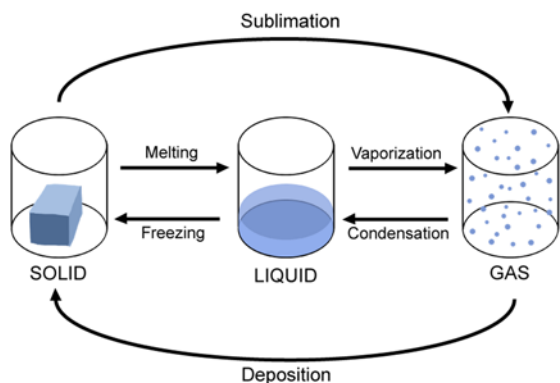


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Sublimation and Deposition: The Magical Phase Changes

Have you ever seen dry ice create spooky fog at a Halloween party? Or noticed snow disappearing without melting into a puddle on a cold winter day? These fascinating phenomena are the result of two unique phase changes: sublimation and deposition.

Sublimation: From Solid to Gas

Sublimation is the process by which a substance transitions directly from the solid state to the gas state without passing through the liquid state. Imagine a piece of dry ice (solid carbon dioxide) that transforms into a cloud of carbon dioxide gas when exposed to the air. This impressive change is due to sublimation. During sublimation, the particles in a solid gain enough energy from their surroundings to break the intermolecular forces holding them together. Instead of melting into a liquid, they go directly from a solid structure to individual gas particles. Dry ice is a well-known example of a substance that sublimates.

Examples of Sublimation

- **Dry Ice:** When dry ice is exposed to room temperature, it sublimates, creating the eerie fog effect often seen in Halloween decorations.
- **Mothballs:** Mothballs made of naphthalene gradually sublimate, releasing vapor that repels moths and other pests.
- **Iodine:** Solid iodine sublimates when heated, forming a purple vapor that can be used to test for the presence of starch.
- **Snow on a Sunny Day:** On a cold winter day with strong sunlight, you may notice that snow appears to disappear without melting. This is because some of the snow sublimates directly into water vapor.

Deposition: From Gas to Solid

Deposition is the opposite of sublimation—it is the process by which a substance transitions directly from the gas state to the solid state without passing through the liquid state. Imagine frost forming on a cold winter morning as water vapor in the air turns directly into ice crystals on a surface. This enchanting change is due to deposition.

During deposition, gas particles lose energy and come together, forming a solid structure without becoming a liquid first. This is commonly observed when water vapor in the air turns into frost or snowflakes on surfaces like windows, leaves, or grass.

Examples of Deposition

- **Frost:** On a chilly night, when the temperature drops below freezing, water vapor in the air can undergo deposition and form frost on surfaces.
- **Snowflakes:** The intricate patterns of snowflakes are the result of water vapor in the clouds undergoing deposition and forming ice crystals.
- **Freeze-Drying:** In the food industry, freeze-drying is a process that involves the deposition of water from frozen foods by sublimating it into vapor, leaving behind the dehydrated product.
- **Space:** In space, where temperatures can be extremely cold, gases from celestial bodies can undergo deposition to form ice on their surfaces.