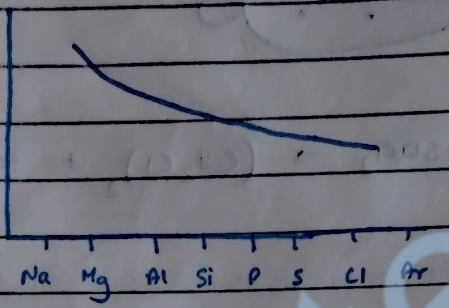
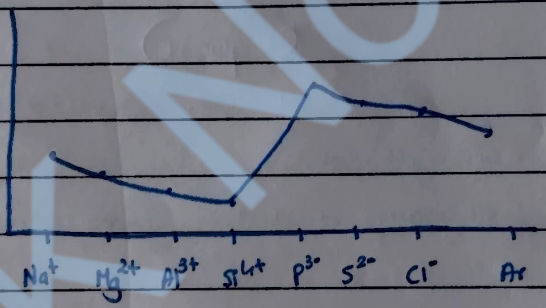
Periodicity

→ as we move across a period, the atomic radius decreases
→ as across the period, electrons increases, nuclear charge increases
→ For increases, which pulls the outer most shell closer to nucleus



→ Ionic radius



→ metal ions lose electrons and a shell which decreases the radius.
→ Non-metal ions gain electrons and have one extra shell compared to the metal ions.

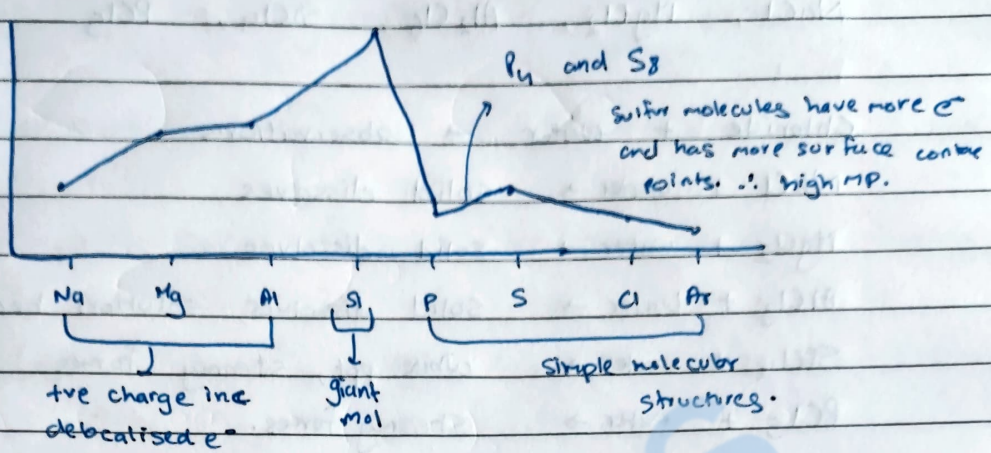
→ Bonding

Element	Sodium	Magnesium	Aluminium	Silicon	Phosphorus	Sulfur
Bonding	metallic	metallic	metallic	Covalent	covalent	covalent
Structure	giant met	giant met	giant met	giant mol	simple mol	simple mol

Element	Chlorine	Argon
Bonding	Covalent	-
Structure	Simple mol	Simple mol

PAGE No.
DATE / /

⇒ Melting Points



→ as we go from Na to Al, electrical conductivity increases.

→ because no. of valence e⁻ increases. No. of free e⁻ increases

→ Silicon is a semiconductor

→ phosphorus to Argon no conductivity.

⇒ Sodium and Magnesium.

→ Sodium reacts vigorously with cold water.

→ $2Na + H_2O \rightarrow 2NaOH + H_2$

→ The product is strongly alkaline, pH → 13-14

→ Magnesium reacts slowly with cold water

→ $Mg + 2H_2O(l) \rightarrow Mg(OH)_2 + H_2$

→ product is weakly alkaline, pH → 10-11

→ Magnesium reacts vigorously with steam

→ $Mg + H_2O(g) \rightarrow MgO + H_2$

⇒ Period 3 chlorides

$NaCl$, $MgCl_2$, Al_2Cl_6, $SiCl_4$, PCl_5

Chloride + water →	observations
$NaCl$ + water →	solid dissolves
$MgCl_2$ + water →	solid dissolves
$AlCl_3$ + water →	solid dissolves, solution becomes acidic.
$SiCl_4$ + water →	white ppt, steamy fumes
PCl_5 + water →	steamy fumes.

$NaCl$ and $MgCl_2$ → ionic bonding, giant ionic structure.

Al_2Cl_6, $SiCl_4$, PCl_5, SCl_2 → covalent bonding, simple molecular structure.

Group 2

→ reactivity increases down the group

→ FOA between nucleus and outermost electron decreases

→ hence less energy is needed to remove the outermost e^-.

$2Mg + O_2 \rightarrow 2MgO$ → white flame → White solid

$2Ca + O_2 \rightarrow 2CaO$ → brick red flame → White solid

$2Sr + O_2 \rightarrow 2SrO$ → scarlet flame → White solid

$2Ba + O_2 \rightarrow 2BaO$ → apple green flame → White solid

* The oxides of group 2 are basic oxides
* As we go down the group, the oxides become more basic.

Solubility in water increases down the group. pH also inc

Sulfates of group 2 become less soluble down the group

hydroxides of group 2 become more soluble down the group.

PAGE No.
DATE / /

⇒ Group 2 elements + water

	Observations
$Mg + 2H_2O \rightarrow Mg(OH)_2 + H_2$	Metal dissolves slowly, very slow fizzing
$Ca + 2H_2O \rightarrow Ca(OH)_2 + H_2$	Metal dissolves slowly, fizzing
$Sr + 2H_2O \rightarrow Sr(OH)_2 + H_2$	Metal dissolves, rapid fizzing
$Ba + 2H_2O \rightarrow Ba(OH)_2 + H_2$	Metal dissolves, rapid fizzing.

⇒ Group 2 carbonates are insoluble in water

Group 2 carbonates react with acids.

metal carbonate + acid → salt + CO_2 + H_2O

⇒ Thermal decomposition of group 2 elements

$MgCO_3 \longrightarrow MgO + CO_2$

$2Mg(NO_3)_2 \rightarrow 2MgO + 4NO_2 + O_2$

($4NO_2$: brown vapour)

⇒ Uses of group 2 elements

MgO → used in furnaces

$Ca(OH)_2$ → used to neutralise acidic soil, also called slaked lime

$CaCO_3$ → present in limestone and marble

Limestone ($CaCO_3$) is roasted (heated) to make CaO, quicklime.

CaO → roasted with clay to make cement.