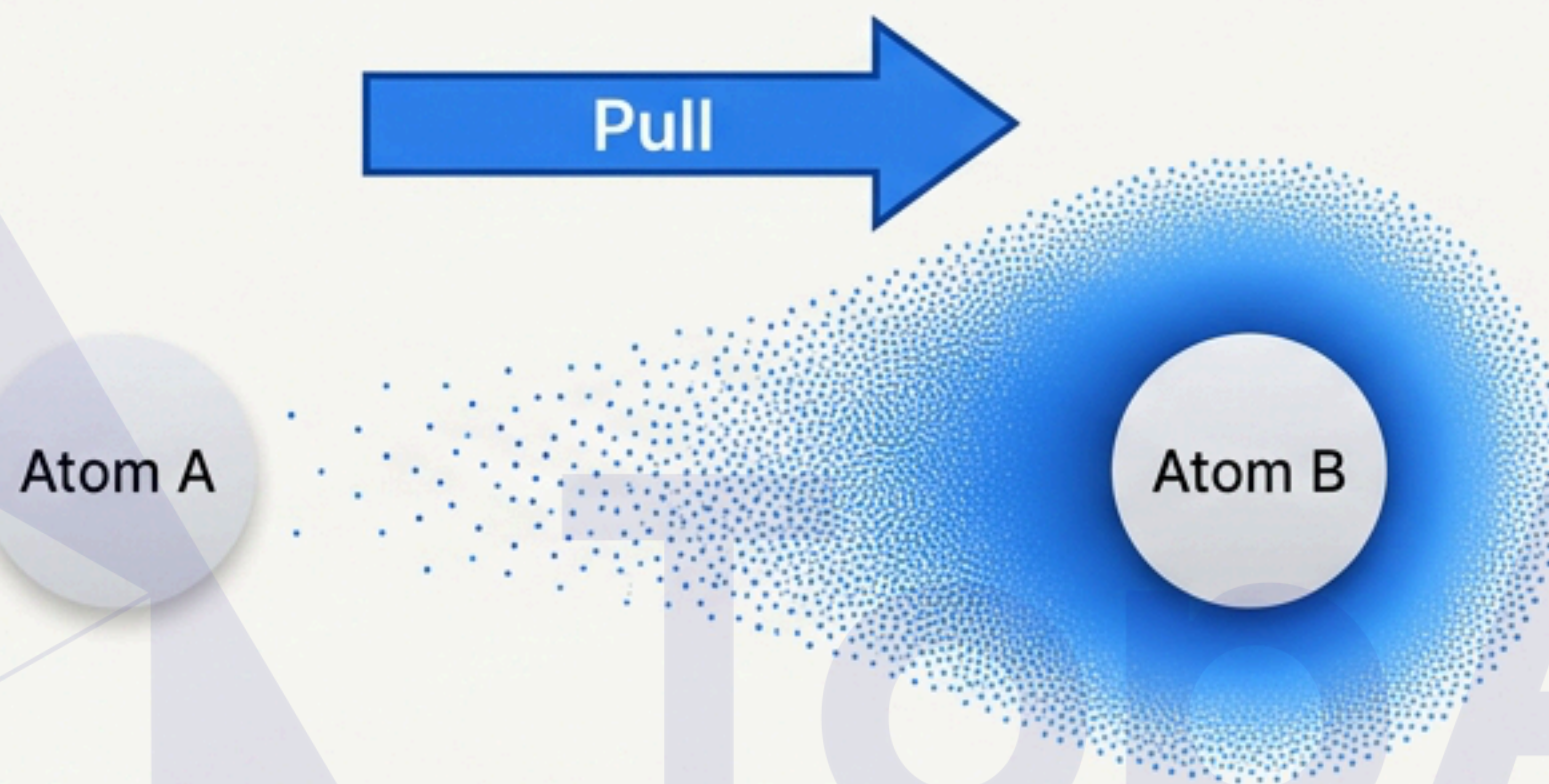


# The Tug-of-War for Shared Electrons

Mapping Electronegativity Across the Periodic Table



# Defining the Invisible Pull



## Core Definition

A qualitative measure of an atom's ability to attract shared electrons to itself within a chemical compound.

## ⚠ Relative, Not Absolute

Unlike Ionization Enthalpy or Electron Gain Enthalpy, electronegativity is not a directly measurable, constant physical quantity. It changes depending on the element an atom is bound to.

# The Pauling Scale Benchmark

In 1922, American scientist Linus Pauling developed the most widely used numerical scale to rank elements by their electron-pulling power.

The Champion

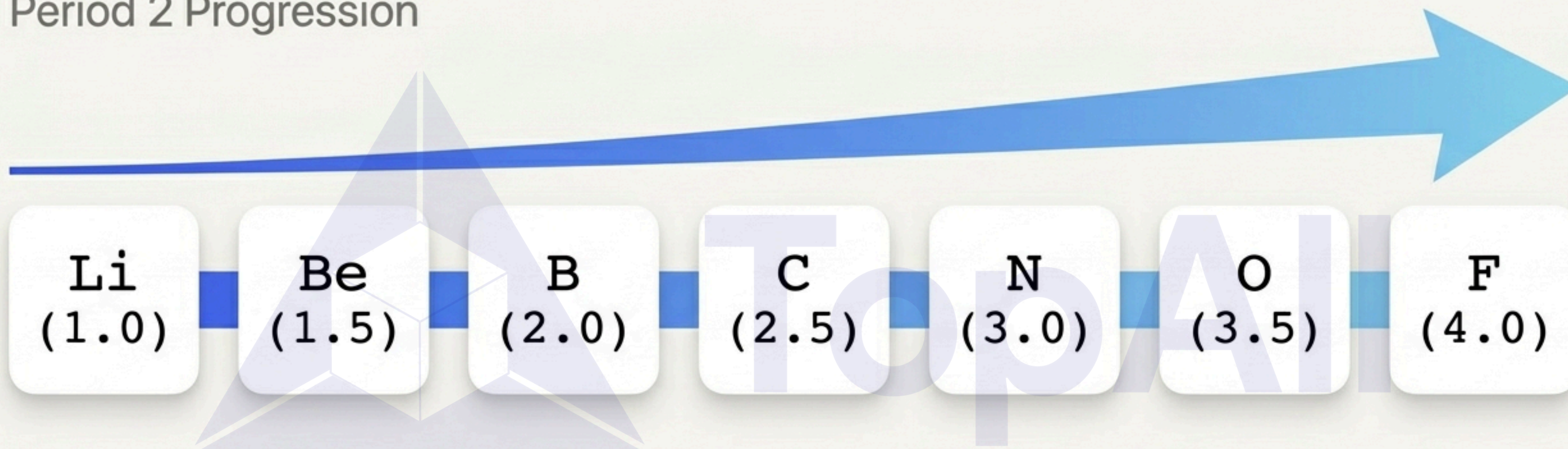
Fluorine (F)

4.0

The element with the greatest inherent ability to attract electrons. Assigned an arbitrary peak value of 4.0.

# The Horizontal Rule: Pulling Tighter Across a Period

Period 2 Progression



## Key Takeaway

**Why it increases:** As you move left to right, valence electrons remain in the same outer shell, but the effective nuclear charge increases. This added nuclear power exerts a stronger attraction on shared electrons.



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

$$E=mc^2$$



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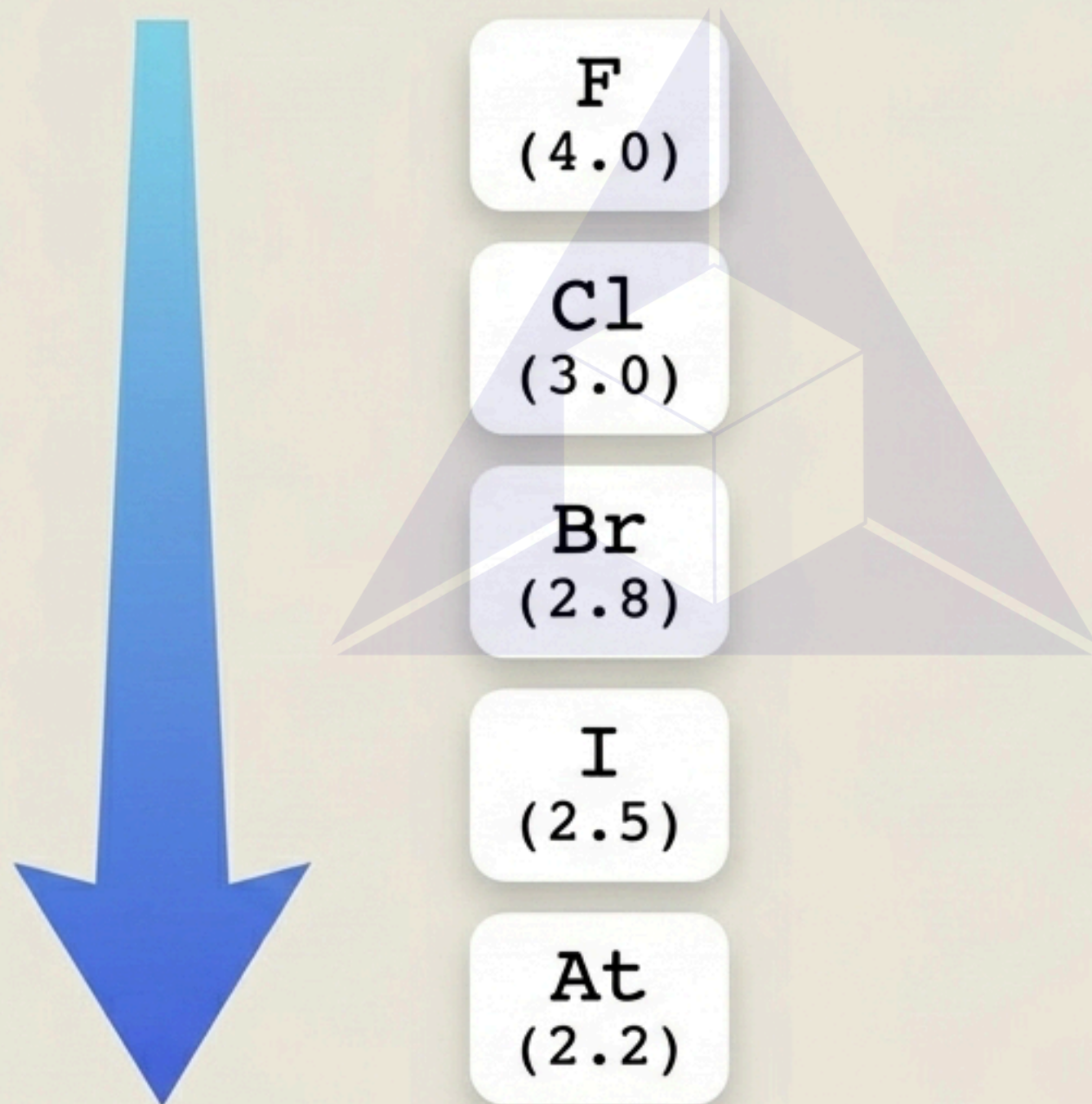
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# The Vertical Rule: Losing Grip Down a Group

Group 17 Progression

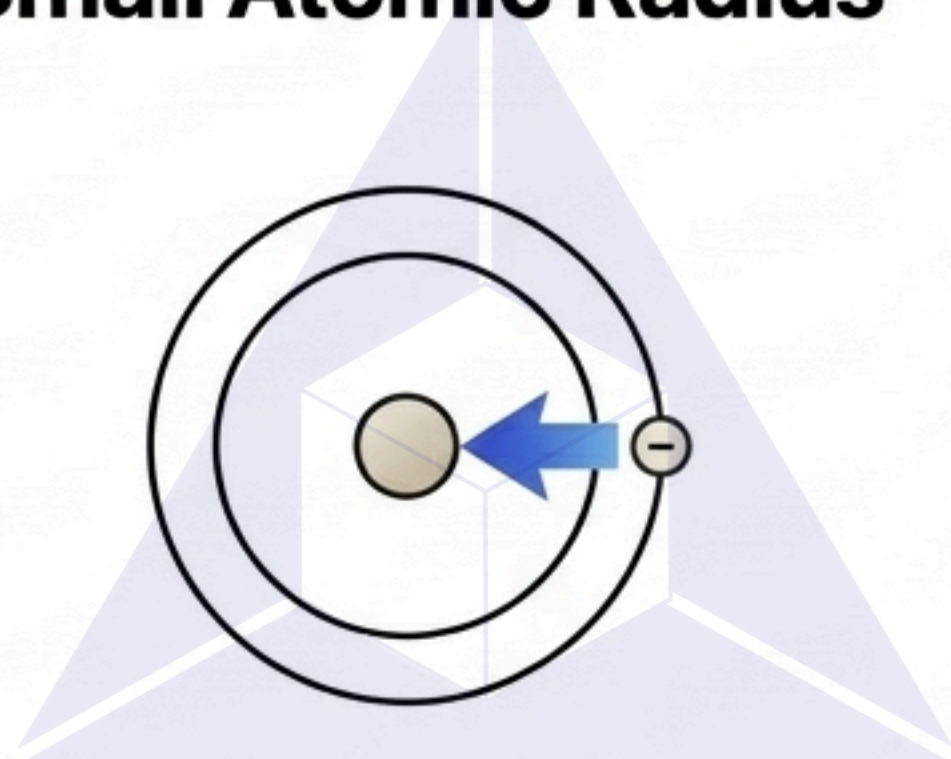


## Key Takeaway

**Why it decreases:** As you move down, the principal quantum number increases. The growing atomic radius places shared electrons further from the nucleus, while inner electron shells increasingly shield the nuclear pull.

# The Underlying Engine: Radius dictates Pull

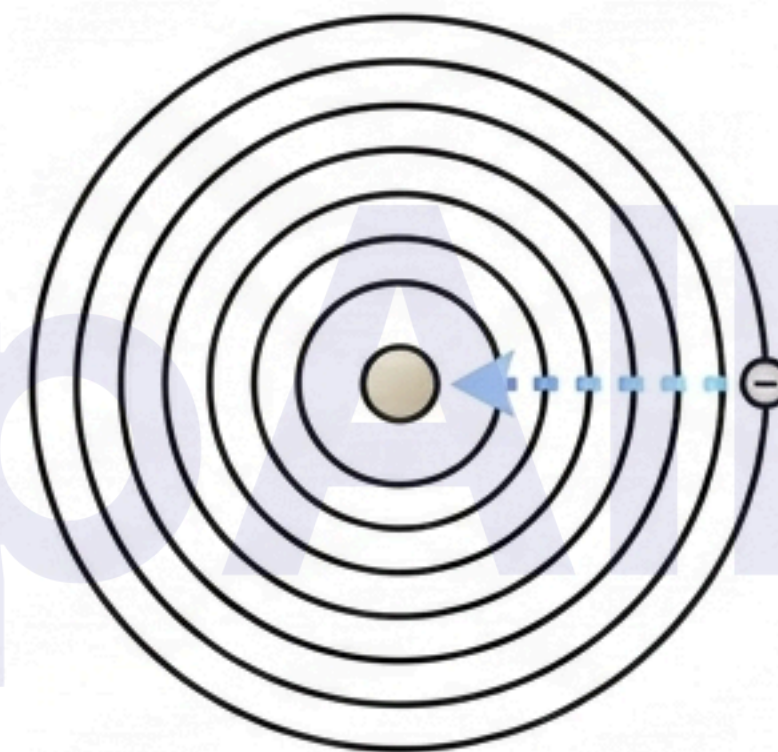
## Small Atomic Radius



- Nucleus is closer to shared electrons.
- Minimal inner-shell shielding.

Result: High Electronegativity.

## Large Atomic Radius



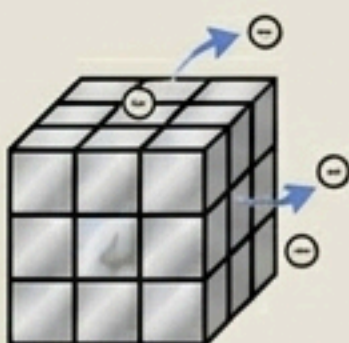
- Nucleus is far from shared electrons.
- Heavy inner-shell shielding blocks nuclear charge.

Result: Low Electronegativity.

# Translating Pull into Chemical Identity

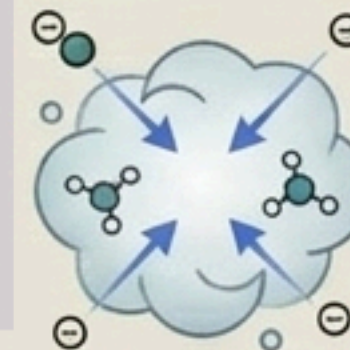
Low Electronegativity

High Electronegativity



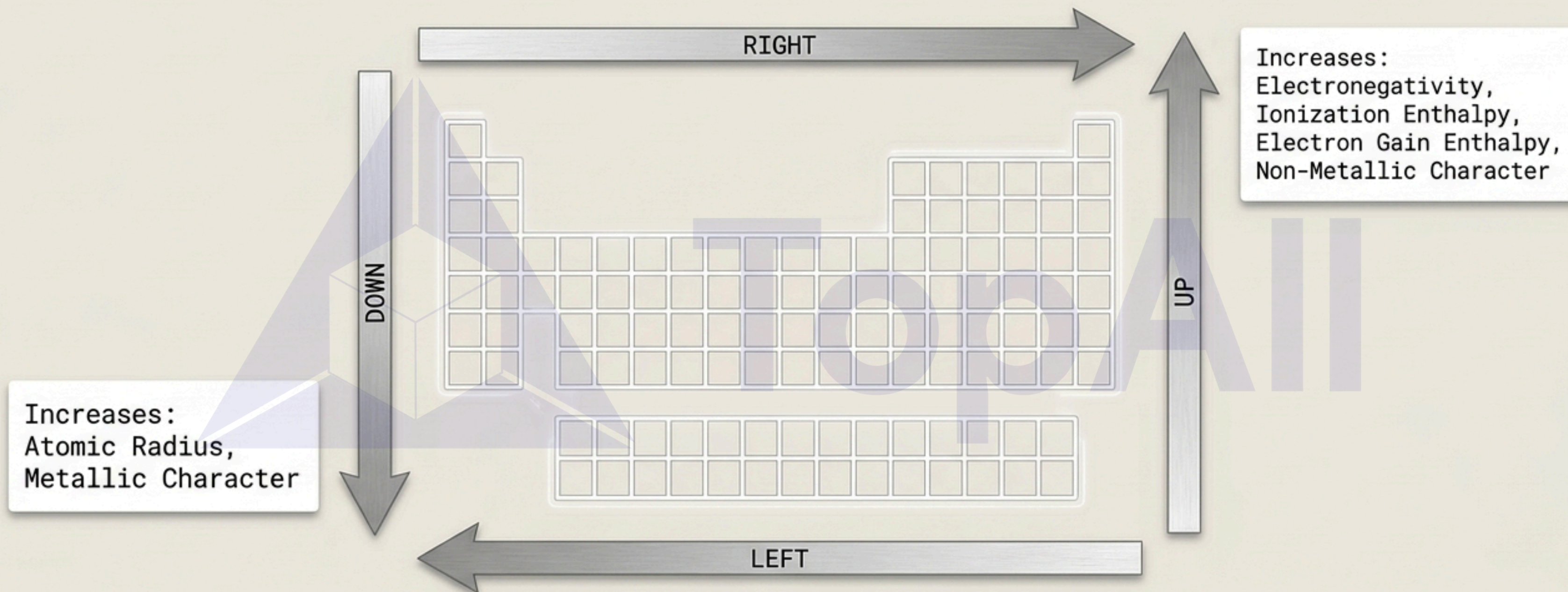
Tendency to lose electrons  
= High Metallic Character.

Tendency to gain electrons =  
High Non-Metallic Character.



**The Inverse Rule.** Electronegativity is directly related to non-metallic properties, and strictly inversely related to metallic properties.

# The Universal Geography of Chemistry



The physical traits of the chemical universe are not random. They are governed by a highly predictable, spatial grid driven by the tug-of-war for electrons.



# You've Learned the Theory.

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