Chapter 15: Classification of Matter
Section 2: Properties of Matter

Physical vs. Chemical properties

- **Physical** – characteristic of a material that can be observed without changing the matter or the identity of the substance
    - Ex. color, shape, size, melting and boiling points, and density
    - Iron is magnetic
    - Viscosity, the resistance to flow, is a physical property of liquids
        - Compare cold syrup to room temperature water
- **Chemical** – characteristics that describe something's ability to become something new
    - Sodium is highly reactive while silver is not
    - Flammability of a substance is a chemical property

Physical change: change that alters the form or appearance of matter but does not turn any substance in the matter into a different substance

- Change of state – solid to a liquid to a gas or vice versa
    - Solid – definite shape and volume
    - Liquid – definite volume but not a definite shape

    - Gas – doesn't have a definite shape or volume
- Separation examples
    - **Distillation:** separating a solution (solid-liquid or 2 liquids) and then condensing one of the liquids into a different container
        - Salt-water can be separated by boiling the water and then condensing the water into a different container
    - **Filtration:** separating a solid from a liquid
        - Coffee filters
    - **Crystallization:** separating a solid out from a hot solution
        - Rock candy
    - **Chromatography:** separation of liquids using chromatography paper and some type of alcohol allowing the liquid to travel "up"

Chemical change: a change in matter that produces one or more new substances

- Also called a chemical reaction

- Evidence of chemical change
  - Tarnishing – silverware
  - Oxidation – vehicle left in the elements will rust
  - Light or an object starts on fire (combustion) – magnesium burns bright
  - Bubbles are created – baking soda and vinegar
  - Heat is produced or taken away (making it cold) – baking soda and vinegar
  - Change of color

Law of conservation of mass: mass is not created or destroyed in any chemical or physical change

- mass of the reactants = mass of the products
- Reactants → Products
  - Reactants = substances before the reaction
  - Products = substances after the reaction
- Example problem
  - If 5.0 grams of hydrogen and 5.0 grams of oxygen are used to make water, how many grams are made?
  - Hydrogen + Oxygen → Water

    5.0 g 5.0 g ?