AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 5.1.2.2

Development of the periodic table

Past-paper questions

Tier	**Foundation**
Question groups	**4**
Available paper years	**2019–2023**

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.

5.1.2.2 Development of the periodic table

Question 01

June 2019 | 8464/C/1F | Original Q3

0 3 This question is about the periodic table and argon.

0 3 . 1 What order did scientists use to arrange elements in early periodic tables?

[1 mark]

Tick (✓) **one** box.

- Atomic weight of element ☐
- Number of neutrons in an atom of element ☐
- Size of atoms of element ☐
- Year element was discovered ☐

0 3 . 2 In early periodic tables some elements were placed in the wrong groups.

Mendeleev overcame some of these problems in his periodic table.

Complete the sentence.

[1 mark]

Mendeleev did this by leaving _____ for elements that had not been discovered.

Question 3 continues on the next page

5.1.2.2 Development of the periodic table

Question 01 · continued June 2019 | 8464/C/1F | Original Q3

0 3 . 3 What is the name of the group that contains argon?

[1 mark]

Tick (✓) **one** box.

- Alkali metals ☐
- Halogens ☐
- Noble gases ☐

0 3 . 4 An atom of argon is represented as $^{40}_{18}Ar$

Determine the number of protons and the number of neutrons in one atom of argon.

[2 marks]

Number of protons _____

Number of neutrons _____

0 3 . 5 Different atoms of argon are, $^{39}_{18}Ar$ and $^{38}_{18}Ar$

What is the name given to these different atoms of argon?

[1 mark]

Tick (✓) **one** box.

- Fullerenes ☐
- Ions ☐
- Isotopes ☐
- Molecules ☐

5.1.2.2 Development of the periodic table

Question 01 · continued

0 3 . 6 What is the electronic structure of an argon atom, $^{40}_{18}Ar$?

[1 mark]

Tick (✓) **one** box.

2 ☐ 2, 8 ☐ 2, 8, 2 ☐ 2, 8, 8 ☐

0 3 . 7 Why is argon unreactive?

[1 mark]

_____

_____

8

Turn over for the next question

5.1.2.2 Development of the periodic table

Question 02

November 2020 | 8464/C/1F | Original Q5

0 5 This question is about elements in the periodic table.

0 5 . 1 What property was used to arrange elements in early periodic tables?

[1 mark]

Tick (✓) **one** box.

Atomic number ☐

Atomic weight ☐

Mass number ☐

0 5 . 2 In early periodic tables, iodine (I) was placed before tellurium (Te).

Mendeleev placed iodine after tellurium.

Figure 7 shows part of Mendeleev's periodic table.

Figure 7

16 **O**	19 **F**
32 **S**	35.5 **Cl**
79 **Se**	80 **Br**
128 **Te**	127 **I**

Suggest **one** reason why Mendeleev placed iodine in the column shown in **Figure 7**.

[1 mark]

5.1.2.2 Development of the periodic table

Question 02 · continued

Table 3 shows the melting points of three Group 1 metals.

Table 3

Metal	Melting point in °C
Lithium	180
Sodium	98
Potassium	63

0 5 . 3 What state is lithium at 100 °C?

Use **Table 3**.

[1 mark]

Tick (✓) **one** box.

Gas ☐ Liquid ☐ Solid ☐

0 5 . 4 Complete the graph in **Figure 8**.

Use **Table 3**.

You should:

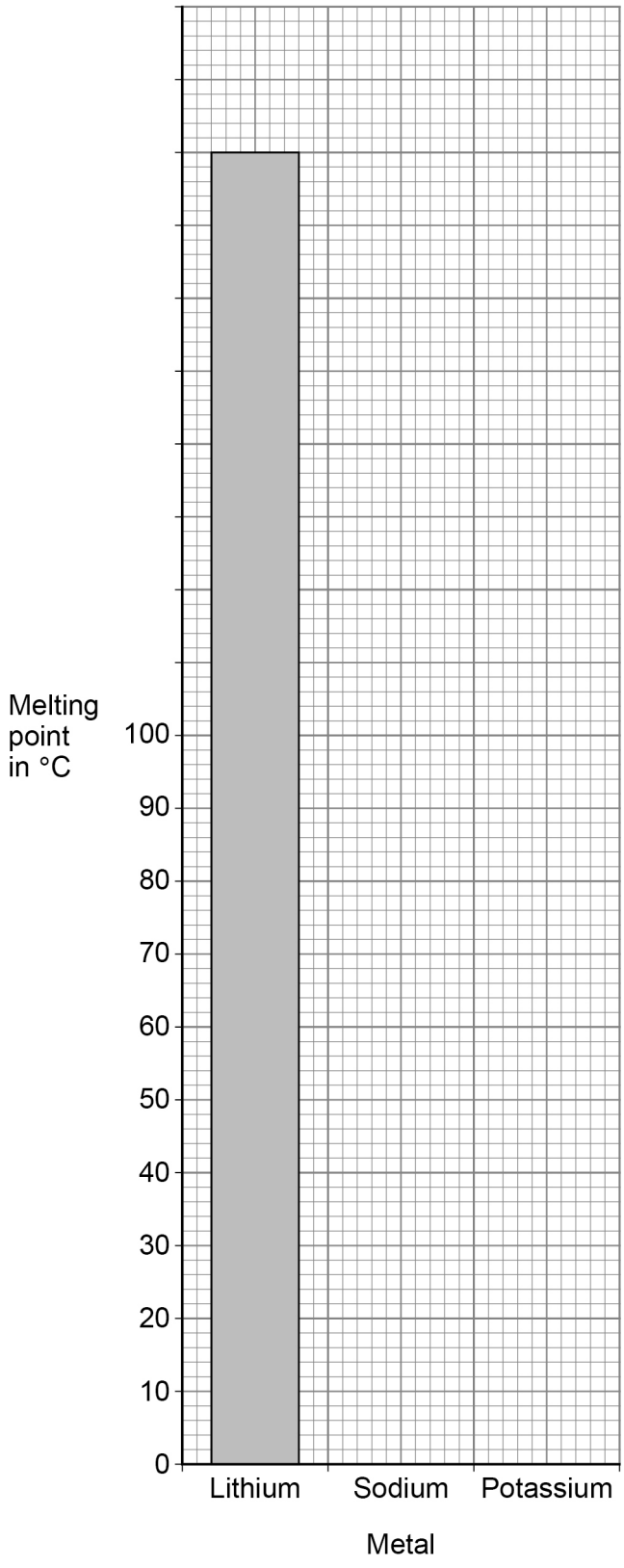
- complete the scale on the y-axis
- draw bars to show the melting points of sodium and potassium.

[3 marks]

5.1.2.2 Development of the periodic table

Question 02 · continued

Figure 8



5.1.2.2 Development of the periodic table

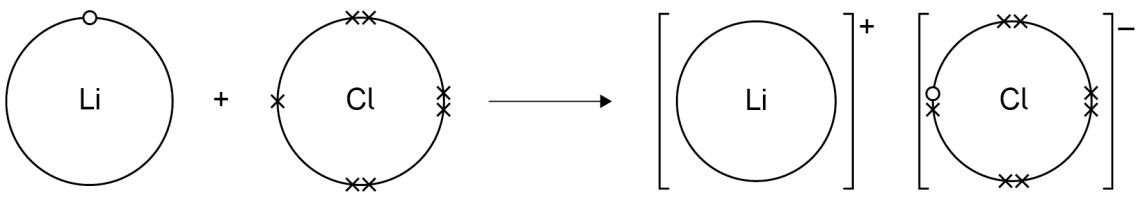
Question 02 · continued

0 5 . 5 Lithium reacts with chlorine to produce lithium chloride.

Figure 9 shows what happens to the electrons in the outer shells when a lithium atom reacts with a chlorine atom.

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

Figure 9



Describe what happens to a lithium atom and to a chlorine atom when they react.

Use **Figure 9** to answer in terms of electrons.

[3 marks]

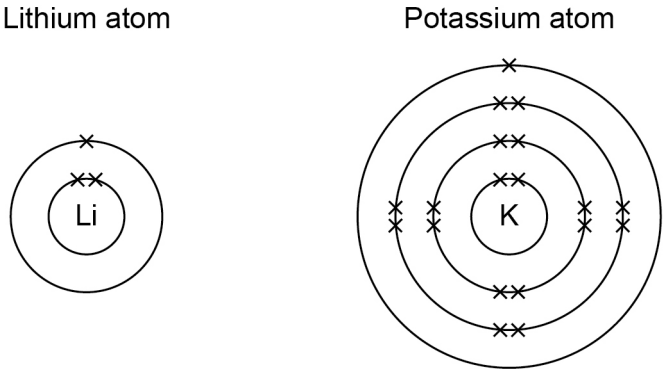
5.1.2.2 Development of the periodic table

Question 02 · continued

0 5 . 6 Lithium and potassium are in the same group of the periodic table.

Figure 10 represents the electronic structures of a lithium atom and of a potassium atom.

Figure 10



Give **two** reasons why potassium is more reactive than lithium.

[2 marks]

1 _____

_____

2 _____

_____

11

5.1.2.2 Development of the periodic table

Question 03

November 2021 | 8464/C/1F | Original Q6

0 6 This question is about the periodic table.

0 6 . 1 **Figure 11** shows part of Mendeleev's version of the periodic table.

Figure 11

H							
Li	Be	B	C	N	O	F	
Na	Mg	Al	Si	P	S	Cl	
K Cu	Ca Zn		Ti	V As	Cr Se	Mn Br	Fe Co Ni
Rb Ag	Sr Cd	Y In	Zr Sn	Nb Sb	Mo Te	I	Ru Rh Pd

Which group of elements had **not** been discovered when Mendeleev's version of the periodic table was published?

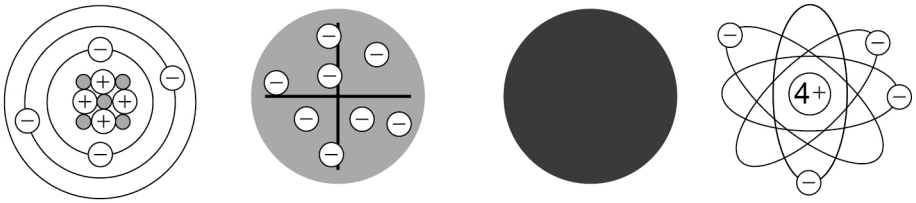
[1 mark]

5.1.2.2 Development of the periodic table

Question 03 · continued

Figure 12 represents different models of the atom.

Figure 12



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

0 6 . 2 Which model represents the plum pudding model?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 6 . 3 Which model resulted from Chadwick's experimental work?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

Question 6 continues on the next page

5.1.2.2 Development of the periodic table

Question 03 · continued

Potassium has different isotopes.

0 6 . 4 What is meant by 'isotopes'?

You should refer to subatomic particles.

[2 marks]

0 6 . 5 **Table 2** shows the mass numbers and the percentage abundance of two isotopes of potassium.

Table 2

Mass number	Percentage abundance
39	93.1
41	6.9

Calculate the relative atomic mass (A_r) of potassium.

Give your answer to 1 decimal place.

[3 marks]

Relative atomic mass (1 decimal place) = _____

8

5.1.2.2 Development of the periodic table

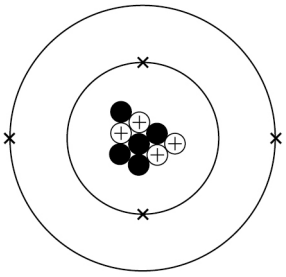
Question 04

June 2023 | 8464/C/1F | Original Q1

0 1 All substances are made from atoms.

0 1 . 1 **Figure 1** represents a beryllium atom.

Figure 1



What is the number of protons and the number of neutrons in the beryllium atom?

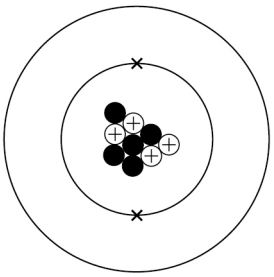
[2 marks]

Number of protons _____

Number of neutrons _____

0 1 . 2 **Figure 2** represents a beryllium **ion**.

Figure 2



What is the relative charge on a beryllium ion?

[1 mark]

Tick (✓) **one** box.

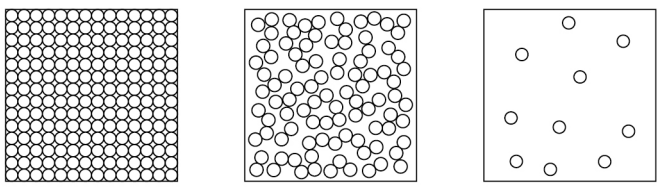
0 ☐ +1 ☐ +2 ☐

5.1.2.2 Development of the periodic table

Question 04 · continued

Figure 3 shows the arrangement of atoms in the three states of matter.

Figure 3



A **B** **C**

0 1 . 3 What state of matter is represented by state **C** in **Figure 3**?

[1 mark]

Tick (✓) **one** box.

Gas ☐

Liquid ☐

Solid ☐

5.1.2.2 Development of the periodic table

Question 04 · continued

0 1 . 4 What is the name of the process when state **B** changes into state **A**?

Use **Figure 3**.

[1 mark]

Tick (✓) **one** box.

Condensing ☐

Freezing ☐

Melting ☐

0 1 . 5 How can state **B** be changed into state **C**?

Use **Figure 3**.

[1 mark]

Question 1 continues on the next page

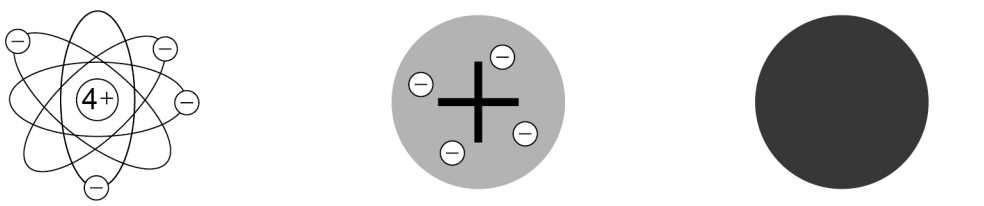
5.1.2.2 Development of the periodic table

Question 04 · continued

Experimental evidence led to the scientific model of the atom changing over time.

0 1 . 6 **Figure 4** shows three models for the atom.

Figure 4

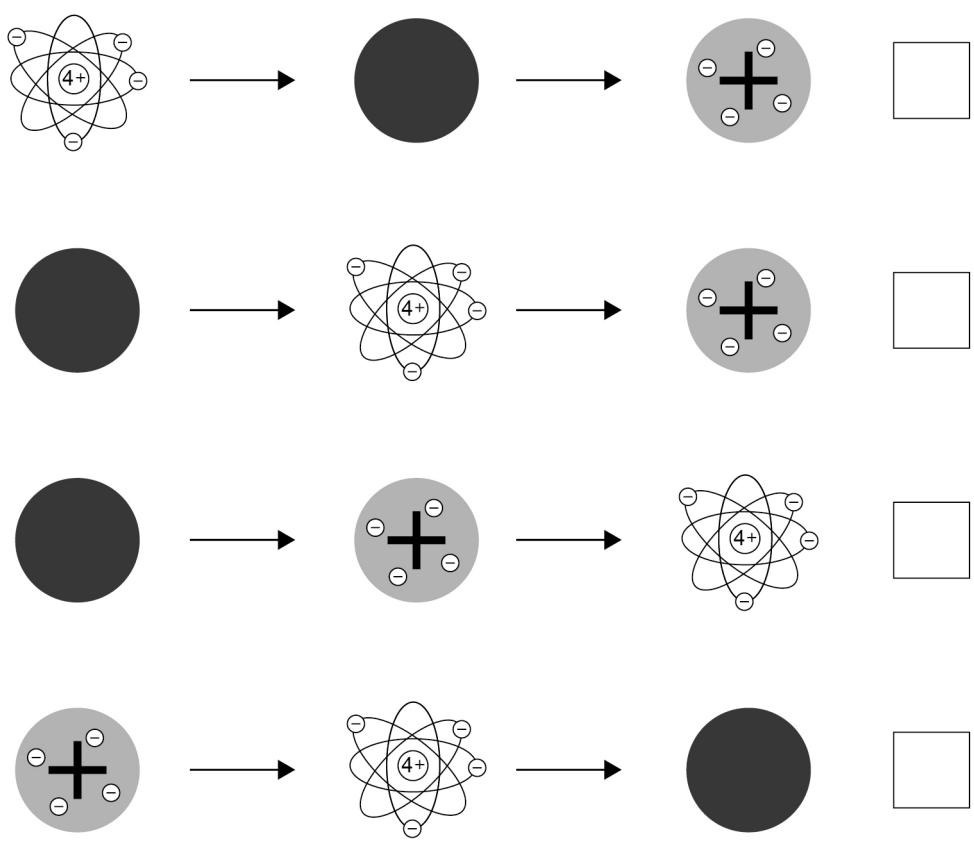


Nuclear model **Plum pudding model** **Tiny spheres model**

What is the order for the development of the model of the atom?

[1 mark]

Tick (✓) **one** box.



5.1.2.2 Development of the periodic table

Question 04 · continued

0 1 . 7 Complete the sentence.

Choose the answer from the box.

[1 mark]

Bohr	**Chadwick**	**Mendeleev**

The existence of neutrons was discovered by _____.

8

Turn over for the next question