Paper 3

Questions are applicable for both core and extended candidates

1 The chemical elements are arranged in the Periodic Table in groups and periods.

(a) (i) Describe how the metallic character of the elements changes from left to right across a period.

.....

..... [1]

(ii) The elements in Group I are known as the alkali metals.

Describe **two** trends in the properties of the elements, going down Group I.

1 .....

2 .....

[2]

2 This question is about metals.

(a) Iron is a transition element. Potassium is an element in Group I of the Periodic Table.

State **two** differences in the physical properties of iron compared to potassium.

1 .....

2 .....

[2]

3 This question is about metals and metal compounds.

(a) Table 5.1 shows some properties of some Group I metals.

Table 5.1

metal	melting point in °C	boiling point in °C	observations on reaction with water	solubility of metal hydroxide in g/dm^3 at room temperature
sodium	98	883	bubbles form rapidly but no flame	
potassium	63	760		1130
rubidium		686	explodes	1980
caesium	29	669	explodes	3860

Use the information in Table 5.1 to predict:

(i) the melting point of rubidium ..... [1]

(ii) the solubility of sodium hydroxide at room temperature ..... [1]

(iii) the observations when potassium reacts with water

.....

..... [1]

(iv) the physical state of caesium at 20 °C. Give a reason for your answer.

physical state .....

reason .....

..... [2]

4 The table shows some properties of four Group I elements.

element	melting point / °C	boiling point / °C	relative hardness
lithium	181	1342	.....
sodium	98	.....	0.70
potassium	63	760	0.36
rubidium	39	686	0.22

(a) (i) Complete the table by estimating:
- the boiling point of sodium
- the relative hardness of lithium. [2]

(ii) Predict the physical state of lithium at 200 °C.

Give a reason for your answer.

.....

..... [2]

(b) Potassium reacts with water.

$$2K + 2H_2O \rightarrow 2KOH + H_2$$

Describe **two** observations when potassium reacts with water.

1 .....

2 .....

[2]

Paper 4

Questions are applicable for both core and extended candidates unless indicated in the question

5 Lithium, sodium and potassium are Group I elements.

(a) Name the type of bonding in these elements.

..... [1]

(b) Sodium reacts with cold water to form hydrogen gas and a solution of a strong alkali.

(i) State the test for hydrogen gas.

test .....

positive result .....
[1]

(ii) Suggest the pH of a solution of a strong alkali.

pH = ... [1]

(iii) Name a substance which can be used to confirm the pH of a solution of a strong alkali.

..... [1]

(iv) Write the symbol equation for the reaction between sodium and cold water.

Include state symbols.

..... [3]

6 **(a)** The symbols of the elements in Period 2 of the Periodic Table are shown.

Li Be B C N O F Ne

Use the symbols of the elements in Period 2 to answer the questions that follow.
Each symbol may be used once, more than once or not at all.

Give the symbol of the element that:

(v) is an alkali metal ..... [1]

7 The Periodic Table can be used to classify elements.

(a) Group I elements react with cold water to form alkaline solutions.

(i) Place the Group I elements caesium, lithium, potassium, rubidium and sodium in their order of reactivity with water.

Put the most reactive element first.

most reactive ⟶ least reactive

[1]

(ii) Name the alkaline solution formed when caesium reacts with cold water.

..... [1]

(b) Group I elements have lower melting points than transition elements.

Describe one **other** difference in the **physical** properties of Group I elements and transition elements.

..... [1]