CHEMISTRY CH. 4 NOTES

I. What determines an element's chemistry? (Lesson 1 - p. 125-129)

A. VALENCE ELECTRONS (electrons on the outer shell)
- they have the **highest** energy, involved with chemical bonding
- number of **valence** electrons in each atom determines **chemical** properties of elements
- **ELECTRON** DOT DIAGRAMS = used to represent valence electrons

B. Bonding
- Atoms like to have 8 valence electrons to be **stable**!!! (8 = Great)
- He (Helium) is stable with 2 **electrons**
- Atoms form **bonds** to have 8 **valence** electrons and become stable

C. Periodic Table
- **PERIODS** = rows (across), **COLUMNS** = groups (vertical)
- ATOMIC NUMBER = number of protons (& electrons)
- Number of valence electrons **INCREASE** from the left to right across each period
- Elements in a group have same valence electrons and similar **properties** (Just like your family:))

D. Noble Gases
- Group 18, have **8** valence electrons except He (Helium) has **2**
- Not likely to gain, lose or **share** electrons, do not **react** with other elements (very stable)

E. Metals

- React by **losing** valence electrons (Losers are positive)
- Reactivity goes **DOWN** from left to right going **across** the periodic table (except for column 17 (the **halogens**) = most reactive!)

F. Non-Metals

- Become **stable** when they gain or share electrons to have 8 **valence** electrons
- Usually combine with metals by **gaining**
- Can also combine with other nonmetals or metalloids by **sharing**

G. Metalloids (**zigzag** group of elements that have **properties** of BOTH metals and non-metals)

- Can either **lose** or **share** electrons

H. Hydrogen

- In Group 1 because it has 1 valence electron but it is a **non-metal**
- H **shares** its electrons when forming **compounds** with other non-metals to obtain a **stable** arrangement of **2** electrons

II. How do ions form? (Lesson 2 Part 1 p. 131-133)

A. ION

- An atom or **group** of atoms that has an **electric** charge
- Electron dot diagrams = the dots indicate the number of **valence electrons**

B. Positive Ions

- When a **neutral** atom loses a valence electron, it loses a **negative** charge and becomes a **positive** ion (losers are positive)
- When a neutral atom **gains** an electron it becomes a **negative** ion (gainers are negative)

C. POLYATOMIC IONS

- **Ions** that are made of more than **one** atom
- Examples: HCO_3, NO_3, **CO_3,** SO_4

D. Ions and how they bond

- Atoms that easily **lose** electrons react with atoms that easily **gain** electrons
- Valence electrons are **transferred** from atom to atom
- Transfer gives each atom a more **stable** arrangement of electrons

E. IONIC BONDS

- the attraction between two **oppositely** charged ions, positive + negative = **strongest** bond

F. IONIC COMPOUND

- a compound that results from an **Ionic** Bond
- Made up of **positive** and negative ions
- Examples: $MgCl_2$, **NaCl,** LiO, KF

III. How are the formulas and names of ionic compounds written? (p. 134-137 - Lesson 2 - Part 2)

A. CHEMICAL FORMULA
- a group of **symbols** that shows the **ratio** of elements in a compound.
- Examples: **H_20**, $MgCl_2$, $CaCl_2$

B. Formulas of Ionic Compounds
- Ions combine to **balance** the charges on the **ions**
  (ex: Mg+2 + Cl-1 = $MgCl_2$)
- **SUBSCRIPTS** indicate the **ratio** of elements in a compound (ex: $MgCl_2$ = for every 1 Mg there are 2 Cl)

C. Naming Ionic Compounds
- **Ionic** compounds - the **positive** ion ALWAYS comes **1st** followed by the negative ion
- Name of the positive ion is usually a **METAL**
- When a **+** and **-** ion combine the end of the **- ion** changes to **ide** (example: Magnesium + Chlorine = Magnesium Chloride)