F | Original Q9

0 9 This question is about the periodic table.

Sodium and potassium are in Group 1 of the periodic table.

0 9 . 1 Give **one** similarity and **one** difference between the electronic structures of sodium and potassium.

[2 marks]

Similarity _____

_____

Difference _____

_____

Group 1 elements react with water.

0 9 . 2 Give **two** observations made when potassium reacts with water.

[2 marks]

1 _____

_____

2 _____

_____

0 9 . 3 Potassium hydroxide solution is produced when potassium reacts with water.

What is the colour of universal indicator when added to potassium hydroxide solution?

Give **one** reason for your answer.

[2 marks]

Colour of universal indicator _____

Reason _____

_____

4.1.2.4 Group 0

Question 40 · continued

Table 4 shows the densities of some of the elements in Group 0 of the periodic table.

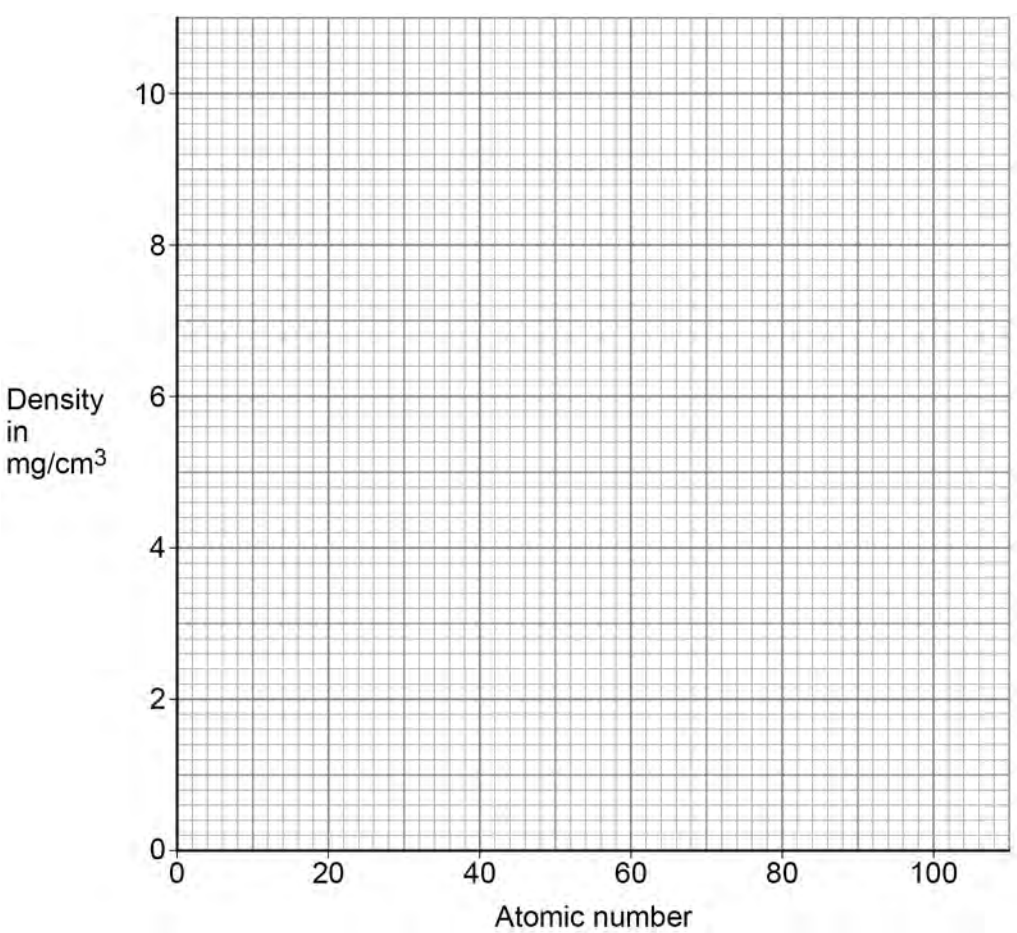
Table 4

Element	Atomic number	Density in mg/cm^3
Helium	2	0.2
Neon	10	0.8
Argon	18	1.6
Krypton	36	**X**
Xenon	54	5.4
Radon	86	9.1

0 9 . 4 Plot the data from **Table 4** on **Figure 15**.

[2 marks]

Figure 15



4.1.2.4 Group 0

Question 40 · continued

0 9 . 5 Estimate the density (**X**) of krypton.

Use **Figure 15** and **Table 4**.

[1 mark]

Density = _____ mg/cm^3

0 9 . 6 The elements in Group 7 are called the halogens.

A more reactive halogen can displace a less reactive halogen from a solution of its salt.

Which combination of solutions will produce a reaction when mixed?

[1 mark]

Tick (✓) **one** box.

- Chlorine and potassium fluoride ☐
- Chlorine and potassium bromide ☐
- Bromine and potassium fluoride ☐
- Bromine and potassium chloride ☐

0 9 . 7 Which of the following describes the trends going down Group 7?

[1 mark]

Tick (✓) **one** box.

- Relative molecular mass decreases and boiling point decreases. ☐
- Relative molecular mass decreases and boiling point increases. ☐
- Relative molecular mass increases and boiling point decreases. ☐
- Relative molecular mass increases and boiling point increases. ☐

11

4.1.2.4 Group 0

Question 41

June 2025 | 8462/1F | Original Q8

0 8 This question is about elements in the periodic table.

0 8 . 1 Describe where the non-metallic elements are found in the periodic table.

[1 mark]

0 8 . 2 Gallium (Ga) is a metallic element in Group 3.

Which of these properties of gallium is **not** typical of most metals?

[1 mark]

Tick (✓) **one** box.

- A boiling point above 1000 °C ☐
- A melting point below 100 °C ☐
- Conducts electricity when solid ☐
- Forms positive ions ☐

4.1.2.4 Group 0

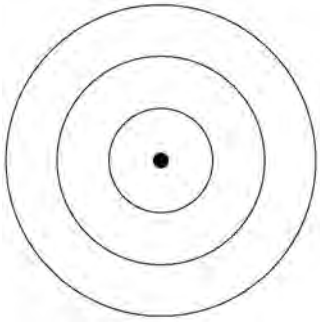
Question 41 · continued

0 8 . 3 A sodium atom can be represented as $^{23}_{11}Na$

Complete **Figure 12** to show the electronic structure of a sodium atom.

[1 mark]

Figure 12



0 8 . 4 Mendeleev created an early periodic table.

Mendeleev placed most of the elements in order of atomic weight.

Tellurium and iodine were not placed in order of atomic weight.

Why did Mendeleev **not** place tellurium and iodine in order of atomic weight?

[1 mark]

0 8 . 5 Argon is an element in Group 0 of the periodic table.

Explain why argon is unreactive.

[2 marks]

4.1.2.4 Group 0

Question 41 · continued

An element **X** consists of two isotopes.

0 8 . 6 What is meant by 'isotopes'?

Answer in terms of subatomic particles.

[2 marks]

0 8 . 7 **Table 5** shows the mass numbers and percentage abundances of the isotopes of **X**.

Table 5

Mass number	Percentage abundance (%)
113	4
115	96

Which is the closest estimate to the relative atomic mass of **X**?

[1 mark]

Tick (✓) **one** box.

~113 ☐ ~114 ☐ ~115 ☐

9