

Trends within the periodic table

1. The table shows the properties of four elements from Group VII of the Periodic Table.

Element	Proton Number	Electronic structure	Boiling point (°C)	Melting point (°C)	State at 20°C	Reaction with hydrogen	
						Ease	Product
Fluorine		2.7	-188	-218	gas	Explosive reaction in dull light	hydrogen fluoride
Chlorine	17		-34	-101		Explosive reaction in sunlight	hydrogen chloride
Bromine	35	2.8.18.7	+59	-7		React if heated	hydrogen bromide
Iodine	53	2.8.18.18.7	+185	+114	solid	React if heated strongly	hydrogen iodide

(a) Complete the spaces in the table. (4)

(b) Comment briefly on the trend in melting points for these four elements.

 (1)

(c) Explain, in as much detail as you can:

(i) why the reactions of these elements with hydrogen are similar.

(ii) why their reactivity with hydrogen decreases from fluorine to iodine.

(4)
(Total 9 marks)

2. The electronic structures of five elements, V, W, X, Y and Z are shown below.

$\frac{V}{2.1}$	$\frac{W}{2.6}$	$\frac{X}{2.8.4}$	$\frac{Y}{2.5}$	$\frac{Z}{2.8.6}$
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- (a) (i) Write the letters of the **two** elements which belong to the same group in the Periodic Table
 (ii) To which group do they belong? (2)

(b) Write the letters of **two** elements that are gases (1)

(c) Lithium, sodium and potassium are the first three elements in Group 1 of the Periodic Table.

- (i) Lithium reacts with cold water to produce lithium hydroxide and hydrogen.
 Describe how the reaction between sodium and water is
(A) similar and **(B)** different to that between lithium and water.
 (A) Similar

 (B) Different

 (3)

- (ii) Potassium is much more reactive than lithium.
 Explain this in terms of their electronic structures.

 (3)

(3)
(Total 9 marks)

3. (a) What is the name given to the block of elements in the middle of the Periodic Table which includes vanadium?
 (1)

- (b) Some of the properties of vanadium are shown in this list.
- It has a high melting point.
 - It is a solid at room temperature.
 - It is a conductor of electricity.

Unit C3, C3.1.3

- It is a good conductor of heat.
- It forms coloured compounds.
- It forms crystalline compounds.
- It forms compounds that are catalysts.

Select **two** properties, from the list above, which are **not** typical of a Group 1 metal.

1

2

(2)
(Total 3 marks)