

**CHEMISTRY DEPARTMENT**  
**S.6 BRAINSTORMING TEST**  
**INORGANIC CHEMISTRY**  
**SUB-TOPIC; EXPLAINING TRENDS IN INORGANIC CHEM**

**NAME** \_\_\_\_\_

**Signature** \_\_\_\_\_ **STREAM** \_\_\_\_\_

**Instructions;** Attempt all questions in this paper.

**PERIOD 3 ELEMENTS.**

1. The table below shows the melting points of some elements in period 3 of a periodic table

Element	Na	Mg	Al	Si	P	S	Cl
Melting point (°C)	98	650	660	1415	44	115	-106

State and explain the trend in melting points of the elements. (06 marks)

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2. The table below shows the melting points some oxides of some of the elements in period 3 of a periodic table.

Oxide of the elements.	Na <sub>2</sub> O	MgO	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	P <sub>2</sub> O <sub>5</sub>	SO <sub>3</sub>	Cl <sub>2</sub> O <sub>7</sub>
Melting point (°C)	1274	2828	2007	1607	560	30	-91

(a) State and explain the trend in melting points of the oxides. (06 marks)

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

2. The table below shows the melting points some chlorides of some of the elements in period 3 of a periodic table.

Chloride of the elements.	NaCl	MgCl <sub>2</sub>	AlCl <sub>3</sub>	SiCl <sub>4</sub>	PCl <sub>5</sub>	S <sub>2</sub> Cl <sub>2</sub>	SCl <sub>2</sub>
Melting point (°C)	808	714	190	-68	-92	-76	-80

(a) State and explain the trend in melting points. (06 marks)

[illegible]

## GROUP(II) ELEMENTS

The table below shows the melting points of group(II) elements

Element	Be	Mg	Ca	Sr	Ba
Melting point ( $^{\circ}\text{C}$ )	1280	650	850	770	720

(i) State the trend

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(ii) Explain the trend

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b) The table below shows the standard electrode potentials of group(II) elements

Element	Be	Mg	Ca	Sr	Ba
Standard electrode potential(V) for $M^{2+}/M$	-1.71	-2.37	-2.87	-2.89	-2.29

(i) State the trend (01 mark)

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(ii) Explain the trend (03marks)

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c) The table below shows the solubility of group(II) hydroxides in water at room temperature

Metal hydroxide	Be(OH) <sub>2</sub>	Mg(OH) <sub>2</sub>	Ca(OH) <sub>2</sub>	Sr(OH) <sub>2</sub>	Ba(OH) <sub>2</sub>
Solubility(g/100g of water)	insoluble	0.002	0.150	0.900	4.000

(iii) State the trend (01 mark)

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(iv) Explain the trend (03marks)

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d) The table below shows the temperatures for complete decomposition of group(II) metal carbonates.

<b>Metal hydroxide</b>	<b>BeCO<sub>3</sub></b>	<b>MgCO<sub>3</sub></b>	<b>CaCO<sub>3</sub></b>	<b>SrCO<sub>3</sub></b>	<b>BaCO<sub>3</sub></b>
<b>Decomposition temperature (°C)</b>	<b>25</b>	<b>540</b>	<b>900</b>	<b>1290</b>	<b>1360</b>

(i) State the trend in thermo stability of the metal carbonates

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(ii) Explain the trend (03marks)

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e) The table below shows the melting points of group(IV) elements.

Element	Carbon(diamond)	Silicon	Germanium	Tin	Lead
Melting point(°C)	3550	1410	937	232	327

(i) State the trend in melting points. (01 mark)

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(ii) Explain the trend (06 marks)

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**Group(IV) elements**

(a) The table below shows the melting points of the dioxides of group(IV) elements.

Element	$\text{CO}_2$	$\text{SiO}_2$	$\text{GeO}_2$	$\text{SnO}_2$	$\text{PbO}_2$
Melting point( $^{\circ}\text{C}$ )	-56	1700	1116	1827	752

(i) State the trend in melting points. (01 mark)

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(ii) Explain the trend (06 marks)

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b) The table below shows the decomposition temperature of the hydrides of group(IV) hydrides.

Hydride	$\text{CH}_4$	$\text{SiH}_4$	$\text{GeH}_4$	$\text{SnH}_4$	$\text{PbH}_4$
Decomposition temp( $^{\circ}\text{C}$ )	800	450	285	150	0

(i) State the trend in melting points. (01 mark)

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(ii) Explain the trend (03 marks)

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c) The table below shows the boiling points of the tetrachlorides of group(IV) elements.

<b>Tetrachloride</b>	<b><math>\text{CCl}_4</math></b>	<b><math>\text{SiCl}_4</math></b>	<b><math>\text{GeCl}_4</math></b>	<b><math>\text{SnCl}_4</math></b>	<b><math>\text{PbCl}_4</math></b>
<b>Boiling point (<math>^{\circ}\text{C}</math>)</b>	<b>77</b>	<b>58</b>	<b>83</b>	<b>114</b>	<b>Decomposes</b>

(i) State the trend in boiling points. (01 mark)

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(ii) Explain the trend (03 marks)

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**Group(VII) elements**

5. The table below shows the boiling points of group(VII) elements

Element	F	Cl	Br	I
Melting point (°C)	-188	-34	+58	+185

(i) State the trend (01 mark)

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(ii) Explain the trend (03 marks)

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b) The table below shows the values of bond dissociation energies of halogens.

Halogen	F <sub>2</sub>	Cl <sub>2</sub>	Br <sub>2</sub>	I <sub>2</sub>
Bond dissociation energy (kJmol <sup>-1</sup> )	158	242	193	151

(i) State the trend

(01 mark)

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(ii) Explain the trend

(03 marks)

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c) The table below shows the boiling points of group(VIII) hydrides

Hydride	HF	HCl	HBr	HI
Boiling point (°C)	+19.9	-85	-67	-34

(ii) State the trend

(01 mark)

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(iii) Explain the trend

(03 marks)

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d) The table below shows the acid dissociation constants,  $K_a$ , of group(VIII) hydrides.

Element	HF	HCl	HBr	HI
$K_a$ (mol dm <sup>-3</sup> )	$6.6 \times 10^{-4}$	$1.3 \times 10^6$	$1.0 \times 10^9$	$3.2 \times 10^9$

(i) State the trend

(01 mark)

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(ii) Explain the trend

(03 marks)

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**SUCCESS.**