

## Change of Phase

A period during which a substance undergoes a change in internal energy but not a change in temperature.

- The energy absorbed or liberated during a change of phase changes the potential energy associated with the bonds between molecules.
- Various terms associated with phase change include **melting** (solid to liquid), **freezing** (liquid to solid), **boiling** or **vaporization** (liquid to gas), **condensation** (gas to liquid), and **sublimation** (solid to gas).

## Density

The property of matter that indicates the mass per unit volume. Density provides an indication of the packing of the particles of matter. Density is calculated by the equation:

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$

## Freezing

The **change of phase** from a liquid to a solid.

- When a liquid freezes, it releases heat energy and changes to the solid phase.
- The amount of heat released in order to accomplish this phase change is called the **heat of fusion** ( $H_f$ ).
- The table of *Heat Constants* in the reference information gives the heat of fusion for a number of common substances.

## Mass

A fundamental measurement that determines the quantity of matter in an object.

## Measurement

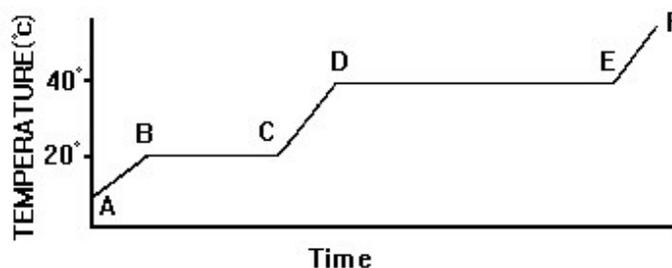
The process of describing an object using numbers. The comparison of an object to a known standard to produce a numerical observation.

## Heating and Cooling Curve

A graph representing the changes in the phases of matter.

The graph below represents the uniform heating of a solid starting below its melting point.

- Throughout the initial rise, interval  $AB$ , the solid steadily increases in temperature.
- The plateau  $BC$  represents the **solid-liquid equilibrium**, during which the solid is melting. The substance is partly solid, partly liquid, with a constant temperature during this **phase change**; this temperature is the **melting point** of the solid.
- Throughout the second rise, interval  $CD$ , the substance is a liquid, steadily increasing in temperature.
- The plateau  $DE$  represents the **liquid-gas equilibrium**, during which the liquid is melting. The substance is partly liquid, partly a gas, with a constant temperature throughout this phase change; this temperature is the **vaporization point** of the liquid.
- During the third rise, interval  $EF$ , the substance is a gas, steadily increasing in temperature.



## Inference

A conclusion or prediction based on observations.

**Observation**

Information that is gathered by the human senses (sight, hearing, touch, taste or smell), or by instruments that extend the senses.

**Phase change**

Change in state of matter. The addition or removal of heat energy can cause the form of matter to change between solid, liquid, and vapor.

**Phase of Matter**

The gas, liquid, or solid form of matter. Matter can change from one phase to another. Phase changes are accompanied by the absorption or release of energy.

**Volume**

The amount of space occupied by an object.