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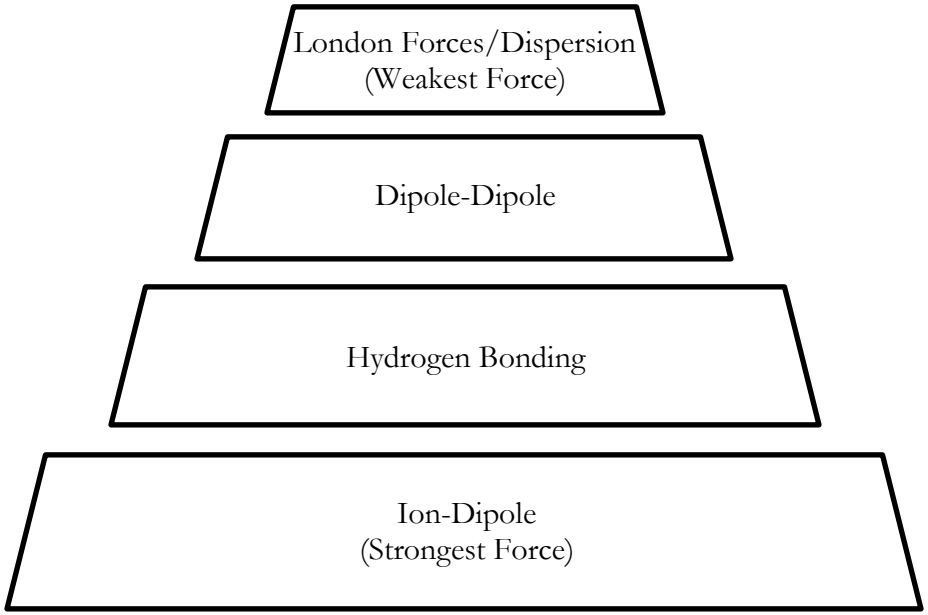
Intermolecular Forces

Each intermolecular force varies in strength; however, intermolecular forces are weaker than intramolecular forces (i.e. ionic bonds, metallic bonds, or covalent bonds). Intermolecular forces are forces of attraction that act between neighboring particles, and intramolecular forces are forces that keep a molecule together. The strength of intermolecular forces is responsible for many properties of substances, including the boiling points of liquids and the melting points of solids. The stronger the attractive force in a given substance, the higher the boiling point or melting point. This handout describes four types of intermolecular forces and provides examples of molecules with weaker and stronger attractions. Students should complete a variety of practice problems from the textbook to ensure they understand the types and relative strengths for any given selection of molecules.



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Type of Intermolecular Force	Description and Relative Strength	Weaker Example	Stronger Example
London/Dispersion	Occurs in all substances; is the weakest force; intermolecular attractions increase with an increase in molecular weight	CH_4	Br_2
Dipole-Dipole	Stronger than London Dispersion Forces; polar molecules are present; intermolecular attractions increase with increasing polarity	CH_3OCH_3	CH_3CN
Hydrogen	A hydrogen atom bonded directly to nitrogen, oxygen, or fluorine; intermolecular attractions increase with an increase in the number of hydrogen bonds present	NH_3	N_2H_4
Ion-Dipole	Only occurs between ions and polar molecules; is the strongest force	$NaCl$ $dissolved\ in\ water$	$HC_2H_3O_2$ $in\ water$