# Introduction to the Periodic Table

*Groups- elements with similar chemical and physical properties are filling similar sublevel); vertical columns 1-8, both 'a' (main) and 'b' (transition)*

*Periods- horizontal rows; filling same energy level.*

*Percent abundance in the earth's crust (actually above water):*

*Oxygen = 45-47%*
*Si = 25-28%*
*Al = 8-8.5%*
*Fe = 5%*
*Ca = 4%*
*Na = 3%*
*K = 2%*
*Mg = 2%*
*all others = < 1%*

*Periodic table contains metals, nonmetals, metalloids.*

*Families (and notable members):*
*1 (1A)- al-qali (arabic chemists), alkali metals; slippery feel to certain plants.*
*2 (2A)- alkaline earth metals*
*3 (3B) -12 (8B + 1B-2B) are the transition metals.*
*13 (3A)- Al*
*14 (4A)- Carbon, 17th most abundant*
*15 (5A)- Nitrogen*
*16 (6A)- Oxygen and sulfur*
*17 (7A)- Halogens: F probably most reactive element (electronegative), Cl*
*18 (8A)- Noble/rare/inert gases*

Metals- silver-gray color (except gold & copper), solid at room temp (except Hg). May be polished (reflect light), bent or hammered flat (malleable), most have high melting points, conduct heat and electricity well. Found on left and lower part of Periodic Table.

Nonmetals- do not reflect light, poor conductors of heat and electricity, are brittle (cannot be hammered or bent), can be solids (C), liquids (Br), and gases (N, O, and noble gases).

Metalloids- found along zig-zag line (except Al); have properties of both, often used as semiconductors since they do not conduct electricity well unless mixed with a metal.

Atomic number- derived from the number of protons; what happens if we change the number of protons? - a new element.

Ions- atom with different number of electrons.

Isotopes- atom with different number of neutrons.

Chemical formulas- what kind of atoms and the ratio of atoms (using subscripts).

Periodicity- physical and chemical properties of the elements occurred at repeated intervals called periods.

Periodic Trends- properties that show patterns when examined across the periods or vertically down the groups. These include atomic radii, ionization energy, electronegativity, ionic radii.

Electronegativity- measure of the ability of an atom in a compound to attract electrons from other atoms. **Increases across periods, decreases down groups.**

Ionization Energy**-** energy required to remove one electron from a neutral atom of an element. **Increases across periods**, **decreases down groups**.

Atomic Radii- one half the distance between the nuclei of identical atoms that are bonded together. **Decreases across periods, increases down groups.**

Ionic radii- radius of an atom forming an ionic bond or an ion.

Atoms in an ionic bond are of greatly different size; one atom is a positively-charged **cation** (smaller), and the other atom is an negatively-charged **anion** (larger).

**Decreases across the period** until formation of the negative ions then there is a sudden increase followed by a steady decrease to the end. The sudden increase on formation of negative ions is due to the new (larger) outer shell.