

# 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.

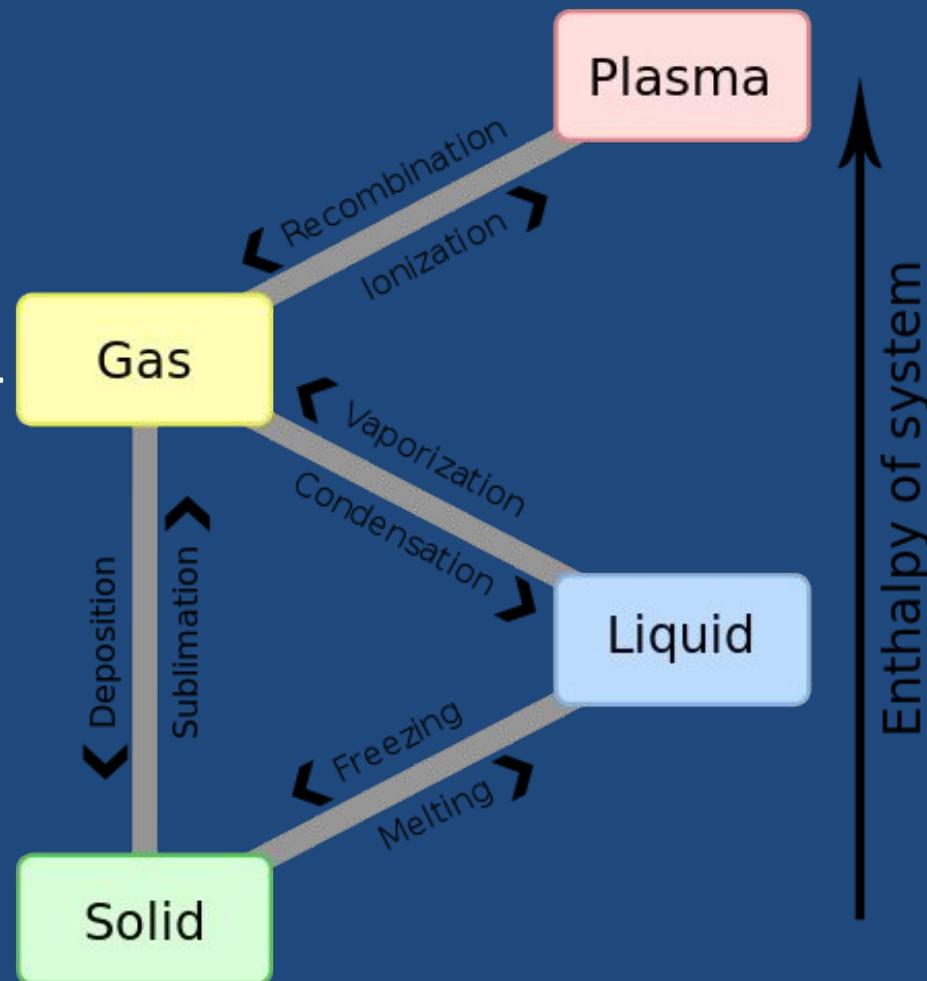


# Energy and Phase Changes

- 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.

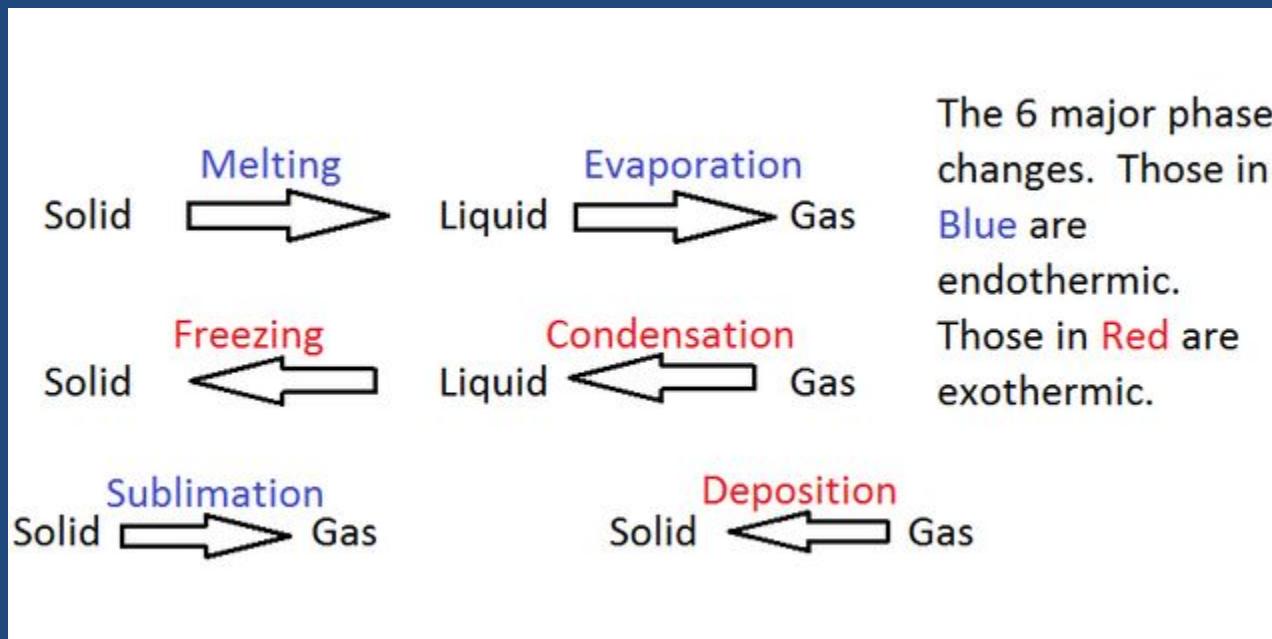
# How to recognize a phase change

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



# Freezing

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



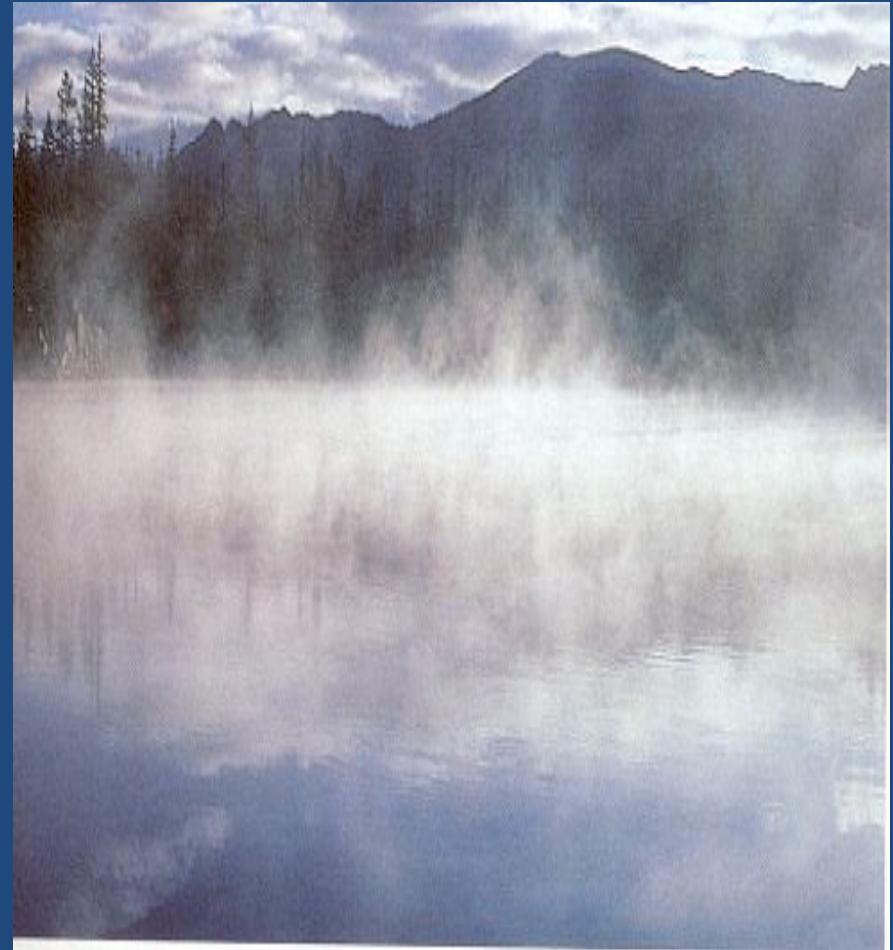
# Vaporization (Boiling)

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



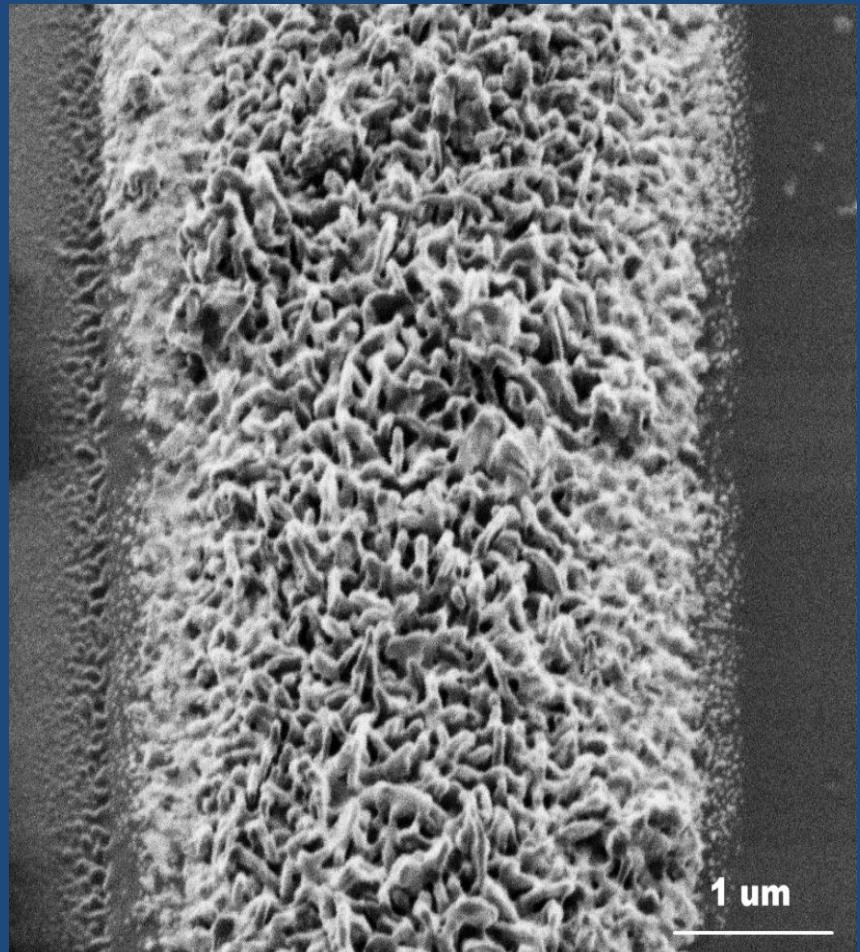
# Sublimation

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



# Deposition

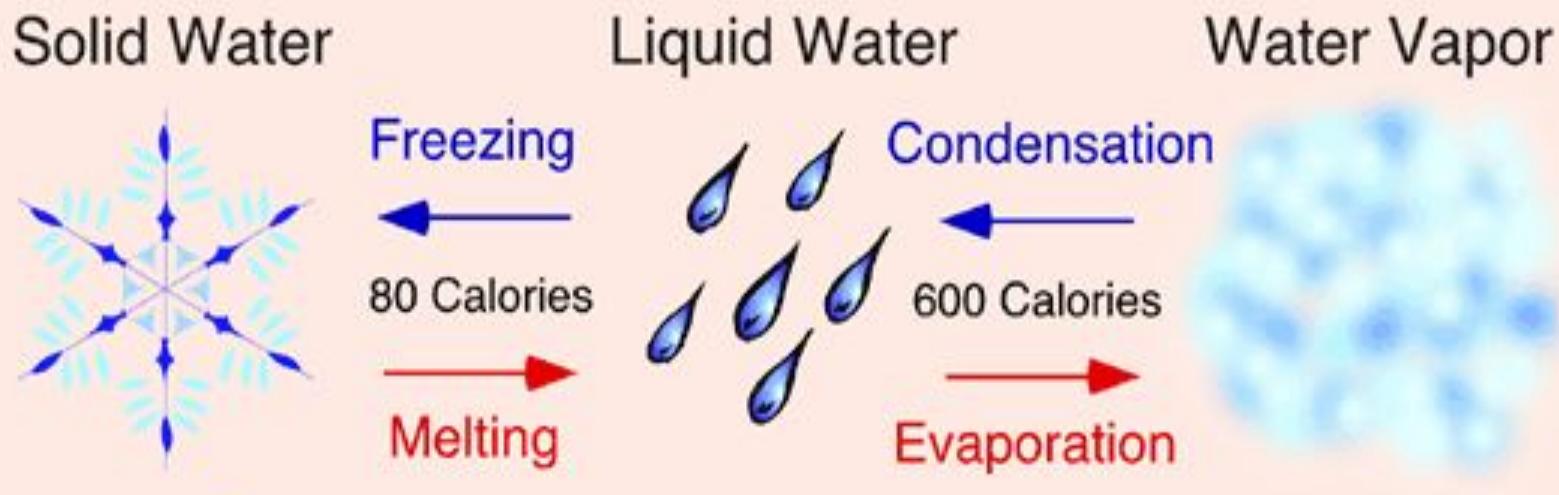
- Gas  Solid
- Molecules slow down, move closer together and release heat energy.
- Exothermic



# 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



**Heat Energy Released**

**Heat Energy Absorbed**