PERIODIC TABLE, Ions and Ionic formulas

CHM 090 with Dr. Kim

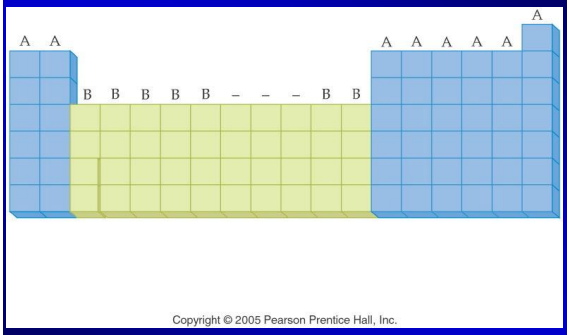
GCC

6.1 CLASSIFICATION OF THE ELEMENTS

Dimitri Mendeleev (1869) arranged elements in a table in order of increasing mass. He put elements with similar properties in the same column.

Organization of the Periodic Table

- A ***horizontal row*** **is called a _____.**
- **A *vertical column* is called a _____**
- **Elements in the same group exhibit similar properties.**
- **Main Group Elements: ____ Group**
- **Transition Metals: _____ Group**



Some Group Names to Memorize

Group IA: _____

Group IIA: _____

Group VIIA: _____

Group VIIIA: _____

B Groups: Transition _____

The noble gas in the third row is _____

The halogen in the fourth row is _____

Ion Formation

- Atoms gain or lose electrons in order to combine and make compounds.
- When an atom has lost or gained electrons it is now called _____
- An ion has unequal numbers of protons and electrons unlike an atom
- Remember atoms are _____

Metals lose electrons

- **Losing negative electrons makes the atom less negative or more positive**
- **The atom becomes a _____ ion**
- **Cation is a + ion**
- **Metals like to _____ electrons and become _____!!!**

Example Sodium Na

- Sodium atom likes to lose one electron
- Sodium atom has ___ protons, ___ electrons
- Sodium ion has ___ protons, ____ electrons
- Thus Na ion has a charge of +1 because there is one more proton than electron
  - Your Turn
- Do the exact same thing with Calcium atom which likes to lose two electrons

NonMetals gain electrons

- **Gaining negative electrons makes the atom more negative or less positive**
- **The atom becomes a _____ ion**
- **Anion is a (-) ion**
- **Nonmetals like to _____ electrons and become _____!!!**

Example Oxygen O

- Oxygen atoms like to gain 2 electrons
- Oxygen atoms have __ protons, __ electrons
- Oxygen ions have __ protons, ___ electrons
- Thus oxygen ion has a –2 charge because there is 2 more electrons than protons
  - YOUR TURN
- Do the exact same thing for fluorine F atom which likes to gain 1 electron

Ionic Compound

- We saw that Na becomes Na^{+1} and F becomes F^{-1}
- Opposites attract so Na^{+} and F^{-} like each other. Oh la la!
- So they bond and make compound _____

- **Metals lose electrons and become positively charged ions = cations**

Group	**Group IA metals**	**Group IIA metals**	**Group IIIA metals**
Charge			
Example	**Li^{+}**	**Mg^{2+}**	**Al^{3+}**

- **Nonmetals gain electrons** and become **negatively charged ions = anions**

Group	Group VA nonmetals	Group VIA nonmetals	Group VIIA nonmetals
Charge			
Example	N^{3-}	O^{2-}	F^{-}

What charged ion do they make?

Cl: ___

Ca: ___

P: _____

Na: _____

O : _____

Al : _____

What charge will the following atoms have when they become ions?

- **K**
- **Mg**
- **B**
- **S**
- **N**
- **I**
- **Ba**
- **In**

Putting ions together to make ionic compounds

Ions come together to make neutral compounds. This means they must add up to zero. So a +1 ion wants a -1 ion with it. A +2 ion wants a _____ with it. A +3 ion wants a _____ ion with it.

Ionic Compounds

NaCl is an ionic compound. Why did one Na and one Cl bond together?

Ionic Compounds

- $CaCl_2$ is an ionic compound. Why did one Ca and two Cl's bond together?

Write your own formulas

- Na and O make
- Na and F make
- K and S make
- Mg and Cl make
- Mg and S make
- K and N make