

Intermolecular Forces & Physical Properties

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Intermolecular Forces and Physical Properties

Connections with Polarity

- Last time, we learned that polar covalent bonds can lead to molecules which are polar.
- Today, we are going to look at how these polar molecules behave when they exist in large groups.

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Intermolecular Forces and Physical Properties

Intermolecular Forces

- Polar molecules, when gathered in large groups, are attracted to one another.
 - Positive dipoles from one molecule attract negative dipoles from neighboring molecules, and vice-versa
- These forces of attraction between polar molecules are termed **intermolecular forces (IMF's)**
 - Weak attractions (about 1/10 - 1/100 a covalent bond)
 - The more polar the molecules, the stronger the intermolecular forces

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Intermolecular Forces and Physical Properties

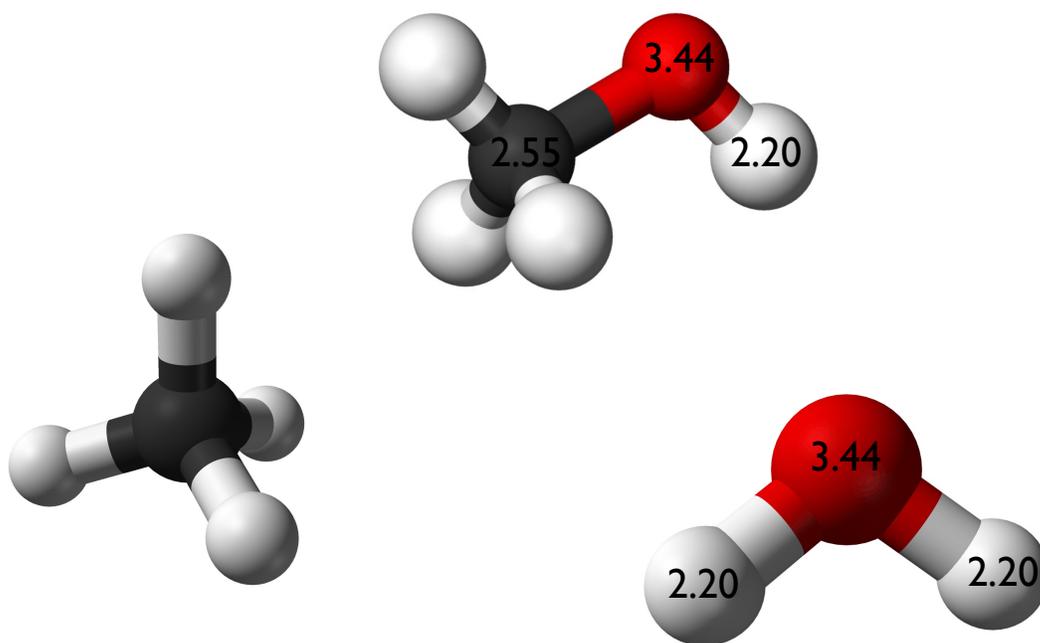
Intermolecular Forces

- The **strength** of intermolecular forces (IMF's) within a substance determines its physical properties
 - Phase
 - solid
 - liquid
 - gas
 - Volatility
 - The ease with which a liquid evaporates into a gas
 - Boiling Point
 - The temperature at which the molecules in a liquid have enough energy to vaporize into a gas
 - Cohesion
 - An attractive force that exists within a substance.
 - Adhesion
 - An attractive force that exists between two different substances

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Intermolecular Forces and Physical Properties

Practical Applications

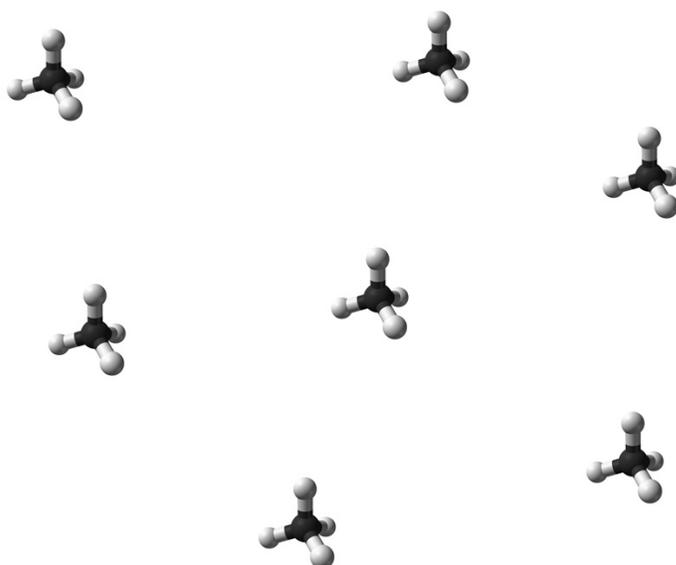


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Intermolecular Forces and Physical Properties

Practical Applications - Phases of Matter

- CH_4 No Polarity \Rightarrow No IMF's \Rightarrow Gas

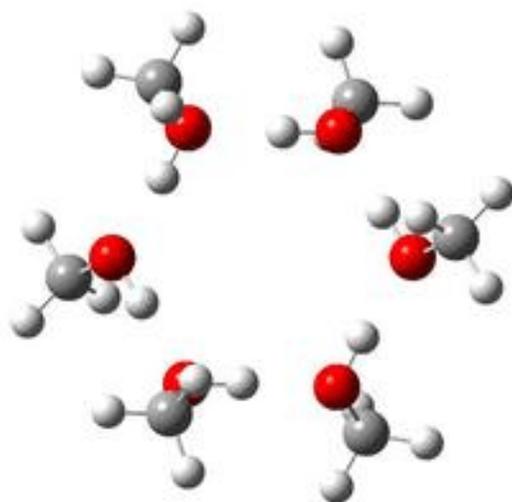


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Intermolecular Forces and Physical Properties

Practical Applications - Phases of Matter

- CH_3OH Polar Molecule \Rightarrow IMF's \Rightarrow Liquid

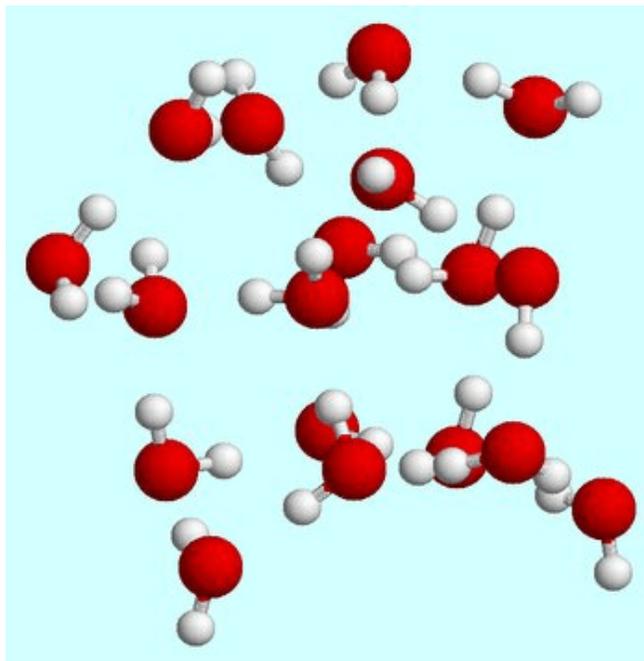


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Practical Applications - Phases of Matter

- H_2O Polar Molecule \Rightarrow IMF's \Rightarrow Liquid



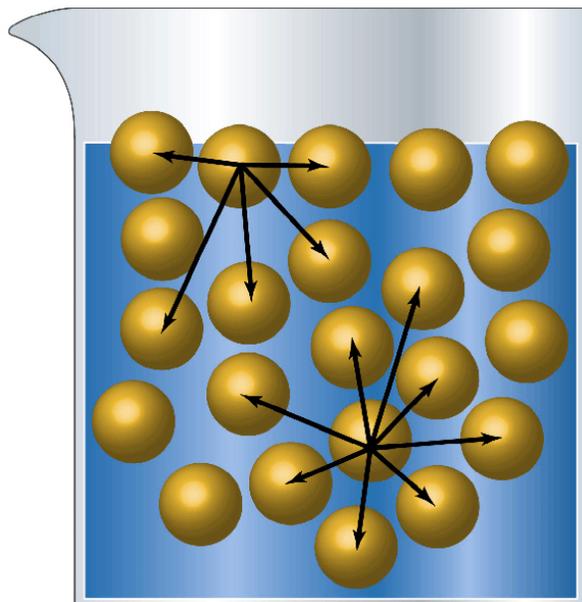
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Intermolecular Forces and Physical Properties

Properties of Substances

- Volatility

\uparrow Polar \Rightarrow \uparrow IMF's \Rightarrow \downarrow Volatility



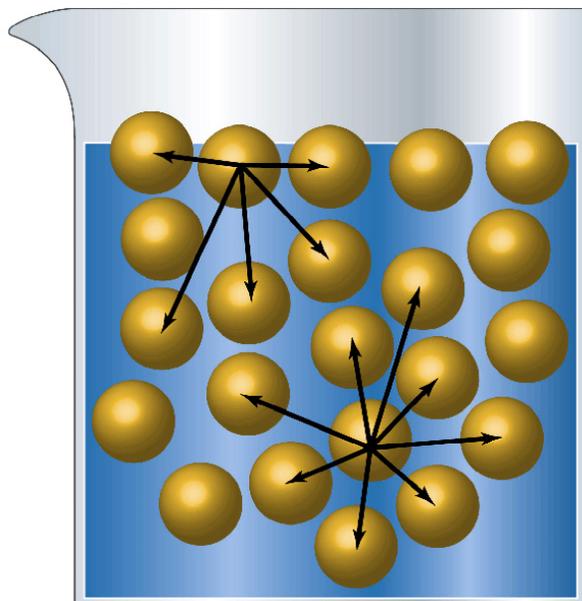
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Intermolecular Forces and Physical Properties

Properties of Substances

- Boiling Point

\uparrow Polar \Rightarrow \uparrow IMF's \Rightarrow \uparrow Boiling Point



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Intermolecular Forces and Physical Properties

Properties of Substances

- Adhesion and Cohesion

↑Polar ⇒ ↑IMF's ⇒ ↑ Adhesive/Cohesive Forces

