

Name: _____

Unit 4: Introduction to Chemical Compounds

Why do elements combine?

So Far We've Learned:

- ☐ That atoms are made up of _____
- ☐ The identity of an atom is determined by the number of _____ in the nucleus
- ☐ BUT, compounds form due to the interactions between _____

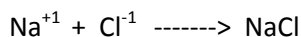
How are Electrons Involved?

I. Either _____

- ☐ Using the Periodic Table, we can predict an element's electron behavior.
- ☐ A (-) charge = _____ electrons
- ☐ A (+) charge = _____ electrons

General Rules (ionic):

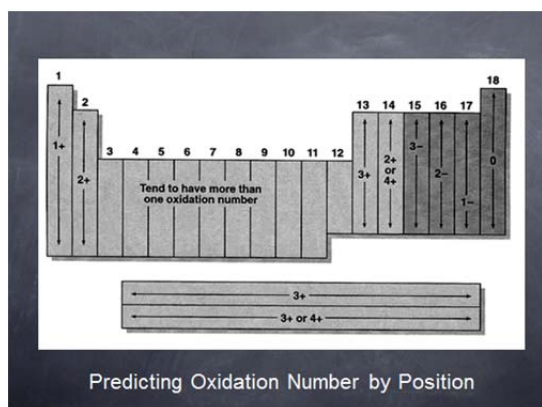
- ☐ Metals will ALWAYS form _____
- ☐ Non-metals will ALWAYS form _____
- ☐ Chemical compounds form from the interaction between oppositely charged ions:



sodium ion + chloride ion ----> sodium chloride

BIG IDEA:

- ☐ Every element is trying to rearrange its electrons (by gaining or losing them) in order to "look like" a noble gas element.
- ☐ This is called achieving a " _____



Identifying Ions

Name	Common Ion (Na^{+1})	Cation or Anion	Anion "ide" name
Strontium			
Iodine			
Nitrogen			
Oxygen			
Lithium			
Magnesium			
Silver			
Zinc			
Iron (II)			
Phosphorous			
Sulfur			
Aluminum			
Fluorine			
Chlorine			
Potassium			
Bromine			
Cesium			
Francium			
Chromium (VI)			

When Ions Combine, the Compound MUST be _____

☐ All (+) charges must be cancelled by (-) charges

☐ Need to _____

☐ Li and Cl

☐ Li and O

☐ Mg and Cl

☐ Mg and O

☐ Al and Cl

☐ H and S

Anatomy of a _____

1. Symbols for the _____ in the compound
2. Numbers called _____ that indicate _____:

AlCl_3 = 1 Al and 3 Cl

This should make sense because Al has a +3 charge and Cl has a -1 charge

3. The subscript is ONLY associated with the element symbol to the immediate left.

TRY THESE:

Binary Ionic Compound Chart

Determine the oxidation numbers for each of the ions listed in the chart. Make a correct chemical formula in each intersection of the chart, using a combination of the respective ions.

	Cl ----	Br ----	O ----	S ----	P ----
Na ----					
K ----					
Be ----					
Mg ----					
Sc(III) ---					
Al ----					
Ti (IV) ----					
V (V) ----					

Polyatomic Ions

- ☺ "Poly-" means many
- ☺ Polyatomic ions are charged particles that consist of more than one atom
- ☺ These ions can combine just like ions formed from single elements

Common Polyatomic Ions

Table 5.2 Common Polyatomic Ions

Name of Ion	Formula	Charge
ammonium	NH_4^+	1+
hydronium	H_3O^+	1+
hydrogen carbonate	HCO_3^-	1-
hydrogen sulfate	HSO_4^-	1-
acetate	$\text{C}_2\text{H}_3\text{O}_2^-$	1-
nitrite	NO_2^-	1-
nitrate	NO_3^-	1-
cyanide	CN^-	1-
hydroxide	OH^-	1-
dihydrogen phosphate	H_2PO_4^-	1-
permanganate	MnO_4^-	1-
carbonate	CO_3^{2-}	2-
sulfate	SO_4^{2-}	2-
sulfite	SO_3^{2-}	2-
oxalate	$\text{C}_2\text{O}_4^{2-}$	2-
monohydrogen phosphate	HPO_4^{2-}	2-
dichromate	$\text{Cr}_2\text{O}_7^{2-}$	2-
phosphate	PO_4^{3-}	3-

Just One Catch!

- ☞ If more _____, the formula for the compound will need to have _____ around this ion
- ☞ Example: $\text{Mg}^{+2} + \text{PO}_4^{-3} \rightarrow \text{Mg}_3(\text{PO}_4)_2$

Polyatomic Ions May be Used Like Other Ions

- ☞ Just like Sodium (Na^+) can combine with chloride (Cl^{-1}), to make NaCl
- ☞ A polyatomic ion called ammonium (NH_4^{+1}) can combine with chloride (Cl^{-1}) to make NH_4Cl
- ☞ The N and 4 H's that make up NH_4 , collectively lose 1 electron to become NH_4^{+1}

Naming Ionic Compounds

1. Determine the ions that make up the compound. (Use Periodic Table or "Common Ions Chart")
2. Write the name of the POSITIVE ion first
3. Write the name of the NEGATIVE ion second. (Sometimes the name of this ion will change slightly)

Negative Ion Names

THE PERIODIC TABLE

Examples:

Chlorine becomes _____

Fluorine becomes _____

Oxygen becomes _____

Phosphorous becomes _____

Nitrogen becomes _____

If polyatomic ions are used...

- Naming is easy!
- Just put the _____ (positive first, negative second)
- No _____ are needed

Example:

$\text{Mg}_3(\text{PO}_4)_2$ is named Magnesium phosphate

Transition Metals

THE PERIODIC TABLE

A 10x18 grid with numbers 1 through 18 at the top. The numbers are placed in the top row of the grid, with 1 at the top-left and 18 at the top-right. A red staircase path is drawn on the grid, starting at the top-left corner (row 1, column 1) and ending at the bottom-right corner (row 10, column 18). The path consists of horizontal and vertical segments, forming a series of steps that descend from left to right.

Introduction to naming Chemical Compounds

So Far We've Learned:

- ☼ Compound are made from ions
- ☼ Formulas start with the cation and end with the anion renamed with "ide"
- ☼ Subscripts determine the number of atoms
- ☼ Polyatomic ions are ions made of many atoms and usually have parenthesis around them

How are compound named? (Type I & II)

all metals (cations) use the _____

all non metal ions (anions) use the _____

polyatomics _____

transition metals require _____ that match thier charge eg. Fe^{+2} is Iron (II), Fe^{+3} is Iron (III)

Transition Metals

THE PERIODIC TABLE

1																		18
	2												13	14	15	16	17	
			3	4	5	6	7	8	9	10	11	12						

Type III

- ☼ _____ (NO IONS)
- ☼ Use _____ to tell the number of atoms (see chart)
- ☼ No _____

Acids

Always begin with _____

Use a _____