AQA GCSE Chemistry | 8462

SPECIFICATION POINT 4.1.1.5

Size and mass of atoms

Past-paper questions

Tier	**Foundation**
Question groups	**32**
Available paper years	**2008–2025**

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.

4.1.1.5 Size and mass of atoms

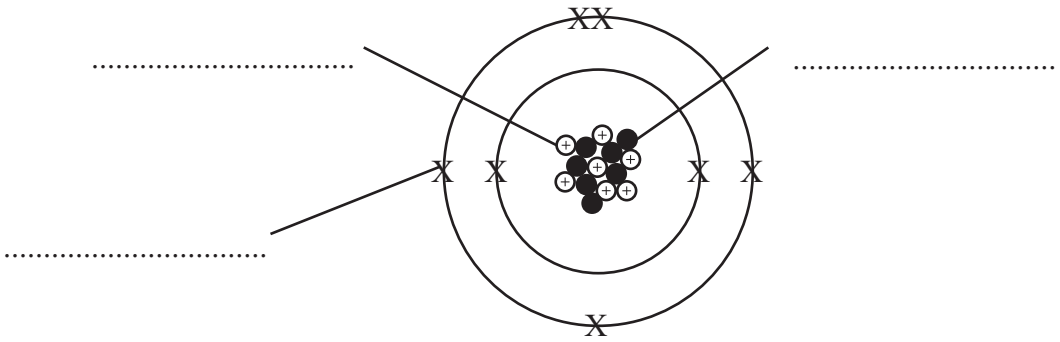
Question 01

June 2008 | CHY2F | Original Q5 | Legacy

5 (a) The diagram represents an atom of nitrogen.

5 (a) (i) Use words from the box to label the diagram.

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



(2 marks)

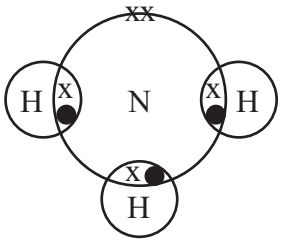
5 (a) (ii) Draw a ring around the mass number of this atom.

5 **7** **14** **21**

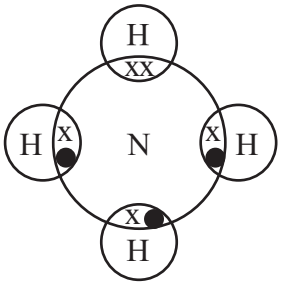
(1 mark)

5 (b) Nitrogen can react with hydrogen to make ammonia, NH_3.

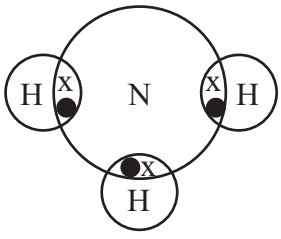
A



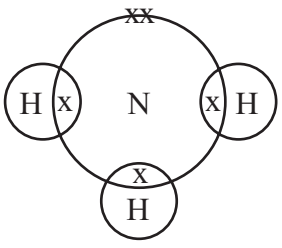
B



C



D



Which diagram, **A**, **B**, **C** or **D**, best represents an ammonia molecule?

(1 mark)

4.1.1.5 Size and mass of atoms

Question 01 · continued

for mark

5 (c) Ammonia is made using the Haber process. The word equation for this reaction is shown below.

nitrogen + hydrogen $\rightleftharpoons$ ammonia

5 (c) (i) Which **two** of the statements in the table do you know are true **only** by looking at the word equation?

Put a tick (✓) next to these **two** true statements.

Statement	(✓)
The reaction is very fast.	
Ammonia can break up to form nitrogen and hydrogen.	
Ammonia is made from nitrogen and hydrogen.	
The reaction that makes ammonia is endothermic.	

(2 marks)

5 (c) (ii) Draw a ring around the name of the raw material from which nitrogen is obtained.

air **methane** **oil** **water**

(1 mark)

5 (d) Some of the ammonia produced is neutralised by nitric acid to make a salt. This salt is used as a fertiliser.

Put a tick (✓) next to the name of the salt produced when ammonia is neutralised with nitric acid.

Name of salt	(✓)
ammonia nitrate	
ammonia nitride	
ammonium nitrate	
ammonium nitride	

(1 mark)

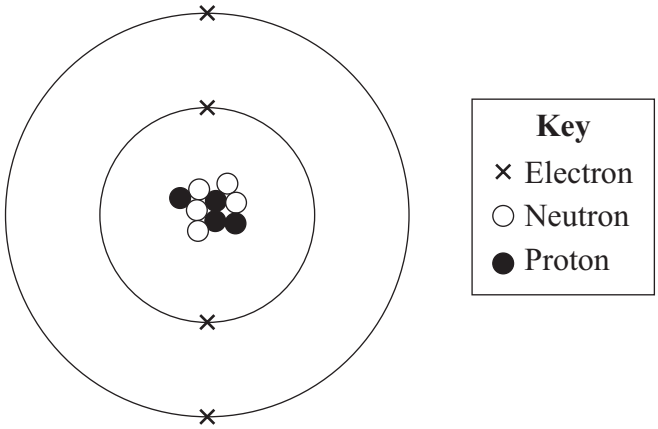
8

4.1.1.5 Size and mass of atoms

Question 02

June 2009 | CHY2F | Original Q1 | Legacy

1 The diagram represents an atom of beryllium.



Use a number from the box to complete each sentence.

4	7	9	12

1 (a) The atomic number (proton number) of this atom is ☐ .

(1 mark)

1 (b) The mass number of this atom is ☐ .

(1 mark)

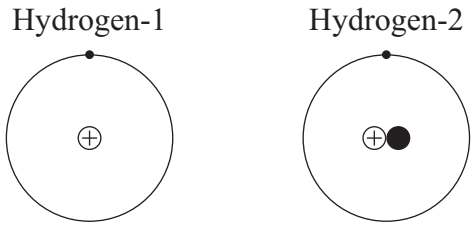
2

4.1.1.5 Size and mass of atoms

Question 03

3 Two isotopes of hydrogen are hydrogen-1 ($^{1}_{1}H$) and hydrogen-2 ($^{2}_{1}H$).

The diagrams represent atoms of hydrogen-1 and hydrogen-2.



3 (a) Use the correct words from the box to complete the sentences.

electrons	**neutrons**	**protons**

3 (a) (i) The positive particles , ⊕ , in the nucleus of atoms are called

..... .

(1 mark)

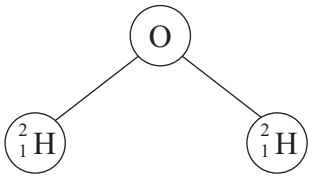
3 (a) (ii) The particles with no charge, ● , in the nucleus of atoms are called

..... .

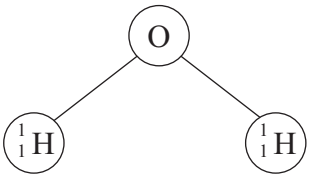
(1 mark)

3 (b) The diagrams show two different types of water molecule.

Molecule A



Molecule B



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

Molecule **A** is [heavier than / lighter than / the same mass as] molecule **B**.

Explain your answer.

.....

.....

(2 marks)

4

4.1.1.5 Size and mass of atoms

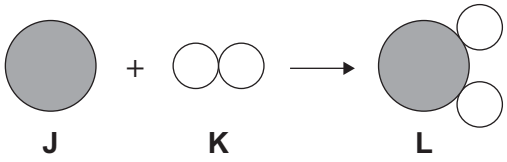
Question 04

June 2010 | CHY1AP | Original Q9 | Legacy

QUESTION NINE

The diagram represents the reaction between substance **J** and substance **K** to create a new substance, **L**.

In the diagram, each circle represents an atom.



9A Which substance or substances are elements?

1 **J** only

2 both **K** and **L**

3 both **J** and **K**

4 **L** only

9B Substance **L** . . .

1 is an impure substance.

2 is a mixture.

3 will have the same chemical properties as substances **J** and **K**.

4 is a compound of **J** and **K**.

9C When substance **L** is formed from substances **J** and **K** . . .

1 there is an overall increase in mass.

2 there is an overall decrease in mass.

3 there is no overall change in mass.

4 the total number of atoms changes.

9D A molecule of substance **K** will . . .

1 have two separate nuclei.

2 share a nucleus.

3 not have any chemical bonds.

4 not contain any electrons.

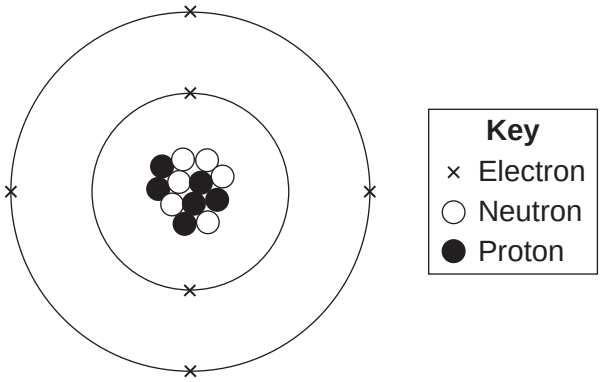
END OF TEST

4.1.1.5 Size and mass of atoms

Question 05

June 2010 | CHY2F | Original Q2 | Legacy

2 The diagram represents a carbon atom.



2 (a) Use words from the box to answer the questions.

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

2 (a) (i) What is the name of the central part of the atom?

.....

(1 mark)

2 (a) (ii) What is the name of the particle with no charge?

.....

(1 mark)

2 (a) (iii) What is the name of the particle with a negative charge?

.....

(1 mark)

2 (b) Use the diagram above to help you to answer these questions.

2 (b) (i) Draw a ring around the atomic (proton) number of this carbon atom.

6 **12** **18**

(1 mark)

2 (b) (ii) Draw a ring around the mass number of this carbon atom.

6 **12** **18**

(1 mark)

4.1.1.5 Size and mass of atoms

Question 05 · continued

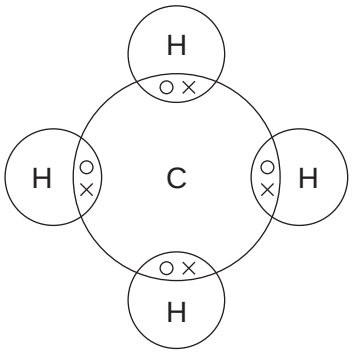
2 (c) A different carbon atom has 6 protons and 8 neutrons.

Draw a ring around the symbol that represents this atom.

$^{8}_{6}C$ $^{14}_{6}C$ $^{14}_{8}C$

(1 mark)

2 (d) The diagram shows the bonding in a methane molecule.



2 (d) (i) Draw a ring around the chemical formula of a methane molecule.

CH_4 **CH^4** **C_4H**

(1 mark)

2 (d) (ii) Draw a ring around the word that describes methane.

compound **element** **mixture**

(1 mark)

2 (d) (iii) Draw a ring around the type of bonding in a methane molecule.

covalent **ionic** **metallic**

(1 mark)

9

4.1.1.5 Size and mass of atoms

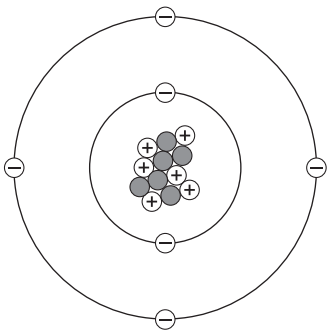
Question 06

January 2012 | CH1FP | Original Q1 | Legacy

1 The picture shows a diamond ring.



1 (a) Diamond is a form of carbon. The diagram represents a carbon atom.



Complete the table to show the name and charge of each type of particle in the carbon atom.

Name of particle	Charge
proton	
neutron	0
	–1

(2 marks)

4.1.1.5 Size and mass of atoms

Question 06 · continued

1 (b) Use the Chemistry Data Sheet to help you to answer these questions.

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

Gold and carbon are

- compounds.
- elements.
- mixtures.

(1 mark)

1 (b) (ii) Complete the sentence.

Gold and carbon have different properties because gold is a metal and carbon is a ..... .

(1 mark)

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

Pure gold is not used to make the ring because pure gold is too

- hard.
- reactive.
- soft.

The gold ring is made by mixing pure gold with other metals to form

- a compound.
- an atom.
- an alloy.

(2 marks)

Question 1 continues on the next page

4.1.1.5 Size and mass of atoms

Question 06 · continued

1 (d) The data in the table shows some information about the three metals in the gold ring.

Name of metal	Atomic number	Percentage (%) of metal
gold	79	
silver	47	16
copper	29	9

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

Question	Answer
What is the percentage of gold in this ring?	29
	61
How many electrons are there in a copper atom?	75
How many neutrons are in an atom of silver with a mass number of 108?	79

(3 marks)

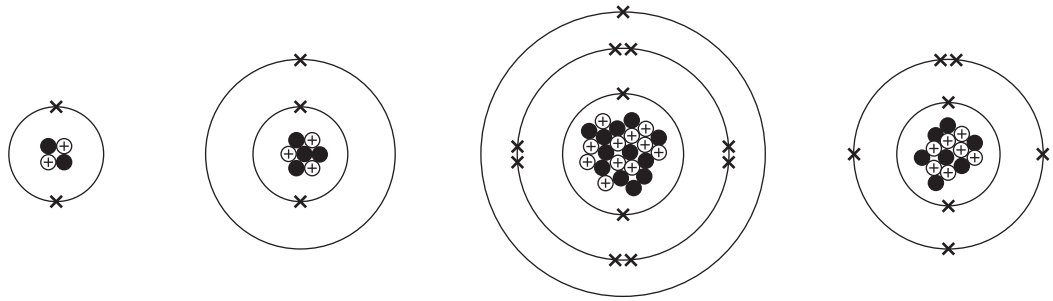
9

4.1.1.5 Size and mass of atoms

Question 07

June 2012 | CH1FP | Original Q1 | Legacy

1 The diagrams show the sub-atomic particles in four different atoms.



Atom A **Atom B** **Atom C** **Atom D**

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

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

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

energy level.
molecule.
nucleus.

(1 mark)

1 (a) (ii) The centre of each atom contains neutrons and

bonds.
electrons.
protons.

(1 mark)

1 (b) Complete the sentence.

There is no overall electrical charge on each atom because the

number of ..... is equal to the number of ..... .

(1 mark)

4.1.1.5 Size and mass of atoms

Question 07 · continued

1 (c) What is the name of the element represented by atom **D**? .....
(1 mark)

1 (d) Which **two** of the atoms, **A**, **B**, **C** and **D**, are in the same group of the periodic table?

Give a reason for your answer.

Atom ☐ and atom ☐

Reason .....

.....
(2 marks)

6

Turn over for the next question

4.1.1.5 Size and mass of atoms

Question 08

June 2012 | CH2FP | Original Q2 | Legacy

2 Gold and gold ions are used as catalysts.

2 (a) An atom of gold is represented as:

$$^{197}_{79}Au$$

Complete the sentences.

The atomic number of gold is ..... .

The number of electrons in an atom of gold is ..... .

(2 marks)

2 (b) Scientists have found that gold nanoparticles are very good catalysts.

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

A gold nanoparticle contains a few | hundred / thousand / million | atoms.

(1 mark)

2 (c) The formation of a gold ion (Au^{3+}) from a gold atom (Au) is shown in the symbol equation.

$$Au \rightarrow Au^{3+} + 3e^-$$

2 (c) (i) Complete the sentence.

The particles lost when a gold atom becomes a gold ion

are called ..... .

(1 mark)

2 (c) (ii) Draw a ring around the correct answer to complete the sentence.

The number of these particles lost when a gold atom becomes a gold ion is | one. / two. / three. |

(1 mark)

4.1.1.5 Size and mass of atoms

Question 08 · continued

2 (d) Gold ions are used as a catalyst in the reaction to make chloroethene.

How does a catalyst help a reaction?

.....

(1 mark)

2 (e) Chloroethene can react to make a thermosoftening polymer.

2 (e) (i) Draw a ring around the correct answer to complete the sentence.

When heated, a thermosoftening polymer will

dissolve.

melt.

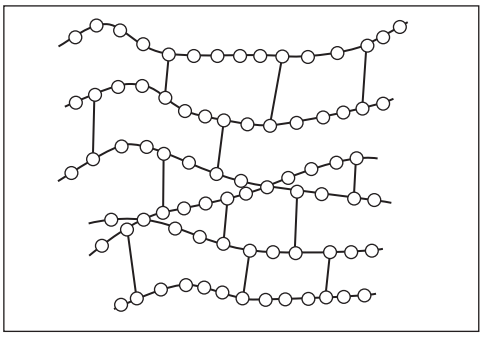
solidify.

(1 mark)

2 (e) (ii) Polymer **B** is a different type of polymer.

The diagram shows the structure of polymer **B**.

Polymer B



How can you tell from the diagram that polymer **B** is **not** thermosoftening?

.....

.....

(1 mark)

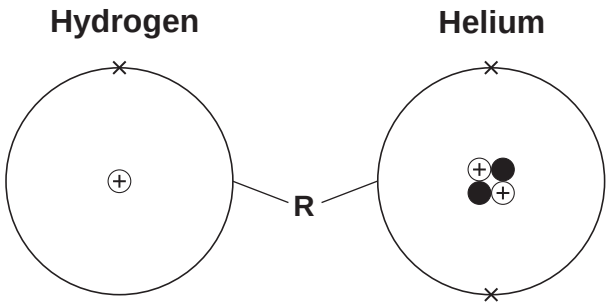
8

4.1.1.5 Size and mass of atoms

Question 09

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)

4.1.1.5 Size and mass of atoms

Question 09 · 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

4.1.1.5 Size and mass of atoms

Question 10

January 2013 | CH2FP | Original Q1 | Legacy

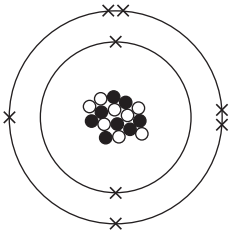
1 This question is about atoms and molecules.

1 (a) Complete the table to show the relative masses of the particles in atoms.

Name of particle	Relative mass
Proton	.....
Neutron	1
Electron	.....

(2 marks)

1 (b) The diagram shows an oxygen atom.



Key
- ● Proton
- ○ Neutron
- × Electron

Use the correct number to complete each sentence.

8	**16**	**18**	**24**

The atomic (proton) number of the oxygen atom shown above is ..... .

The mass number of the oxygen atom shown above is ..... .

(2 marks)

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

Oxygen atoms with different numbers of neutrons are called

isotopes.

molecules.

polymers.

(1 mark)

4.1.1.5 Size and mass of atoms

Question 10 · continued

1 (c) (ii) An oxygen atom with a different number of neutrons has 10 neutrons.

Draw a ring around the symbol which represents this atom.

$^{16}_{8}O$ $^{18}_{10}O$ $^{18}_{8}O$

(1 mark)

1 (d) A water molecule contains hydrogen and oxygen atoms.

1 (d) (i) Use the correct answer to complete the sentence.

a compound	an element	a mixture

Water is ..... .

(1 mark)

1 (d) (ii) Draw a ring around the correct structure of a water molecule.

H — O — H **O — H — H** **O — H — O**

(1 mark)

1 (d) (iii) Draw a ring around the type of bonding in a water molecule.

covalent **ionic** **metallic**

(1 mark)

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

The bonds in a water molecule are formed by [gaining / losing / sharing] electrons.

(1 mark)

10

4.1.1.5 Size and mass of atoms

Question 11

June 2013 | CH1FP | Original Q1 | Legacy

1 Magnesium burns in oxygen.



1 (a) Use the Chemistry Data Sheet to help you to answer this question.

The word equation for magnesium burning is:

magnesium + oxygen ⟶ magnesium oxide

Draw **one** line from each substance to its correct description.

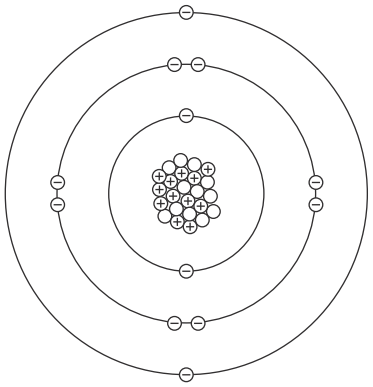
Substance	Description
magnesium	compound
magnesium oxide	metal
oxygen	mixture
	non-metal

(3 marks)

4.1.1.5 Size and mass of atoms

Question 11 · continued

1 (b) The diagram represents a magnesium atom.



Complete the table to show the name of each particle and the charge of each particle in the magnesium atom.

Name of particle	Charge
proton	+1
neutron	.....
.....	–1

(2 marks)

1 (c) Use the Chemistry Data Sheet to help you to answer these questions.

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

1 (c) (i) In a magnesium atom, the protons and neutrons are in the

core.
nucleus.
shell.

(1 mark)

1 (c) (ii) The number of protons in a magnesium atom is the

atomic number.
mass number.
group number.

(1 mark)

1 (c) (iii) The sum of the protons and neutrons in a magnesium atom is the

atomic number.
mass number.
group number.

(1 mark)

8

4.1.1.5 Size and mass of atoms

Question 12

June 2013 | CH2FP | Original Q1 | Legacy

1 This question is about lithium and sodium.

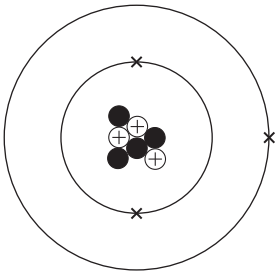
1 (a) Use the Chemistry Data Sheet to help you to answer this question.

In which group of the periodic table are lithium and sodium? Group ☐

(1 mark)

1 (b) A lithium atom can be represented as $^{7}_{3}Li$

The diagram represents the lithium atom.



1 (b) (i) Some particles in the nucleus have a positive charge.

What is the name of these particles? .....

(1 mark)

1 (b) (ii) Some particles in the nucleus have no charge.

What is the name of these particles? .....

(1 mark)

1 (b) (iii) Use the correct answer from the box to complete the sentence.

3	4	7

The mass number of this atom of lithium is ☐

(1 mark)

Question 1 continues on the next page

4.1.1.5 Size and mass of atoms

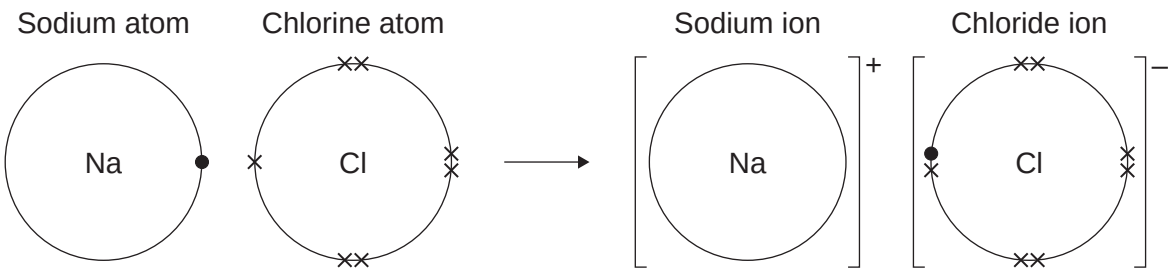
Question 12 · continued

1 (c) Sodium reacts with chlorine to produce sodium chloride.

sodium + chlorine ⟶ sodium chloride

The diagram shows how the reaction happens.

Only the outer electrons are shown.



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

1 (c) (i) A sodium atom changes into a sodium ion by [gaining / losing / sharing] an electron.

(1 mark)

1 (c) (ii) A sodium ion has [a negative / no / a positive] charge.

(1 mark)

1 (c) (iii) The ions in sodium chloride are held together by strong [covalent / electrostatic / magnetic] forces.

(1 mark)

4.1.1.5 Size and mass of atoms

Question 12 · continued

1 (d) Sodium chloride is an ionic compound.

Tick (✓) **two** properties of ionic compounds.

Property	Tick (✓)
Do **not** dissolve in water	
High melting points	
Low boiling points	
Strong bonds	

(2 marks)

1 (e) (i) The formula of sodium chloride is NaCl

Calculate the relative formula mass of sodium chloride.

Relative atomic masses: Na = 23; Cl = 35.5

.....

.....

Relative formula mass = ...

(1 mark)

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

The relative formula mass of a substance, in grams, is one ion / isotope / mole of the substance.

(1 mark)

1 (f) Nanoparticles of sodium chloride (salt) are used to flavour crisps.

What are nanoparticles?

.....

.....

(1 mark)

12

4.1.1.5 Size and mass of atoms

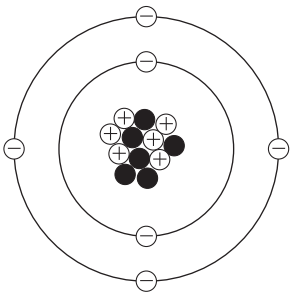
Question 13

June 2014 | CH1FP | Original Q1 | Legacy

1 Fossil fuels contain carbon.

1 (a) **Figure 1** represents a carbon atom.

Figure 1



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

1 (a) (i) The name of the particle with a positive charge is

an electron.
a neutron.
a proton.

[1 mark]

1 (a) (ii) The centre of the atom is called the

energy level.
molecule.
nucleus.

[1 mark]

1 (a) (iii) Use the Chemistry Data Sheet to help you to answer this question.

Use the correct number from the box to complete each sentence.

[2 marks]

4	6	8	10	12

The mass number of this carbon atom is ☐

In the periodic table, carbon is in Group ☐

4.1.1.5 Size and mass of atoms

Question 13 · continued

1 (b) Coal is a fossil fuel.

A piece of coal contains:

- 80% carbon
- 9% oxygen
- 1% sulfur
- 5% hydrogen.

The rest of the coal is other elements.

1 (b) (i) What is the percentage of other elements in this piece of coal?

[1 mark]

..... %

1 (b) (ii) Coal burns in air to produce carbon dioxide, sulfur dioxide and water.

Draw **one** line from each product to the type of pollution caused by each product.

[3 marks]

Product	Type of pollution
Carbon dioxide	Acid rain
Sulfur dioxide	Global dimming
Water	Global warming
	No pollution

8

4.1.1.5 Size and mass of atoms

Question 14

June 2014 | CH2FP | Original Q4 | Legacy

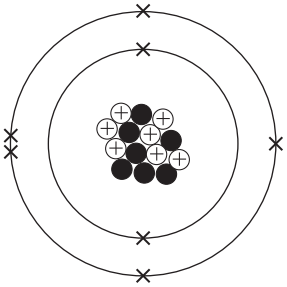
4 Fertilisers contain elements that plants need.

AQAGROW
Plant Fertiliser

Contains:
- Nitrogen
- Phosphorus
- Potassium

4 (a) **Figure 5** represents a nitrogen atom.

Figure 5



Complete each sentence.

4 (a) (i) The mass number of this nitrogen atom is ..... .

[1 mark]

4 (a) (ii) Atoms of nitrogen with different numbers of neutrons are called ..... .

[1 mark]

4 (a) (iii) Compared with a proton, the mass of an electron is ..... .

[1 mark]

4.1.1.5 Size and mass of atoms

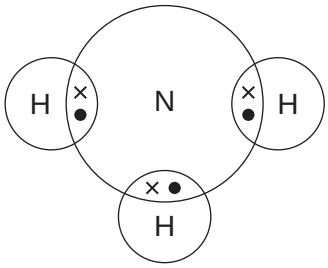
Question 14 · continued

4 (b) Fertilisers can be made from ammonia.

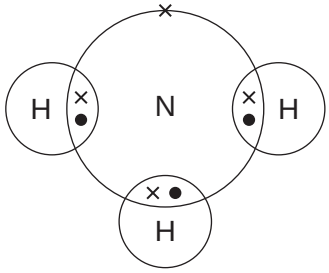
4 (b) (i) Which diagram, **A**, **B**, or **C**, represents the electronic structure of an ammonia molecule?

[1 mark]

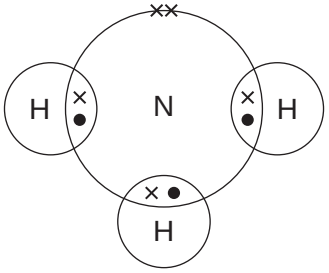
A



B



C



The electronic structure of an ammonia molecule is shown in diagram ☐

4 (b) (ii) What is the correct formula of ammonia?

Draw a ring around the correct answer.

[1 mark]

N_3H **NH_3** **NH^3**

Question 4 continues on the next page

4.1.1.5 Size and mass of atoms

Question 14 · continued

4 (c) A student made ammonium nitrate by reacting ammonia solution with an acid.

4 (c) (i) Name the acid used to make ammonium nitrate.

[1 mark]

.....

4 (c) (ii) Complete the sentence.

[1 mark]

The student added a few drops of ....., which changed colour when the ammonia solution had neutralised the acid.

4 (c) (iii) The student added charcoal and filtered the mixture.

This produced a colourless solution of ammonium nitrate.

How is solid ammonium nitrate obtained from the solution?

[1 mark]

.....

4 (c) (iv) A farmer put ammonium nitrate fertiliser onto a field of grass.

Suggest what would happen to the grass.

[1 mark]

.....

.....

Question 14 · continued

4 (d) Some fertilisers contain potassium chloride.

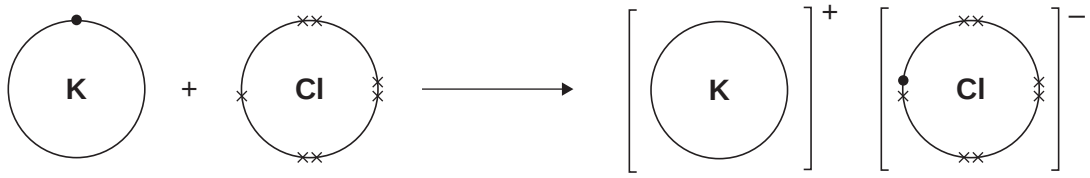
Potassium reacts with chlorine to produce potassium chloride.

Figure 6 shows how this happens.

The dots (•) and crosses (x) represent electrons.

Only the outer shell is shown.

Figure 6



Use **Figure 6** to help you answer this question.

Describe, as fully as you can, what happens when potassium reacts with chlorine to produce potassium chloride.

[4 marks]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

13

4.1.1.5 Size and mass of atoms

Question 15

June 2015 | CH2FP | Original Q1 | Legacy

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 ☐

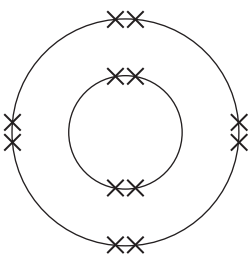
One mole of the atom ☐

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

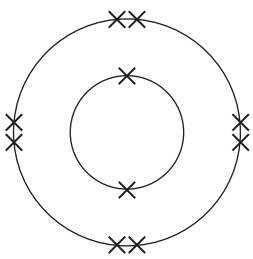
Which structure, **A**, **B** or **C**, represents the electronic structure of the carbon atom?

[1 mark]

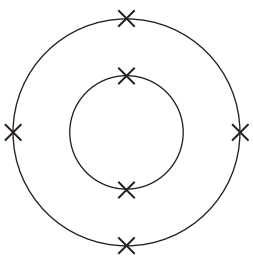
Structure A



Structure B



Structure C



The carbon atom is structure ☐.

4.1.1.5 Size and mass of atoms

Question 15 · 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

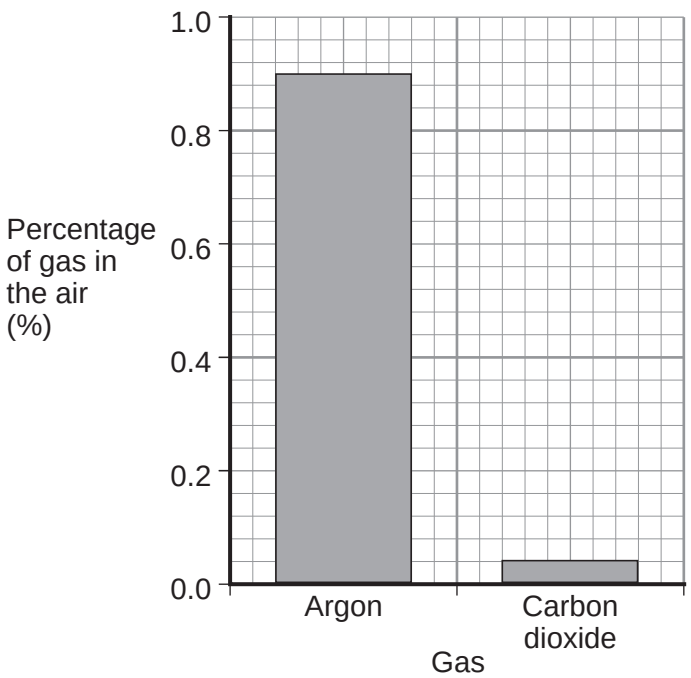
4.1.1.5 Size and mass of atoms

Question 15 · 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

4.1.1.5 Size and mass of atoms

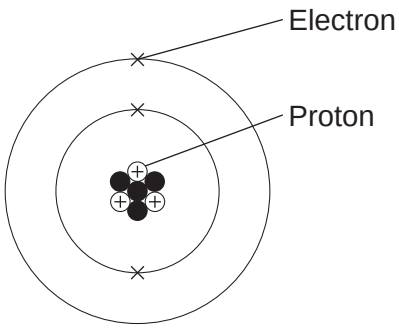
Question 16

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 ☐

4.1.1.5 Size and mass of atoms

Question 16 · 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

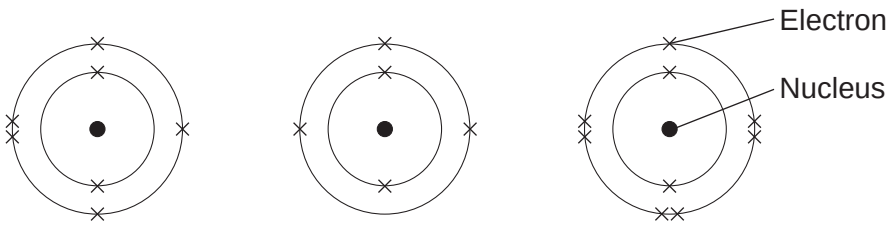
4.1.1.5 Size and mass of atoms

Question 16 · 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.

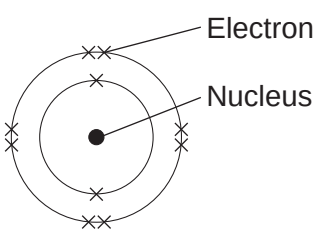
Atom X ☐

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

4.1.1.5 Size and mass of atoms

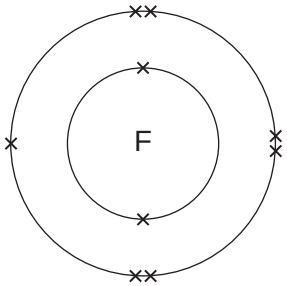
Question 17

June 2016 | CH2FP | Original Q1 | Legacy

1 This question is about fluorine.

1 (a) **Figure 1** shows the arrangement of electrons in a fluorine atom.

Figure 1



1 (a) (i) In which group of the periodic table is fluorine?

[1 mark]

Group _____

1 (a) (ii) Complete **Table 1** to show the particles in an atom and their relative masses.

[2 marks]

Table 1

Name of particle	Relative mass
Proton	
Neutron	1
	Very small

1 (a) (iii) Use the correct answer from the box to complete the sentence.

[1 mark]

alkalis	**alloys**	**isotopes**

Atoms of fluorine with different numbers of neutrons are called _____ .

4.1.1.5 Size and mass of atoms

Question 17 · continued

1 (b) Sodium reacts with fluorine to produce sodium fluoride.

1 (b) (i) Complete the word equation for this reaction.

[1 mark]

sodium + _____ ⟶ _____

1 (b) (ii) Complete the sentence.

[1 mark]

Substances in which atoms of two or more different elements are chemically combined are called _____ .

1 (b) (iii) The relative formula mass (M_r) of sodium fluoride is 42.

Use the correct answer from the box to complete the sentence.

[1 mark]

ion	mole	molecule

The relative formula mass (M_r), in grams, of sodium fluoride is one _____ of the substance.

Question 1 continues on the next page

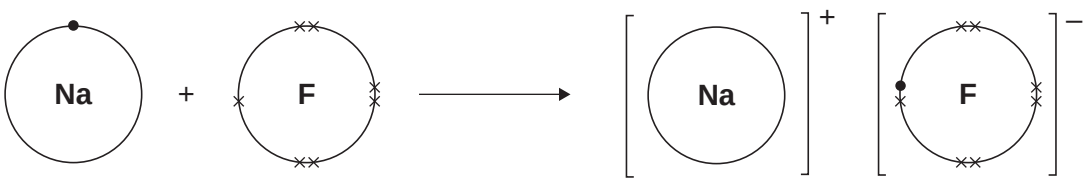
4.1.1.5 Size and mass of atoms

Question 17 · continued

1 (b) (iv) **Figure 2** shows what happens to the electrons in the outer shells when a sodium atom reacts with a fluorine atom.

The dots (•) and crosses (×) represent electrons.

Figure 2



Use **Figure 2** to help you answer this question.

Describe, as fully as you can, what happens when sodium reacts with fluorine to produce sodium fluoride.

[4 marks]

4.1.1.5 Size and mass of atoms

Question 17 · continued

1 (b) (v) Sodium fluoride is an ionic substance.

What are **two** properties of ionic substances?

[2 marks]

Tick (✓) **two** boxes.

- Dissolve in water ☐
- Gas at room temperature ☐
- High melting point ☐
- Low boiling point ☐

13

Turn over for the next question

4.1.1.5 Size and mass of atoms

Question 18

June 2018 | 8462/1F | Original Q3

0 3 This question is about the structure of the atom.

0 3 . 1 Complete the sentences.

Choose answers from the box.

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

[5 marks]

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

The centre of the atom is the _____.

The two types of particle in the centre of the atom are the proton and the _____.

James Chadwick proved the existence of the _____.

Niels Bohr suggested particles orbit the centre of the atom. This type of particle is the _____.

The two types of particle with the same mass are the neutron and the _____.

Table 2 shows information about two isotopes of element **X**.

Table 2

	Mass number	Percentage (%) abundance
Isotope 1	63	70
Isotope 2	65	30

4.1.1.5 Size and mass of atoms

Question 18 · continued

0 3 . 2 Calculate the relative atomic mass (A_r) of element **X** using the equation:

$$A_r = \frac{\text{(mass number} \times \text{percentage) of isotope 1 + (mass number} \times \text{percentage) of isotope 2}}{100}$$

Use **Table 2**.

Give your answer to 1 decimal place.

[2 marks]

A_r = _____

0 3 . 3 Suggest the identity of element **X**.

Use the periodic table.

[1 mark]

Element **X** is _____

0 3 . 4 The radius of an atom of element **X** is 1.2×10^{-10} m

The radius of the centre of the atom is $\frac{1}{10\,000}$ the radius of the atom.

Calculate the radius of the centre of an atom of element **X**.

Give your answer in standard form.

[2 marks]

Radius = _____ m

10

4.1.1.5 Size and mass of atoms

Question 19

June 2018 | 8462/1F | Original Q7

0 7 This question is about elements in Group 1.

A teacher burns sodium in oxygen.

0 7 . 1 Complete the word equation for the reaction.

[1 mark]

sodium + oxygen → _____

0 7 . 2 What is the name of this type of reaction?

[1 mark]

Tick **one** box.

Decomposition ☐

Electrolysis ☐

Oxidation ☐

Precipitation ☐

0 7 . 3 The teacher dissolves the product of the reaction in water and adds universal indicator.

The universal indicator turns purple.

What is the pH value of the solution?

[1 mark]

Tick **one** box.

1		4		7		13	

4.1.1.5 Size and mass of atoms

Question 19 · continued

0 7 . 4 The solution contains a substance with the formula NaOH

Give the name of the substance.

[1 mark]

0 7 . 5 All alkalis contain the same ion.

What is the formula of this ion?

[1 mark]

Tick **one** box.

H^+ ☐

Na^+ ☐

OH^- ☐

O^{2-} ☐

0 7 . 6 A solution of NaOH had a concentration of 40 g/dm^3

What mass of NaOH would there be in 250 cm^3 of the solution?

[2 marks]

Mass = _____ g

4.1.1.5 Size and mass of atoms

Question 19 · continued

0 7 . 7 The melting points of the elements in Group 1 show a trend.

Table 6 shows the atomic numbers and melting points of the Group 1 elements.

Table 6

Element	Atomic number	Melting point in °C
Lithium	3	181
Sodium	11	98
Potassium	19	63
Rubidium	37	**X**
Caesium	55	29

Plot the data from **Table 6** on **Figure 11**.

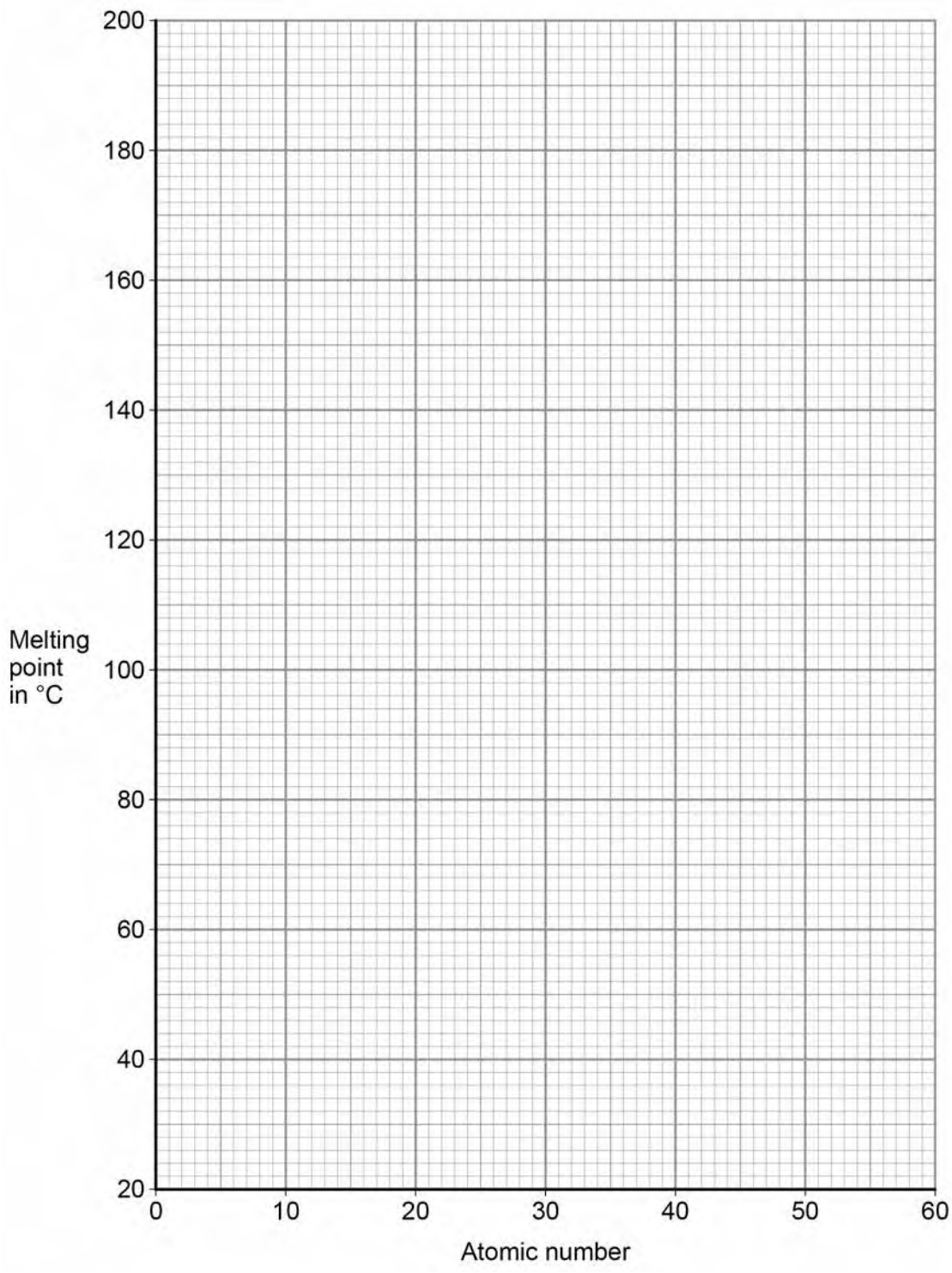
[2 marks]

4.1.1.5 Size and mass of atoms

Question 19 · continued

June 2018 | 8462/1F | Original Q7

Figure 11



0 7 . 8 Predict the melting point, **X**, of rubidium, atomic number 37

Use **Figure 11**.

[1 mark]

Melting point = _____ °C

10

4.1.1.5 Size and mass of atoms

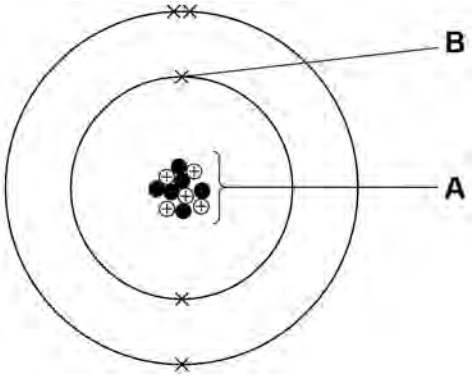
Question 20

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 _____

4.1.1.5 Size and mass of atoms

Question 20 · 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

4.1.1.5 Size and mass of atoms

Question 20 · 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

4.1.1.5 Size and mass of atoms

Question 21

November 2020 | 8462/1F | Original Q2

0 2 This question is about models of the atom.

0 2 . 1 Atoms were first thought to be tiny spheres that could not be divided.

Which particle was discovered to change this model of the atom?

[1 mark]

Tick (✓) **one** box.

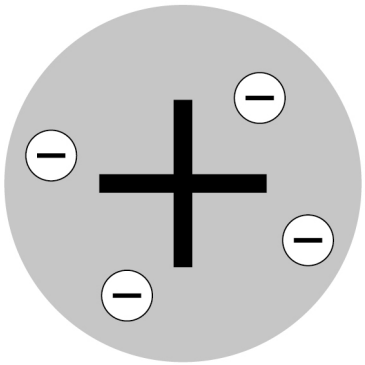
Electron ☐

Neutron ☐

Proton ☐

0 2 . 2 **Figure 2** shows another model of the atom.

Figure 2



What is the name of this model of the atom?

[1 mark]

4.1.1.5 Size and mass of atoms

Question 21 · continued

0 2 . 3 A scientist fired particles at gold atoms.

Some of these particles were scattered.

The results led to a different model of the atom.

Which type of particle was fired at the gold atoms?

[1 mark]

Tick (✓) **one** box.

- Alpha ☐
- Electron ☐
- Neutron ☐
- Proton ☐

0 2 . 4 Which scientist first suggested that electrons orbit the nucleus at specific distances?

[1 mark]

Tick (✓) **one** box.

- Bohr ☐
- Chadwick ☐
- Mendeleev ☐

4.1.1.5 Size and mass of atoms

Question 21 · continued

0 2 . 5 The model of the atom used today has three subatomic particles:

- electrons
- neutrons
- protons.

Complete the sentences.

[3 marks]

Atoms of the same element have the same atomic number because they have the same number of _____.

Atoms of the same element can have different mass numbers because they have different numbers of _____.

Atoms have no overall charge because they have the same number of _____ and _____.

0 2 . 6 The radius of a nucleus is approximately 1×10^{-14} m

The radius of an atom is approximately 1×10^{-10} m

A teacher uses a ball of radius 1 cm to represent the nucleus.

What could represent the atom on the same scale?

[1 mark]

Tick (✓) **one** box.

- A ball of radius 10 cm ☐
- A sports arena of radius 100 m ☐
- An island of radius 10 km ☐
- A planet of radius 1000 km ☐

8

4.1.1.5 Size and mass of atoms

Question 22

November 2020 | 8462/1F | Original Q9

0 9 This question is about metals and the reactivity series.

0 9 . 1 Which **two** statements are properties of most transition metals?

[2 marks]

Tick (✓) **two** boxes.

- They are soft metals. ☐
- They form colourless compounds. ☐
- They form ions with different charges. ☐
- They have high melting points. ☐
- They have low densities. ☐

0 9 . 2 A student added copper metal to colourless silver nitrate solution.

The student observed:

- pale grey crystals forming
- the solution turning blue.

Explain how these observations show that silver is less reactive than copper.

[3 marks]

4.1.1.5 Size and mass of atoms

Question 22 · continued

0 9 . 3 A student is given three metals, **X**, **Y** and **Z** to identify.

The metals are magnesium, iron and copper.

Plan an investigation to identify the three metals by comparing their reactions with dilute hydrochloric acid.

Your plan should give valid results.

[4 marks]

Question 9 continues on the next page

4.1.1.5 Size and mass of atoms

Question 22 · continued

0 9 . 4 Metal **M** has two isotopes.

Table 6 shows the mass numbers and percentage abundances of the isotopes.

Table 6

Mass number	Percentage abundance (%)
203	30
205	70

Calculate the relative atomic mass (A_r) of metal **M**.

Give your answer to 1 decimal place.

[2 marks]

Relative atomic mass (1 decimal place) = _____

11

4.1.1.5 Size and mass of atoms

Question 23

November 2021 | 8462/1F | Original Q9

0 9 This question is about atomic structure and the periodic table.

Gallium (Ga) is an element that has two isotopes.

0 9 . 1 Give the meaning of 'isotopes'.

You should answer in terms of subatomic particles.

[2 marks]

0 9 . 2 **Table 8** shows the mass numbers and percentage abundances of the isotopes of gallium.

Table 8

Mass number	Percentage abundance (%)
69	60
71	40

Calculate the relative atomic mass (A_r) of gallium.

Give your answer to 1 decimal place.

[2 marks]

Relative atomic mass (1 decimal place) = _____

4.1.1.5 Size and mass of atoms

Question 23 · continued

Gallium (Ga) is in Group 3 of the modern periodic table.

0 9 . 3 Give the numbers of electrons and neutrons in an atom of the isotope $^{69}_{31}Ga$

[2 marks]

Number of electrons _____

Number of neutrons _____

0 9 . 4 What is the most likely formula of a gallium ion?

[1 mark]

Tick (✓) **one** box.

- Ga^{+} ☐
- Ga^{-} ☐
- Ga^{3+} ☐
- Ga^{3-} ☐

0 9 . 5 Gallium was discovered six years after Mendeleev published his periodic table.

Give **two** reasons why the discovery of gallium helped Mendeleev's periodic table to become accepted.

[2 marks]

1 _____

_____

2 _____

_____

9

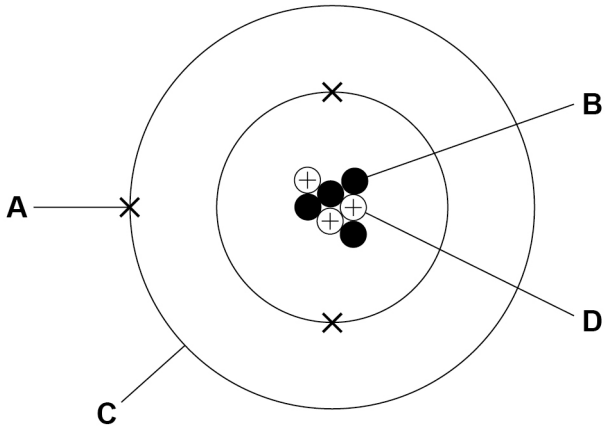
4.1.1.5 Size and mass of atoms

Question 24

0 1 This question is about atoms.

0 1 . 1 **Figure 1** represents an atom of an element.

Figure 1



Draw **one** line from each name to the correct label.

[2 marks]

Name	Label
	A
Neutron	B
Proton	C
	D

4.1.1.5 Size and mass of atoms

Question 24 · continued

0 1 . 2 An atom of element **Y** has:

- an atomic number of 9
- a mass number of 19.

Give the number of electrons and the number of neutrons in this atom.

Choose answers from the box.

[2 marks]

1	**9**	**10**	**19**	**28**

Number of electrons _____

Number of neutrons _____

Question 1 continues on the next page

Question 24 · continued

Table 1 shows information about two isotopes of element **Z**.

Table 1

	Mass number	Percentage abundance (%)
Isotope **A**	39	93.3
Isotope **B**	41	6.7

0 1 . 3 Calculate the relative atomic mass (A_r) of element **Z**.

Use **Table 1** and the equation:

$$A_r = \frac{\text{(mass number} \times \text{percentage) of isotope } \mathbf{A} + \text{(mass number} \times \text{percentage) of isotope } \mathbf{B}}{100}$$

Give your answer to 3 significant figures.

[3 marks]

A_r (3 significant figures) = _____

4.1.1.5 Size and mass of atoms

Question 24 · continued

0 1 . 4 Suggest the identity of element **Z**.

Use the periodic table.

[1 mark]

Element **Z** _____

0 1 . 5 Complete the sentence.

Choose the answer from the box.

[1 mark]

electrons	**neutrons**	**protons**

Isotopes of the same element have different mass numbers because the isotopes have different numbers of _____.

9

4.1.1.5 Size and mass of atoms

Question 25

June 2022 | 8462/1F | Original Q7

0 7 This question is about small particles.

0 7 . 1 Coarse particles, fine particles and nanoparticles are all small particles.

Which is the largest particle?

[1 mark]

Tick (✓) **one** box.

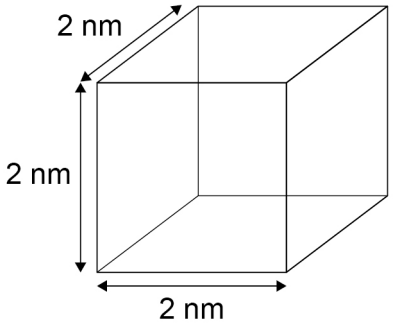
Coarse particle ☐

Fine particle ☐

Nanoparticle ☐

0 7 . 2 **Figure 12** shows a cubic nanoparticle.

Figure 12



The surface area of the cubic nanoparticle is 24 nm^2.

Calculate:

- the volume of the cubic nanoparticle
- the simplest surface area : volume ratio of the cubic nanoparticle.

[4 marks]

Volume = _____ nm^3

Simplest surface area : volume ratio = _____ : 1

Question 25 · continued

0 7 . 3 Catalysts made of nanoparticles are often more effective than catalysts made of normal sized particles.

Complete the sentences.

[2 marks]

Compared with normal sized particles, the surface area to volume ratio of

nanoparticles is _____.

This means that the mass of a nanoparticle catalyst needed to have the same effect

as the same catalyst made of normal sized particles is _____.

0 7 . 4 Silver nanoparticles can be added to the material used to make socks.

Some facts about silver and bacteria are:

- silver nanoparticles are small enough to be breathed in
- silver is very expensive
- silver can kill bacteria
- bacteria can cause infections
- bacteria can break down sweat to produce unpleasant smells.

Suggest **one** advantage and **one** disadvantage of wearing socks containing silver nanoparticles.

[2 marks]

Advantage _____

_____

Disadvantage _____

_____

4.1.1.5 Size and mass of atoms

Question 25 · continued June 2022 | 8462/1F | Original Q7

0 7 . 5 An atom has a radius of 1×10^{-10} m.

A spherical nanoparticle has a radius of 1×10^{-8} m.

How many times larger is the radius of the nanoparticle than the radius of the atom?
[1 mark]

Tick (✓) **one** box.

2 times ☐

10 times ☐

100 times ☐

200 times ☐

10

4.1.1.5 Size and mass of atoms

Question 26

June 2023 | 8462/1F | Original Q1

0 1 This question is about atoms.

Atoms contain three types of particle:

- electrons
- neutrons
- protons.

0 1 . 1 Which particle has no electrical charge?

[1 mark]

Tick (✓) **one** box.

Electron ☐

Neutron ☐

Proton ☐

0 1 . 2 Which particles have the same relative mass?

[1 mark]

Tick (✓) **one** box.

An electron and a neutron ☐

An electron and a proton ☐

A neutron and a proton ☐

0 1 . 3 The formula of a compound is N_2O

How many of each type of atom are in one molecule of N_2O?

[2 marks]

Nitrogen _____

Oxygen _____

4.1.1.5 Size and mass of atoms

Question 26 · continued

An atom of element **Z** contains:

- 3 electrons
- 4 neutrons
- 3 protons.

0 1 . 4 Give the name of element **Z**.

Use the periodic table.

[1 mark]

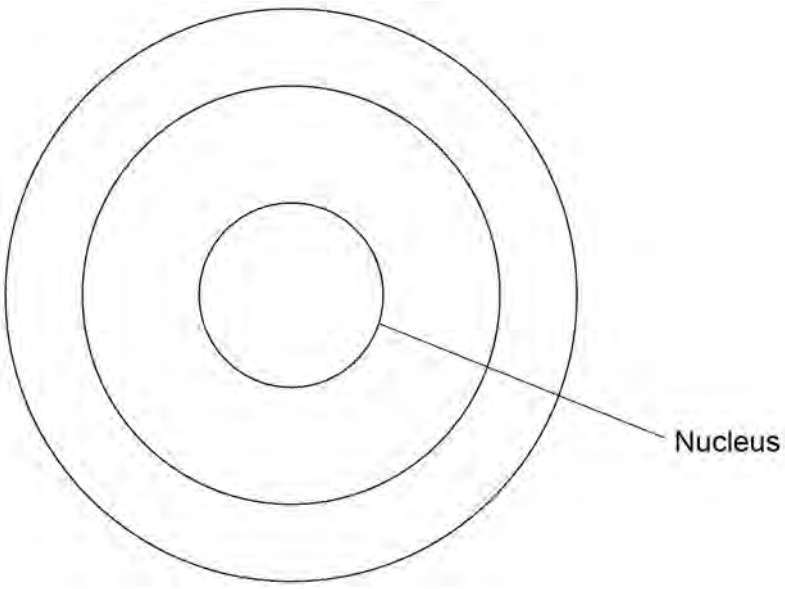
0 1 . 5 Complete **Figure 1** to show the position of the particles in an atom of element **Z**.

Use the symbols:

× = electron
● = neutron
○ = proton

[4 marks]

Figure 1



9

4.1.1.5 Size and mass of atoms

Question 27

June 2023 | 8462/1F | Original Q3

0 3 This question is about carbon.

0 3 . 1 Which type of substance is carbon?

[1 mark]

Tick (✓) **one** box.

Compound ☐

Element ☐

Mixture ☐

0 3 . 2 Carbon has isotopes with mass numbers 12, 13 and 14.

Complete the sentences.

Choose answers from the box.

[2 marks]

electrons	**ions**	**molecules**	**neutrons**	**protons**

The isotopes of carbon have the same number of _____.

The isotopes of carbon have a different number of _____.

4.1.1.5 Size and mass of atoms

Question 27 · continued

0 3 . 3 12 g of carbon contains 6.02×10^{23} atoms.

Which expression is used to calculate the mass of one atom of carbon?

[1 mark]

Tick (✓) **one** box.

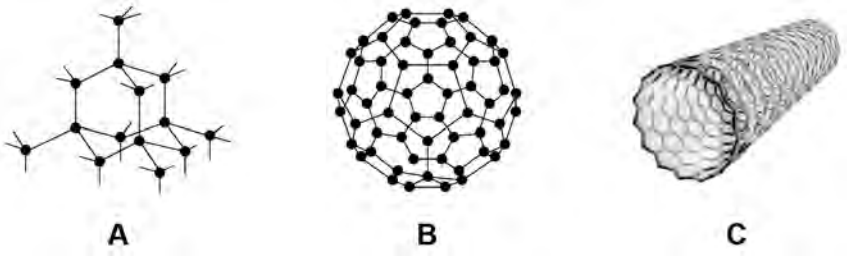
$\frac{12}{6.02 \times 10^{23}}$ ☐

$\frac{6.02 \times 10^{23}}{12}$ ☐

$12 \times 6.02 \times 10^{23}$ ☐

0 3 . 4 **Figure 2** shows diagrams that represent different forms of carbon.

Figure 2



Which diagram in **Figure 2** represents Buckminsterfullerene?

[1 mark]

Tick (✓) **one** box.

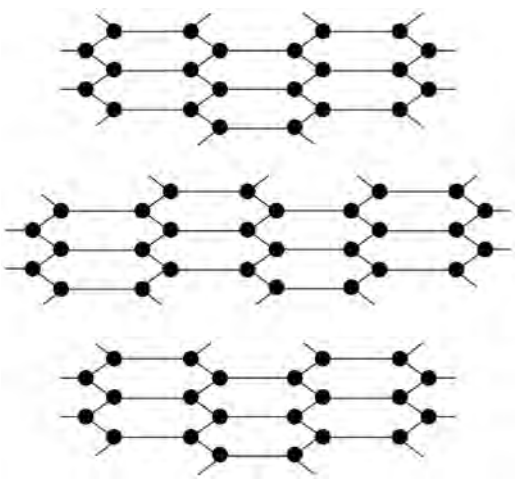
A ☐ **B** ☐ **C** ☐

Question 3 continues on the next page

Question 27 · continued

0 3 . 5 **Figure 3** represents part of the structure of graphite.

Figure 3



Draw **one** line from each property of graphite to the structural feature that is the reason for that property.

[2 marks]

Property	Structural feature
	Graphite has hexagonal rings of carbon atoms.
Graphite conducts electricity.	The bonds between carbon atoms in the layers are strong.
Graphite is soft.	There are no covalent bonds between layers of atoms.
	There are delocalised electrons in graphite.

7

4.1.1.5 Size and mass of atoms

Question 28

June 2023 | 8462/1F | Original Q9

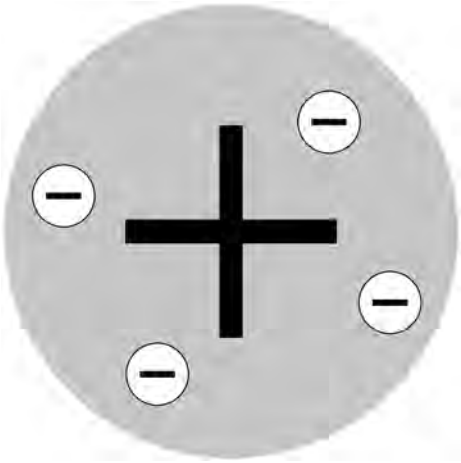
0 9 Discoveries in chemistry led to a better understanding of atomic structure.

0 9 . 1 Atoms were originally thought to be tiny spheres that could not be divided.

The plum pudding model of the atom was then developed.

Figure 10 represents the plum pudding model of the atom.

Figure 10



Describe the plum pudding model of the atom.

[2 marks]

0 9 . 2 Atoms contain electrons, neutrons and protons.

Write these three particles in order of their discovery.

[1 mark]

Earliest _____

_____

Latest _____

4.1.1.5 Size and mass of atoms

Question 28 · continued

Very few atoms of the element tennessine (Ts) have ever been identified.

The atomic number of tennessine is 117

0 9 . 3 Predict the number of outer shell electrons in an atom of tennessine.

Give **one** reason for your answer.

Use the periodic table.

[2 marks]

Number of outer shell electrons _____

Reason _____

_____

0 9 . 4 Tennessine was first identified by a small group of scientists in 2010.

Suggest **one** reason why tennessine was **not** accepted as a new element by other scientists until 2015.

[1 mark]

_____

_____

Question 9 continues on the next page

Question 28 · continued

0 9 . 5 The discovery of isotopes explained why some relative atomic masses are not whole numbers.

Element **R** has two isotopes.

Table 5 shows the mass numbers and percentage abundances of the isotopes of element **R**.

Table 5

Mass number	Percentage abundance (%)
6	7.6
7	92.4

Calculate the relative atomic mass (A_r) of element **R**.

Give your answer to 1 decimal place.

[3 marks]

Relative atomic mass (1 decimal place) = _____

9

4.1.1.5 Size and mass of atoms

Question 29

June 2024 | 8462/1F | Original Q5

0 5 This question is about carbon and carbon compounds.

An atom of carbon is represented as:

(Mass number) 13
(Atomic number) 6 C

0 5 . 1 What is the number of protons in this atom of carbon?

Tick (✓) **one** box.

[1 mark]

1 ☐ 6 ☐ 7 ☐ 13 ☐

0 5 . 2 What is the number of neutrons in this atom of carbon?

Tick (✓) **one** box.

[1 mark]

1 ☐ 6 ☐ 7 ☐ 13 ☐

0 5 . 3 What is the number of electrons in this atom of carbon?

Tick (✓) **one** box.

[1 mark]

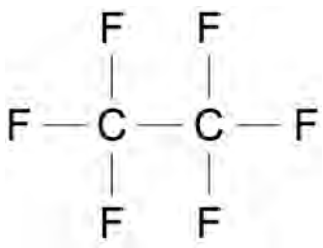
1 ☐ 6 ☐ 7 ☐ 13 ☐

Question 5 continues on the next page

Question 29 · continued

0 5 . 4 **Figure 10** shows the structure of a carbon compound.

Figure 10



Complete the formula of the carbon compound.

[1 mark]

C__ F__

0 5 . 5 Methane:

- is a carbon compound
- exists as small molecules
- has a low boiling point.

What is the reason for the low boiling point of methane?

[1 mark]

Tick (✓) **one** box.

Covalent bonds **and** intermolecular forces are weak. ☐

Only covalent bonds are weak. ☐

Only intermolecular forces are weak. ☐

4.1.1.5 Size and mass of atoms

Question 29 · continued

June 2024 | 8462/1F | Original Q5

0 5 . 6 Buckminsterfullerene (C_{60}) is a form of carbon.

Buckminsterfullerene was the first fullerene to be discovered.

What is the shape of a buckminsterfullerene molecule?

[1 mark]

Tick (✓) **one** box.

Cubic ☐

Cylindrical ☐

Spherical ☐

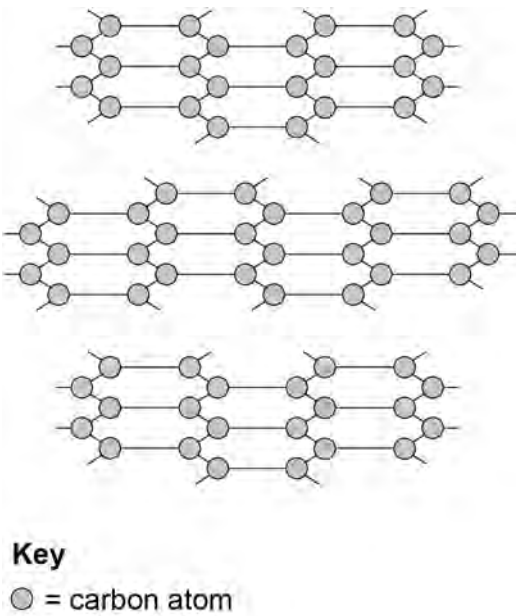
Question 5 continues on the next page

Question 29 · continued

0 5 . 7 Graphite is a form of carbon.

Figure 11 represents the structure of graphite.

Figure 11



How many covalent bonds does each carbon atom form in graphite?

[1 mark]

Tick (✓) **one** box.

1 ☐

2 ☐

3 ☐

4 ☐

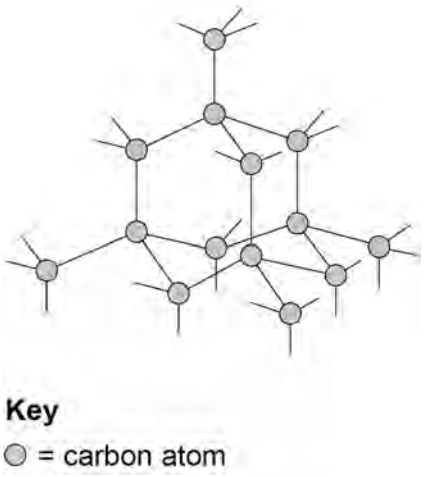
4.1.1.5 Size and mass of atoms

Question 29 · continued

0 5 . 8 Diamond is another form of carbon.

Figure 12 represents the structure of diamond.

Figure 12



Describe the structure and bonding in diamond.

[3 marks]

10

4.1.1.5 Size and mass of atoms

Question 30

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 _____

_____

Question 30 · continued

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

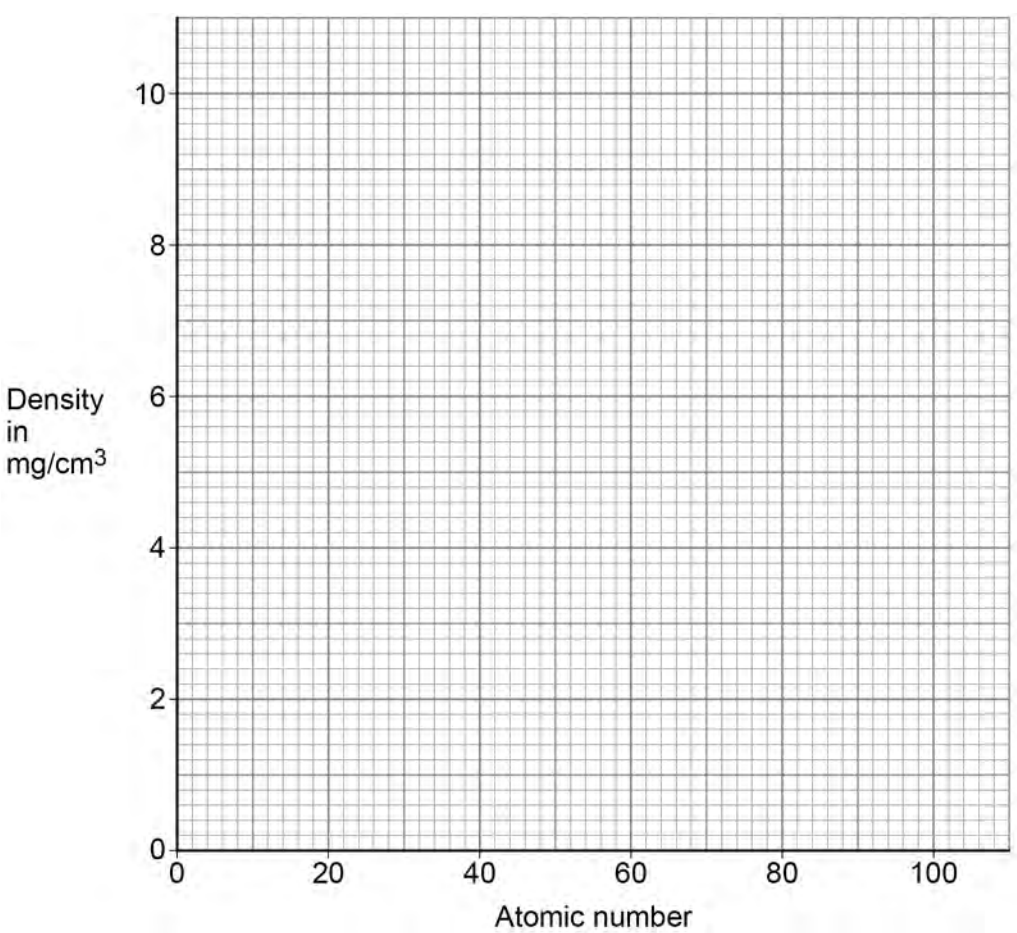
Table 4

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



Question 30 · 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

4.1.1.5 Size and mass of atoms

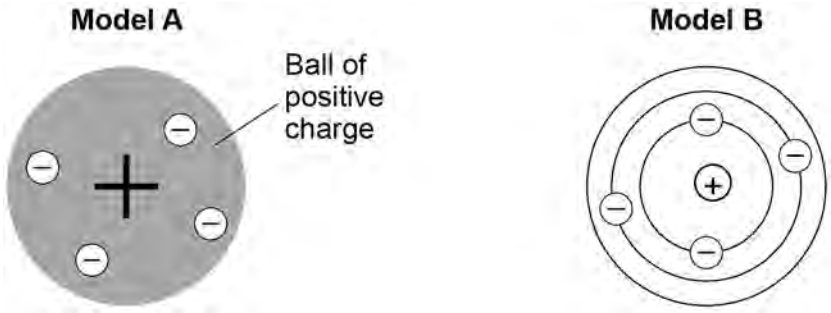
Question 31

June 2024 | 8462/1F | Original Q10

1 0 This question is about models of the atom.

Figure 16 shows two early models of the atom.

Figure 16



1 0 . 1 Name the models of the atom shown in **Figure 16**.

[2 marks]

Model **A** _____

Model **B** _____

1 0 . 2 Compare model **A** with the model of the atom used today.

Use **Figure 16**.

[4 marks]

_____

_____

_____

_____

_____

_____

_____

_____

4.1.1.5 Size and mass of atoms

Question 31 · continued

June 2024 | 8462/1F | Original Q10

1 0 . 3 Chadwick's experiments showed the existence of neutrons in an atom.

This led to an understanding of isotopes.

Define the term 'isotopes'.

Refer to subatomic particles in your answer.

[2 marks]

8

4.1.1.5 Size and mass of atoms

Question 32

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 ☐

4.1.1.5 Size and mass of atoms

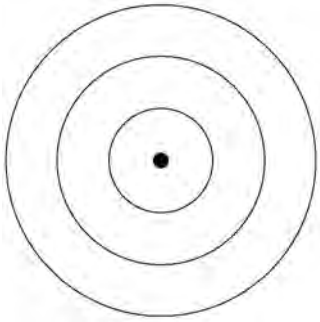
Question 32 · continued

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]

Question 32 · 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