

Success 24/7 Chemistry: Liquids and Solids

Liquids

Liquids and solids are condensed states of matter.

Liquids and gases flow. They are both considered “fluids”.

Particles of a liquid are held together by weak attractive forces.

Vaporization

The process by which a liquid changes to a gas

Evaporation

When gas molecules escape from the surface of a liquid.

- Vaporization in an open container
- As temperature increases, more molecules achieve enough energy to escape.
- Evaporation is a cooling process. (Ex: Sweating)

Vapor Pressure:

- Vapor pressure is the pressure of the vapor over a liquid (and some solids) at equilibrium.
- Pressure of vapor on the walls of the container.

Dynamic Equilibrium

Takes place when the rate of evaporation is equal to the rate of condensation.

Boiling Point (BP)

- The temperature at which the vapor pressure of the liquid equals the pressure surrounding the liquid...
- Normal BP occurs at 1 atm
- Mountains = low BP (due to lower atmospheric pressures)
- Pressure cooker = high BP
- The temperature of a liquid ***never*** exceeds its boiling point...!

Melting Point (MP)

- The temperature at which a solid changes to a liquid
- Melting point = freezing point
- Vibrations (due to increasing KE) are strong enough to overcome attractive forces
- Ionic solids = high melting point (strong attractive forces)
- Molecular solids = low melting point (weak attractive forces)

Crystals

- Most ionic solids are crystalline
- Atoms, ions or molecules arranged in an orderly, repeating, 3-D pattern are called a crystal lattice.
- **Unit cell**- smallest group of particles within a crystal that retains the geometric shape of the crystal...

Allotropes

- Two or more different forms of an element in the same physical state.
- Carbon has four main allotropes, and seven in total.

1. Diamond

- forms when carbon crystallizes under great pressure
- atoms tightly packed together

2. Graphite

- atoms are loosely packed
- forms sheets
- sheets interact but bonds between layers are weak

3. Fullerenes

- hollow carbon structures
- Buckminsterfullerene C₆₀ (Buckyballs)
- nanotubes

4. Amorphous (non-crystalline)

-soot

-diamond-like carbon (DLC)

-glassy carbon

Other amorphous solids: Rubber, plastic, glass