

What is a Phase Change?

- Is a change from one state of matter (solid, liquid, gas, plasma) to another.
- Phase changes are **physical changes** because:
 - It only affects physical appearance, not chemical make-up.
 - **Reversible**

What happens during a phase change?

- During a phase change, heat energy is either absorbed or released.
- Heat energy is released as molecules slow down and move closer together.
- Heat energy is absorbed as molecules speed up and expand.

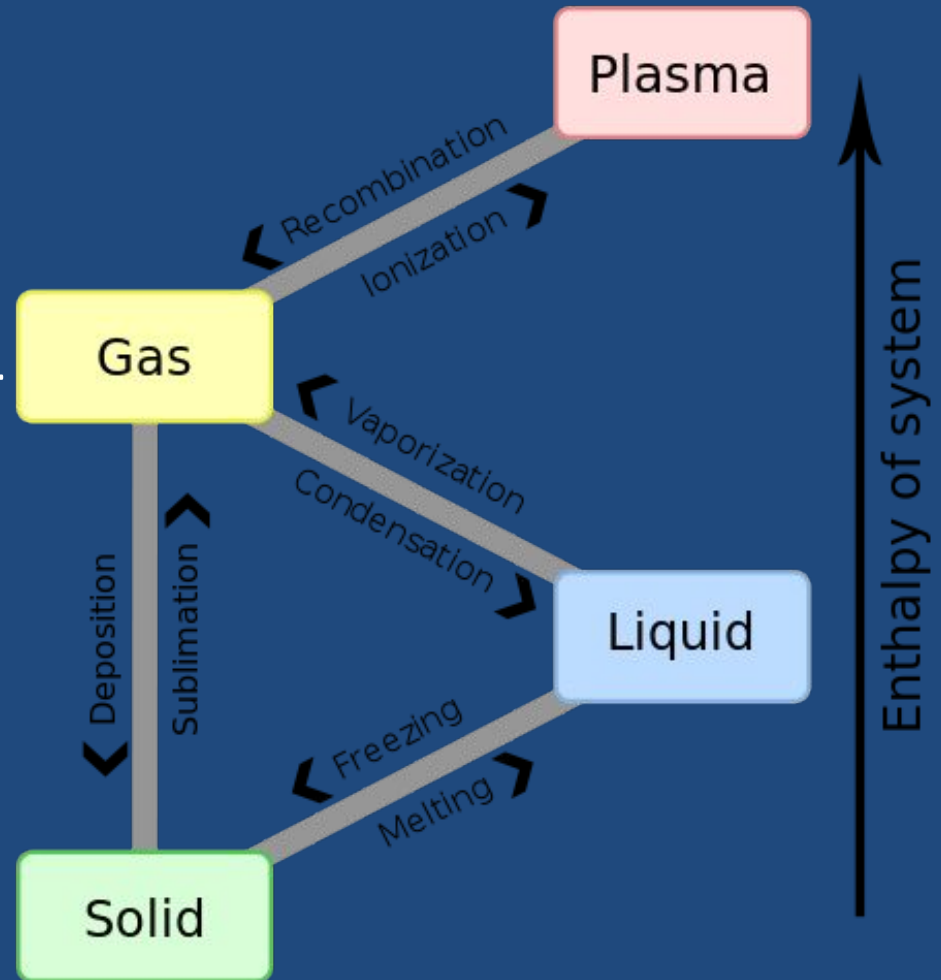


Energy and Phase Changes

- Energy is either absorbed or released during a phase change
 - **Endothermic** – the system absorbs energy from its surroundings; energy goes IN
 - Exp. Baking bread, producing sugar by photosynthesis, evaporation of water, etc.
 - **Exothermic** – the system releases energy to its surroundings; energy goes OUT
 - “Exo” □ think of “exit”
 - Exp. Making ice cubes, condensation, nuclear fission, rusting iron, etc.

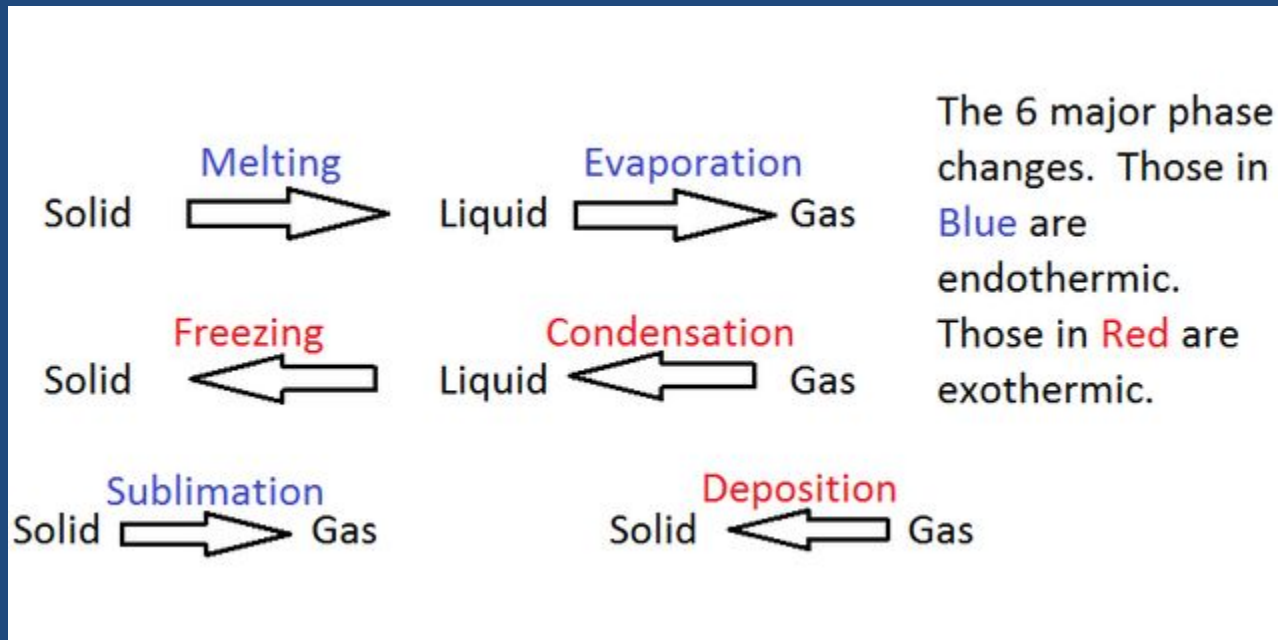
How to recognize a phase change

- Measuring the temp of a substance as it's heated or cooled
 - Temperature of a substance DOES NOT change during a phase change



Types of Phase Changes

- <https://www.youtube.com/watch?v=tuE1LePDZ4Y>



Melting

- solid \rightarrow liquid
- Molecules speed up, move farther apart, and absorb heat energy
- Endothermic



Freezing

- liquid \rightarrow solid
- Molecules slow down, move closer together and release heat energy.
- Exothermic



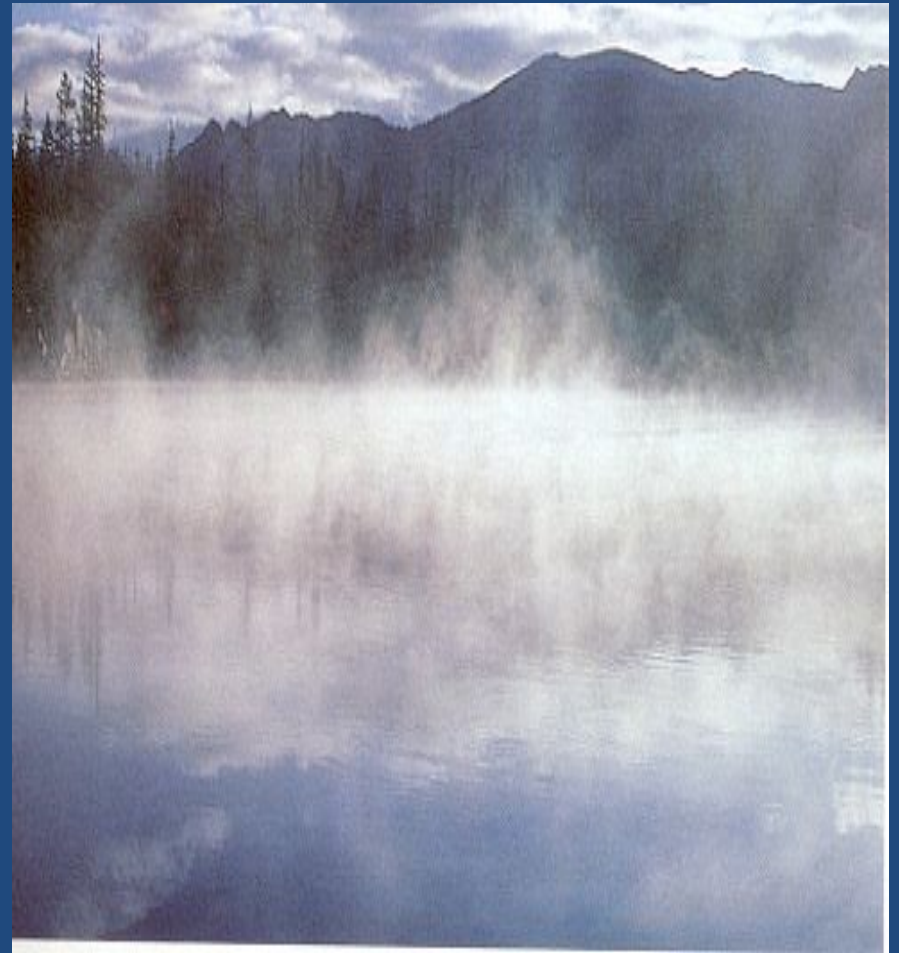
Vaporization (Boiling)

- Liquid \rightarrow Gas
- It occurs at the boiling point of matter.
- Molecules speed up, move farther apart, and absorb heat energy.
- Endothermic



Evaporation

- Liquid \rightarrow gas on the surface of a liquid (occurs at all temperatures).
- Molecules speed up, move farther apart, and absorb heat energy.
- Endothermic



Condensation

- Gas \rightarrow Liquid
- Molecule slow down, move closer together and release heat energy.
- Exothermic



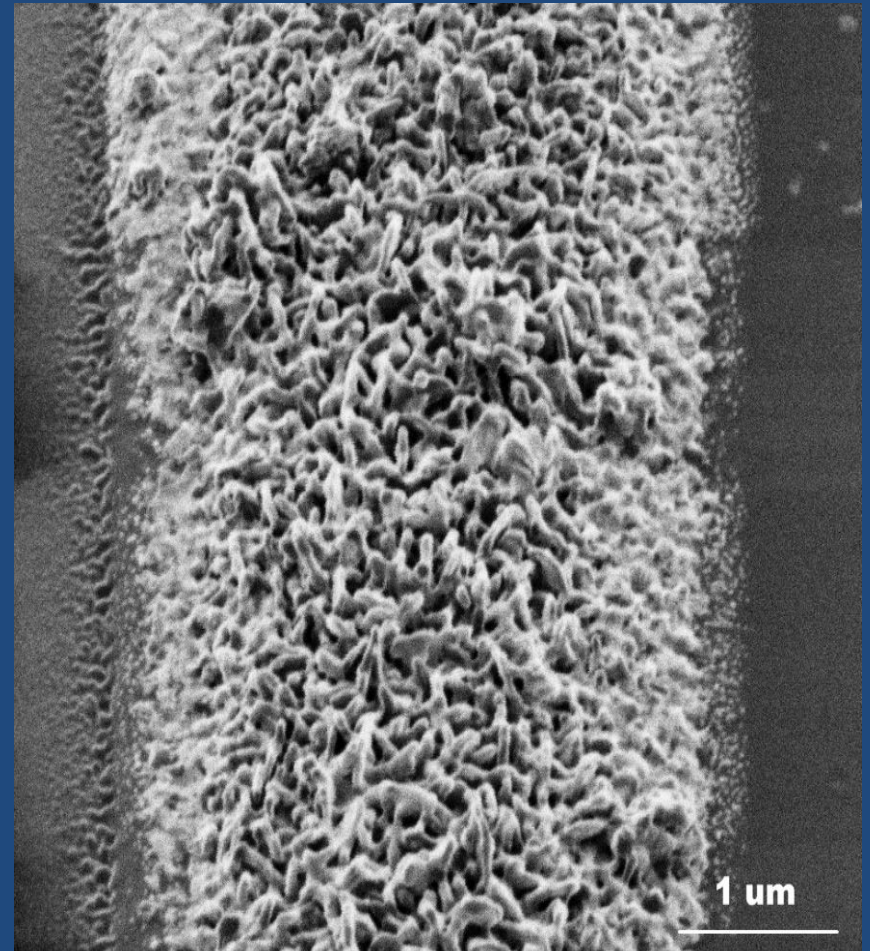
Sublimation

- Solid \rightarrow Gas
- Molecules speed up, move farther apart, and absorb heat energy.
- Endothermic



Deposition

- Gas \rightarrow Solid
- Molecules slow down, move closer together and release heat energy.
- Exothermic



Melting & Boiling Points

- **Melting Point:** The temperature at which a solid changes into a liquid.
- **Boiling Point:** The temperature at which a liquid changes into a gas.
- **What is a Freezing point?**
 - Compare the freezing and melting points of water.

Summary

Solid Water



Liquid Water



Water Vapor



Freezing



80 Calories



Melting

Condensation



600 Calories



Evaporation

Heat Energy Released

Heat Energy Absorbed