14.1 Heterogeneous Mixtures

Suspensions

- Heterogeneous mixtures from which particles will settle out upon standing.
- The particles in a suspension are much larger than the particles in a solution and do not stay suspended indefinitely.
  - Particles in a suspension typically have a diameter greater than 1000 nm.
    - Particles in a solution are usually only about 1 nm.

Colloids

- Heterogeneous mixtures containing particles with a size between 1 nm and 1000 nm.
- The particles are spread throughout the dispersion medium, which can be a solid, liquid, or gas.
- Particles will not settle out and cannot be separated with filter paper.
- Common Colloids
  - Foams
    - Gas in liquid or gas in solid.
    - Examples
      - Whipped Cream (gas in liquid)
      - Marshmallow (gas in solid)
  - Aerosol
    - Liquid in gas
      - Spray cans
  - Smoke
    - Solid in gas
      - Dust in air
  - Gels
    - Solid in liquid
      - Egg whites
      - Paint
      - Blood
      - Jelly
• Emulsions
   o Liquid in liquid
     ▪ Milk
     ▪ Mayonnaise
   o Requires an emulsifying agent to hold two liquids together that wouldn’t normally mix.
     ▪ For example, mayonnaise is a mixture of vinegar and oil, which don’t usually mix. However, with the addition of an emulsifying agent, egg yolks, the oil and vinegar mix together nicely to form mayonnaise.

− Properties of Colloids
  • The Tyndall Effect
    o Particles in a colloid will scatter light, allowing you to see the beam of light when shined through the colloid.
      ▪ Also happens with suspensions.
      ▪ Does not happen with solutions.
  • Brownian Motion
    o Chaotic movement of colloidal particles.
      ▪ Particles in a colloid are constantly colliding with the particles of the solvent in which they are dispersed.
  • Coagulation
    o Colloidal particles generally develop a positive or negative charge from ions that build up on their surface.
      ▪ All of the particles have the same charge, repelling each other, and making it impossible for the particles to group together.
    o If you add a substance with the opposite charge to the colloid, it will neutralize the colloid particles and they will clump together.
      ▪ This clumping together is called coagulation.