

**1**

This question is about halogens and their compounds.

The table below shows the boiling points and properties of some of the elements in Group 7 of the periodic table.

Element	Boiling point in °C	Colour in aqueous solution
Fluorine	-188	colourless
Chlorine	-35	pale green
Bromine	X	orange
Iodine	184	brown

(a) Why does iodine have a higher boiling point than chlorine?

Tick **one** box.

Iodine is ionic and chlorine is covalent

Iodine is less reactive than chlorine

The covalent bonds between iodine atoms are stronger

The forces between iodine molecules are stronger

(1)

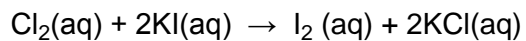
(b) Predict the boiling point of bromine.

.....

(1)

(c) A redox reaction takes place when aqueous chlorine is added to potassium iodide solution.

The equation for this reaction is:



Look at table above.

What is the colour of the final solution in this reaction?

Tick **one** box.

Brown

Orange

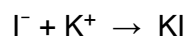
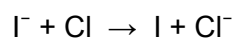
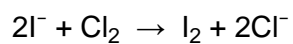
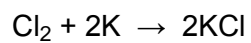
Pale green

Colourless

(1)

(d) What is the ionic equation for the reaction of chlorine with potassium iodide?

Tick **one** box.



(1)

(e) Why does potassium iodide solution conduct electricity?

Tick **one** box.

It contains a metal

It contains electrons which can move

It contains ions which can move

It contains water

(1)

(f) What are the products of electrolysis of potassium iodide solution?

Tick **one** box.

**Product at cathode**

**Product at anode**

hydrogen

iodine

hydrogen

oxygen

potassium

iodine

potassium

oxygen

(1)

(Total 6 marks)

2

This question is about elements and the periodic table.

(a) Newlands and Mendeleev both produced early versions of the periodic table.

(i) Complete the sentence.

In their periodic tables, Newlands and Mendeleev arranged the elements in order of

.....

(1)

(ii) Name the particle that allowed the elements to be arranged in order of their atomic number in the modern periodic table.

.....

(1)



**3**

These are the electronic structures of the atoms of three different elements.

2.8.1  
element A

2.8.8  
element B

2.8.8.1  
element C

(a) Identify elements A and B.

Element A is .....

Element B is .....

**(2)**

(b) (i) Why is element C more reactive than element A?

.....  
.....  
.....  
.....  
.....  
.....

**(2)**

(ii) Why is element B unreactive?

.....  
.....  
.....

**(2)**

**(Total 6 marks)**

## Mark schemes

- |          |   |            |
|----------|---|------------|
| <b>1</b> | (a) The forces between iodine molecules are stronger                    | 1          |
|          | (b) anything in range +30 to +120                                       | 1          |
|          | (c) Brown   | 1          |
|          | (d) $2 \text{I}^- + \text{Cl}_2 \rightarrow \text{I}_2 + 2 \text{Cl}^-$ | 1          |
|          | (e) It contains ions which can move                                     | 1          |
|          | (f) hydrogen iodine   | 1          |
|          |   | <b>[6]</b> |

<b>2</b>	(a)	(i) atomic weights <i>allow atomic masses</i>	1
		(ii) proton <i>allow proton number</i>	1
	(b)	(i) F/fluorine <i>allow F<sub>2</sub></i>	1
		(ii) any <b>one</b> from:	
		<ul style="list-style-type: none"> <li>• copper has a higher density</li> <li>• copper is stronger</li> <li>• copper is harder</li> <li>• copper is less reactive</li> </ul>	
		<i>allow named property</i> <i>ignore colour, conductivity, melting point and boiling point</i> <i>allow converse for potassium</i>	1
	(iii) relative distance from nucleus <i>allow more / fewer energy levels / shells or larger / smaller atom</i>	1	
	relative attraction to nucleus <i>allow more / less shielding</i>	1	
	relative ease of gain or loss of electron	1	
	opposite explanation of ease of gain or loss of electron for other group  <i>max 3 marks if 'outer' not mentioned</i>	1	
			<b>[8]</b>

<b>3</b>	(a)	A is sodium/Na*	
		B is argon/Ar*	
		<i>each for 1 mark</i> <i>(*case of letters must be correct)</i>	2
(b)	(i)	<i>ideas that</i>	
		<ul style="list-style-type: none"> <li>• outer electron (in element C / 2.8.8.1 / potassium) is at a higher energy level / in a more outer shell/further away from <u>nucleus</u> / shielded by more full electron shells</li> <li>• electron is more easily lost/less strongly held / attracted</li> </ul>	
		<i>each for 1 mark</i>	2

(ii) *ideas that*

- (element B / 2.8.8 / argon) has an outer shell that is complete/has 8 electrons
- no tendency to gain or lose electrons / has a stable configuration
- (not 'is stable' / 'in group 0' / 'a noble gas')  
*each for 1 mark*

2

[6]