

Atomic structure and the periodic table – GCSE Combined Science Chemistry**1. No.3.4**

What are Group 7 elements known as?

[1 mark]Tick (✓) **one** box.

Alkali metals

☐

Halogens

☐

Noble gases

☐**2. No.3.5**

Fluorine, chlorine and bromine react with gold.

Which element will be the most reactive with gold?

[1 mark]Tick (✓) **one** box.

Fluorine

☐

Chlorine

☐

Bromine

☐

3. No.5

This question is about elements in the periodic table.

What property was used to arrange elements in early periodic tables?

[1 mark]

Tick (✓) **one** box.

Atomic number

☐

Atomic weight

☐

Mass number

☐

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]

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

Table 3

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

What state is lithium at 100 °C?

Use **Table 3**.

[1 mark]

Tick (✓) **one** box.

Gas

☐

Liquid

☐

Solid

☐

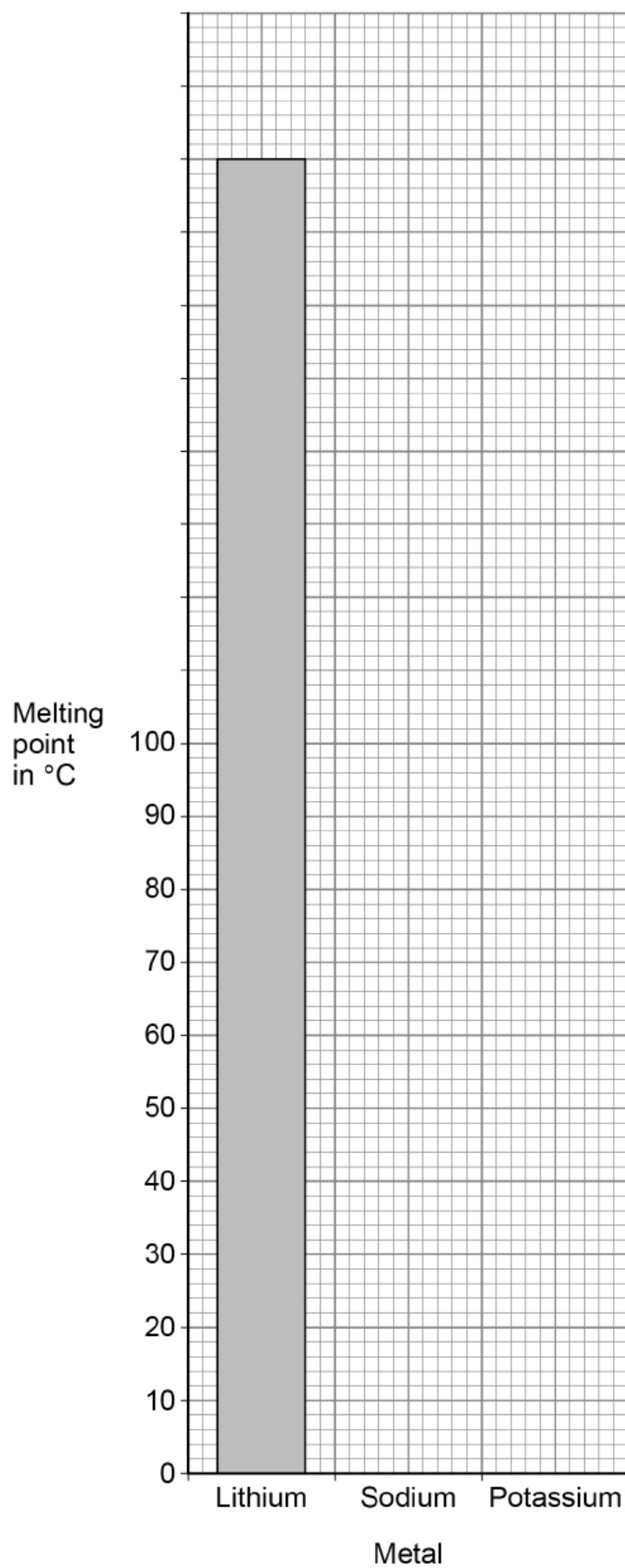
Complete the graph in **Figure 8**.

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]

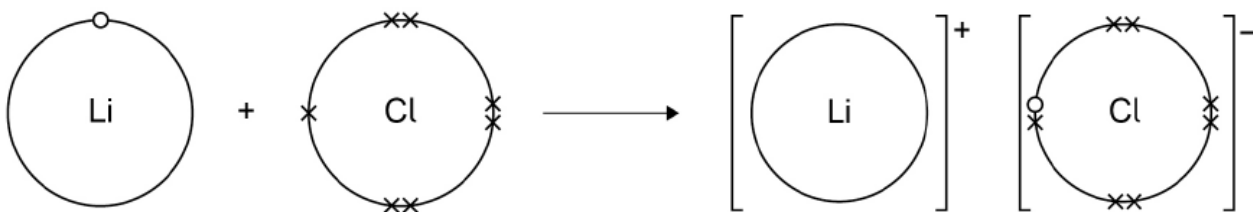
Figure 8

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.

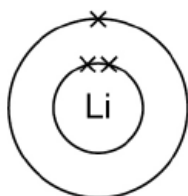
[3 marks]

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

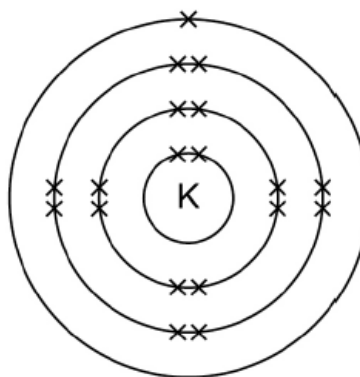
Figure 10 represents the electronic structures of a lithium atom and of a potassium atom.

Figure 10

Lithium atom



Potassium atom



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

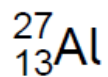
[2 marks]

1 _____

2 _____

4. No.6.1

An aluminium atom is represented as:



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

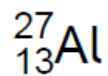
[2 marks]

Number of electrons _____

Number of neutrons _____

5. No.1.1

An aluminium atom is represented as:



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

[2 marks]

Number of electrons _____

Number of neutrons _____

6. No.7.3

Figure 6 shows part of Mendeleev's periodic table.

Figure 6

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

Explain why the early periodic tables placed iodine (I) before tellurium (Te), but then Mendeleev placed tellurium before iodine.

[3 marks]

7. No.3

This question is about the periodic table and argon.

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

☐

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.

What is the name of the group that contains argon?

[1 mark]

Tick (✓) **one** box.

Alkali metals

☐

Halogens

☐

Noble gases

☐

An atom of argon is represented as ${}^{40}_{18}\text{Ar}$

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

[2 marks]

Number of protons _____

Number of neutrons _____

Different atoms of argon are, ${}^{39}_{18}\text{Ar}$ and ${}^{38}_{18}\text{Ar}$

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

[1 mark]

Tick (✓) **one** box.

Fullerenes

☐

Ions

☐

Isotopes

☐

Molecules

☐

What is the electronic structure of an argon atom, $^{40}_{18}\text{Ar}$?

[1 mark]

Tick (✓) **one** box.

2 ☐

2, 8 ☐

2, 8, 2 ☐

2, 8, 8 ☐

Why is argon unreactive?

[1 mark]

8. No.4.6

How does the size of a potassium atom compare with the size of a sodium atom?

Give a reason for your answer.

[2 marks]

Reason

9. No.4

This question is about elements in the periodic table.

What order did scientists use to arrange elements in early periodic tables?

[1 mark]

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

Mendeleev overcame this in his periodic table.

Give **one** way Mendeleev did this.

[1 mark]

Table 2 shows the boiling points of fluorine, chlorine and bromine.

Table 2

Element	Boiling point in °C
Fluorine	−186
Chlorine	−34
Bromine	+59

Explain why the boiling points in **Table 2** are low.

[2 marks]

Explain the trend in the boiling points in **Table 2**.

[3 marks]

Explain why neon is unreactive.

Give the electronic structure of neon in your answer.

[2 marks]

How many atoms are there in 1 g of argon?

The Avogadro constant is 6.02×10^{23} per mole.

Relative atomic mass (A_r): Ar = 40

[2 marks]

Number of atoms in 1 g = _____