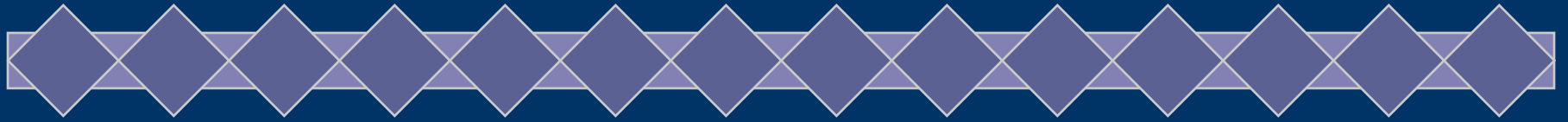


Unit 6 Molecular Compounds

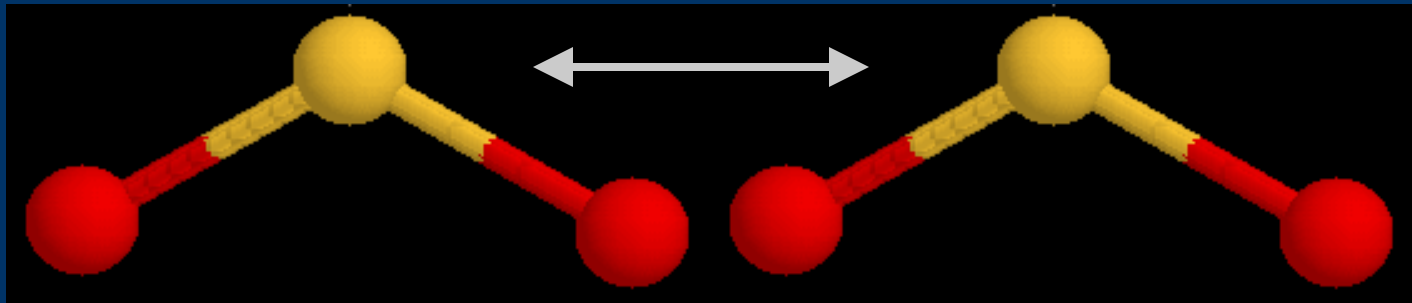


I. Intermolecular Forces

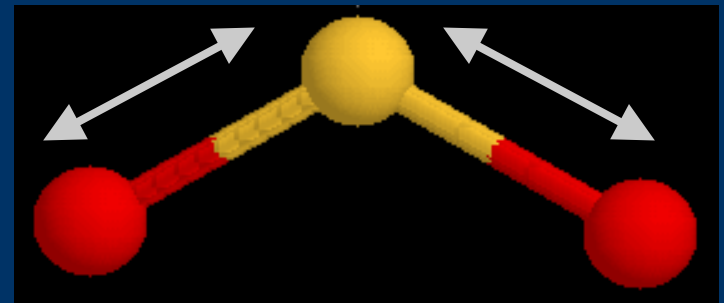


A. Definition of IMF

- ◆ Attractive forces **between** molecules.



- ◆ Much weaker than chemical bonds **within** molecules.



- ◆ a.k.a. van der Waals forces

B. Types of IMF



- ◆ The weakest IMF are called van der Waal's forces - there are two kinds:
 - #1. Dispersion forces (London Dispersion Forces)
 - #2. Dipole-Dipole forces

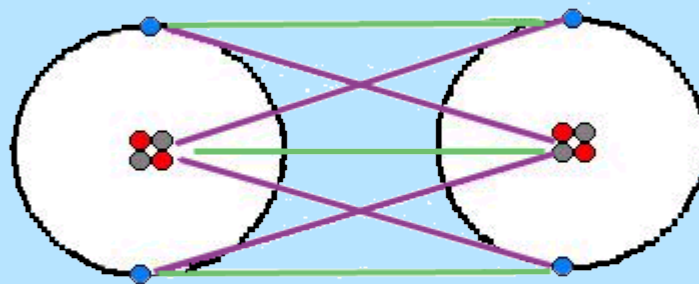
#1. Dispersion forces (London Dispersion Forces)



- The London dispersion force is the weakest intermolecular force.
- London forces are the attractive forces that cause nonpolar substances to condense to liquids and to freeze into solids when the temperature is lowered sufficiently.

Example:

London forces between two Helium atoms



- Repulsive forces
- Attractive forces

2. Dipole - Dipole Attractions

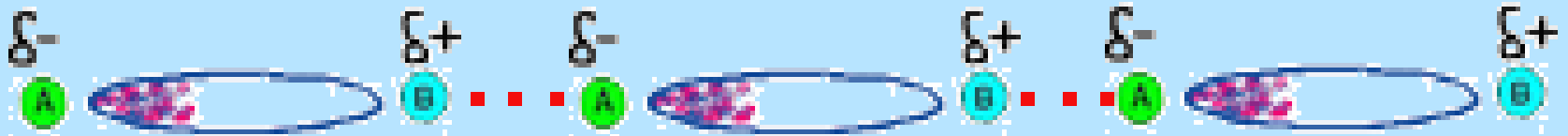


- ◆ Dipole-Dipole Forces occurs when polar molecules are attracted to each other.
- ◆ Dipole interaction happens in water
 - positive region of one molecule attracts the negative region of another molecule.

Dipole-Dipole Attractions

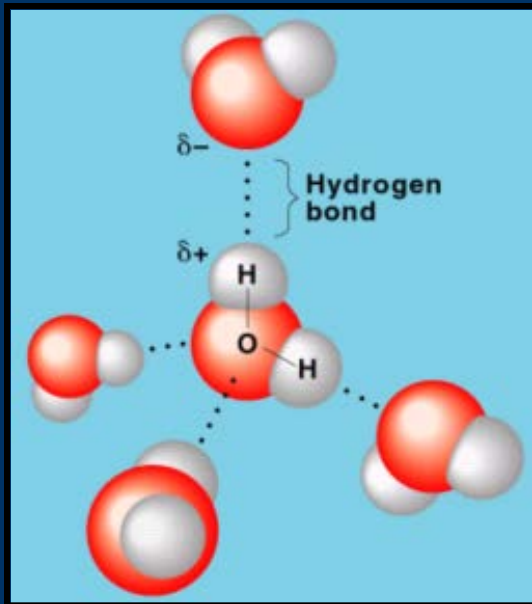


- ◆ These charges are called induced dipoles



B. Types of IMF

◆ Hydrogen Bonding



Hydrogen bonding is actually an intermolecular attraction that forms between the hydrogen of one molecule and a small, highly electronegative element in an adjacent molecule. Typically this is **Fluorine (HF)**, **Oxygen (H₂O)** or **Nitrogen (NH₃)**.

B. Types of IMF

	LONDON DISPERSION FORCES	DIPOLE-DIPOLE FORCES	HYDROGEN BONDING
Definition	<ul style="list-style-type: none"> Attraction between 2 instantaneous dipoles. Asymmetrical electron distribution. All atoms & molecules. 	<ul style="list-style-type: none"> Attraction between 2 permanent dipoles. Polar molecules. 	<ul style="list-style-type: none"> Attraction between molecules with N-H, O-H, & F-H bonds. Extremely polar bonds \Rightarrow very strong dipole-dipole force.
Diagram			
Relative Strength	<ul style="list-style-type: none"> weakest 	<ul style="list-style-type: none"> medium strength 	<ul style="list-style-type: none"> strongest
Other Information	<ul style="list-style-type: none"> Increase in strength as molar mass increases (more electrons). 	<ul style="list-style-type: none"> Stronger when molecules are closer together 	<ul style="list-style-type: none"> Not chemical bonding.

C. Determining IMF



- polar = dispersion, dipole-dipole



- nonpolar = dispersion



- H-F bond = dispersion, dipole-dipole, hydrogen bonding

Now go to a computer ...

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- ◆ [http://www.science.uwaterloo.ca/~cc
hieh/cact/c123/intermol.html](http://www.science.uwaterloo.ca/~cc
hieh/cact/c123/intermol.html)
Student Activity

Visual Intermolecular Forces

