

Liquids & Solids

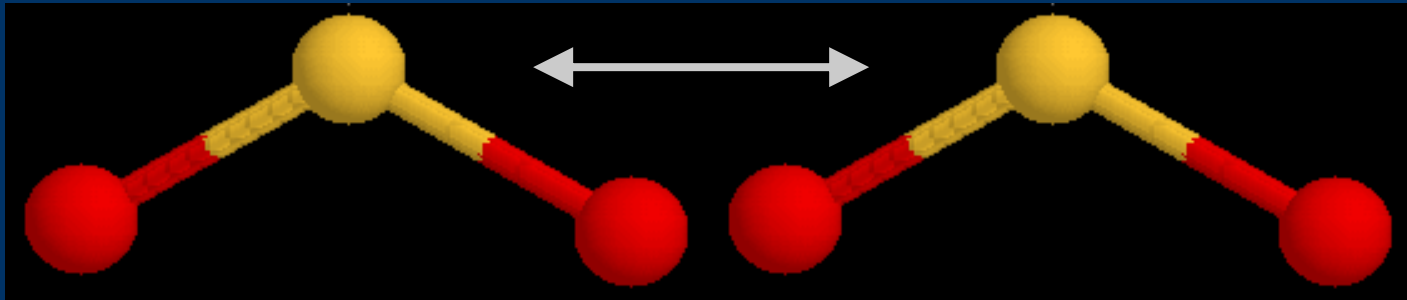


I. Intermolecular Forces

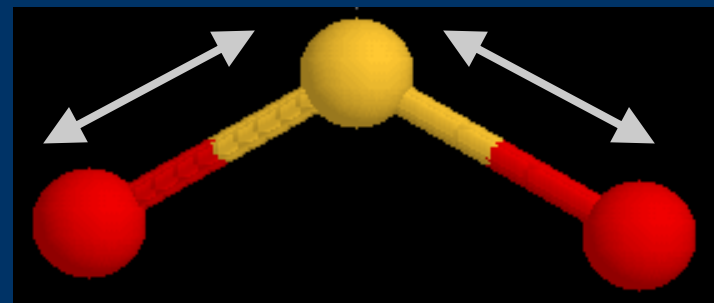


A. Definition of IMF

- ◆ Attractive forces **between** molecules.



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



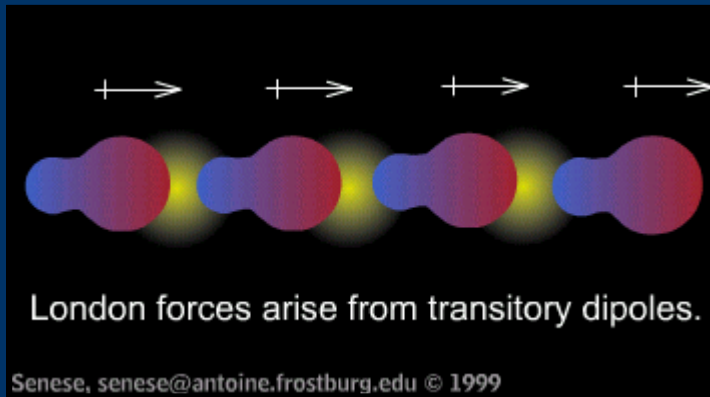
- ◆ a.k.a. van der Waals forces

B. Types of IMF

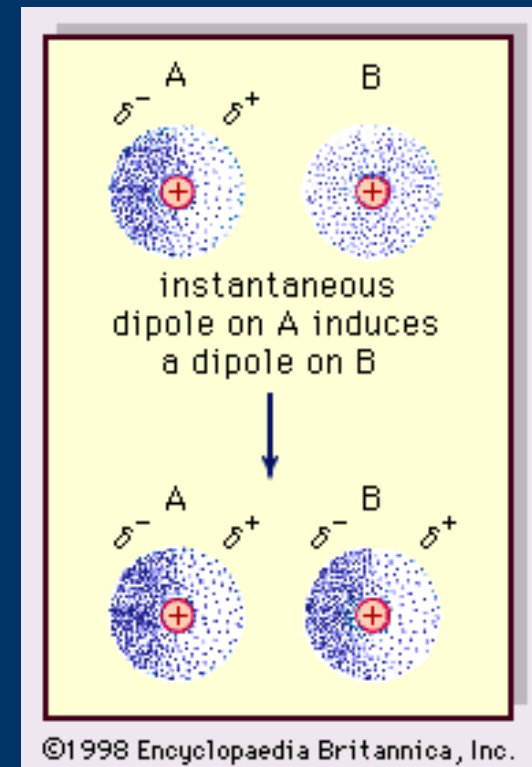
| | LONDON DISPERSION FORCES | DIPOLE-DIPOLE FORCES | HYDROGEN BONDING |
|--------------------------|--|---|---|
| Definition | <ul style="list-style-type: none"> Attraction between 2 instantaneous dipoles. Asymmetrical electron distribution. All atoms & molecules. | <ul style="list-style-type: none"> 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. |

B. Types of IMF

◆ London Dispersion Forces

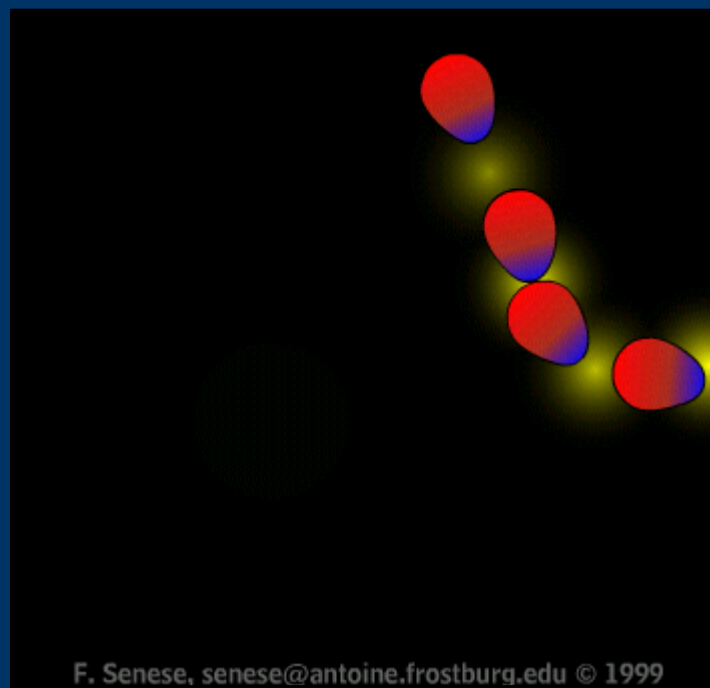
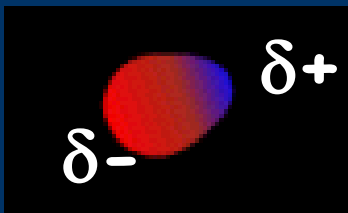


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B. Types of IMF

◆ Dipole-Dipole Forces

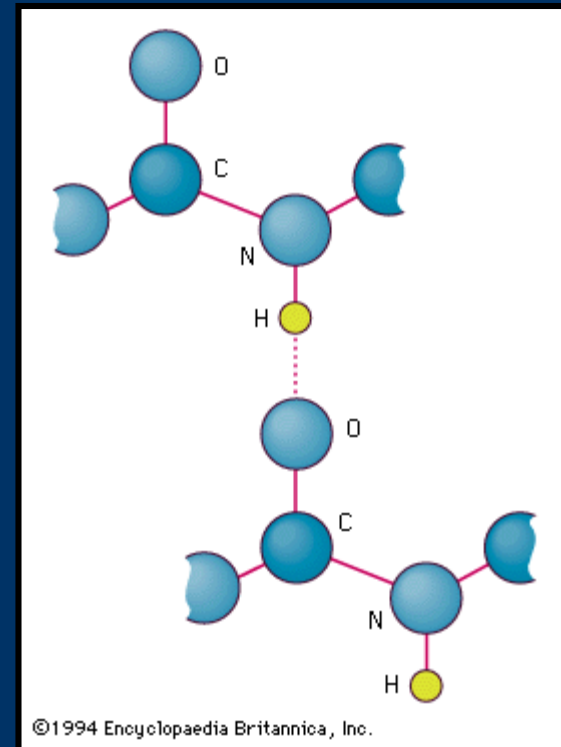
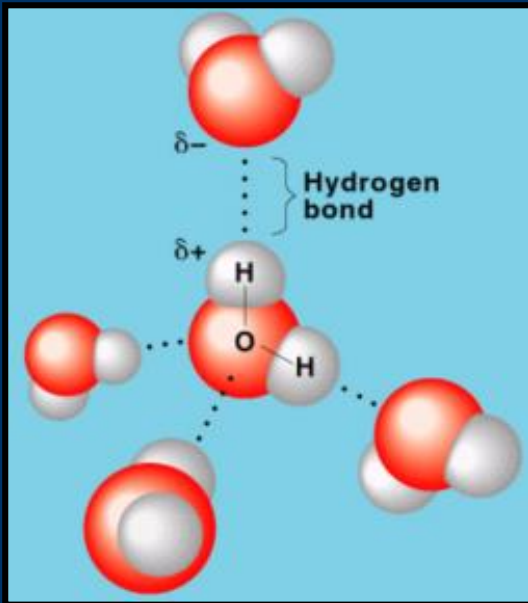


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B. Types of IMF

◆ Hydrogen Bonding



C. Determining IMF



- ◆ PH_3
 - polar = dispersion, dipole-dipole
- ◆ CH_4
 - nonpolar = dispersion
- ◆ HF
 - H-F bond = dispersion, dipole-dipole, hydrogen bonding