

4.1.1 Octet Rule



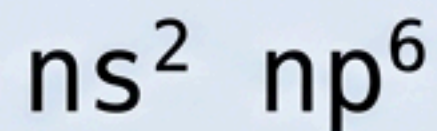
The Quest for Noble Gas Stability

[Kössel & Lewis, 1916]



Every system tends to lower its energy to attain stability. In chemistry, atoms combine specifically to get eight electrons in their outermost (valence) shell.

The Noble Gas Benchmark



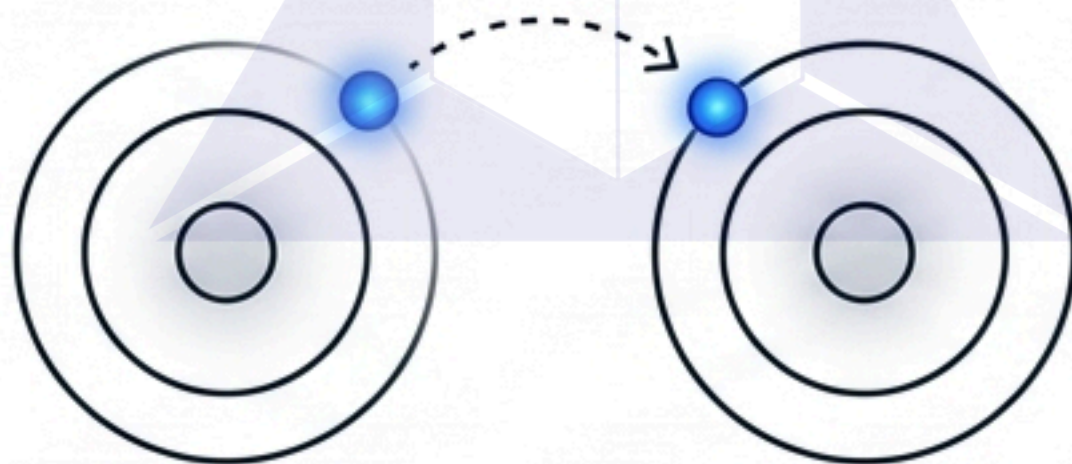
The uniquely stable outer shell configuration of eight electrons (an octet), mirroring the chemically inert noble gases.

How Atoms Complete the Octet

...atoms can combine either by transfer of valence electrons from one atom to another (gaining or losing) or by sharing of valence electrons in order to have an octet in their valence shells.

TRANSFER

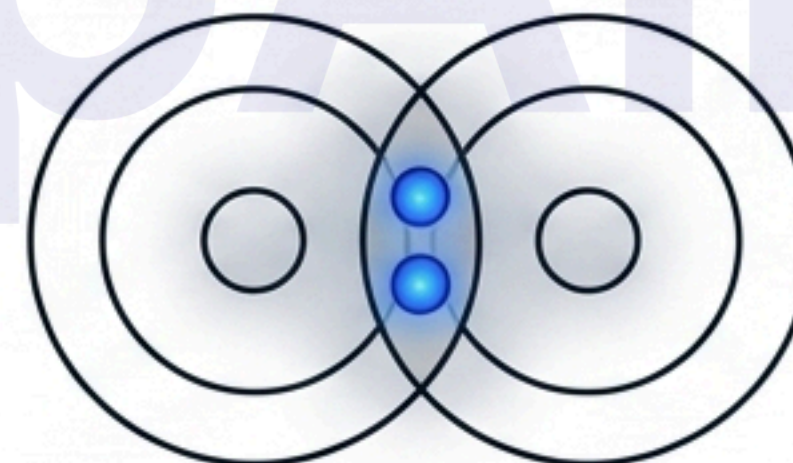
Electrovalent / Ionic



Gaining or losing electrons to achieve stability, resulting in electrostatic attraction between positive and negative ions.

SHARING

Covalent



Sharing pairs of electrons between atoms so that both can count the shared electrons toward their stable outer octet.



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$$E=mc^2$$



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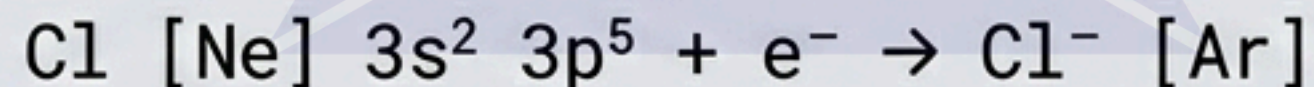
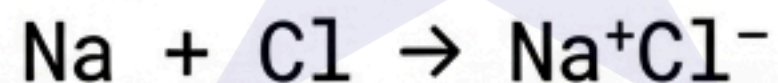
Key Highlights

- » Free Study Material, Videos & Infographics
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- » Track Your Performance Smarter



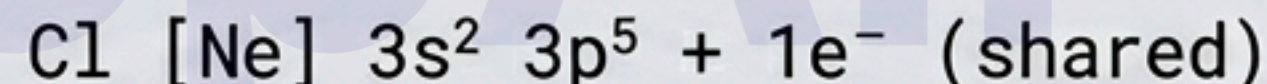
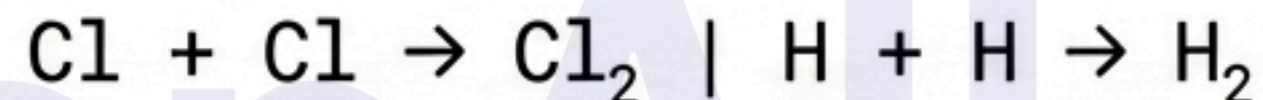
Comparing Transfer and Sharing

TRANSFER (NaCl)



Sodium completely transfers its 1 valence electron to chlorine. Both instantly achieve stable noble gas configurations.

SHARING (Cl_2 / H_2)



H seeks a duplet (He configuration).

Two chlorine atoms share a pair of electrons. Each atom contributes one electron, allowing both to count the shared pair toward their 8.

The First Bonding Model

The Octet Rule is your foundational baseline.

It is the most useful first model for understanding why chemical bonds form, especially for second-period elements and basic organic compounds. It successfully explains the vast majority of simple molecule structures.

Limits of the Octet Rule (to explore later):

Odd-electron molecules
(NO, NO₂)

Incomplete octets
(LiCl, BCl₃)

Expanded octets
(3d orbitals: PF₅, SF₆)



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