

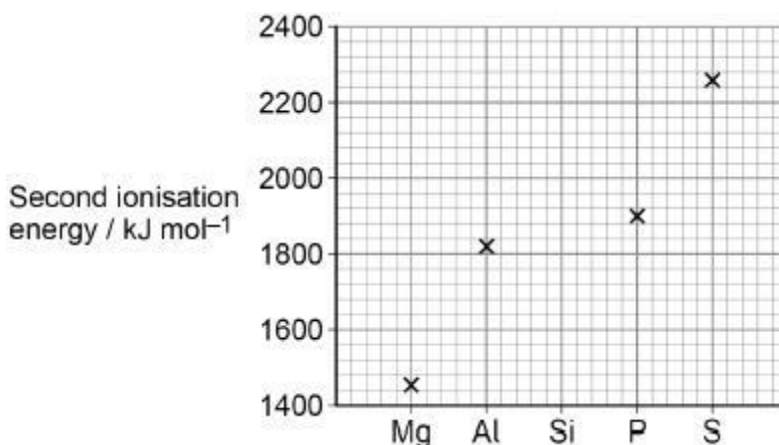
Name of the Student: _____

Max. Marks : 20 Marks

Time : 20 Minutes

Q1.

This question is about Period 3 elements.

The graph shows the **second** ionisation energies of some elements in Period 3.

- (a) Draw a cross (x) on the graph above to show the **second** ionisation energy of silicon.

(1)

- (b) Identify the element in Period 3, from sodium to argon, that has the highest **second** ionisation energy.

Give an equation, including state symbols, to show the process that occurs when the **second** ionisation energy of this element is measured.

If you were unable to identify the element you may use the symbol **Q** in your equation.

Element _____

Equation _____

(2)

- (c) Explain why the atomic radius decreases across Period 3, from sodium to chlorine.

(2)

- (d) Identify the element in Period 3, from sodium to chlorine, that has the highest electronegativity.

(1)

- (e) Phosphorus burns in air to form phosphorus(V) oxide.
Give an equation for this reaction.

(1)

(Total 7 marks)

Q2.

This question is about compounds that contain fluorine.

- (a) Sodium fluoride contains sodium ions (Na^+) and fluoride ions (F^-).
 Na^+ and F^- have the same electron configuration.

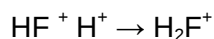
Explain why a fluoride ion is larger than a sodium ion.

(2)

- (b) Explain, in terms of structure and bonding, why the melting point of sodium fluoride is high.

(2)

- (c) The ion H_2F^+ is formed when hydrogen fluoride gains a proton as shown in the equation



Name the type of bond formed when HF reacts with H^+
Explain how this bond is formed.

Type of bond _____

Explanation _____

- (d) Fluoroantimonic acid contains two ions, SbF_6^- and H_2F^+

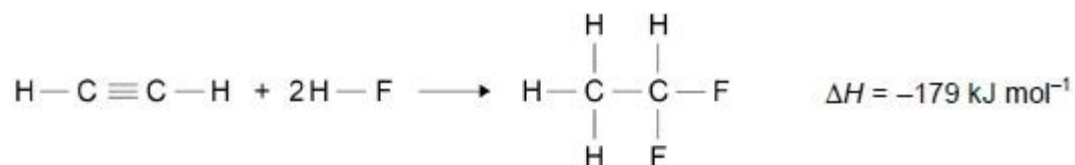
Draw the shape of the SbF_6^- ion and the shape of the H_2F^+ ion. Include any lone pairs that influence the shape.

Name the shape of each ion.

	SbF_6^-	H_2F^+
Shape		
Name of shape		

(4)

- (e) Hydrogen fluoride reacts with ethyne (C_2H_2) as shown in the equation. All compounds are in the gaseous state.



The table shows some mean bond enthalpy data.

Bond	C-H	$\text{C}\equiv\text{C}$	H-F	C-C
Mean bond enthalpy / kJ mol^{-1}	412	837	562	348

Use the data in the table above to calculate a value for the bond enthalpy of a C-F bond in the product.

C–F bond enthalpy _____ kJ mol⁻¹

(3)

(Total 13 marks)