

Topic 4: Intermolecular Forces and Boiling Points of Molecules

Intermolecular forces

- Inter means between
- Molecular refers to molecules
- Forces between molecules
- These forces attract molecules to each other

Intramolecular forces

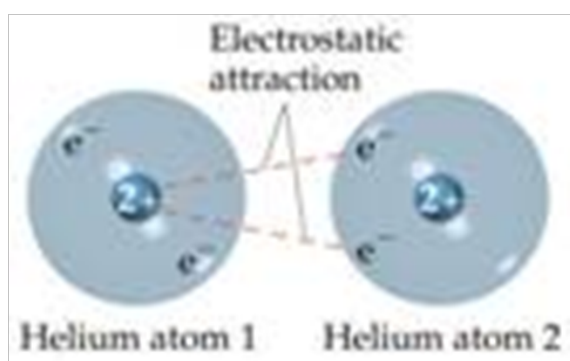
- Intra means within
- Within a molecule
- Ex. Covalent bonds

Three types of intermolecular forces

- London Dispersion **LD** - sewing thread
- Dipole-Dipole **DD** - rope
- Hydrogen Bonding **HB** - chains

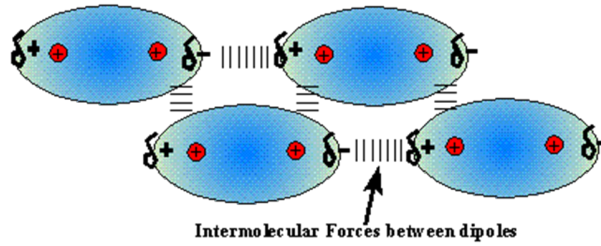
London Dispersion

- Positive and negative charges **attract each other**.
- Every atom has **positive protons** in the **nucleus** and **negative electrons** on **orbitals surrounding the nucleus**.
- **positive protons of one molecule attract the negative electrons of the other**.



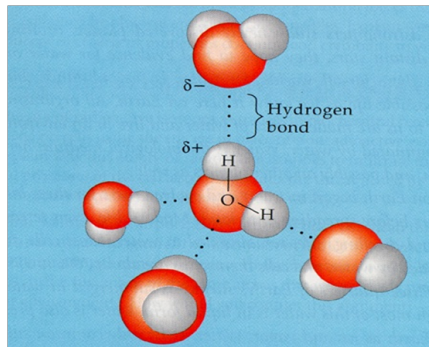
Dipole-Dipole

- Force of attraction between **polar molecules**.
- Slightly **negative poles** of one molecule attract slightly **positive poles** of another molecule
- Determines solubility of molecules
 - **Like dissolves like**
 - **Polar molecules dissolve in polar molecules**
 - **Non-polar molecules dissolve in non-polar molecules**



Hydrogen Bonding

- Force of attraction between a hydrogen bonded to **O, F, or N** of one molecule and the **lone pairs** of O, F, or N on another molecule.
- It is the **strongest** intermolecular force



Effect of intermolecular forces

- Boiling point/Melting point
 - The higher the I.M. the higher the mp or bp
 - More forces to hold the molecules together
- Surface tension
 - Higher I.M. higher surface tension b/c forces hold surface of liquid intact

Example: Which of the following compounds would have a higher m.p./b.p.?

