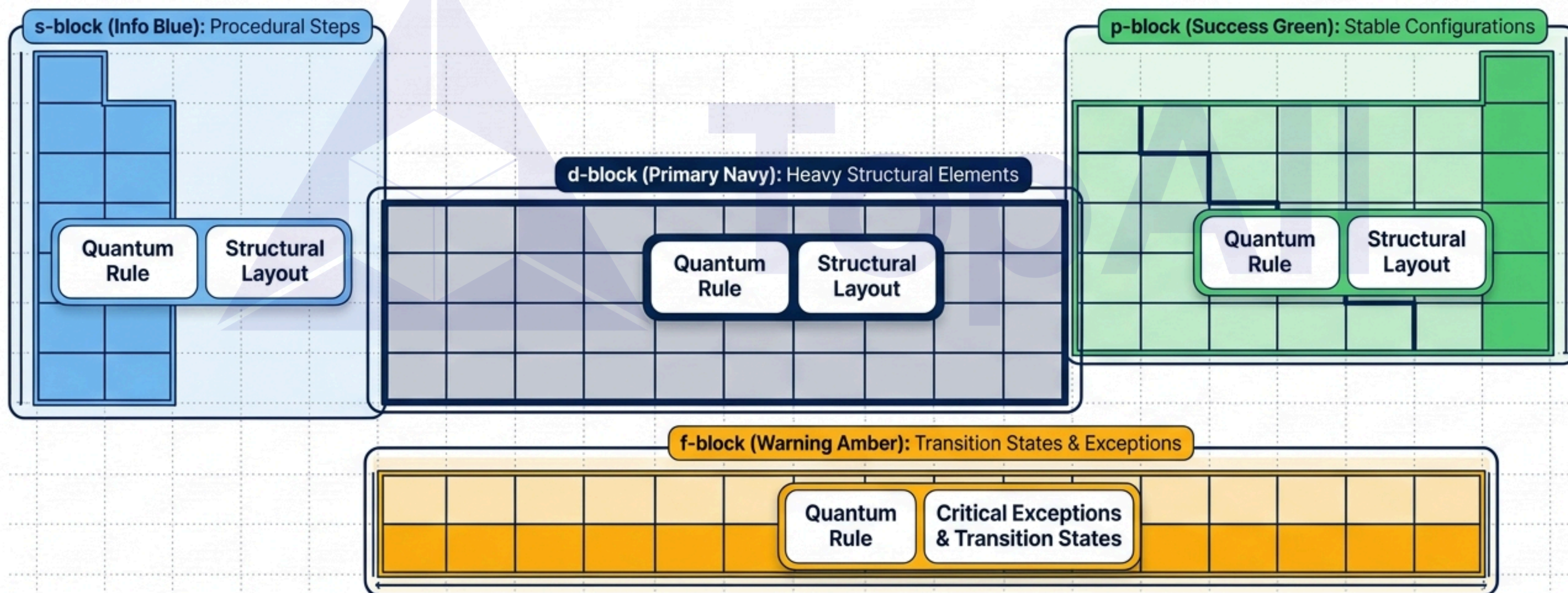
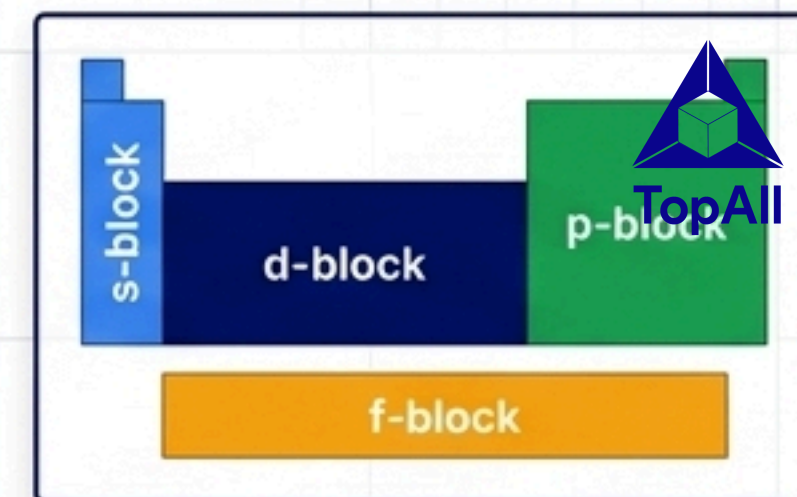


The 4-Block Map of the Periodic Table

Quantum rules, structural layout, and key exceptions for s, p, d, and f blocks.



The Golden Rule: The Last Electron Decides the Block



Input

Write the Atom's Electronic Configuration.

Process

Locate the final (highest energy) electron added.

Output

The subshell (s, p, d, f) receiving this electron determines the block.

Example: Sodium (Na, Z=11)



→ s-block element

Main Group Elements: The s and p Blocks



s-Block

- ✓ Groups: 1 (Alkali Metals) & 2 (Alkaline Earth Metals)
- ✓ Configuration: ns^1 and ns^2
- ✓ Highly reactive metals, form 1+ or 2+ ions
- ✓ Mostly form ionic compounds (Exceptions: Li, Be)

p-Block

- ✓ Groups: 13 to 18
- ✓ Configuration: ns^2np^1 to ns^2np^6
- ✓ Includes halogens, chalcogens, and noble gases
- ✓ Non-metallic character increases left to right

Together, s-block + p-block = Representative or Main Group Elements



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Heavy Metals: The d and f Blocks

d-Block / Transition Elements

- **Groups:** 3 to 12
- **Configuration:** $(n-1)d^{1-10} ns^{0-2}$
- Form a bridge between active s-block and less active p-block
- Form coloured ions, show variable valence, used as catalysts

Exam Alert

Zn, Cd, Hg ($(n-1)d^{10} ns^2$) do NOT show typical transition metal properties.

f-Block / Inner-Transition Elements

- **Location:** Two bottom rows (Lanthanoids Ce-Lu, Actinoids Th-Lr)
- **Configuration:** $(n-2)f^{1-14} (n-1)d^{0-1} ns^2$
- All are metals. Actinoids are highly complex and radioactive.
- Includes Transuranium Elements (after Uranium)

The Helium Exception: Configuration vs. Placement



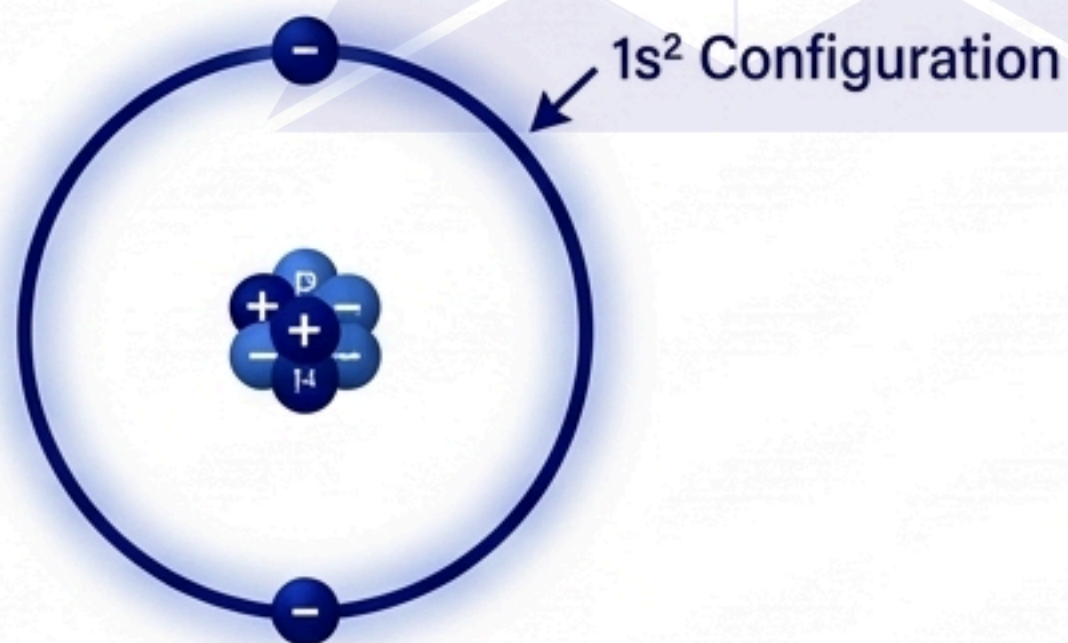
The Rule

Helium's configuration is $1s^2$. By strict Aufbau rules, it belongs in the s-block (Group 2).

WHY?

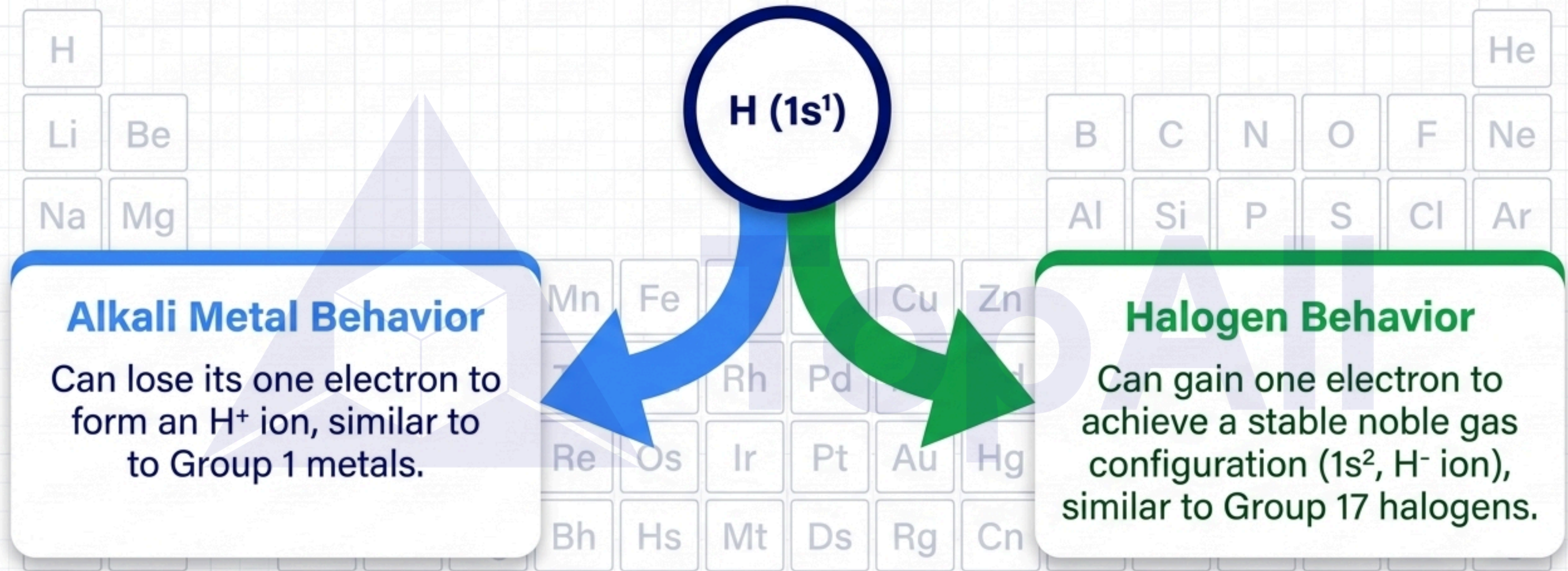
The Reality

It is placed in the p-block (Group 18) with Noble Gases.



Helium possesses a **completely filled valence shell**, resulting in **low chemical reactivity** that **perfectly matches** other noble gases. **Property dictates final placement.**

The Hydrogen Exception: A Dual Identity



Because it is a special case, Hydrogen is placed completely separately at the top center of the Periodic Table.

Key Takeaway: The Blueprint of Chemistry



Micro: Quantum Orbital Filling



(The fundamental law: where the last electron goes)

Macro: Table Placement

(s, p, d, or f block classification)



Emergent: Chemical Properties



(Metallic character, reactivity, ion formation)



K	Ba	V	Cr	Mn	Fe	Cu	Zn	Ga	Ge	As	Se	Br	Kr				
Rb	Sr	Y	Zr	Nb	Mo	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe		
Os	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Rf	Db	Sg						Nh	Fl	Mc	Lv	Ts	Og		

Emergent:
Chemical Properties

(Metallic character, reactivity, ion formation)

The chemical elements are not a random cluster of entities. The block classification proves that macroscopic chemical properties are a direct, logical consequence of microscopic electronic configurations.



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