Chapter 2 -Atoms, Molecules & Ions

Section 2.2 Fundamental Chemical Laws

1. **Law of conservation of mass** - Mass is neither created nor destroyed by chemical reactions.
2. **Law of definite proportion** - a given compound always contains exactly the same proportion of elements by mass.
3. **Law of multiple proportions** - when two elements form a series of compounds, the ratios of the masses of the second element that combine with 1 gram of the first element can always be reduced to small whole numbers.

Section 2.3 Dalton's Atomic Theories

Section 2.4 Early Experiments to Characterize the Atom

1. **J.J. Thomson** - using cathode-ray tubes.
2. **Henri Becquerel** - use of photographic plates to help discover radioactivity.
3. **Ernest Rutherford** - alpha particles and gold foil experiment.

Section 2.5 Modern view of Atomic Structure

1. **Isotopes** - atoms with the same number of protons but different numbers of neutrons.
2. **Atomic number** - number of protons in an element.
3. **Mass number** - the total number of protons and neutrons in an element.

Section 2.6 Molecules and Ions

1. **Chemical bonds** - forces that hold atoms together in compounds.
2. **Covalent bonds** - bonds in which electrons are shared (with in molecules).
3. **Ionic bonds** - force of attraction between oppositely charged ions.
   a. **cation** - positively charged ion.
   b. **anion** - negatively charged ion.

Section 2.7 Introduction to the Periodic Table

1. Know **families** (or vertical groups) and **periods** (or series, vertical rows).
2. Know **nonmetals**, **metalloids** (or semimetals) and **metals**.

Section 2.8 Naming Simple Compounds

1. **Binary ionic compounds** (type I)
   a. the cation is always named first and the anion second.
   b. a monatomic cation takes its name from the name of the element it represents.
   c. a monatomic anion is named by taking the root of the element name and adding -ide.

   see table 2.3 p.60

2. **Binary ionic compounds** (type II)
   a. the charge on the metal ion must be specified. (systematic name)

   see table 2.4 p.61

3. **Polyatomic ions** (**table 2.5 p.65**)

4. **Binary compounds** (type III) covalent
   a. the first element in the formula is named first, using the full element name.
   b. the second element is named as if it were an anion.
   c. prefixes are used to denote the numbers of atoms present.
   d. the prefix mono- is not used for naming the first element.

   see table 2.6 p.66

5. **Acids** - molecules with produce a solution which contains H+ ions.
   a. if the anion name ends in -ate, the suffix -ic is used in its place.
   b. if the anion has an -ite ending, the suffix -ous is used in its place.
   c. if the anion does not contain oxygen, the acid is named with the prefix hydro- and the suffix -ic.

   see tables 2.7 and 2.8 on p. 70

****Notes have been derived from Zumdahl 4th ed. - All page and table references are made to this edition.**