Quickie Tutorial for writing ionic formulas. The positive ion (usually a metal but can be a positive poly-ion like ammonium), is always in the left position of the formula. The negative ion, either a nonmetal or a negative poly-ion like sulfate or nitrate or carbonate.... you get the idea, is always on the right SO.....

POSITIVE ION NEGATIVE ION like **NaCl** where Na is the +ion and Cl is the -ion

You MUST know the oxidation numbers (the charge of the ions) in order to write the formula. Check the periodic table for individual ions. You must rely on your memory or cheat sheet for the poly-ion formulas.

Here is the easy way to do this stuff.

Take the oxidation number of the positive ion and make it the subscript of the negative ion. Take the oxidation number of the negative ion and make it the subscript of the positive ion. Write them next to each other with their subscripts.

Remember
1 is never a subscript

There are never any plus signs or minus signs in the final formula

When you are finished the oxidation numbers must add up to zero

If the ion is a poly-ion, your formula may require parenthesis because you cannot change the existing formula of the poly-ion and you may need to show that you have more than one of the poly ions.

Here is an example: Mg +2 and Cl -1 becomes $MgCl_2$ Magnesium's oxidation number (+2) has become Chlorine's subscript AND Chlorine's oxidation number (-1) has become Magnesium's subscript BUT YOU NEVER WRITE 1 AS A SUBSCRIPT. Ok, let's add it up. 1 magnesium at (+2) is indeed canceled out by 2 chlorines at (-1) each....No plus signs or minus signs in final formula.

Here is another example: NH_4 +1 and CO_3 -2 becomes $(NH_4)_2CO_3$ because it takes two ammoniums at +1 to cancel one carbonate at -2. Notice I did not change the existing formulas of either poly-ion. You might need you cheat sheet if you did not memorize the formulas!!!!!! :(

some other minor details..... if oxidation numbers are the same number like +2 and -2, or +3 and -3 they already cancel out like Mg +2 and O -2 becomes MgO because +2 cancels -2.

If they are multiples of each other like +4 and -2, you must simplify it first, like a fraction. So Pb +4 and O-2 becomes PbO_2 because you divide +4 of Pb by 2 and get +2, divide -2 of O by the same number and get 1. Pb+2 and O-1. Then just as before, switch the ox numbers to become subscripts.

It is easy to figure out what the ions of an ionic compound are if you work backwards.....do the exact opposite of the above directions. Here is an example: What ions come together to form $FeCl_3$ Fe must be +3 because the subscript of Cl is 3 (work backwards). We know that it is positive 3 because it is a metal and is in the left position of the formula. Cl must be -1 because Fe has no subscript and Cl is in the negative, left position of the formula. If you take Fe+3 and Cl-1 and go through the steps that I first described, you will indeed end up with $FeCl_3$

OK, Here is how you name these rascals. The name of the positive ion NEVER changes and the name of the negative ion changes to end in "ide" if and only if it is a single negative ion. Poly-ions NEVER change their names. It does not matter if they are a positive ion or a negative ion.

Here are some examples:

NaCl is sodium chloride (sodium does not change and chlorine changes to chloride)

BaS_2 is barium sulfide (barium does not change and sulfur changes to sulfide)

NH_4Cl is ammonium chloride (ammonium does not change and chlorine becomes chloride)

$Ca(OH)_2$ is calcium hydroxide (calcium does not change and neither does the poly-ion hydroxide)

NH_4NO_3 is ammonium nitrate (neither poly-ions change their names)

IF IT HAS A TRANSITION METAL, the name must include a Roman numeral. The Roman numeral always follows the transition metal. It represents the oxidation number (the charge) of that transition metal in that compound. You might have to work backwards again on these.

Here are some examples: $FeCl_3$ is iron III chloride. Notice the Roman numeral III follows iron because iron is +3 in that compound. Chlorine changes to chloride.

Co_3N_2 is cobalt II nitride. Notice the Roman numeral II follows the cobalt because it is +2 in the compound. Nitrogen changes to nitride.

TiI_4 is titanium IV iodide. Notice the Roman numeral IV follows the titanium because it is +4 in the compound. Iodine changes to iodide.

GOOD LUCK!!

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