GUIDE TO NAMING MONATOMIC IONS, BINARY IONIC COMPOUNDS, & TRANSITION METALS – SECTION 7.1

	Definition	**Steps in Creating the Formula**	**How Do You Name It?**	**Example**
Monatomic Ions	Ions formed from a single atom. Main group ions form to a noble gas configuration (remember, group 1 is +1, group 2 is +2, etc.)	No formulas—just ions!! Write the atomic symbol with its charge as a superscript Ca^{+2}	**For cations (+):** The elements name. **For anions (-):** The ending of the name is dropped and the ending **–ide** is added.	Cation: Ex. Ca is calcium; Ca^{+2} is Calcium Anion: Ex. F is flourine; F^{-} is flouride

Try a few examples:

a. **What do you call a sodium ion (Na^{+1})?**

b. **How would you express a sulfide ion and what charge would it have?**

c. **What charge does a phosphide ion have?**

d. **What charge does a potassium ion have? How would you express it?**

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	Definition	**Steps in Creating the Formula**	**How Do You Name It?**	**Example**
Binary <u>Ionic</u> Compounds (only has TWO elements in the compounds)	Compounds composed of two elements, the total charge must be equal to zero.	1. Write the symbols and charges of the ions side by side, cation (+) first. **Al^{3+} O^{2-}** 2. Cross over the charges by using the absolute value of each ion's charge as the subscript for the other ion. Make sure that the total charges now add up to zero. **Al_2^{3+} O_3^{2-}** 3. The reason for this is so that the number of electrons that are being given by the cation can be received by the anion(s). **Al_2O_3**	1. Use the name of the cation (+) first 2. Then use the anion (-) name, but drop the ending and add –ide **Note:** You are basically just naming the monatomic ions separately and then putting them together NEVER USE PREFIXES!	**Al_2O_3** Aluminum Oxide

Try a few examples:

Write the formula for the binary ionic compounds formed between the following elements:

a. **Calcium and iodine**

b. **Sodium and sulfur**

Name the following compounds:

a. **LiCl**

b. **$CaCl_2$**

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	Definition	**Steps in Creating the Formula**	**How Do You Name It?**	**Example**
Ionic Compounds that contain Transition (d-block) Metals	D-block elements	Transition metals can have more than one charge (no formulas) Figure out the charge of the metal by uncrossing the subscripts	The name won't change (ex. Fe=iron=iron no matter what the charge) NEVER USE PREFIXES!	$PbCl_2$ Lead (II) chloride $Pb(NO_3)_4$ Lead (IV) nitrate

Try a few examples: (Note: I will not expect you to memorize the charges for these—you should be able to figure it out based on the charge of the negative ion or look it up on the table).

Write the formula and give the name for the compounds that form between:

a. **Cu(2+) and Br (-)**

b. **Sn(2+) and F(-)**

c. **Hg(2+) and S(2-)**

Name:

a. **CuO**

b. **$FeCl_3$**

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	Definition	**Steps in Creating the Formula**	**How Do You Name It?**	**Example**
Compounds containing Polyatomic Ions (has MORE than two elements in compound)	Ionic compounds that use one or two positive or negative polyatomic ions to form ionic compounds Another note: Are produced by the loss of hydrogen ions (H+) from oxyacids: Sulfuric acid H_2SO_4 Sulfate SO_4^{2-}	***You basically use the same steps as with putting two monatomic ions together.*** THE TOTAL POSITIVE CHARGE WILL BALANCE THE TOTAL NEGATIVE CHARGE. Remember to treat the polyatomic ions as a package—you will NEVER change the formula of a polyatomic ion!!	***Same as binary ionic compounds,*** except in this case, you won't be changing the editing of the polyatomic ion (it stays *–ate,* or *–ite*.) **SEE PAGE 210 FOR LIST OF POLYATOMIC IONS** NEVER USE PREFIXES!	Al^{+3} bonding with $(SO_3)^{-1}$ Gives you $Al(SO_3)_3$ called Aluminum Sulfite

Try a few examples: (Note: I expect you to memorize the formulas and charges of the polyatomic ions from the table on page 210 in your book).
Write the formula for:

a. **Copper (II) Sulfate**

b. **Potassium Sulfide**

c. **Potassium Perchlorate**

Give the names for:

a. **$Ca(OH)_2$**

b. **$FeCrO_4$**

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	Definition	**Steps in Creating the Formula**	**How Do You Name It?**	**Example**
Molecular (Covalent) Compounds	Molecular compounds are covalently bonded units.	You will usually be given the formula or use the name of the compound to figure out the formula	Two ways: 1. The less electronegative element is given first. It is given a prefix (ex. di, tri, etc.) only if it contributes more than one atom to a molecule. ▪ Ex. Carbon = C ▪ Ex. Diphosphorus = P_2 2. The second element is named by combining: ▪ a. a prefix indicating the number of atoms contributed by the element, ▪ b. the root of the name of the second element, and ▪ c. the ending *–ide*. ▪ Ex. Trioxide = O_3	Ex. CCl_4 Carbon Tetrachloride Ex. P_5O_2 Penta-phosphorus Dioxide

Note: I expect you to memorize the prefixes on page 212

Name the following:

a. **SO_3**

b. **ICl_3**

c. **PBr_5**

Write the formulas for:

a. **Phosphorus tetraiodide**

b. **Dinitrogen trioxide**

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	Definition	**Steps in Creating the Formula**	**How Do You Name It?**	**Example**
Binary Acids	Consist of 2 elements, usually hydrogen and one of the halogens (Group 17 elements)	Will always have one hydrogen bonded to a highly electronegative atom to form	To name an acid which contains a monatomic anion: • start the name with hydro • drop the -ide ending of the anion • add the suffix, -ic acid.	Ex. HCl Hydrochloric Acid
Write the formula for: **a. HI** **b. HF**				
	Definition	**Steps in Creating the Formula**	**How Do You Name It?**	**Example**
Oxyacids	Acids that contain hydrogen, oxygen, and a third element (usually a nonmetal).	Will always have one hydrogen bonded to a negatively charged group--likely a oxyanion (ex. NO_3-)	If the anion ends in -ate the acid name will end as -ic. If the anion ends in -ite the acid will end as -ous.	Sulfuric acid – H_2SO_4 Sulfurous acid- H_2SO_3
Write the formula for: **a. Phosphoric acid** **Name:** **a. H_2SO_4**				