The Periodic Table

The periodic table is arranged according to atomic numbers.

Symbols on the periodic table represent each element.

There is also a key to identify the information given about each element.

                       -4

12.011              +2    >  selected oxidation stats

  atomic mass        +4

             C  symbol

               6    number of protons

           2-4    electron configuration

atomic mass - weighted average of the naturally occurring isotopes

Arrangement of the Periodic Table

Period (1-7) horizontal rows that indicate the PEL's (principle energy level) which

                  contain electrons

    Period 1 : 1 PEL

    Period 2 : 2 PEL's

    etc.

Groups/Families - vertical columns that at times (group 1, 2, 13-18) shows that atoms in the same group have the same number of valence electrons which in turm gives them similar chemical properties.

    Group 1 : ! valance electron

    Group 2 : 2 valence electrons

    Group 13 : 3 valence electrons

    etc.

Picture of Periodic Table with names of the Groups

Left Side - metals

Right Side - non-metals

Properties of Metals

1) Group 1 and 2 metals are most active.

2) Metals are solids at room temperature; except mercury(Hg) which is a liquid.

3) Metals are malleable = hammered into a shape.

4) Metals are ductile = pulled through a wire.

5) Metals have luster = shiny.

6) Metals are good conductors of heat and electricity, due to their mobile electrons.

7) Metals have low ionization energies and electronegativities.

8) Metals lose  electrons to form positive ions with smaller radii.

9) Transition metals take on multiple oxidation states and form colorful compounds.

     Their ions form pretty colors.

                CuSO4 . 5H20    ~    This compound is blue because of Cu (group 11)

Properties of Semi - Metals / Metalloids

    Take on properties of both the metals and non - metals.

    B, Si, Ge, As, Sb, Te (single, double, double, single)

Properties of Non - Metals

1) Most active non - metals. Group 16 and Group 17 ; Group 18 is inactive because it

    has 8 valence electrons (except He).

2) Non - metals can be gases, molecular or network solids and bromine is a liquid.

3) Non - metals are brittle and dull.

4) Non - metals have high ionization energies and electronegativities.

5) Poor conductors of heat and electricity (insulators).

6) Non - metals gain electrons to form negative ions with larger radii.

Allotropes - some non-metals can exist in two or more forms in the same phase, but their physical and chemical properties are different.

    Examples : 02                        03

                oxygen gas      ozone

                                                carbon (graphite, coal, diamonds)

Electronegativity - atoms attraction for another atoms electrons

        Trends - Across a period - electronegativity increases

                      - Down a group - electronegativity decreases

Ionization Energy - the amount of energy required to remove the most loosely bound

                              electron

        Trends - Across a period - ionization energy increases

                      - Down a group - ionization energy decreases

Atomic Radius - the distance from the nucleus to the outermost PEL in an atom.

        Trends - Across a period - the atomic radius decreases

                      - Down a group - the atomic radius increases

Ionic Radius - the distance from the nucleus to the outermost PEL of an ion

                    compare atomic radii vs. ionic radii for metals and non-metals

        Metals - lose electrons to form positive ions so . . . their atomic radius is greater

                    than their ionic radius

        Non-Metals - gain electrons to form negative ions so . . . their atomic radius is less than ionic radius

Hint : Electronegativity and ionization energy follow the same trened, atomic radius is the opposite (Remember Flourine : F)