# Intermolecular and intramolecular forces

*Intermolecular* forces are the forces that hold atoms together *within a molecule*. *Intermolecular* forces are forces that *exist between molecules. Such as HCl.*

**Types of intermolecular forces of attraction**

1. **Ionic bond:** This bond is formed by the complete transfer of valence electron(s) between atoms. It is a type of chemical bond that generates two oppositely charged ions. In ionic bonds, the metal loses electrons to become a positively charged cation, whereas the nonmetal accepts those electrons to become a negatively charged anion A force developed between opposite ions which is called ionic bond.
2. **Covalent bond:** This bond is formed between atoms that have similar electronegativity’s—the affinity or desire for electrons. Because both atoms have similar affinity for electrons and neither has a tendency to donate them, they share electrons in order to achieve octet configuration and become more stable.

A **nonpolar covalent bond** is formed between same atoms or atoms with very similar electronegativity’s—the difference in electronegativity between bonded atoms is less than 0.5.

1. **Metallic bonding:** This type of covalent bonding specifically occurs between atoms of metals, in which the valence electrons are free to move through the lattice. This bond is formed via the attraction of the mobile electrons—referred to as sea of electrons—and the fixed positively charged metal ions. Metallic bonds are present in samples of pure elemental metals, such as gold or aluminum, or alloys, like brass or bronze.

The freely moving electrons in metals are responsible for their a reflecting property—freely moving electrons oscillate and give off photons of light—and their ability to effectively conduct heat and electricity.

## Relative strength of the intramolecular forces

| **Intramolecular force** | **Basis of formation** | **Relative strength** |
| --- | --- | --- |
| Metallic bond | Metal cations to delocalized electrons | 1, strongest |
| Ionic bond | Cations to anions | 2 |
| Polar covalent bond | Partially charged cation to partially charged anion | 3 |
| Nonpolar covalent bond | Nuclei to shared electrons | 4, weakest |

## Intermolecular forces of attraction

Now let’s talk about the intermolecular forces that exist between molecules. Intermolecular forces are much weaker than the intramolecular forces of attraction but are important because they determine the physical properties of molecules like their boiling point, melting point, density, and enthalpies of fusion and vaporization.

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