

CLASS 11 CHEMISTRY • UNIT 4

4.1 Kössel-Lewis Approach to Chemical Bonding

Why atoms combine to become stable.

THE DRIVING FORCE

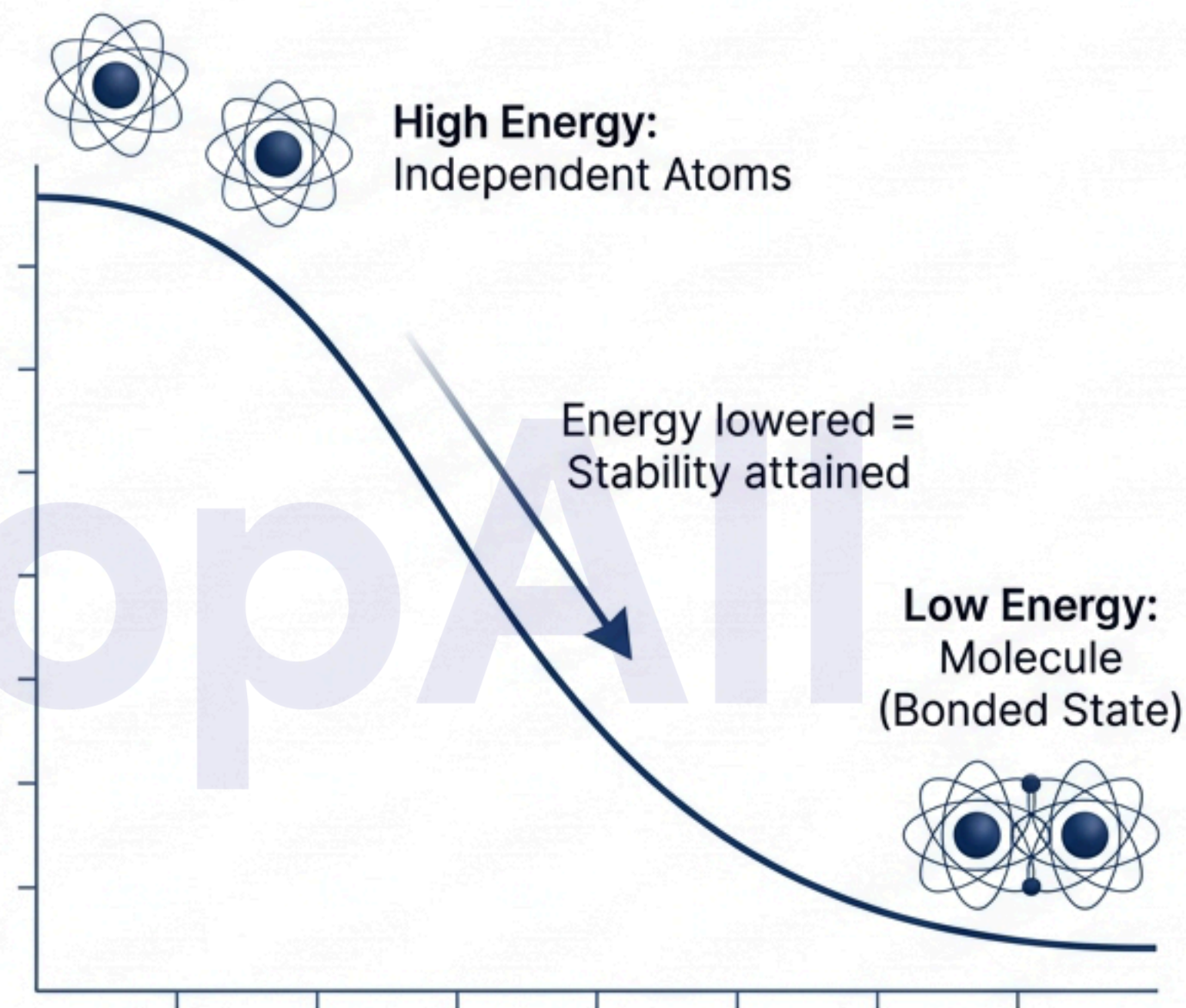
Why Atoms Bond

The Quest for Stability

Every system in nature tends to move toward lower energy. Bonding is nature's mechanism for lowering the total energy of an atomic system.

The Noble Gas Standard

Under normal conditions, only noble gases exist as independent atoms. They already possess the ideal, highly stable electronic configuration.



Atoms combine to mimic the stability of noble gases.

The Lewis View of the Atom



The Octet Rule: A stable electronic arrangement is achieved when all eight corners of the outer shell are occupied. Atoms link to achieve this octet.



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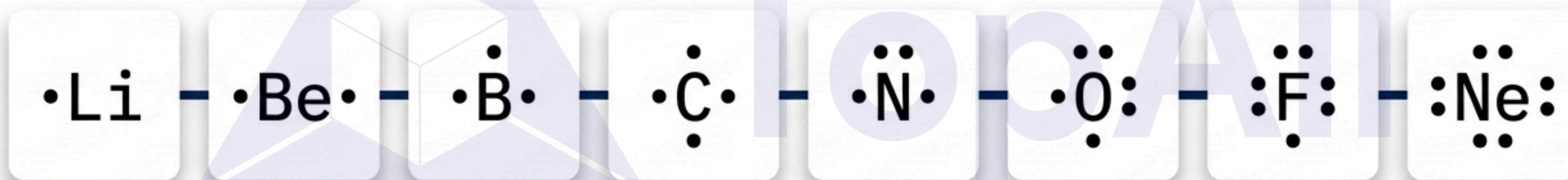
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Lewis Symbols

Only outer shell electrons participate in chemical combinations. G.N. Lewis introduced simple dot notations to represent these valence electrons.



Group Valence = [Number of dots] OR [8 - Number of dots]

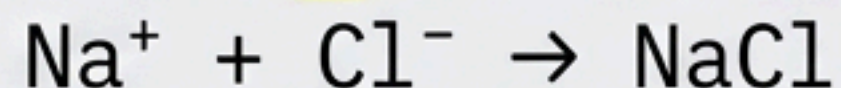
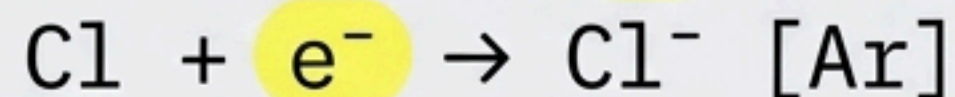
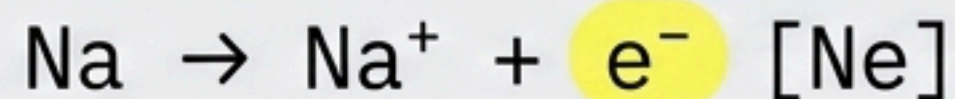
Inner shell electrons are protected and generally do not participate in bonding.

Ionic and Covalent Possibilities

Electron Transfer (Kössel)

Electrovalent (Ionic) Bond

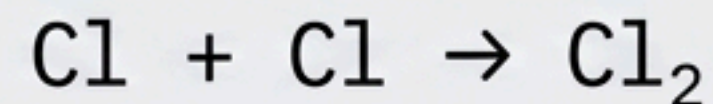
One atom loses an electron, another gains it. Both achieve noble gas configurations, held together by electrostatic attraction.



Electron Sharing (Lewis-Langmuir)

Covalent Bond

Atoms share a pair of electrons. Each atom contributes one electron to the shared pair to complete their outer shells.



Final Recap

-  **Valence Electrons Matter** (Inner electrons are protected; outer electrons bond).
-  **Noble Gas Standard** (Atoms gain, lose, or share to reach an octet).
-  **Lower Energy = Stability** (Bonding is nature's way of minimizing energy).

The Kössel-Lewis Approach in Action

The formation of NaCl perfectly illustrates this theory. Sodium (highly electropositive) loses its single valence electron, becoming Na^+ with a stable Neon core. Chlorine (highly electronegative) gains that electron, becoming Cl^- with a stable Argon core. The resulting electrostatic attraction creates the chemical bond.





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