AQA - Atomic structure and the periodic table – GCSE Chemistry Paper_1

1. June/2021/Paper_1H/No.6

0 1 This question is about the periodic table.

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

Figure 1

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

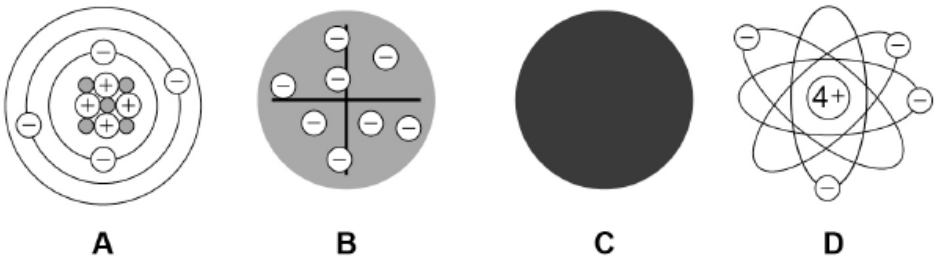
Which group of elements had **not** been discovered when Mendeleev's version of the periodic table was published?

[1 mark]

_____

Figure 2 represents different models of the atom.

Figure 2



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

0 1 . 2 Which model represents the plum pudding model?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 1 . 3 Which model resulted from Chadwick's experimental work?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

Potassium has different isotopes.

0 1 . 4 What is meant by 'isotopes'?

You should refer to subatomic particles.

[2 marks]

0 1 . 5 **Table 1** shows the mass numbers and the percentage abundance of two isotopes of potassium.

Table 1

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) = _____

2. June/2021/Paper_1F/No.1

0 1 Magnesium is in Group 2 of the periodic table.

1.0 g of magnesium reacted with chlorine to produce magnesium chloride.

0 1 . 1 Which types of element react when magnesium reacted with chlorine?

[1 mark]

Tick (✓) **one** box.

A metal and a metal ☐

A metal and a non-metal ☐

A non-metal and a non-metal ☐

0 1 . 2 Write the word equation for the reaction when magnesium reacts with chlorine.

[1 mark]

_____ + _____ → _____

0 1 . 3 What apparatus was used to measure the mass of 1.0 g of magnesium?

[1 mark]

Tick (✓) **one** box.

Balance ☐

Beaker ☐

Ruler ☐

0 1 . 4 What mass of magnesium chloride was produced?

[1 mark]

Tick (✓) **one** box.

Less than 1.0 g ☐

1.0 g ☐

More than 1.0 g ☐

0 1 . 5 Magnesium reacts with oxygen to produce magnesium oxide.

Calculate the percentage mass of magnesium in magnesium oxide (MgO).

Relative atomic mass (A_r): Mg = 24

Relative formula mass (M_r): MgO = 40

[2 marks]

Percentage mass of magnesium = _____ %

Magnesium carbonate decomposes to produce magnesium oxide and carbon dioxide.

The word equation for the reaction is:

magnesium carbonate → magnesium oxide + carbon dioxide

Four students heated 2.00 g of magnesium carbonate for 10 minutes.

Table 1 shows the results.

Table 1

Mass of carbon dioxide produced in g				
Student 1	**Student 2**	**Student 3**	**Student 4**	**Mean**
0.97	0.91	0.50	0.95	**X**

0 1 . 6 What is the most likely reason for **Student 3**'s anomalous result?

[1 mark]

Tick (✓) **one** box.

The student heated more than 2.00 g of magnesium carbonate. ☐

The student heated the magnesium carbonate for less than 10 minutes. ☐

The student used a higher temperature. ☐

0 1 . 7 Calculate value **X** in **Table 1**.

Do **not** use the anomalous result.

Give your answer to 2 significant figures.

[3 marks]

X (2 significant figures) = _____ g

3. June/2021/Paper_1F/No.4

0 4 Sodium and potassium are Group 1 elements.

0 4 . 1 What is the name of Group 1 elements?

[1 mark]

Tick (✓) **one** box.

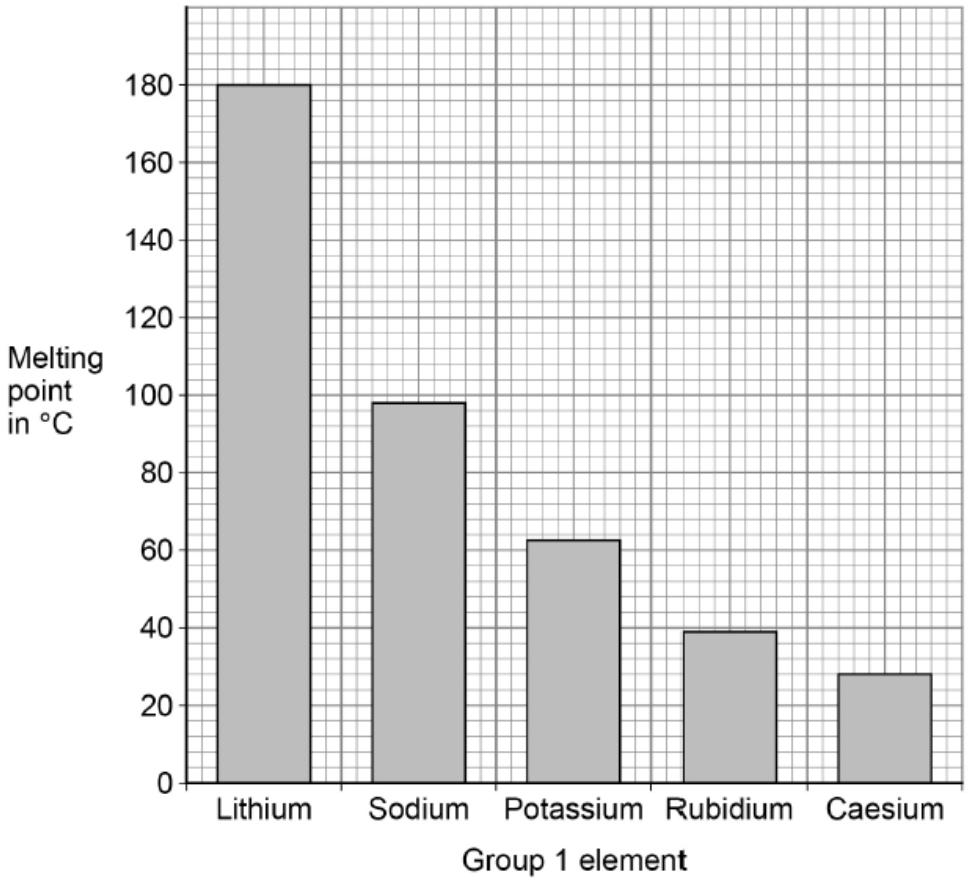
Alkali metals ☐

Halogens ☐

Noble gases ☐

0 4 . 2 **Figure 5** represents the melting points of Group 1 elements.

Figure 5



What is the melting point of sodium?

[1 mark]

Melting point of sodium = _____ °C

0 4 . 3 Sodium reacts with water to produce sodium hydroxide and hydrogen.

Balance the equation for the reaction.

[1 mark]

$$\_\_\_\_\_ Na + 2H_2O \rightarrow 2NaOH + H_2$$

0 4 . 4 Calculate the relative formula mass (M_r) of sodium hydroxide (NaOH).

Relative atomic masses (A_r): H = 1 O = 16 Na = 23

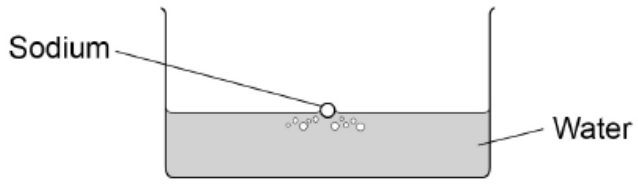
[2 marks]

Relative formula mass (M_r) = _____

0 4 . 5 Sodium and potassium both react with water.

Figure 6 shows sodium reacting with water.

Figure 6



Compare what is seen when sodium reacts with water and when potassium reacts with water.

[4 marks]