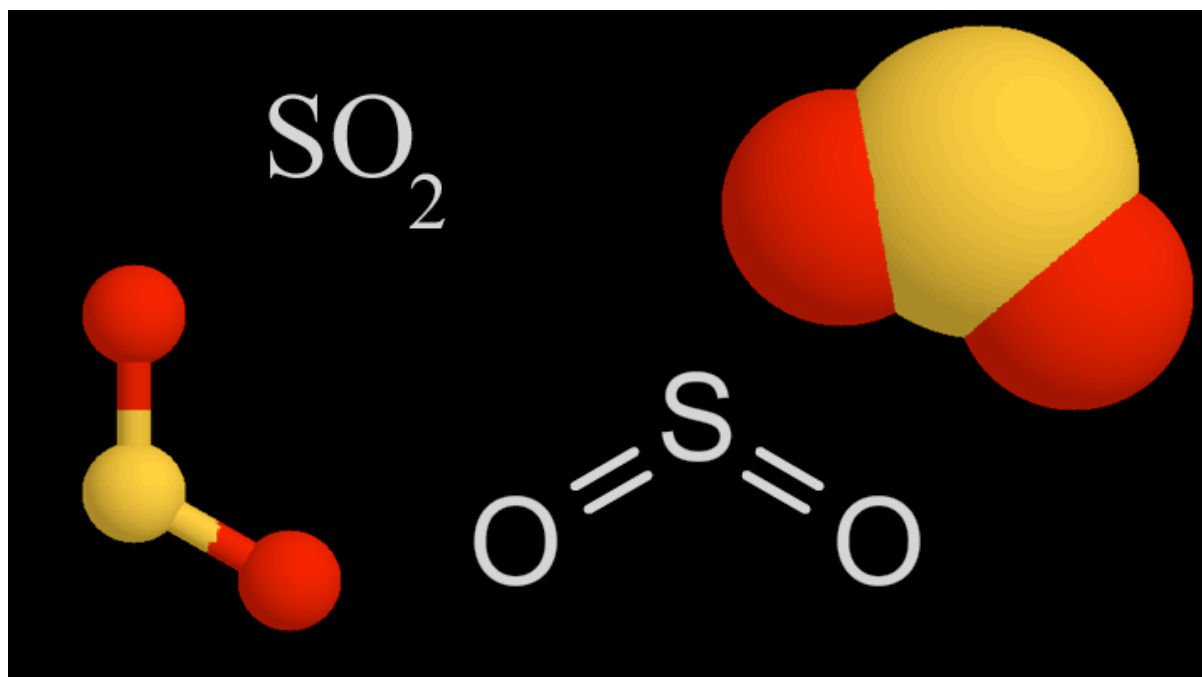


General Chemistry



**CHEMICAL REACTIONS
INTERMOLECULAR FORCES
THERMODYNAMICS**

17 OCTOBER 2009



**A molecule of sulfur dioxide.
Where is the energy stored within a
molecule?**

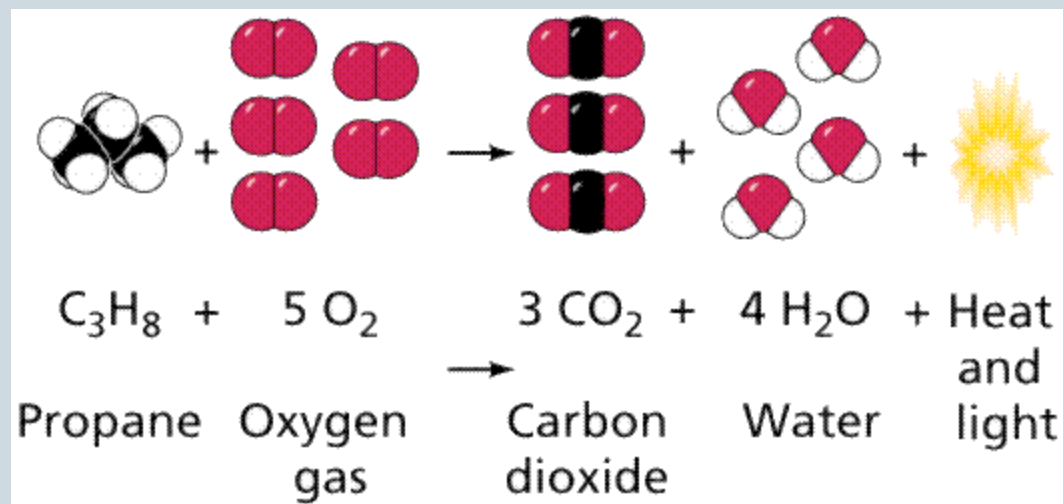
Video



FIVE TYPES OF CHEMICAL REACTIONS

Types of Chemical Reactions

- Combustion



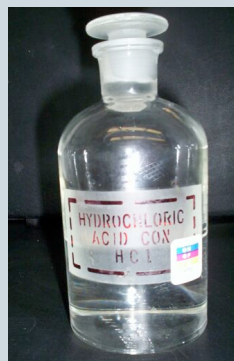
What would the decomposition equation for water be?

- Synthesis/
Decomposition



Types of Chemical Reactions

- Single Replacement

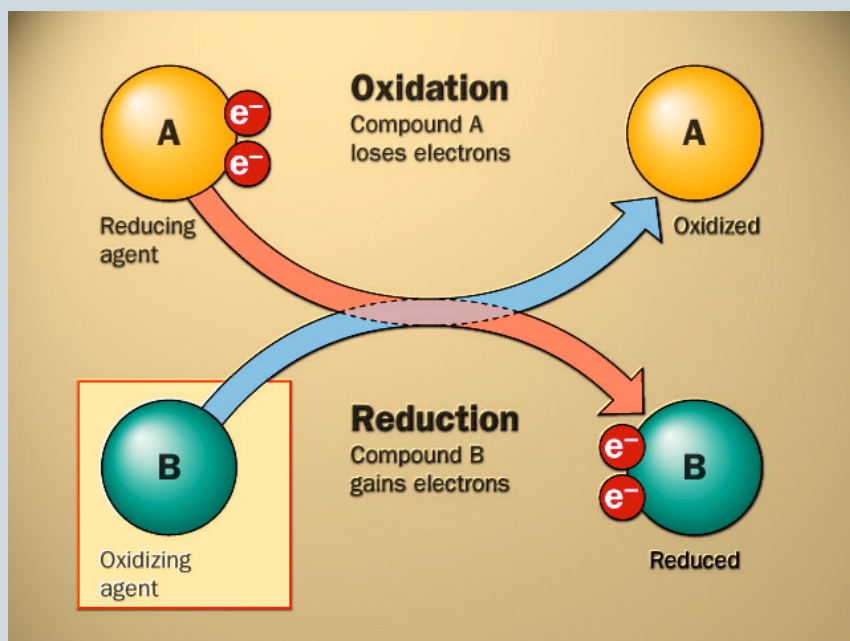


- Double Replacement



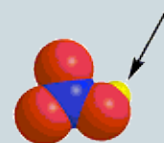
Special Kinds of Chemical Reactions

Oxidation Reduction Reaction

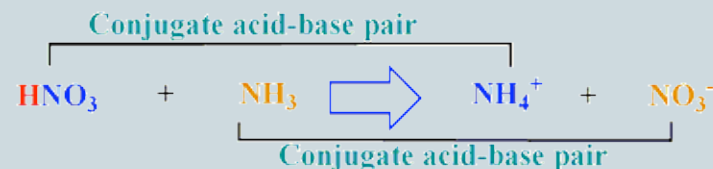


Acid-Base Reactions

This hydrogen atom will go to ammonia molecule as a **proton** leaving the lone pair of electron to the NO_3^- Anion.



This **proton** will form a covalent bond with the lone pairs of electrons on the ammonia ion



Nitric Acid
will give a proton to the base "ammonia"

Ammonia
will act as a **base** by accepting the proton from the acid

Ammonium ion
Conjugate Acid
of the base

Nitrate ion
Conjugate base
of the Acid

Ketchup + Baking Soda =

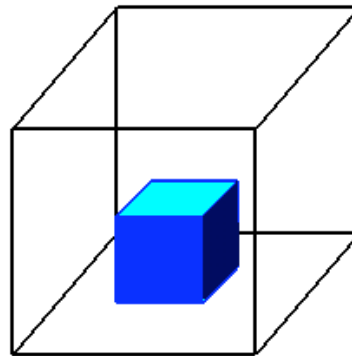




States of Matter

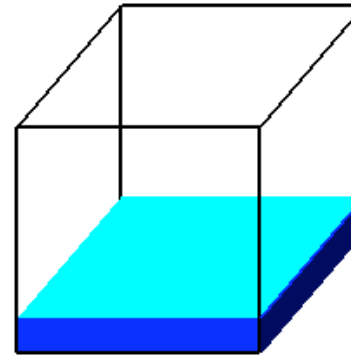
Glenn
Research
Center

Where could you find
a compound in all
three states of matter
at the same time?



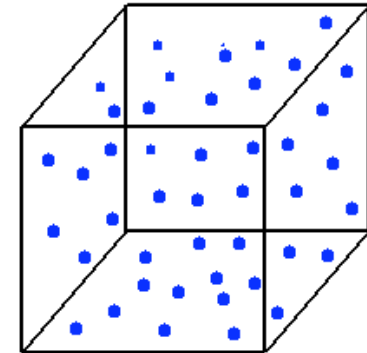
Solid

Holds Shape
Fixed Volume



Liquid

Shape of Container
Free Surface
Fixed Volume



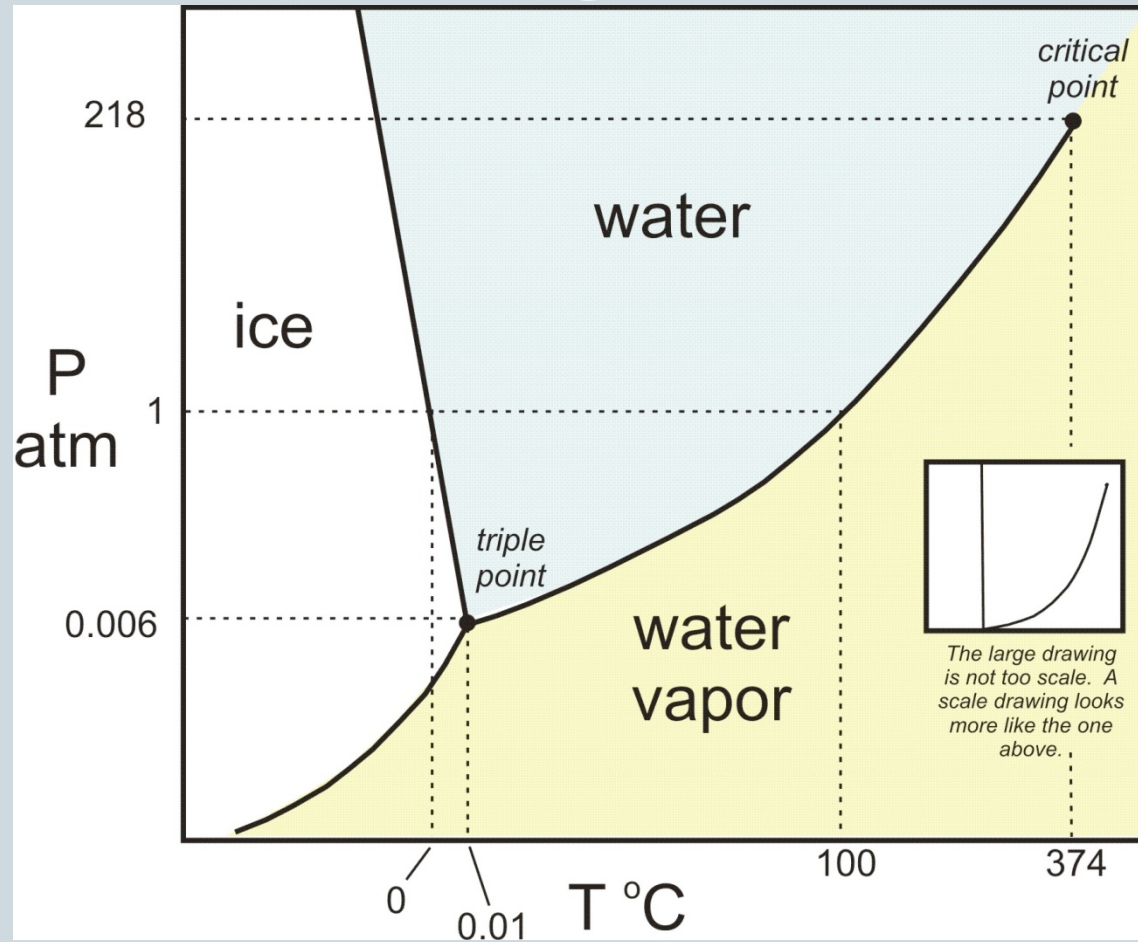
Gas

Shape of Container
Volume of Container



Iceberg, Disko Bay, Greenland

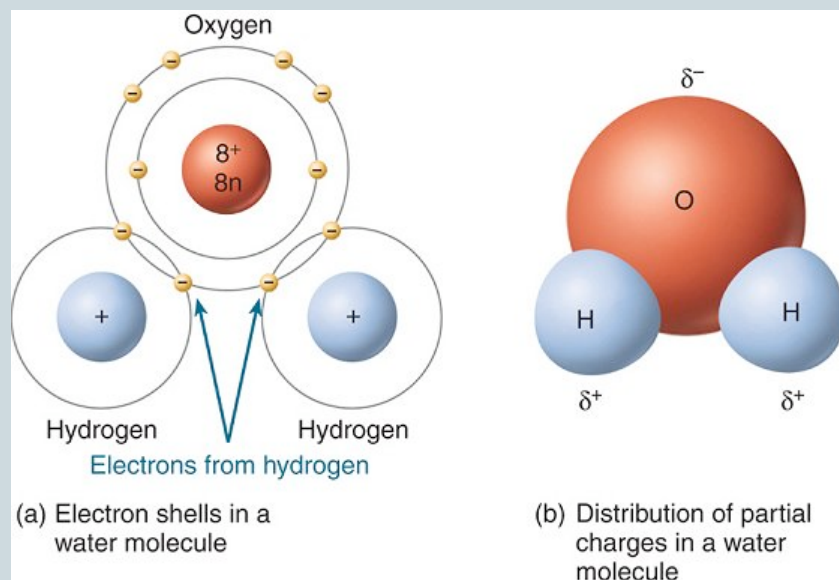
Phase Diagrams



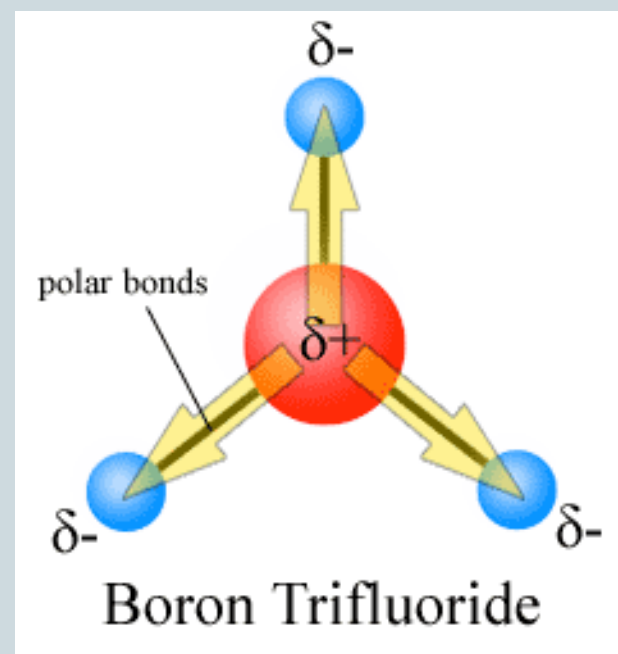
What does dry ice do?

Polar vs. Non-Polar Molecules

Polar



Non-Polar



Like Dissolves Like



- Will salt dissolve in water?
- Will sugar dissolve in water?
- Will oil and water mix?
- Will alcohol and water mix?
- Will Styrofoam dissolve in water?

Intra- vs. Intermolecular Forces



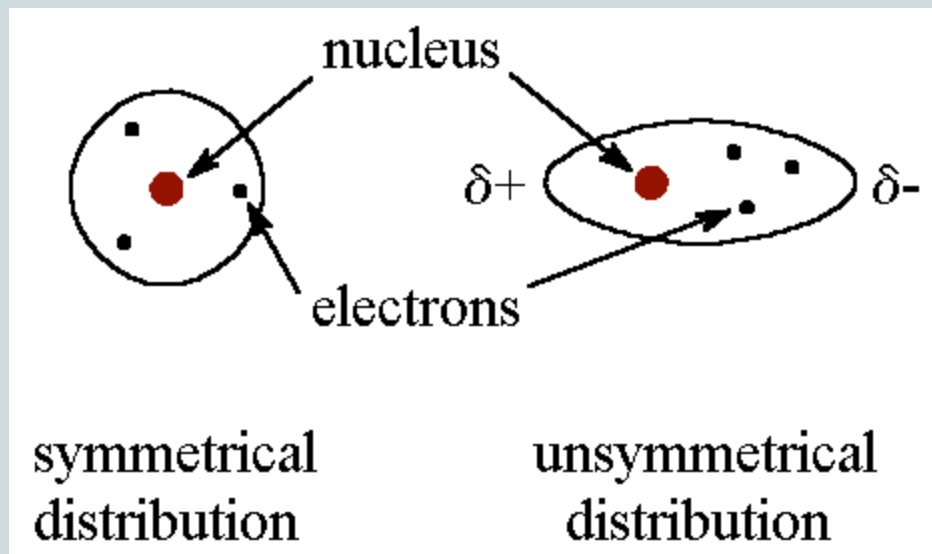
Intramolecular forces

- Made up of ionic and covalent bonds.
- In-between atoms of an individual molecule.
- Mostly determines chemical properties of molecule.

Intermolecular forces

- Made up of London dispersion forces, dipole-dipole forces, and Hydrogen bonds.
- In-between molecules
- Mostly determines physical properties of molecule.

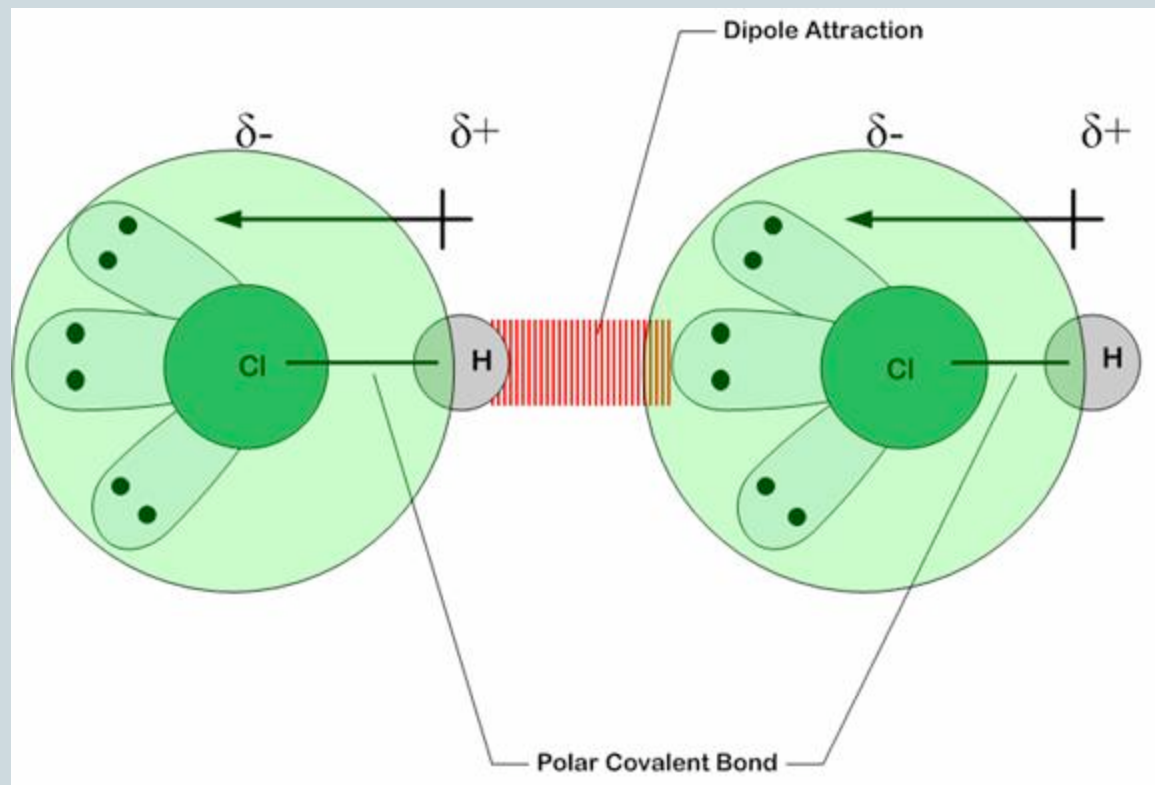
London Dispersion Forces



What causes this unsymmetrical distribution?

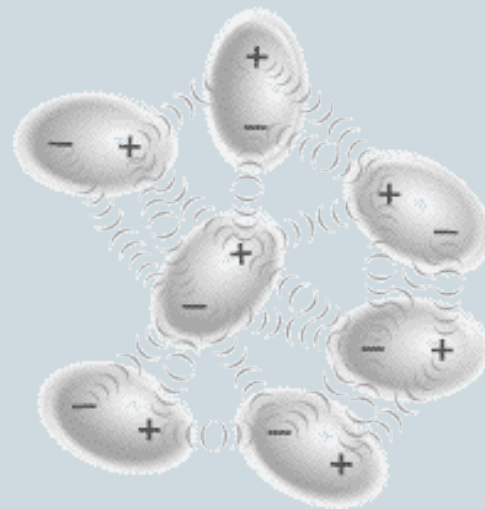


Dipole-Dipole Forces

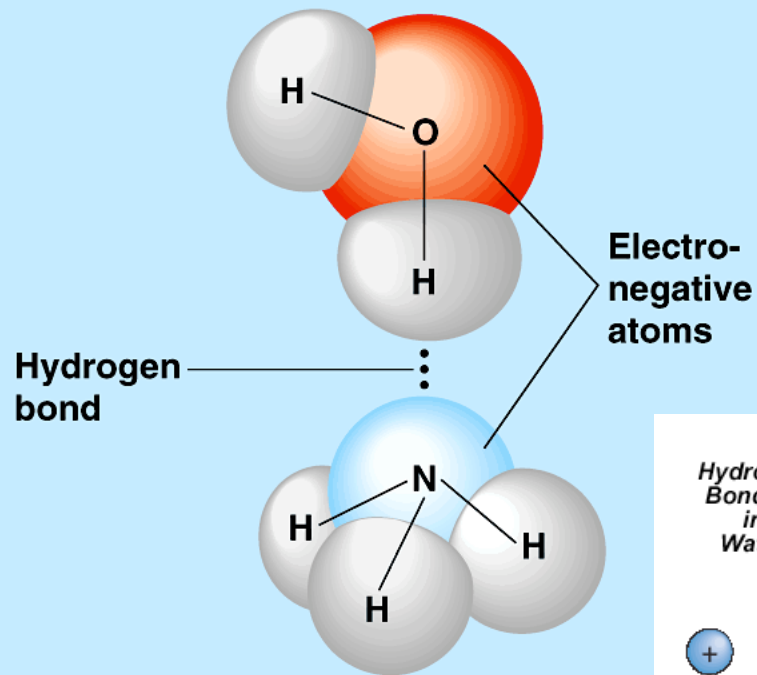


attraction

repulsion

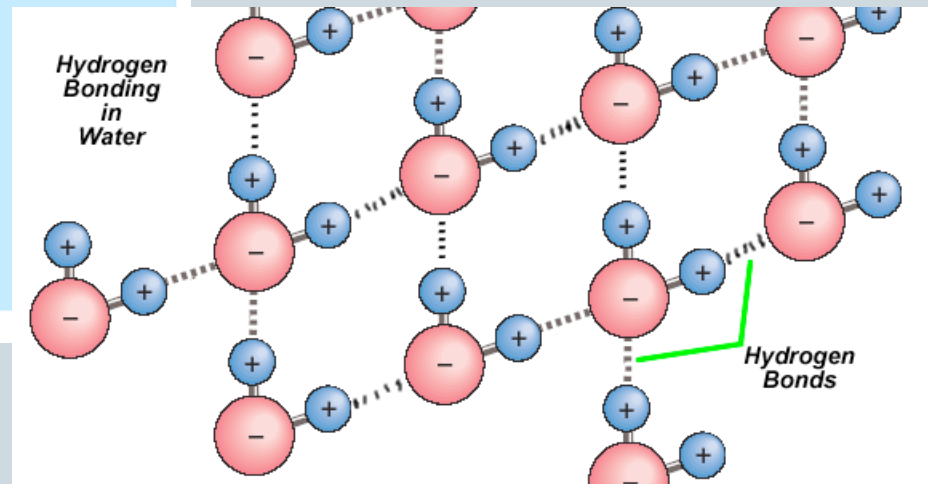


Hydrogen Bonding



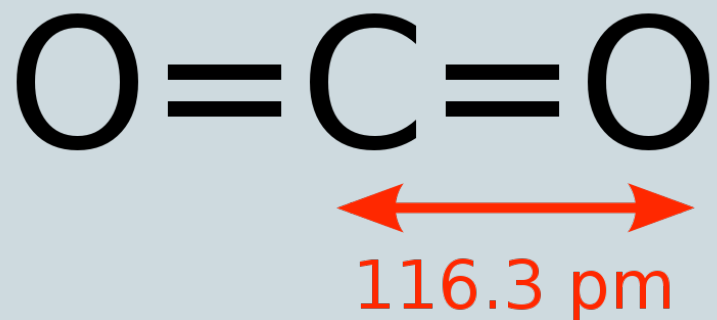
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What forces hold together water molecules and what forces hold together oil?

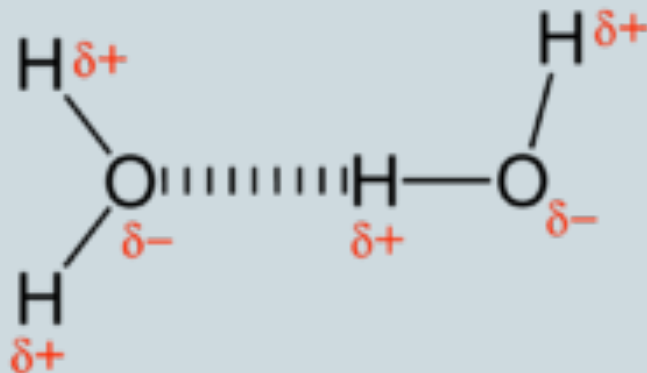


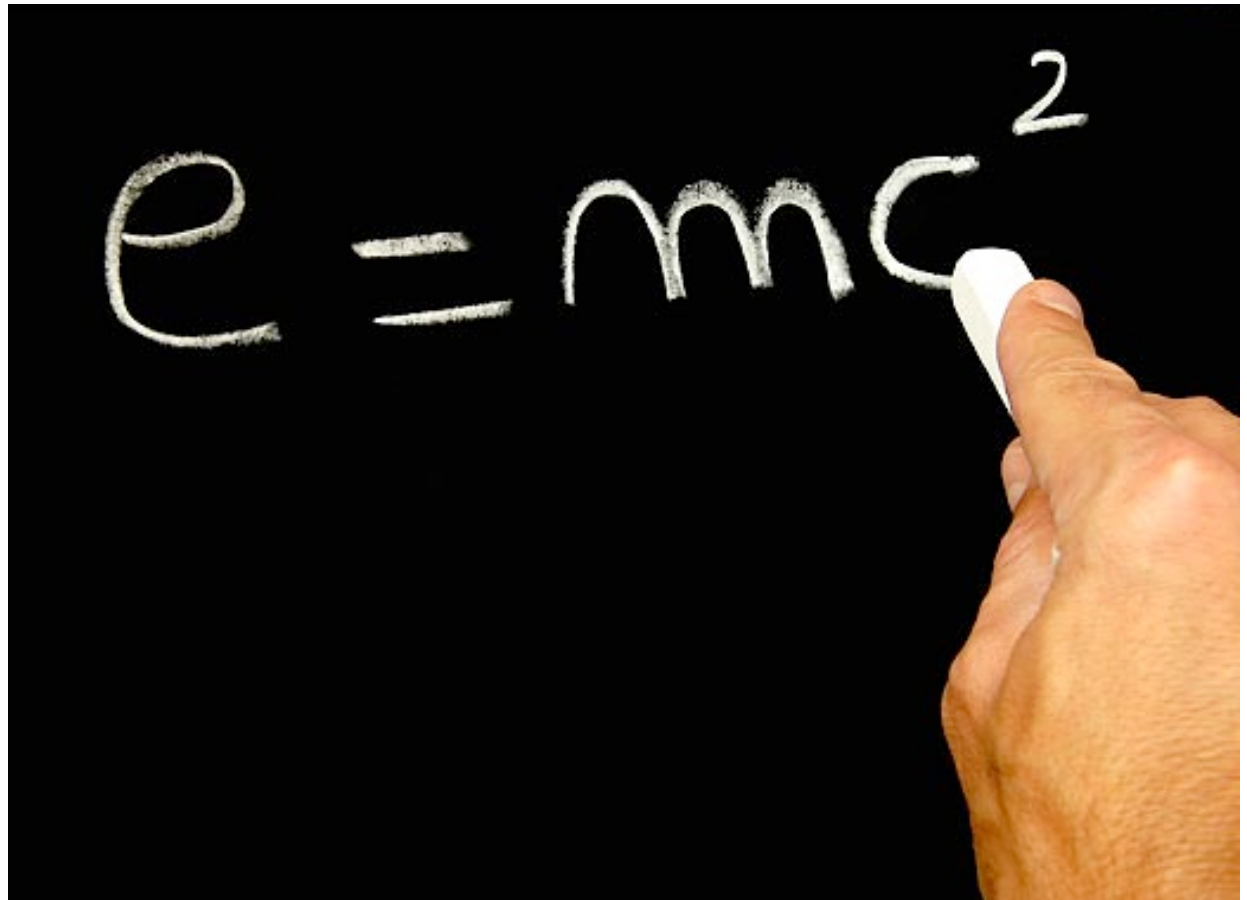
Physical Properties of Compounds: Boiling Point

- Carbon dioxide, bp = $-57\text{ }^{\circ}\text{C}$



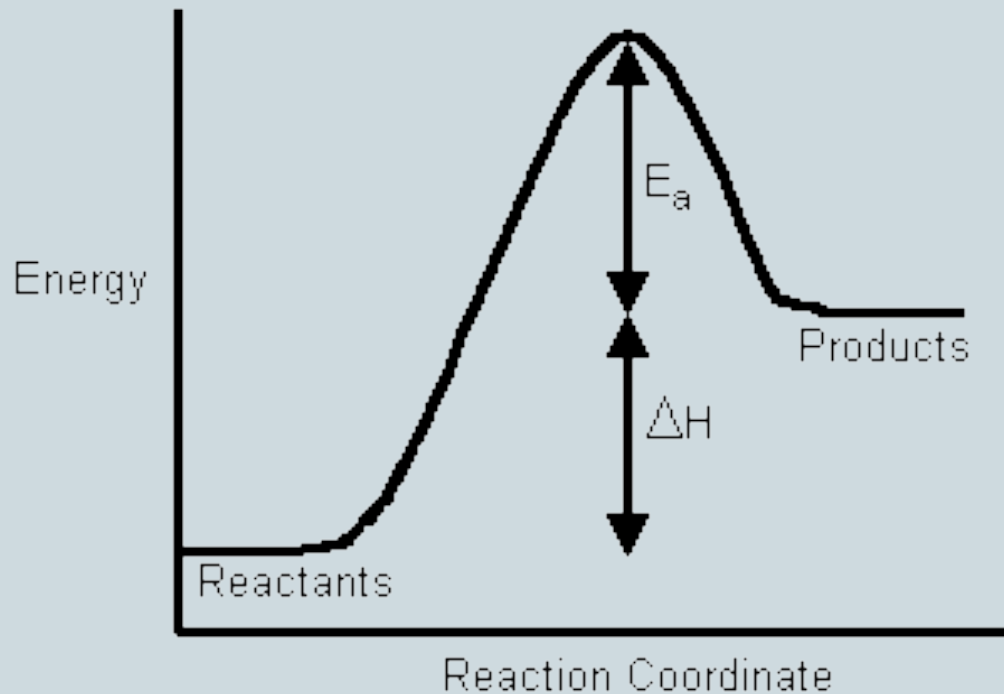
- Water, bp = $100\text{ }^{\circ}\text{C}$



A hand holding a piece of white chalk is writing the equation $E=mc^2$ on a black chalkboard. The equation is written in a cursive, handwritten style. The hand is positioned on the right side of the frame, with the index finger pointing towards the end of the equation. The chalkboard is black and the chalk is white. The background of the slide is a solid orange color on the left and a light blue-grey color on the right.
$$E=mc^2$$

Thermodynamics

Enthalpy

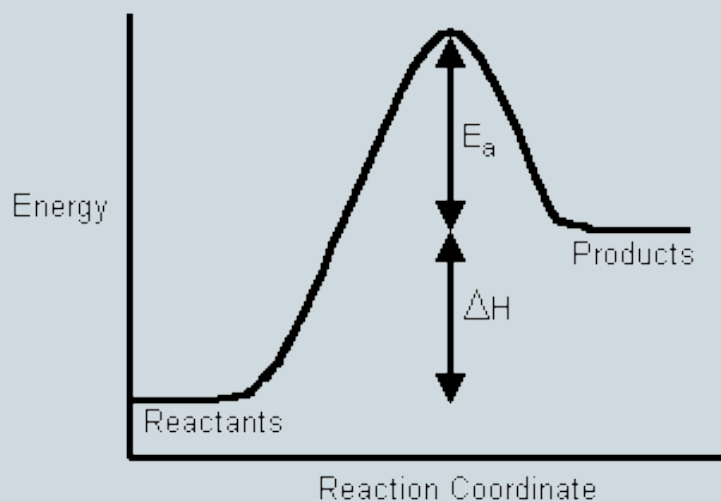


ΔH = Enthalpy =
heat absorbed or
released by the
reaction

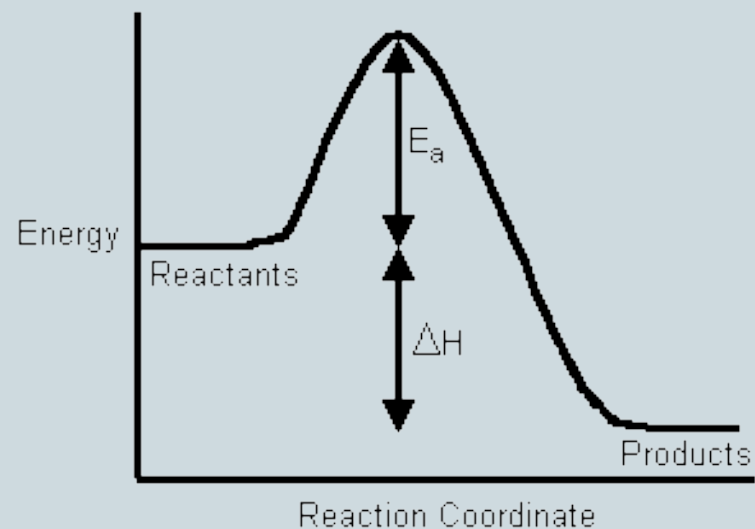
Endothermic vs. Exothermic

Endothermic Reactions

Breaking chemical bonds releases energy, and making them stores it.



Exothermic Reactions

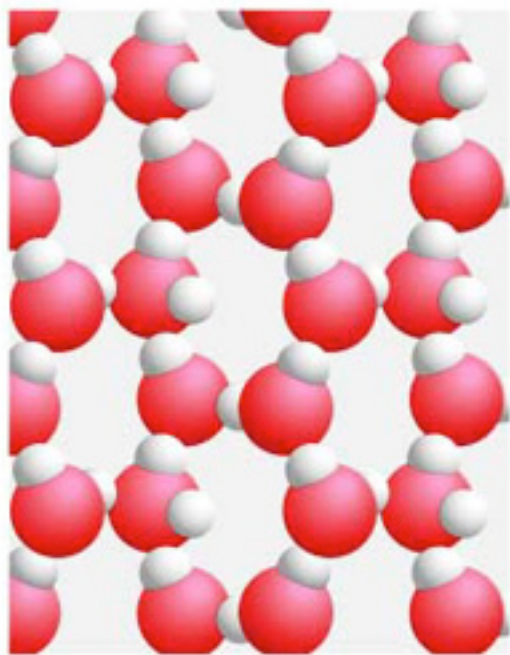


Is **COMBUSTION** an endo or exothermic reaction?

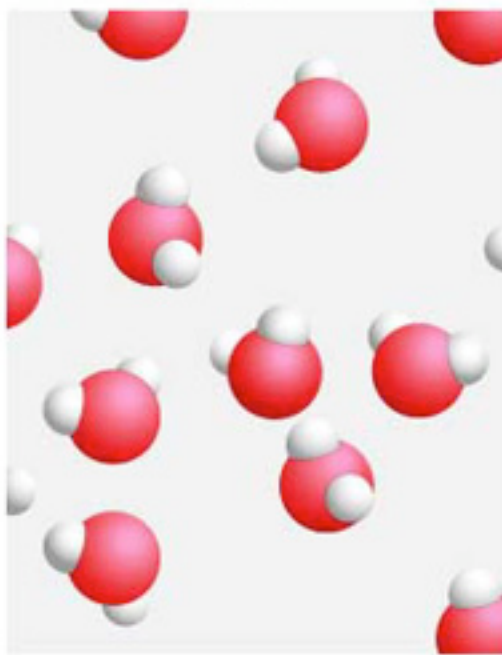
Entropy



Solid



Liquid



Gas



Order



Disorder

