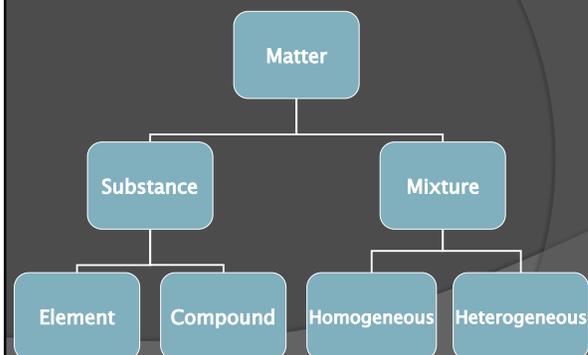


Chapter 15

Classification of Matter

Section 15.1 – Composition of Matter



Pure Substance

- **pure substance**
 - a type of matter with a fixed composition
- A pure substance can be either an element or a compound.
- **element**
 - all the atoms in a substance have the same identity (simplest pure substance)

Elements

- 90 occur naturally; the rest are synthetic
- cannot be broken down through physical or chemical means
- **Atom**
 - smallest whole part of an element
- represented by symbols → Hydrogen – H
- most are solids, several are gases, **2 are liquids** (Bromine – Br and Mercury – Hg)
- most are metals

Compounds

- composed of atoms joined chemically; always in the same ratio
- **molecule**
 - smallest whole part of a compound
- **formula**
 - represents the atoms and ratios with symbols and subscripts $\text{Mg}(\text{OH})_2$
 NaCl
- compounds are created by chemical means and separated by chemical means

Mixtures

- contain physical combinations of atoms or molecules of different substances
- each part of a mixture keeps its own set of properties
- can be separated physically
- compositions may vary

Heterogeneous Mixture

- a mixture in which different materials can be distinguished easily
- materials **do not** dissolve
- settle on standing
- Examples:
 - pizza, salad dressing, chocolate chip ice cream, trail mix

Homogeneous Mixture

- contains two or more gaseous, liquid, or solid substances blended evenly throughout
- **solution**
 - a homogeneous mixture of particles so small that they cannot be seen with a microscope and will never settle to the bottom of their container
 - remain constantly and uniformly mixed

Colloid

- a type of mixture with particles that are larger than those in solutions but not heavy enough to settle out
- example: milk

Detecting Colloids

- distinguish through its appearance
- you can tell for certain if a liquid is a colloid by passing a beam of light through it
 - A light beam is invisible as it passes through a solution, but can be seen readily as it passes through a colloid. This occurs because the particles in the colloid are large enough to scatter light, but those in the solution are not.
- called the Tyndall effect

Suspensions

- a heterogeneous mixture containing a liquid in which visible particles settle
- Example:
 - Muddy Pond Water

Comparing Solutions, Colloids and Suspensions

Description	Solutions	Colloids	Suspensions
Settle upon standing?	No	No	Yes
Separate using filter paper?	No	No	Yes
Particle size	0.1 – 1 nm	1 – 100 nm	>100 nm
Scatter light?	No	Yes	Yes

Section 16.2 – Properties of Matter

- Physical Properties
 - describe matter without changing its identity
- Examples
 - color, shape, size, density, melting point, and boiling point

Behavior

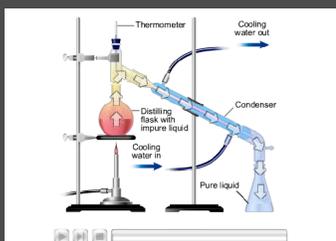
- Conductivity
 - Ability to transfer current
- Malleability
 - Ability to be hammered into sheets
- Ductility
 - Ability to be drawn into wire
- Solubility
 - Can dissolve
- Magnetic
 - Is attracted to a magnet

- Looking at physical properties is the best way to separate a mixture

Physical Change

- a change in size, shape, or state of matter
- substance—the identity of the element or compound—does not change.
- The process for separating substances in a mixture by evaporating a liquid and recondensing its vapor is **distillation**.

Distillation



Chemical Properties

- describe how a material will react to form something new
- Examples
 - flammable (can burn)
 - can corrode (metals combine with metals → dull, brittle)
 - can sour
 - forms precipitate (solid forms from 2 liquids)
 - reacts with acid
 - effervesces (forms bubbles of gas, NOT BOILING)

Chemical Change

- change of one substance to another (makes something new)
- signs of change:
 - smoke, heat, light, bubbles, precipitate, any new physical properties that were not present before

Conservation of Mass

- According to the **law of conservation of mass**, the mass of all substances that are present before a chemical change equals the mass of all the substances that remain after the change