

p-Block: The Diverse Main Group

Understanding Groups 13–18, Electronic Configurations, and Periodic Trends

Mapping the p-Block

The Representative Elements

Together with the s-block, the p-block constitutes the Main Group of the periodic table.



13

B

14

C

15

N

16

O

17

F

18

Ne

UNIQUE DIVERSITY: The p-block is the only block containing all three types of elements—metals, non-metals, and metalloids.

The Electronic Blueprint

Start - Group 13



ns



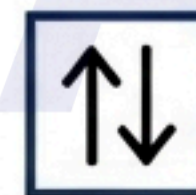
np

Progression

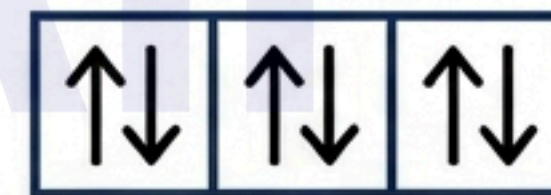
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Successive addition of electrons to the np orbitals across each period.

End - Group 18



ns



np

HELIUM EXCEPTION: Helium has a $1s^2$ configuration but is positioned in the p-block due to its completely filled valence shell and noble gas behavior.



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$$E=mc^2$$



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Group 18: The Noble Gases



- **Closed Valence Shell:** All orbitals in the valence shell are completely filled by electrons.
- **Low Reactivity:** It is highly difficult to alter this stable arrangement by adding or removing electrons.

ULTIMATE STABILITY: The closed-shell configuration makes Noble Gases chemically inert, serving as the 'end goal' for the chemical reactions of other elements.

Chasing Stability: Groups 16 & 17

Halogens (Group 17)

Needs 1 electron



Trait: Highly negative electron gain enthalpy.

Chalcogens (Group 16)

Needs 2 electrons

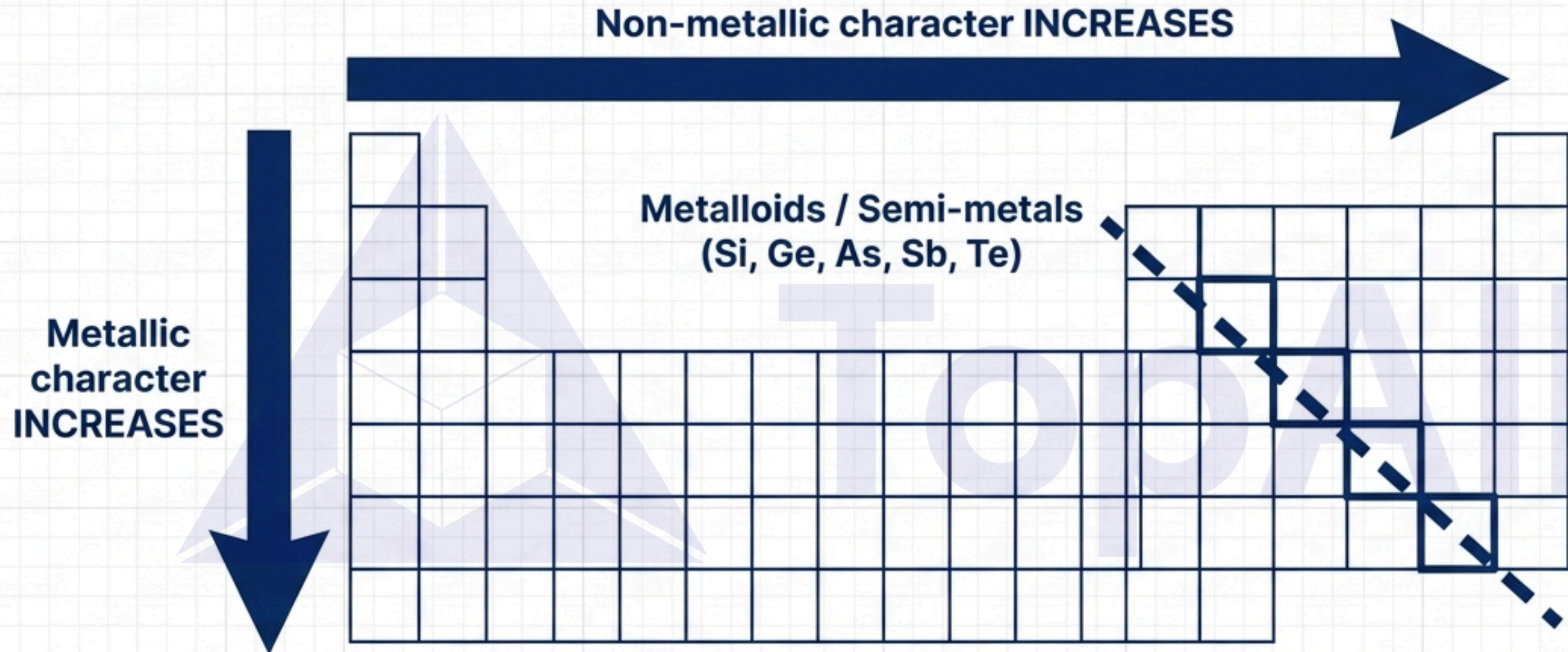


Trait: Readily adds two electrons.



THE DRIVING FORCE: Both groups are critical non-metals defined by their intense drive to attain the stable noble gas configuration.

The Diagonal Shift



Elements transition from metals on the bottom-left to distinct non-metals on the top-right.

BLURRED LINES: The transition is not abrupt. Elements bordering the zig-zag line exhibit dual characteristics of both metals and non-metals.

p-Block: Rapid Revision



IDENTITY:

Groups 13–18. Combined with s-block to form “Representative/Main Group Elements.”

CONFIGURATION:

Progresses from ns^2np^1 to ns^2np^6 . Ends with stable noble gases.

REACTIVITY ALERT:

Group 16 & 17 have highly negative electron gain enthalpies to achieve np^6 stability. Helium is the $1s^2$ exception.

TREND TAKEAWAY:

Non-metallic character $\uparrow$ across a period. Metallic character $\uparrow$ down a group. Separated by diagonal metalloids.



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