Practice: Calculate the lattice energy for $MgCl_2$.

The sublimation energy for magnesium is 148 kJ/mol

The 1st ionization energy of magnesium is 738 kJ/mol

The 2nd ionization energy of magnesium is 1450 kJ/mol

The bond energy for Cl—Cl is 243 kJ/mol

The electron affinity for Cl is –349 kJ/mol

The standard enthalpy of formation for $MgCl_2$ is –641.3 kJ

$Mg(s) + Cl_2(g) \rightarrow MgCl_2(s)$ $\quad \Delta H_f^\circ = -641.3$ kJ

$Mg(s) \rightarrow Mg(g)$	148 kJ
$Mg(g) \rightarrow Mg^+(g) + e^-$	738 kJ
$Mg^+(g) \rightarrow Mg^{2+}(g) + e^-$	1450 kJ
$Cl_2(g) \rightarrow 2\ Cl(g)$	243 kJ
$2\ (\ Cl(g) + e^- \rightarrow Cl^-(g)\ )$	$2\ (-349$ kJ $)$
$Mg^{2+}(g) + 2\ Cl^-(g) \rightarrow MgCl_2(s)$	ΔH_{LE}
$Mg(s) + Cl_2(g) \rightarrow MgCl_2(s)$	-641.3 kJ

$148\text{ kJ} + 738\text{ kJ} + 1450\text{ kJ} + 243\text{ kJ} + 2(-349\text{ kJ}) + \Delta H_{LE} = -641.3\text{ kJ}$

Thursday

Fajan's Rule (M.P. & B.P. low)

Lewis → Covalent (e⁻ sharing)

↳ Ionic bond (e⁻ transfer)

so M.P. & B.P. high

Covalent character in ionic bond

NaBr — e⁻ → Br

$AlBr_3$ — 3e⁻ → to 3 Br

So M.P. should be high.

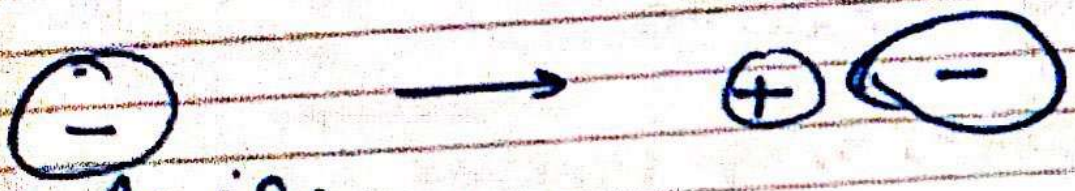
But NaBr M.P. 775°C

$AlBr_3$ 97.5°C (low M.P.)

means these bonds are not purely ionic

→ So, covalent character comes in ionic bond

Q How covalent character comes from in ionic bond.



Cation Small Anion large in size

Zeff high that why it will attract e cloud of anion that's why e cloud is displaced towards cations means e cloud of anion is polarised.

Saturday

means sharing of e's bet cation & anion.

06 Sunday

Polarizing Power :- Define for cation Ability of cation to distort

5 | 07 Monday

Polarizibility - Tendency of anion to become polarised by cation

Polarizing power (↑) → Anion distortion (↑) → Polarizibility (↑) → Sharing of e⁻ (↑) → Covalent character (↑)

means B.P. (↓)
M.P. (↓)

Eg → $AlBr_3$ → means some covalent charach comes in ionic bond

Factor affecting covalent character in ionic bond.

(1) Small size of cation
(2) large " " Anion

(3) Higher charge on cation

(4) Higher charge on Anion

(5) Cation have pseudo inert gas configuration
(d-orbital is fully filled)

Poor shielding ⇒ Zeff charge (↑)
↓
Polarising Power (↑)
↓
Covalent character (↑)

Eg NaCl < MgCl

CaF_2 (M.P.) > CaI_2 (covalent)

Ca^{+2} $F^{\ominus}$ Ca^{+2} $I^{\ominus}$

e⁻ are away from nucleus
e⁻ loosely held
easily polarised

Mg_3N_2 MgF_2

Mg^{+2} N^{-3} Mg^{+2} F^-

↓

more -ve charge

more Polarised by Mg^{+2}

e cloud more distorted

so covalent character

Ionic character ↑ → M.P. B ↑

→ Solubility ↓

→ Thermal stability ↑

Thermally Stable

$Na_2CO_3 > CaCO_3$

Decompose on heating

Na^+

Ca^{+2}

Polarizing power ↑

Covalent character ↑

Thermal Stability less

$Ba(OH)_2$ — more ionic character

$Mg(OH)_2$ — small size, polarizing power more, more covalent character