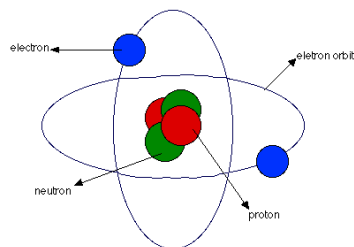


Chapter 1: Matter

Introduction & Atoms

- **Matter** is a general term for what forms all living and nonliving things.
- **Chemistry** is the study of matter.
- All things, both living and nonliving, are made of **atoms**. The word “atom” comes from the Greek word *atomos*, which means “uncuttable.”
- Atoms are composed of even *smaller* particles called: **protons, neutrons, and electrons**.
- **Protons & Neutrons** are roughly equal in size.
- **Electrons** are much smaller!
- In an atom, the number of protons equals the number of electrons.

A model of the Helium atom



-  - PROTON - positively charged subatomic particle
-  - NEUTRON - neutral subatomic particle
-  - ELECTRON - negatively charged subatomic particle

Periodic Table of Elements: 1867, Dmitri Mendeleev

- **Elements** are all of the atoms that make up the world.
- All atoms (elements) are found in the **periodic table of elements**.
 - The elements are arranged horizontally from left to right in order of increasing atomic number.
 - The elements are arranged in the periodic table in groups that are similar.
 - The elements are arranged vertically according to their chemical properties.
- **Atomic Number** is the number of protons in the nucleus of each atom.
- **Chemical Properties** is the chemical reaction and chemical properties of the element
- All of the elements have a **symbol**. Look at the periodic table for the symbols.
- **Atomic weight** is the weight of each atom.

Chapter 2: Molecules

From Atom to Molecules-Bonds

- When two or more atoms combine, they form a **molecule**.
- Atoms in a molecule are “stuck” to each other with **bonds**.
- Bonds are formed with the electrons from each atom in a molecule.
- **Shared electron bonds** is when electrons are shared between two atoms.
- Shared electron bonds are called **covalent bonds**.
- **Unshared electron bonds** is when one atom takes more electrons for itself.
- Unshared electron bonds are called **ionic bonds**.
- The number of bonds an atom can form depends on the number of available electrons.
- Different kinds of molecules have different shapes, but molecules of the same kind always have the same shape.

Chapter 3: Chemical Reactions

Reaction Types

- A **chemical reaction** occurs whenever bonds between atoms and molecules are created or destroyed
- There are different kinds of chemical reactions. They are:
 - **Combination:** reactions where molecules join
 - **Decomposition:** reactions where molecules break apart
 - **Displacement:** reactions where atoms are removed from molecules
 - **Exchange:** reactions where atoms of one molecule trade places with atoms of another molecule
- **Spontaneous** means the reaction happens all by itself, just by mixing the chemicals. Not all chemical reactions occur spontaneously.
- **Precipitate** is the *cause* to happen suddenly
- Sometimes changes occur that indicate a chemical reaction has taken place. These changes include bubble formation, color changes, temperature changes, and the formation of precipitates (precipitation).

Chapter 4: Acids, Bases & pH

pH Scale, Properties of Acids & Bases, Measuring pH

- Acids & Bases react with each other in a special kind of exchange reaction.
- The **pH** tells whether a **solution** is an acid or a base.
- pH can be measured by **pH meters**, **pH paper**, and **acid-base indicators**.

Chapter 5: Acid-Base Neutralization

Concentration, Titration, Plotting Data, Plot of an Acid-Base Titration

- An acid and a base neutralize each other in an acid-base reaction.
 - Equal amounts of acid and base completely neutralize each other.
 - The concentration of an unknown acid or base can be found using a titration.
- The concentration of an

Chapter 6: Mixtures

Types of Mixtures, Like Dissolves Like, Soap

- **Mixture** means to combine substances to make another substance.
- There are two types of mixtures: homogeneous & heterogeneous
 - **Homogeneous** mixtures are made by things that are “like” each other.
 - **Heterogeneous** mixtures are made by things that are “not like” each other.
- Things that are “alike” dissolve in each other: *like dissolves like*
- Soap helps oil “dissolve” in water

Chapter 7: Separating Mixtures

Filtration, Evaporation, Solids, Liquids & Gases, Chromatography

- Mixtures can be separated using different methods including: filtration, evaporation & chromatography
 - **Filtration** is used to separate smaller things from larger things.
 - **Evaporation** can be used to separate molecules that evaporate from molecules that don't evaporate
 - **Paper chromatography** can be used to separate different colors in ink
- There are three states of matter: solids, liquids, and gases. The molecules in a solid are closer together than the molecules in a liquid. In a gas, the molecules are far apart from each other