

Naming Compounds – Review

Here is some step by step for those of you who are struggling, please take the time to read through this and apply it to your work.

There are two main types of compounds, ionic and molecular. Some of the compounds that you will learn about require special systems for naming.

I. Binary Compounds. As you know, binary compounds consist of only two elements. The formula for a binary compound may contain more than two letters, but it will contain only two capital letters. When naming a binary compound, regardless of whether it is ionic or molecular, follow the following steps:

1. Write the name of the element represented by the first symbol in the formula.
2. Write the name of the element represented by the second symbol in the formula, but change the ending of the element's name to "ide".
3. Check a reference table (like the one on the back on the naming flow chart) or p. 54 of your textbook to determine if the element forms more than one ion. If it only forms one then you are done. If the first element forms more than one ion, then use the stock system or classical system. Determine the charge that the first element and write that roman numeral in-between the two elemental names.

Example 1. What is the correct name for the compound AlBr_3 ?

Step 1. Write the name of the element represented by the first symbol in the formula.

aluminum

Step 2. Write the name of the element represented by the second symbol in the formula, but change the ending of the element's name to "ide". **In this case, bromine becomes bromide.**

aluminum bromide

Step 3. Check a reference table to determine if the element forms more than one ion. If it only forms one then you are done. **Aluminum always has an oxidation number of +3, therefore there is no need for a roman numeral. Our answer is;**

aluminum bromide

Example 2. What is the correct name for the element CuS ?

Step 1. Write the name of the element represented by the first symbol in the formula.

copper

Step 2. Write the name of the element represented by the second symbol in the formula, but change the ending of the element's name to "ide". In this case, sulfur becomes sulfide.

copper sulfide

Step 3. Check a reference table to determine if the element forms more than one ion. If it only forms one then you are done. Copper forms oxidation numbers of +1 and +2, so we must go to the next step.

Step 4. If the first element shows more than one ion, then use the stock system. Determine the charge that the first element is showing and write that roman numeral in-between the two elemental names. We check the charge of sulfide and find that it is -2. If one copper is canceling out one sulfur then the apparent charge on the copper must be +2. $(+2) + (-2) = 0$.

copper(II) sulfide

or classic naming

cupric sulfide

Example 3. What is the correct name for the compound Fe₂O₃ ?

Step 1. Write the name of the element represented by the first symbol in the formula.

iron

Step 2. Write the name of the element represented by the second symbol in the formula, but change the ending of the element's name to "ide". So, oxygen becomes oxide.

iron oxide

Step 3. Check a reference table to determine the number of positive oxidation numbers that the first element forms. If it only forms one then you are done. Iron can be +2 or +3, so we must go on to step 4.

Step 4. If the first element shows more than one ion, then use the stock system or classical system. Determine the oxidation number that the first element is showing and write that roman numeral in-between the two elemental names. We know that oxygen is -2 in this case. Since we have 3 atoms of oxygen, each with a charge of -2, then the total negative charge is -6. We must have +6 to balance out the -6. Since there are two iron atoms to make up a total of +6, each

must be +3.
 $2(+3) + 3(-2) = 0$.

iron(III) oxide

or

ferric oxide

II. Ternary Compounds - Ternary compounds contain three elements. The only type of ternary compounds that we will learn how to name in this chapter are those that consist of one polyatomic ion and one monatomic ion. The vast majority of these types of compounds consist of a positive monatomic ion and a negative polyatomic ion. For this type of compound you follow the steps below:

Step 1. Write the name of the element represented by the first symbol in the compound.

Step 2. Write the name of the polyatomic ion, without changing the ending.

Step 3. Check a reference table such as the polyatomic ion sheet to determine the charge numbers that the first element forms. If it only forms one then you are done.

Step 4. If the first element shows more than one charge, then use the stock system. Determine the charge on that the first element is showing and write that roman numeral in-between the two names.

Example 1. Name the compound $\text{Ca}(\text{CN})_2$?

Step 1. Write the name of the element represented by the first symbol in the compound.

Calcium

Step 2. Write the name of the polyatomic ion, without changing the ending.

Calcium Cyanide

Step 3. Check a reference table to determine the number of positive charge that the first element forms. If it only forms one then you are done. **Calcium is always +2, so the final answer is as below:**

Calcium Cyanide

Example 2. What is the name of the compound $\text{Fe}(\text{NO}_3)_2$?

Step 1. Write the name of the element represented by the first symbol in the compound.

iron

Step 2. Write the name of the polyatomic ion, without changing the ending.

iron nitrate

Step 3. Check a reference table to determine the charge that the first element forms. If it only forms one then you are done. Iron can be +2 or +3, so we must go on to step 4.

Step 4. If the first element shows more than one charge number, than use the stock system. Determine the charge that the first element is showing and write that roman numeral in-between the two names. Nitrate shows an charge of -1. Since there are two nitrate ions in the compound, the total negative charge is -2. Therefore, the iron must be +2. $(+2) + 2(-1) = 0$.

iron(II) nitrate

or

ferrous nitrate

Special Exception: The Ammonium ion (NH_4^+) is a positive polyatomic ion. When it combines with a negative monatomic ion, you change the ending of the negative ion to "ide". When it combines with a negative polyatomic ion, you just name both ions.

$(\text{NH}_4)_2\text{S}$ is called ammonium sulfide

NH_4OH is called ammonium hydroxide

Hope this helped! 😊