

Covalent Bonding

How does a covalent bond form?

- A **covalent bond** forms when two atoms **share** one or more pairs of electrons.
- Atoms in covalent bonds typically have **similar electronegativities** and are **usually non-metals**.
- The shared electrons allow each atom to achieve a full outer electron shell, similar to the noble gas configuration.

Types of Covalent Bonds

- **Single Bond:** One pair of electrons is shared (e.g., H_2 , Cl_2).
- **Double Bond:** Two pairs of electrons are shared (e.g., O_2 , CO_2).
- **Triple Bond:** Three pairs of electrons are shared (e.g., N_2).



Dot-and-Cross Diagrams

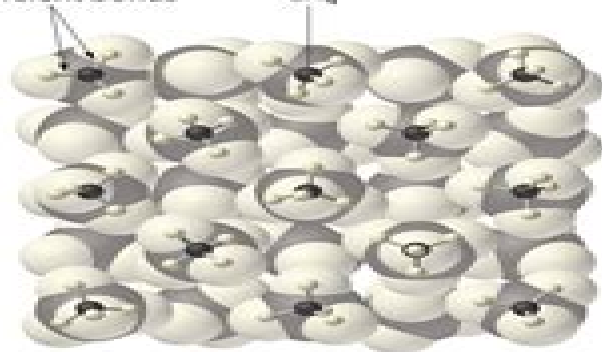
- Only the outer electron shells (valence electrons) are shown.
- Shared pairs of electrons between atoms are shown as pairs of dots and crosses.
- It represents how the atoms bond and achieve stable electron configurations.

Example: Water H_2O



Covalent bonds

CH_4



Properties of Covalent Compounds

- **Molecular Structure:** They are made up of discrete molecules with **weak intermolecular forces**.
- **Melting and Boiling Points:** Generally **lower** than ionic compounds because the forces between molecules are weaker.
- **Electrical Conductivity:** **Poor conductors** of electricity in all states, as they do not have free ions or electrons.
- **Solubility:** Often **soluble in nonpolar solvents** and may be insoluble in water, depending on their polarity.

Chemistry Study Guide Covalent Bonding

James E. Brady, John R. Holum



Chemistry Study Guide Covalent Bonding:

Organic Chemistry Study Guide with Solutions Manual Neil E. Schore, 2007 The guide includes chapter introductions that highlight new material chapter outlines detailed comments for each chapter section a glossary and solutions to the end of chapter problems presented in a way that shows students how to reason their way to the answer

Organic Chemistry Study Guide and Solutions Manual Marc Loudon, Jim Parise, Lisa Bonner, 2024-08-09 The Study Guide and Solutions Manual offers several study tools for students Study Guide Links are brief supplements to text material and provide hints for study shortcuts approaches to problem solving or additional explanations of topics that typically cause difficulty Further Explorations are short discussions that provide additional depth on content in the text Reaction Reviews present the reactions in the chapter in detailed outline form This summary consolidates the reactions of the chapter in one place and presents not only the reactions themselves but also the essential features of their mechanisms and stereochemistry for cases in which these issues are discussed in the text Solutions are provided for all of the over 1600 problems in the text Many include worked out examples in which not only the answer is given but also the detailed approach to the solution is discussed

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