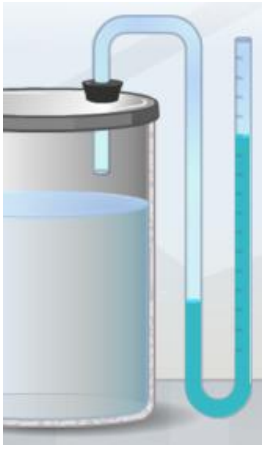
# Vocabulary: Colligative Properties

## Vocabulary

- Boiling point – the temperature at which boiling occurs.
  - At sea level, the boiling point of water is 100 °C (212 °F).
  - Water boils at lower temperatures at higher altitudes because air pressure is lower there.
- Colligative property – a property of a *solution* that depends on the number of particles of *solute* in a given volume of *solvent*.
  - Colligative properties include boiling point, *freezing point*, *vapor pressure*, and *osmotic pressure*.
  - Colligative properties depend on the *concentration* of solute as well as the number of particles a molecule of solute *dissociates* into.
- Concentration – a measure of how much of a given substance is mixed with another substance.
  - In the *Colligative Properties* Gizmo, concentration is measured in moles of solute per kilogram of solvent.
- Dissociate – to break up into smaller components.
  - When sodium chloride (NaCl) dissolves in water, it dissociates into $Na^+$ and $Cl^-$ ions.
  - Different compounds dissociate into different numbers of particles.
    - Sucrose does not dissociate when it is dissolved.
    - Each molecule of sodium chloride dissociates into two ions.
    - Each molecule of calcium chloride ($CaCl_2$) dissociates into three ions.
    - Each molecule of sodium phosphide ($Na_3P$) dissociates into four ions.
- Freezing point – the temperature at which freezing occurs.
  - At sea level, the freezing point of water is 0 °C (32 °F).
- Manometer – a device used to measure gas or vapor pressure.
  - In a manometer, gas or vapor pressure displaces a column of liquid.
  - In a U-tube manometer such as the one shown in the *Colligative Properties* Gizmo, the pressure of gas on each side of the device can be compared by measuring the height of the water column on each side of the tube.



**U-tube manometer**

- Osmosis – the movement of solvent molecules across a semipermeable membrane from an area of high solvent concentration to an area of low solvent concentration.
    - Osmosis often refers to the flow of water molecules across a cell membrane.
- Osmotic pressure – the pressure that must be applied to a solution to prevent water from moving into the solution through a semipermeable membrane.
    - The greater the osmotic pressure is, the greater the tendency for a solution to attract water molecules will be.
- Solute – a substance that is dissolved in another substance to form a solution.
    - In salt water, the solute is salt.
- Solution – a homogeneous mixture of two or more substances.
    - Solutions generally consist of a solute that is dissolved into a solvent.
        - Solvents are generally liquids.
        - Solutes can be solids, liquids, or gases.
    - Examples of solutions include salt water, sugar water, and seltzer.
- Solvent – a liquid or gas that dissolves a solute to form a solution.
    - In salt water, the solvent is water.
- Vapor pressure – the pressure exerted on the walls of a closed container by a gas that has evaporated from a liquid or *sublimated* from a solid.
    - Vapor pressure is a measure of the tendency of a substance to evaporate or sublimate.
        - Sublimation is the phase change from a solid directly to a gas.
    - A liquid will boil when its vapor pressure is equal to atmospheric pressure.
    - A liquid will freeze when its vapor pressure is equal to the vapor pressure of the solid.