



GCSE Chemistry

Group 1 Elements

Question Paper

Time available: 64 minutes

Marks available: 60 marks

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1.

This question is about Group 1 elements.

(a) Complete **Table 1** to show the electronic structure of a potassium atom.

Table 1

Atom	Number of electrons	Electronic structure
Sodium	11	2,8,1
Potassium	19	

(1)

(b) Why do Group 1 elements have similar chemical properties?

Tick (✓) **one** box.

They have the same number of electron shells.

They have the same number of outer shell electrons.

They have two electrons in the first shell.

(1)

(c) What is the type of bonding in sodium?

Tick (✓) **one** box.

Covalent

Ionic

Metallic

(1)

Table 2 shows observations made when lithium, potassium and rubidium react with water.

Table 2

Element	Observations
Lithium	Bubbles slowly Floats Moves slowly
Sodium	1 _____ 2 _____
Potassium	Bubbles very quickly Melts into a ball Floats Moves very quickly Flame
Rubidium	Sinks Melts into a ball Explodes with a flame

(d) Give **two** observations you could make when sodium reacts with water.

Write your answers in **Table 2**.

(2)

(e) How does the reactivity of the elements change going down Group 1?

(1)

(f) Give **two** ways in which the observations in **Table 2** show the change in reactivity going down Group 1.

1 _____

2 _____

(2)

(g) Which gas is produced when Group 1 elements react with water?

Tick (✓) **one** box.

Carbon dioxide

Hydrogen

Nitrogen

Oxygen

(1)

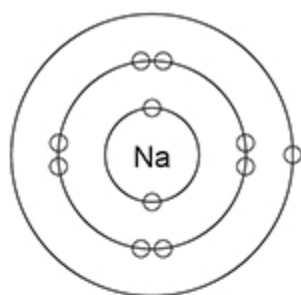
(h) Sodium fluoride is an ionic compound.

The diagram below shows dot and cross diagrams for a sodium atom and a fluorine atom.

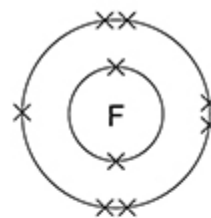
Complete the diagram below to show what happens when a sodium atom and a fluorine atom react to produce sodium fluoride.

You should:

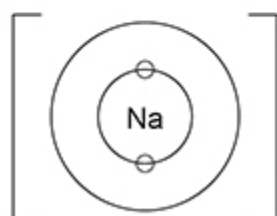
- complete the electronic structures of the sodium ion and the fluoride ion
- give the charges on the sodium ion and the fluoride ion.



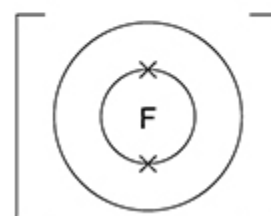
Sodium atom



Fluorine atom



Sodium ion



Fluoride ion

(3)

(Total 12 marks)

2.

This question is about groups in the periodic table.

The elements in Group 1 become more reactive going down the group.

Rubidium is below potassium in Group 1.

(a) Rubidium and potassium are added to water.

Predict **one** observation you would see that shows that rubidium is more reactive than potassium.

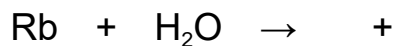
(1)

(b) Explain why rubidium is more reactive than potassium.

(3)

(c) Complete the equation for the reaction of rubidium with water.

You should balance the equation.



(3)

The noble gases are in Group 0.

(d) Which is a correct statement about the noble gases?

Tick (✓) **one** box.

The noble gases all have atoms with eight electrons in the outer shell.

The noble gases have boiling points that increase going down the group.

The noble gases have molecules with two atoms.

The noble gases react with metals to form ionic compounds.

(1)

(e) The table below shows information about the three isotopes of neon.

Mass number	Percentage abundance (%)
20	90.48
21	0.27
22	9.25

Calculate the relative atomic mass (A_r) of neon.

Give your answer to 3 significant figures.

Relative atomic mass (3 significant figures) = _____

(3)

(Total 11 marks)

3.

This question is about Group 1 elements.

(a) Give **two** observations you could make when a small piece of potassium is added to water.

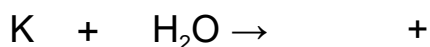
1 _____

2 _____

(2)

(b) Complete the equation for the reaction of potassium with water.

You should balance the equation.



(2)

(c) Explain why the reactivity of elements changes going down Group 1.

(4)

Sodium reacts with oxygen to produce the ionic compound sodium oxide.

Oxygen is a Group 6 element.

(d) Draw a dot and cross diagram to show what happens when atoms of sodium and oxygen react to produce sodium oxide.

Diagram

(4)

(e) Why is oxygen described as being reduced in the reaction between sodium and oxygen?

(1)

(f) Explain why sodium oxide has a high melting point.

(3)
(Total 16 marks)

4.

This question is about elements in Group 1.

A teacher burns sodium in oxygen.

(a) Complete the word equation for the reaction.

sodium + oxygen \rightarrow _____

(1)

(b) What is the name of this type of reaction?

Tick **one** box.

Decomposition

Electrolysis

Oxidation

Precipitation

(1)

(c) 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?

Tick **one** box.

1		4		7		13	
---	--	---	--	---	--	----	--

(1)

(d) The solution contains a substance with the formula NaOH

Give the name of the substance.

(1)

(e) All alkalis contain the same ion.

What is the formula of this ion?

Tick **one** box.

H ⁺	<input type="checkbox"/>
Na ⁺	<input type="checkbox"/>
OH ⁻	<input type="checkbox"/>
O ²⁻	<input type="checkbox"/>

(1)

(f) 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?

Mass = _____ g

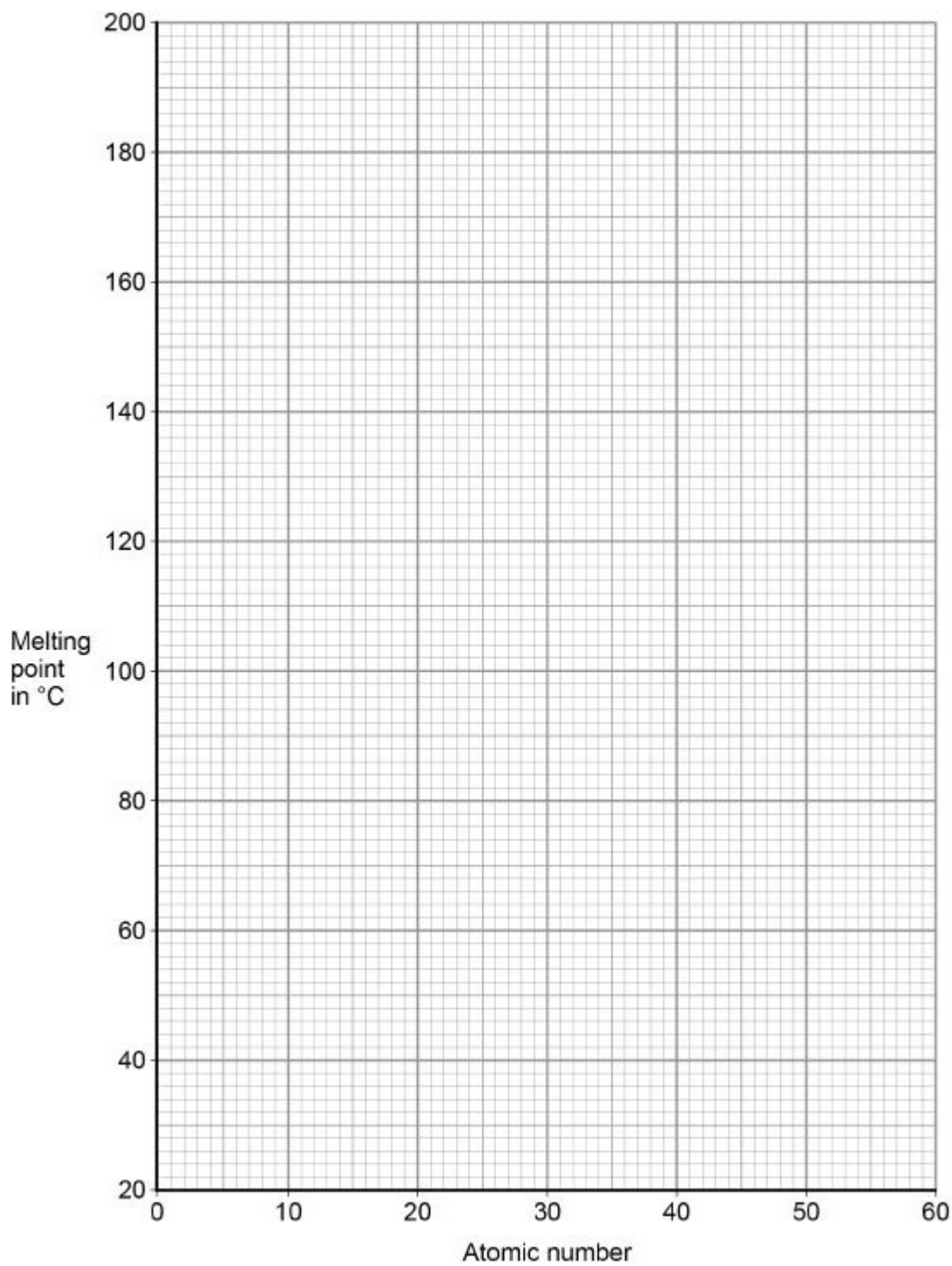
(2)

(g) The melting points of the elements in Group 1 show a trend.

The table below shows the atomic numbers and melting points of the Group 1 elements.

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 the table on the graph below.



(2)

(h) Predict the melting point, X, of rubidium, atomic number 37

Use the graph above.

Melting point = _____ °C

(1)

(Total 10 marks)

(iv) Which **two** statements are correct?

Tick (✓) **two** boxes.

Iron has a higher density than potassium.

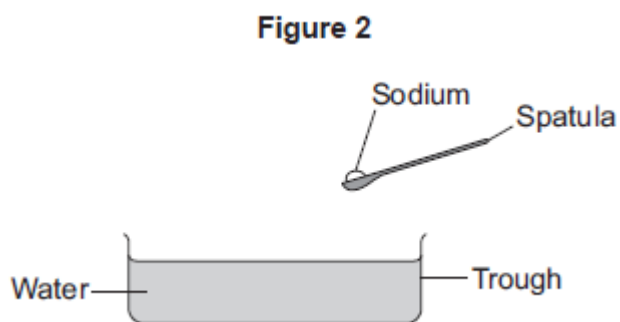
Iron is softer than potassium.

Iron reacts vigorously with water.

Iron forms ions that have different charges.

(2)

(c) **Figure 2** shows sodium being put into water.



Describe **three** observations that can be seen when sodium is put into water.

1. _____

2. _____

3. _____

(3)

(Total 11 marks)