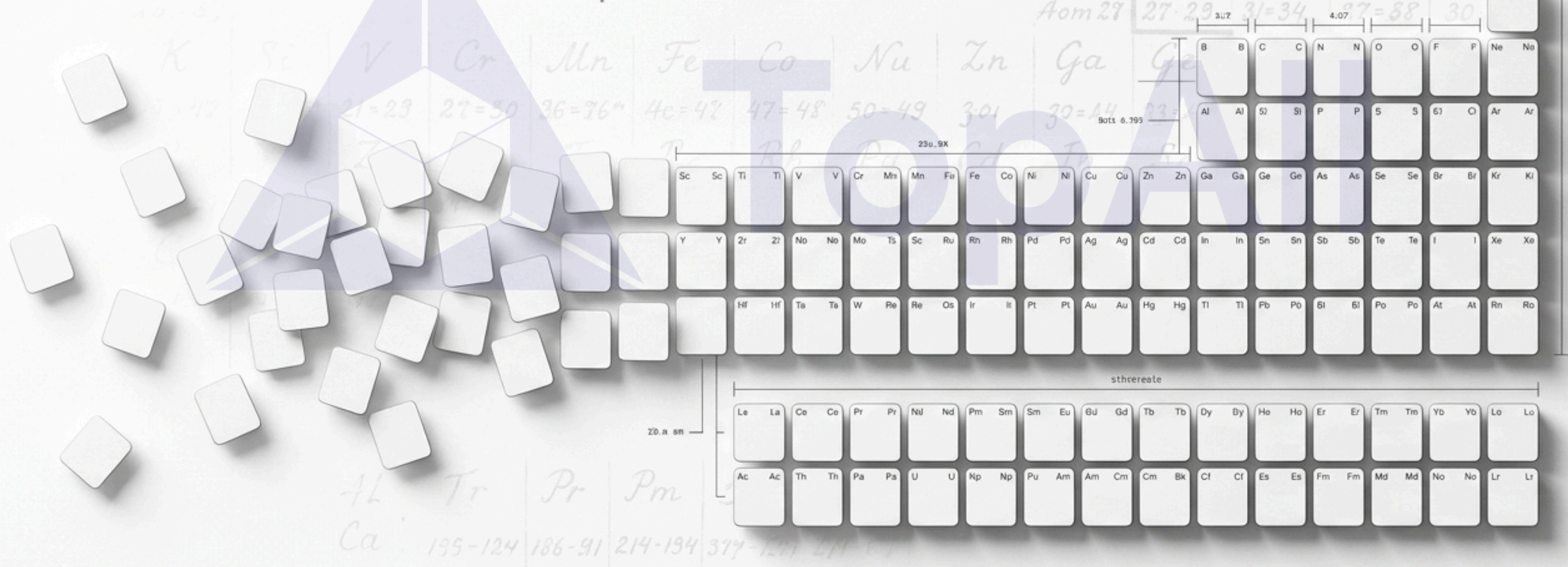


Mendeleev: The Table That Predicted Elements



How visionary pattern recognition transformed 63 chaotic elements into an architectural blueprint for the universe.



The Foundation: Organizing by Atomic Weight

The Primary Axis



The Periodic Law (1869)

The properties of the elements are a periodic function of their atomic weights.

Mendeleev realized that sorting the 63 known elements strictly by increasing atomic weight revealed repeating (periodic) physical and chemical patterns.

The Blueprint: Rows and Columns

Systematizing Chaos

This two-dimensional architectural grid was more elaborate than previous attempts because it integrated a broader range of chemical and physical properties into its structure.

Horizontal Axis (Rows)

Elements are placed sequentially in order of increasing atomic weight.

Vertical Axis (Columns / Groups)

The grid 'wraps' so that elements falling into the same column share fundamental characteristics.



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

$$E=mc^2$$



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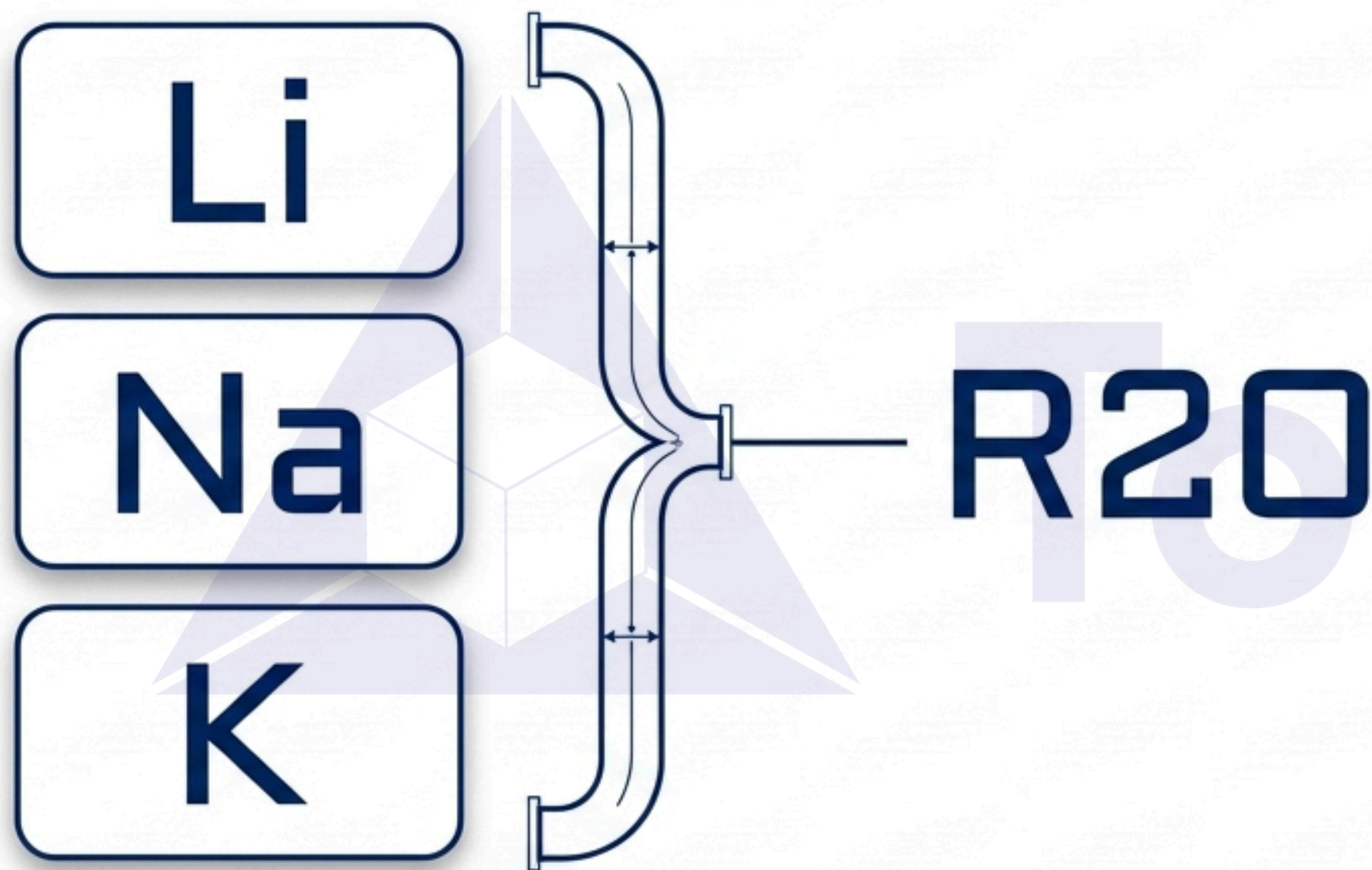
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The Rule of Similarity: Grouping Chemical Families

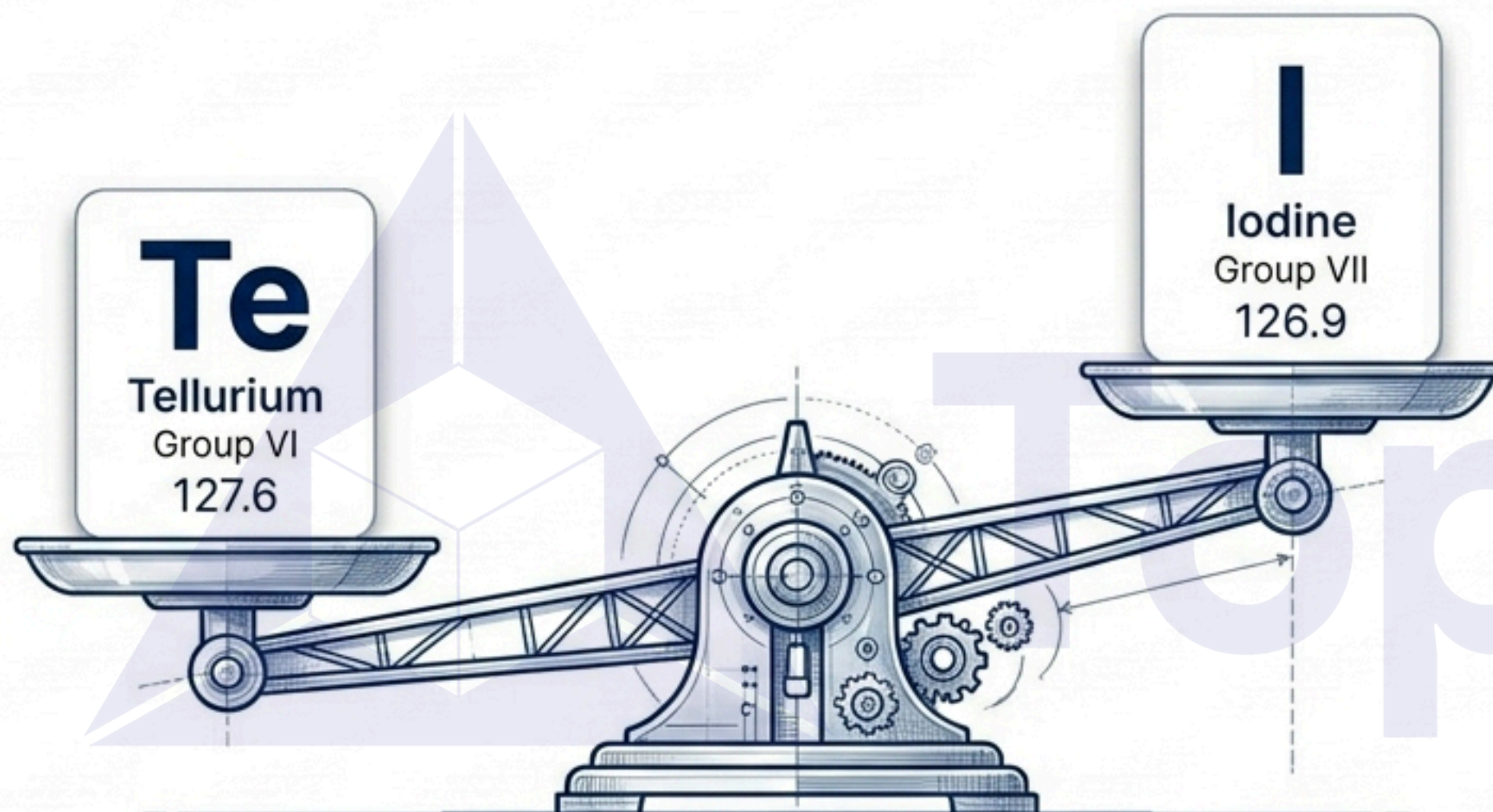


Mendeleev heavily relied on empirical formulas and the properties of the compounds formed by the elements to determine column placement.



If elements formed identical types of oxides and hydrides, they belonged in the same vertical column. Chemical behavior dictated the family.

The Exception: Breaking Rules for Chemical Truth



Atomic Weight Anomaly

Mendeleev realized that sticking strictly to atomic weights would place Iodine in the wrong chemical family. Iodine clearly belonged with Halogens (Fluorine, Chlorine, Bromine) based on its properties.

The Architect's Intuition

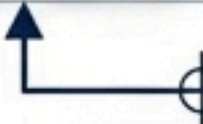
He purposefully ignored the atomic weight order, assuming the contemporary mass measurements were incorrect, prioritizing chemical similarities over rigid numbering.

Te (127.6)						Te (127.6)	I (126.9)						
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The Empty Rooms: Leaving Gaps for the Unknown

B Boron	C Carbon
Al Aluminium	Si Silicon
	

Gap 1: Below Aluminium 

Gap 2: Below Silicon 

Sticking to his primary aim of grouping elements by property, Mendeleev refused to cram known elements into the wrong columns just to fill space. Instead, he proposed that these gaps represented undiscovered elements.

He named these predicted elements Eka-aluminium and Eka-silicon.

The Proof: Eka-Aluminium and Eka-Silicon

Mendeleev's Prediction

Eka-aluminium

At. Wt: 68

Density: 5.9

Oxide: E₂O₃

Chloride: ECl₃

Eka-silicon

At. Wt: 72

Density: 5.5

Oxide: EO₂

Chloride: ECl₄

Actual Discovery

Gallium

At. Wt: 70

Density: 5.94

Oxide: Ga₂O₃

Chloride: GaCl₃

Germanium

At. Wt: 72.6

Density: 5.36

Oxide: GeO₂

Chloride: GeCl₄

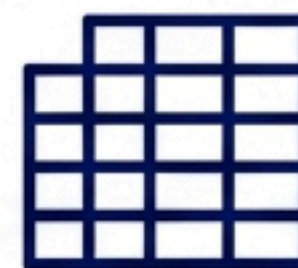
The boldness and quantitative accuracy of these predictions led to the universal acceptance of the Periodic Table.

Exam Summary: Mendeleev's Architecture



The Law

Periodic function of atomic weights (Mendeleev's primary sorting method).



The Structure

Rows (series) = increasing weight.
Columns (groups) = similar chemical properties / empirical formulas.



The Exception

Placed Iodine with halogens despite a lower atomic weight than Tellurium, prioritizing properties over mass.



The Foresight

Left gaps for undiscovered elements. Accurately predicted properties of Eka-aluminium (Gallium) and Eka-silicon (Germanium).

Modern modification: The table is now sorted by Atomic Number (Z), not Atomic Weight.



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