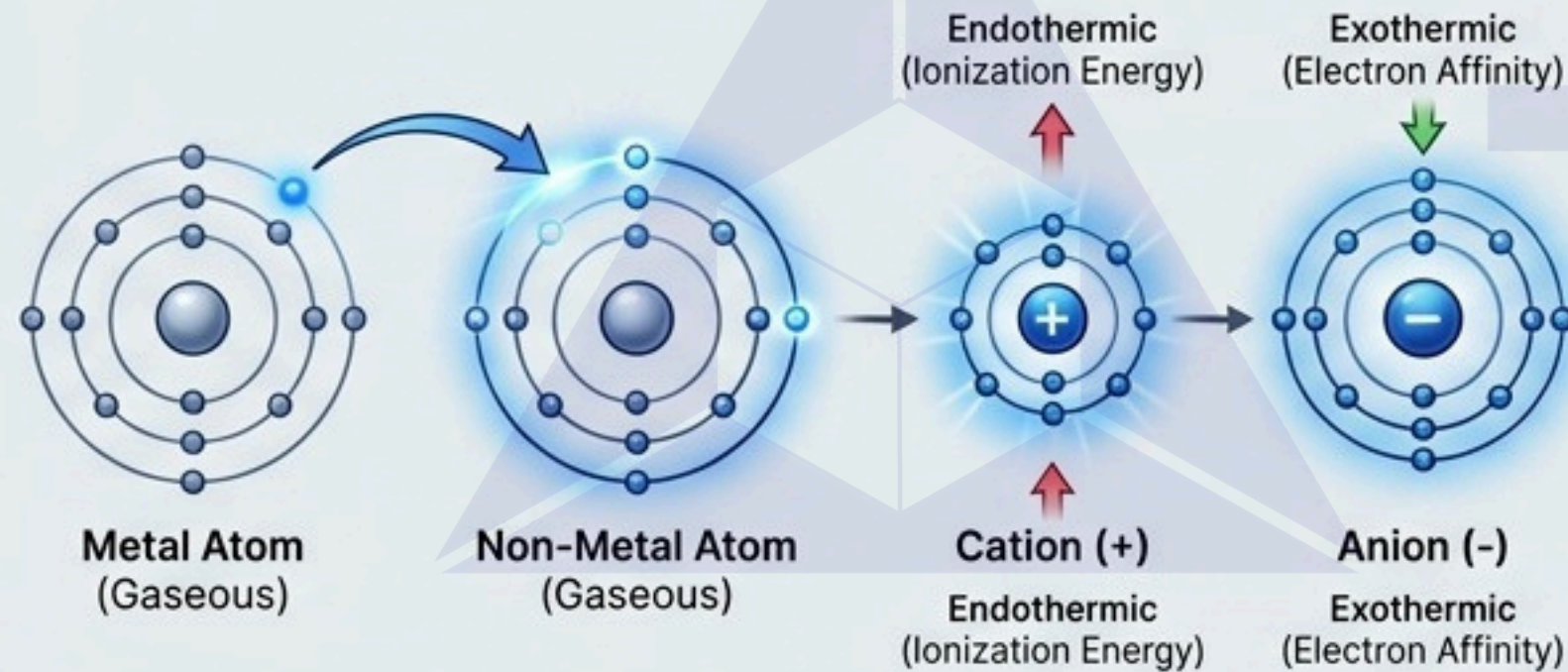


The Mechanics of Electrovalent Bonds

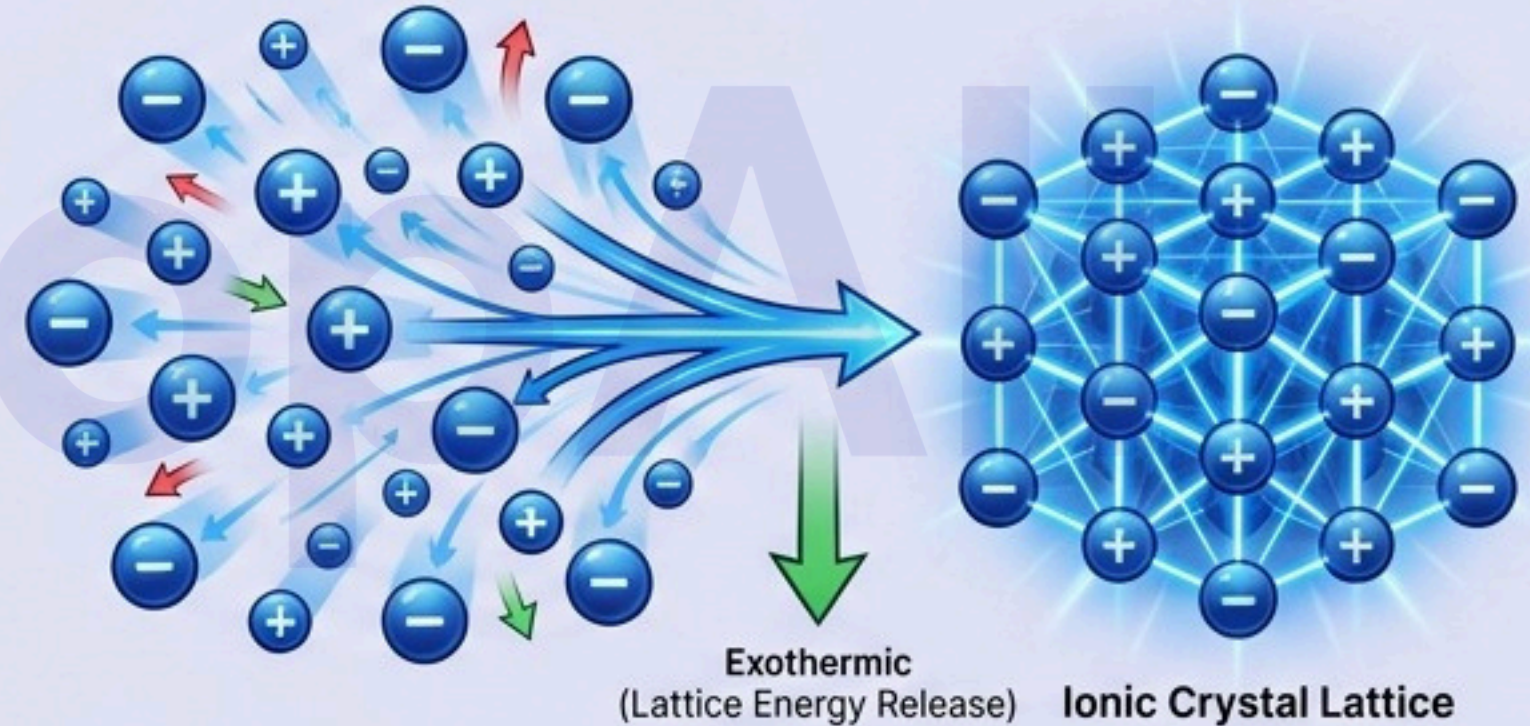
Ionic compound formation relies on two distinct sequential processes—creating the building blocks, then assembling the structure.

1. Ion Formation (The Micro)



Kössel & Lewis Approach: Achieving noble gas configuration via electron transfer.

2. Lattice Formation (The Macro)

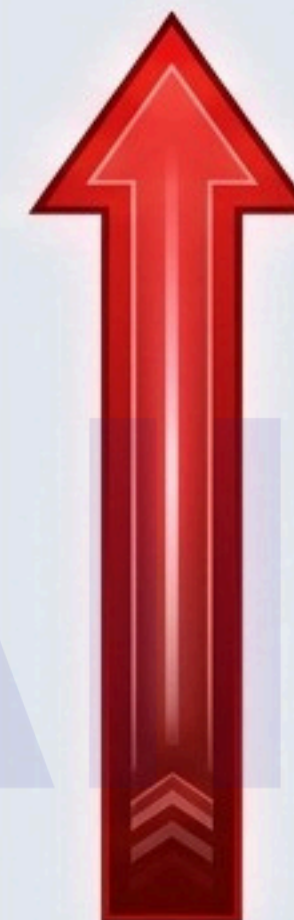


According to Kössel and Lewis, stability isn't just about achieving an octet—it's about the electrostatic attraction of a macroscopic network.

Step 1: Forging the Cation (The Energy Cost)



Ionization occurs exclusively in the gaseous state.



Endothermic
(Energy Absorbed)



Ionization Enthalpy.

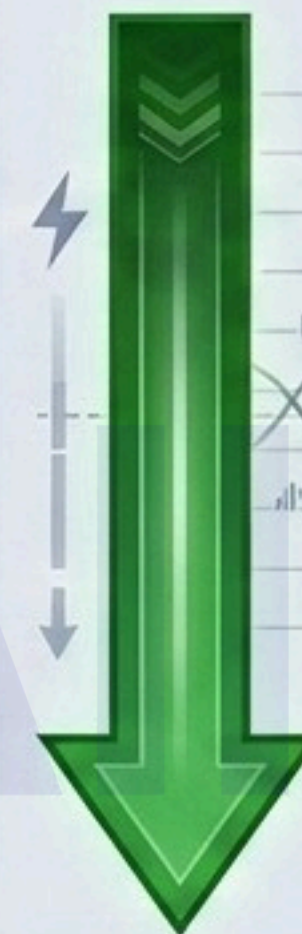
Ionic bonds form most easily with metallic elements that possess comparatively low ionization enthalpies (they require a smaller energy investment to give up electrons).

Example: $\text{Na(g)} \rightarrow \text{Na}^+(\text{g})$ ⚡
costs +495.8 kJ/mol.

Step 2: Forging the Anion (The Energy Return)



The negative ion forms when a neutral non-metallic atom captures the freed electron.



Usually Exothermic
(Energy Released)



Electron Gain Enthalpy.

The most favorable conditions occur with elements (like halogens) that have a highly negative electron gain enthalpy, recovering a significant portion of the energy spent making the cation.

Example: $\text{Cl}(g) + e^- \rightarrow \text{Cl}^-(g)$ ⚡
returns -348.7 kJ/mol.



You've Learned the Theory. Let's Test Them Now.

$$E=mc^2$$



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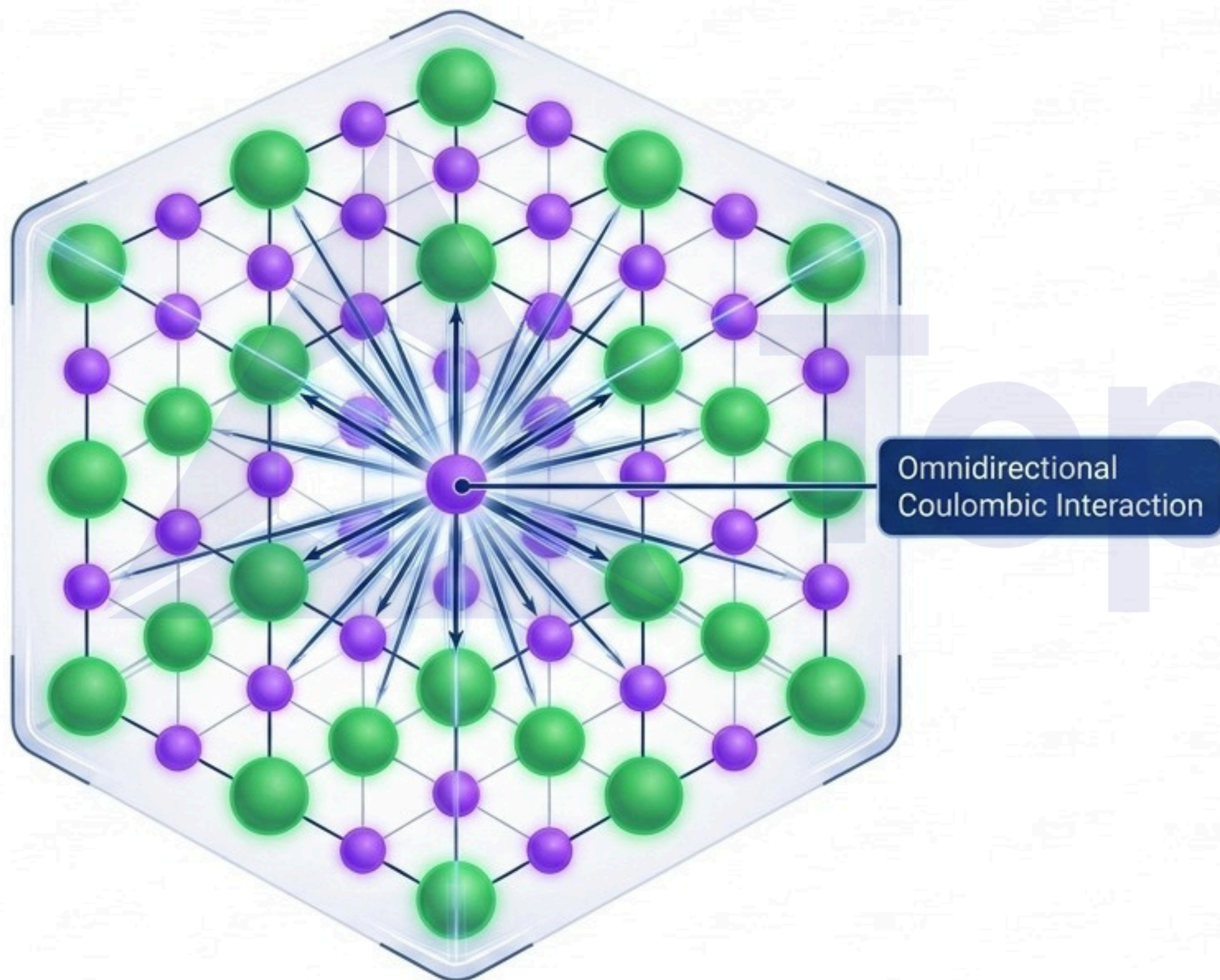
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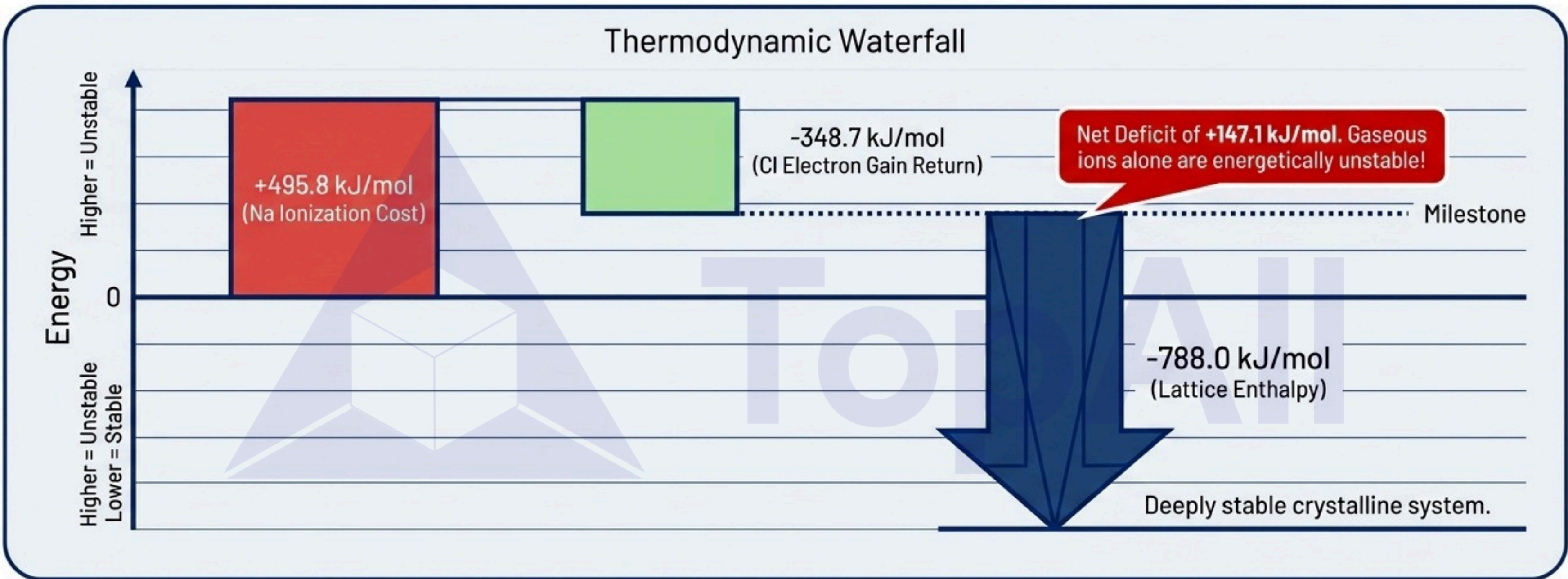
The Solid State: Rock-Salt Lattice



Beyond the Molecule.

Ions do not pair off into isolated 1:1 molecules (like a single NaCl pair). Instead, they organize into massive, orderly, three-dimensional geometric arrangements determined by ion size and packing efficiency.

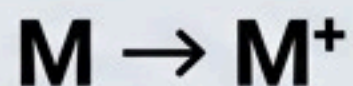
The Secret to Stability: Lattice Enthalpy



Lattice Enthalpy is the massive energy released when gaseous ions snap into a crystal lattice. A qualitative measure of stability is provided by lattice formation, not simply by achieving an octet.

Revision Frame: The Ionic Blueprint

Loop A (The Ions, Micro)



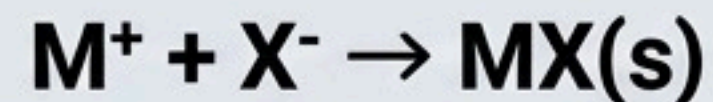
(Low Ionization Enthalpy)



(High Negative Electron Gain)



Loop B (The Lattice, Macro)



(Massive Lattice Enthalpy)

**Electrovalent Bond =
Gaseous Ion Formation +
Crystal Lattice Stabilization**



Favors elements with low IE and high negative EG.



Stability is driven by Lattice Enthalpy, not just the octet rule.



Forms 3D Coulombic arrays, never isolated molecules.



You've Learned the Theory.

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