Unit 5 Ions & Chemical Bonding Name _____

Define the following

- Element _____
- Compound _____
- Homogeneous mixture _____
- Heterogeneous mixture _____

Latin Element Symbols

- Gold ____
- Silver ____
- Copper ____
- Mercury ____
- Potassium ____
- Sodium ____
- Antimony ____
- Tin ____
- Iron ____

Elements vs Compounds

- _____ is the symbol for the element _____.
- _____ is the formula for _____.
- _____ is the formula for _____.

Law of Definite Composition

Compounds *always contain the same elements in a* _____.

Example: Calculate the percent composition of each element in water, H_2O. (Show your work)

Molecule

A _____ chemical composed of two or more _____ atoms.

- Examples of molecules with **different elements**: _____
- Examples of **diatomic elements**: _____
- Examples of **allotropes**: _____

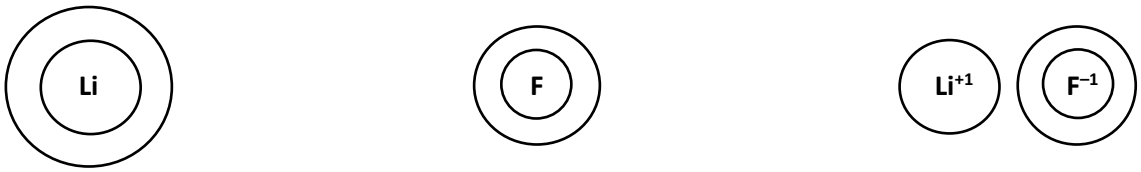
Law of Multiple Proportions

When elements can combine in different ways to form different compounds, they always do it in _____ ratios.

- Examples: Theobromine - **C H N O** and Vitamin B_3 - **C H N O**
- _____ are used to represent compounds and molecules.
- _____ equal number of atoms for each element
- _____ International Union of Pure and Applied Chemistry naming system

Ionic Bonding

Ionic Bonding occurs when a _____ atom _____ valence electrons to a _____ atom to from a _____.



- Metal atoms _____ electrons to become _____.
- Nonmetal atoms _____ electrons to become _____.

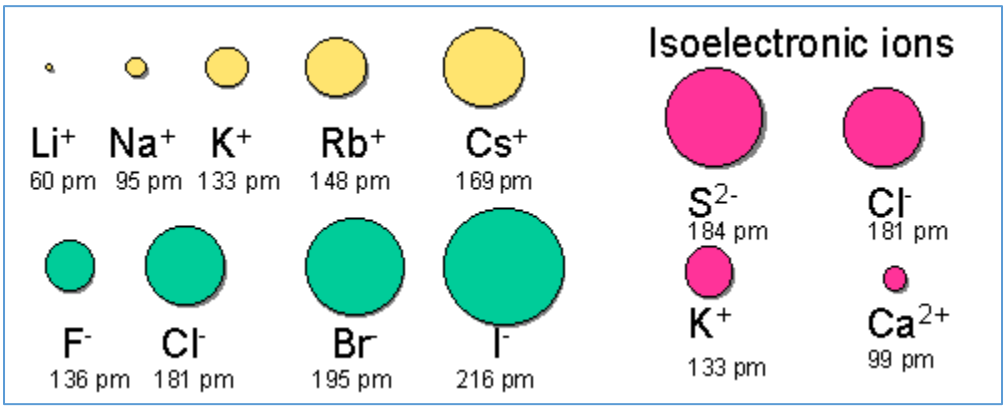
Properties of Ionic compounds

- _____ lattice
- _____ melting points
- _____ vapor pressure
- _____
- _____ conductors
- _____ solutions

Lattice Energy

According to Coulomb's Law, the _____ the charges the _____ the force. So as atoms get smaller, the ionic bond gets stronger and requires _____ energy to break apart.

Practice Problems: Use the image below to compare the physical and chemical properties of each ionic bond.



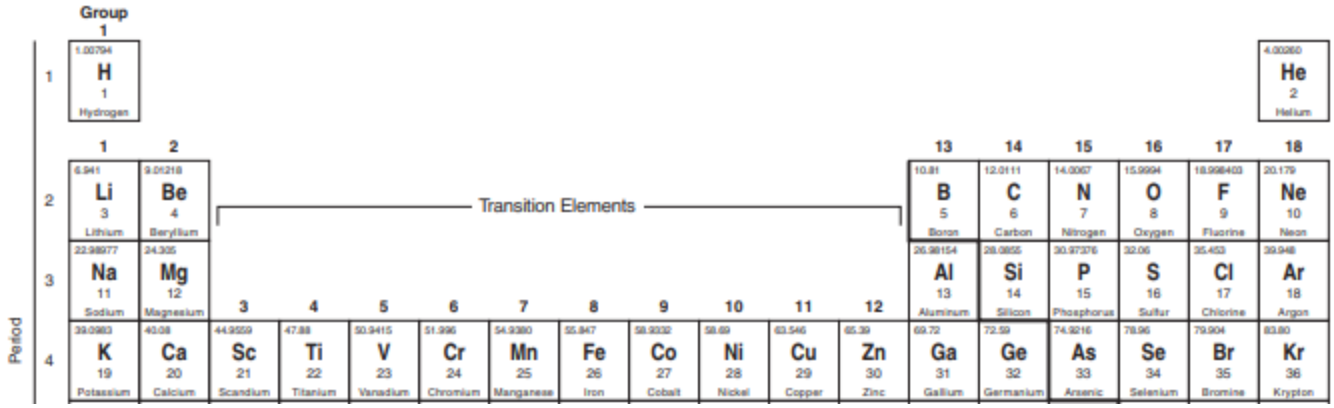
(a) The lattice energy of NaCl is _____ than CsCl

(b) A bond between Ca and F is _____ than a bond between Na and Cl

(c) The melting point of KBr is _____ than LiF

Oxidation Numbers

- Stand for the _____ _____ based on the number of _____ lost or gained.
- Label the oxidation numbers for Groups 1, 2, 13, 15, 16, 17, and 18 on the portion of the periodic table shown below:



Net Charge = ZERO

- When _____ ions attract, their charges _____ _____.

  Examples: Fill in the rest of the examples based on Presentation Slide #20.

Reactants	Ionic Bond	Compound Name
1 Na^{+1} + 1 Cl^{-1} →	Na_1Cl_1	sodium chlor**ide**

Transition Metals

- Transition Metals have _____ oxidation states because of the _____ electrons in the ___**-orbital**.
- The IUPAC naming system assigns _____ _____ to indicate their _____ _____.

  Examples:

Reactants	Ionic Bond	Compound Name

Polyatomic Ions

- **_____ molecules that form an _____ charge.**
- **College Prep must memorize the following:**

NH_4^{+1}	Ammonium	CO_3^{-2}	Carbonate
OH^{-1}	Hydroxide	SO_4^{-2}	Sulfate
NO_3^{-1}	Nitrate	PO_4^{-3}	Phosphate

- **Honors students must memorize the following:**

NH_4^{+1}	ammonium	MnO_4^{-1}	permanganate
NO_3^{-1}	nitrate	$C_2H_3O_2^{-1}$	acetate
NO_2^{-1}	nitrite	CO_3^{-2}	carbonate
O_2^{-2}	peroxide	HCO_3^{-1}	bicarbonate
OH^{-1}	hydroxide	SO_4^{-2}	sulfate
CN^{-1}	cyanide	SO_3^{-2}	sulfite
ClO_4^{-1}	perchlorate	CrO_4^{-2}	chromate
ClO_3^{-1}	chlorate	$Cr_2O_7^{-2}$	dichromate
ClO_2^{-1}	chlorite	PO_4^{-3}	phosphate
ClO^{-1}	hypochlorite	PO_3^{-3}	phosphite

Examples: Fill in the table below based on Common Polyatomic Ionic Bonds

Reactants	Ionic Bond	Compound Name
1 Na^{+1} + 1 HCO_3^{-1} →	$NaHCO_3$	sodium **bi**carbon**ate**

Covalent Bonding

- Occurs when two or more _____ atoms _____ valence electrons to form a _____.
- Generally, follows the _____ _____, because most atoms want ____ valence electrons.
- Some common examples:

Ammonia **NH_3** Water **H_2O** Methane **CH_4** Carbon Dioxide **CO_2**