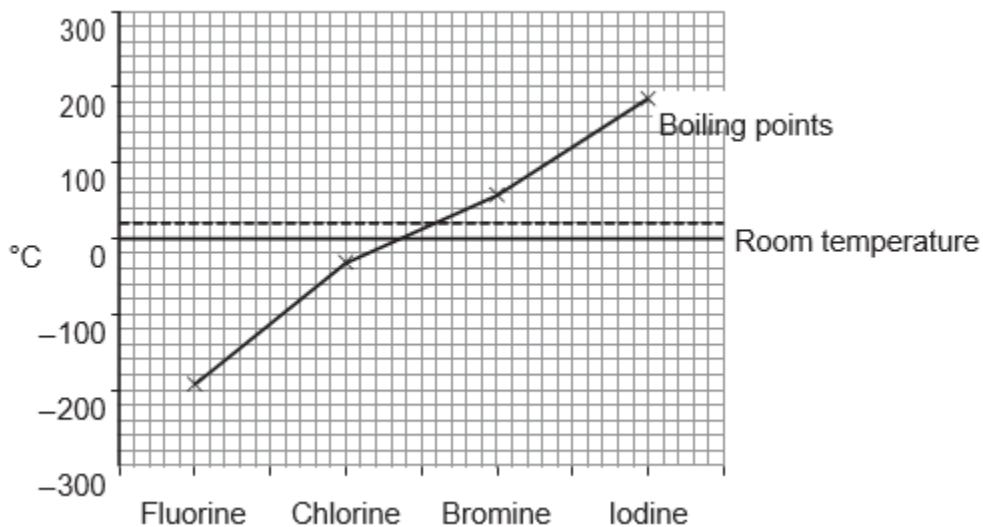


GROUP 7 ELEMENTS

Q1. The graph shows the boiling points of the halogens.



(a) Use the graph to help you answer these questions.

(i) Use the correct answer from the box to complete the sentence.

gas	liquid	solid
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At room temperature chlorine is a _____.

(1 mark)

(ii) Describe the trend in boiling point from fluorine to iodine.

(1 mark)

(b) Chlorine reacts with metals to produce metal chlorides.

(i) When a chlorine atom forms a chloride ion it gains one electron.

What is the charge on a chloride ion?

(1 mark)

(ii) Write a word equation for the reaction between sodium and chlorine.

(1 mark)

Q2. The table shows the boiling points of the Group 7 elements.

(a) The elements are arranged in alphabetical order.

Group 7 element		
Name	Symbol	Boiling point in °C
Astatine	At	337
Bromine		58
Chlorine	Cl	-34
Fluorine	F	-188
Iodine	I	184

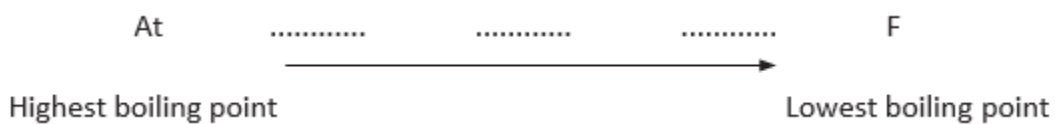
(i) The symbol for bromine is missing from the table.

What is the symbol for bromine?

Symbol =

(1 mark)

(ii) Arrange these elements in order of decreasing boiling point. The first one and the last one have been done for you.



(1 mark)

(b) The table shows some statements about Group 7 elements.

Tick (✓) the **two** correct statements.

	Tick (✓)
They are halogens.	
They are metals.	
They become less reactive down Group 7.	
They are compounds.	

(2 marks)

Q3. Chlorine, bromine and iodine are Group 7 elements.

A student investigated the reactivity of these elements.

The student added:

- aqueous chlorine to potassium bromide and potassium iodide solutions
- aqueous bromine to potassium chloride and potassium iodide solutions
- aqueous iodine to potassium chloride and potassium bromide solutions.

The student's results are shown below.

Solution	Potassium chloride	Potassium bromide	Potassium iodide
Chlorine		Solution turned orange-brown	Solution turned brown
Bromine	No reaction		Solution turned brown
Iodine	No reaction	No reaction	

(i) Use these results to state and explain the trend in reactivity of these Group 7 elements.

(2 marks)

(ii) Complete the equation below, which represents the reaction between chlorine and potassium bromide.



(1 mark)

(iii) In terms of electronic structure, state why chlorine, bromine and iodine are in Group 7.

(1 mark)

Q4. Explain, in terms of electrons, why fluorine is the most reactive element in Group 7.

(3 marks)

Q5. The table shows information about the halogens in Group 7 of the periodic table.

Name of halogen	Melting point in °C	Boiling point in °C	Electronic structure
Fluorine	-220	-188
Chlorine	-101	-35	2,8,7
Bromine	-7	+58	2,8,18,7
Iodine	+114	+183	2,8,18,18,7

(a) Use information from the table to help you to answer these questions.

(i) Name one halogen that is a solid at 25°C.

(1 mark)

(ii) Name one halogen that is a gas at 25°C.

(1 mark)

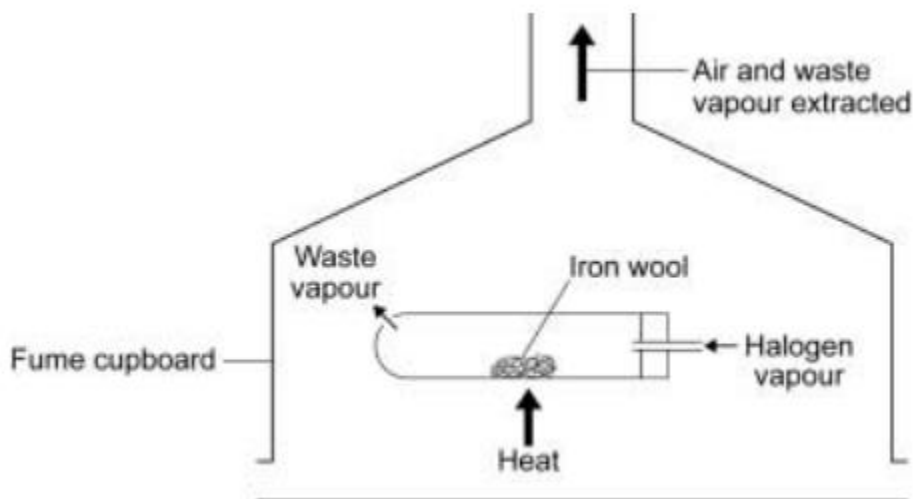
(iii) Use the periodic table to help you to work out the correct electronic structure for fluorine. Write your answer in the table above.

(1 mark)

(iv) Use the periodic table on the Data Sheet to name one Group 7 element that is not shown in the table above.

(1 mark)

(b) A teacher demonstrated the reactivity of the halogens to some students. Halogen vapour was passed over heated iron wool in a fume cupboard.



The teacher's observations are shown in the table below.

	Observations	
	During the reaction	After the reaction
Bromine	The iron wool glowed	A red-brown solid had been produced
Chlorine	The iron wool glowed brightly	A dark brown solid had been produced
Iodine	The iron wool did not glow	A black solid had been produced

(i) What is the order of reactivity of these three halogens?

most reactive halogen 1

2

least reactive halogen 3

(1 mark)

(ii) Explain how you used the teacher's observations to decide your order of reactivity.

(2 marks)

Q6. Chlorine, bromine and iodine are in Group 7 of the periodic table.

Chlorine is more reactive than bromine.

(i) Complete the word equation for the reaction between chlorine and sodium bromide.

chlorine + sodium bromide → + sodium chloride

(1 mark)

(ii) Why does iodine not react with sodium bromide solution?

(1 mark)

Q7.

(a) How do the boiling points of the halogens change down the group from fluorine to iodine?

(1 mark)

(b) Sodium bromide is produced by reacting sodium with bromine.

Sodium bromide is an ionic compound.

(i) Write down the symbols of the two ions in sodium bromide

(1 mark)

(ii) Chlorine reacts with sodium bromide solution to produce bromine and one other product. Complete the word equation for the reaction.

chlorine + sodium bromide → bromine +

(1 mark)

(iii) Why does chlorine displace bromine from sodium bromide?

(1 mark)

(iv) Use the Chemistry Data Sheet to help you to answer this question.

Suggest which halogen could react with sodium chloride solution to produce chlorine.

(1 mark)

Total marks (29)