

1 Potassium is a soft metal which can be cut with a knife. It reacts violently with chlorine to form potassium chloride.

(a) Complete and balance the symbol equation below for the reaction of potassium with chlorine.



(b) Describe the appearance of a piece of freshly cut potassium.

\_\_\_\_\_ [1]  
 \_\_\_\_\_

(c) What happens to the freshly cut potassium when it is left in the air for a few minutes?

\_\_\_\_\_ [1]  
 \_\_\_\_\_

(d) Why is potassium stored under oil in the laboratory?

\_\_\_\_\_ [1]  
 \_\_\_\_\_

(e) Before reacting Group 1 elements with water a risk assessment is carried out.

Give two safety precautions, apart from wearing safety glasses, which must be included in the risk assessment.

1. \_\_\_\_\_
- \_\_\_\_\_
2. \_\_\_\_\_
- \_\_\_\_\_ [2]

Examiner Only	
Marks	Remark

- (f) Equal sized pieces of three Group 1 metals are added to separate troughs of water which contain universal indicator. The observations made are recorded in the table below.

Name of Group 1 metal	Observation when the metal is added to water	Colour of universal indicator
potassium	<ul style="list-style-type: none"> <li>catches fire</li> <li>burns with a lilac flame on the surface of the water</li> <li>quickly disappears</li> </ul>	<ul style="list-style-type: none"> <li>changes colour from green to blue</li> </ul>
lithium	<ul style="list-style-type: none"> <li>floats</li> <li>moves about the surface of the water</li> <li>eventually disappears</li> </ul>	<ul style="list-style-type: none"> <li>changes colour from green to blue</li> </ul>
sodium	<ul style="list-style-type: none"> <li>melts into a silvery ball on the surface of the water</li> <li>disappears</li> </ul>	<ul style="list-style-type: none"> <li>changes colour from green to blue</li> </ul>

Read the information in the table carefully.

- (i) What happens to the reactivity of the Group 1 elements as the Group is descended? You may find your Data Leaflet helpful.

\_\_\_\_\_ [1]

- (ii) Explain fully why the universal indicator changed colour from green to blue.

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_ [3]

- (iii) Give one more observation which could be added to the table for **all three** reactions.

\_\_\_\_\_ [1]

- (iv) Write a **word** equation to describe the reaction between sodium and water.

\_\_\_\_\_ [2]

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Marks	Remark



Almost a decade after Newlands, Dmitri Mendeleev produced a Periodic Table, part of which is shown below.

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

Using your knowledge and understanding, describe the main differences between the Modern Periodic Table and the Periodic Table developed by Mendeleev. In your answer make it clear which version of the Periodic Table you are referring to.

**In this question you will be assessed on your written communication skills including the use of specialist scientific terms.**

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[6]

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Marks	Remark

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2 A small piece of sodium metal was added, using tongs, to a trough of water to which a few drops of universal indicator had been added.

(a) How is sodium stored in the laboratory?

\_\_\_\_\_ [1]

(b) Why was a **small** piece of sodium added to the water?

\_\_\_\_\_ [1]

(c) Why was the sodium handled with tongs instead of using fingers to lift it?

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_ [2]

(d) Choose **three** statements which describe what happens when sodium is placed into the water.

Put a tick (✓) in the three correct boxes.

bubbles of carbon dioxide gas form <input type="checkbox"/>	melts into a silvery ball <input type="checkbox"/>
burns with a lilac flame <input type="checkbox"/>	sinks to the bottom then floats to the top <input type="checkbox"/>
moves quickly across the surface of the water <input type="checkbox"/>	eventually disappears <input type="checkbox"/>

[3]

At the end of this reaction the universal indicator had turned purple.

(e) What does this tell you about the product of the reaction?

\_\_\_\_\_  
 \_\_\_\_\_ [1]

Examiner Only	
Marks	Remark

(E)

Sodium is a Group 1 metal.

(f) Explain, in terms of electrons, why all Group 1 metals react in a similar way.

\_\_\_\_\_  
\_\_\_\_\_ [1]

(g) Suggest why rubidium is **not** used in the school laboratory instead of sodium to demonstrate the reaction of Group 1 metals with water.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [1]

Examiner Only	
Marks	Remark

2 By the 1860s chemists had discovered about 60 elements and were attempting to organise them by looking for patterns. Today, over 100 elements are known and they are arranged in a particular way in the modern Periodic Table.

Examiner Only	
Marks	Remark

(a) Explain what is meant by the term element.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [1]

(c) In what order are the elements arranged in the modern Periodic Table?

\_\_\_\_\_ [1]

(d) What names are given to the rows and columns of elements in the modern Periodic Table?

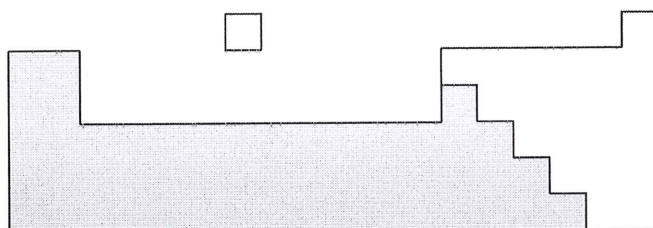
(i) rows \_\_\_\_\_ [1]

(ii) columns \_\_\_\_\_ [1]

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(e) The diagram below shows an outline of part of the modern Periodic Table with a shaded area.



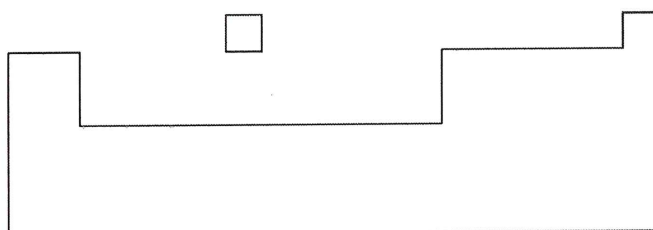
The elements in the shaded area in the diagram have similar physical properties. Give two physical properties of the elements in this area.

1. \_\_\_\_\_ [1]

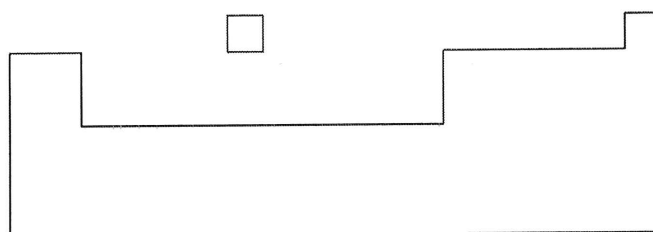
2. \_\_\_\_\_ [1]

(f) On the outlines of the Periodic Tables below shade in the area where the:

(i) halogens can be found.



(ii) alkaline earth metals can be found.



[2]

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Marks	Remark

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3 Chemists have collected a vast amount of information about the atoms of elements and have displayed it on a table called the Periodic Table.

The table below gives information about the atomic number, group number and electronic configuration of the atoms of elements A, B, C and D.

Elements	Atomic Number	Electronic configuration	Group Number
A	12	2,8,2	
B	6		4
C		2,7	7
D	15		5

(a) Complete the table above. [4]

(b) How many electrons would you expect an atom of strontium to have in its outer shell?

\_\_\_\_\_ [1]

(c) Name the element in Group 6 and Period 3 of the Periodic Table.

\_\_\_\_\_ [1]

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Marks	Remark

CI H Feb 2012



- 4 Read the information given below about smart phones and then answer the questions that follow. You may find your Data Leaflet helpful.

The screen on a smart phone is made of a mixture of tin oxide and indium oxide. It is transparent and is able to conduct electricity. The glass underneath is made of aluminium oxide and silicon dioxide and is strengthened with potassium ions. The electrical components are made from copper, silver and gold. The wiring is copper.

Nickel is used in the microphone. Some rare elements including neodymium and gadolinium are used in the magnets of the microphone and in the speaker. Magnesium compounds are used to make phone cases. The batteries contain lithium compounds and carbon.

- (a) Name one element, from each of the following Groups in the Periodic Table, which is mentioned in the passage:

Group 1 \_\_\_\_\_ Group 2 \_\_\_\_\_

Group 3 \_\_\_\_\_ Group 4 \_\_\_\_\_ [4]

- (b) Copper, nickel, silver and gold are all found in the same block or section of the Periodic Table.  
What name is given to this block?

\_\_\_\_\_ [1]

- (c) Give the chemical **symbol** for an element, mentioned in the passage, which is found in the Lanthanum series of the Periodic Table.

\_\_\_\_\_ [1]

- (d) Indium is in the same Group as aluminium. Predict the formula for indium oxide.

\_\_\_\_\_ [1]

- (e) Explain fully, in terms of its structure, why copper is a suitable element to use for the wiring of the phone.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [3]

Examiner Only	
Marks	Remark
○	○

5 In this question you will be assessed on your written communication skills including the use of specialist scientific terms.

Potassium and sodium both react with water. Describe similarities and differences between these reactions.

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[6]

Examiner Only	
Marks	Remark

CI H Nov 2013

- 6 The table below summarises the observations made when solutions of the halogens are added to solutions of the halide ions.

halide solution \ halogen	potassium chloride solution	potassium bromide solution	potassium iodide solution
chlorine		colourless solution becomes orange-brown	colourless solution becomes dark brown
bromine	no reaction		colourless solution becomes dark brown
iodine	no reaction	no reaction	

© CCEA

- (a) Explain why bromine solution does not react with potassium chloride solution.

\_\_\_\_\_

\_\_\_\_\_ [2]

- (b) Name the **type** of reaction that takes place between potassium bromide and chlorine.

\_\_\_\_\_ [1]

- (c) Write a balanced **symbol** equation for the reaction between chlorine and potassium iodide.

\_\_\_\_\_ [3]

- (d) Explain in terms of their electronic structures why the halogens have similar chemical properties.

\_\_\_\_\_

\_\_\_\_\_ [2]

Examiner Only	
Marks	Remark
○	○



7 The table below gives information about four members of the halogens.

element	ion	physical state at room temperature	colour	formula of molecule	toxicity
fluorine	F <sup>-</sup>	gas	yellow	F <sub>2</sub>	high
chlorine	Cl <sup>-</sup>	gas	green	Cl <sub>2</sub>	high
bromine	Br <sup>-</sup>	liquid	reddish-brown	Br <sub>2</sub>	high
iodine	I <sup>-</sup>	solid	grey-black	I <sub>2</sub>	high

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Marks	Remark

(a) Describe the trends in physical state at room temperature and colour as you move down the group of halogens.

\_\_\_\_\_ [2]  
 \_\_\_\_\_

(b) Explain why all the halogens form ions with a charge of minus one.

\_\_\_\_\_ [2]  
 \_\_\_\_\_

(c) Astatine, At, is the fifth member of the halogens.

(i) Using the data given predict the following properties of astatine.

Physical state at room temperature: \_\_\_\_\_

Colour: \_\_\_\_\_

Toxicity: \_\_\_\_\_

Formula of ion: \_\_\_\_\_

Formula of molecule: \_\_\_\_\_ [2]

(ii) What would you predict to be the name of the compound formed when sodium reacts with astatine?

\_\_\_\_\_ [1]



7 This question is about the halogens.

An experiment was carried out to compare the reactivity of the elements of Group 7. The elements were added to aqueous solutions of three halides. The results are shown in the table below.

<b>solution halogen</b>	<b>sodium chloride</b>	<b>sodium bromide</b>	<b>sodium iodide</b>
<b>chlorine</b>	no reaction	reaction and colour change	reaction and colour change
<b>bromine</b>	no reaction	no reaction	reaction and colour change
<b>iodine</b>	no reaction	no reaction	no reaction
<b>X</b>	reaction	reaction and colour change	reaction and colour change

(a) Use your knowledge and the information in the table to answer the following questions.

(i) Which of the four halogens in the table is the most reactive?

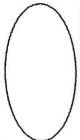
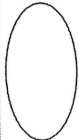
\_\_\_\_\_ [1]

(ii) Which halogen in the table is the least reactive?

\_\_\_\_\_ [1]

(iii) Describe and explain the colour changes you would observe when chlorine is added to sodium iodide solution.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [3]

Examiner Only	
Marks	Remark
	





- (b) Write a balanced symbol equation for the reaction between bromine and sodium iodide.

\_\_\_\_\_ [3]

- (c) Predict the name of the halogen **X**.

\_\_\_\_\_ [1]

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**THIS IS THE END OF THE QUESTION PAPER**

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Examiner Only	
Marks	Remark

8 When the elements sodium and potassium react with water very similar chemical reactions take place. However there are some noticeable differences.

(a) Give three ways in which the reactions of sodium and potassium with water are similar.

- 1. \_\_\_\_\_
- 2. \_\_\_\_\_
- 3. \_\_\_\_\_ [3]

(b) Explain fully, in terms of their electron arrangements, why sodium and potassium react in such similar ways.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

(c) Give two ways in which the reactions of sodium and potassium with water are different.

- 1. \_\_\_\_\_
- 2. \_\_\_\_\_ [2]

(d) Complete and balance the symbol equation for the reaction of potassium with water.



(e) When sodium reacts with bromine it forms the compound sodium bromide. Write a balanced symbol equation for this reaction.

\_\_\_\_\_ [3]

[Turn over

