

Chemistry Lecture #91: Naming Acids

A binary acid is made of only two elements. For example, HCl is a binary acid made of only hydrogen and chlorine.

Generally, binary acids are named by using the following steps:

1. Use the prefix "hydro."
2. Use part of the name of the 2nd element in the formula.
3. Add the suffix "ic."
4. Add the word "acid."

For example, HCl would be named as follows:

1. hydro
2. chlor (since the 2nd element is chlorine).
3. ic
4. acid.

Thus, HCl would be called "hydrochloric acid."

You should be able to write the names of the following binary acids given the formula, or write the formula given the name.

Memorize the names and formulas of the following acids:

HF	hydrofluoric acid
HCl	hydrochloric acid
HBr	hydrobromic acid
HI	hydroiodic acid

Ternary acids contain three elements. For example, HNO_3 is an acid that contains hydrogen, nitrogen, and oxygen.

If a ternary acid contains a polyatomic ion whose name ends in "ate," use the following steps to name the acid:

1. Write part of the name of the polyatomic ion.
2. Add the suffix "ic."
3. Add the word "acid."

For example, HNO_3 contains the polyatomic ion nitrate (NO_3^-). It would be named as follows:

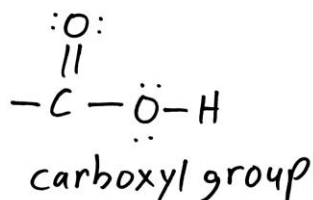
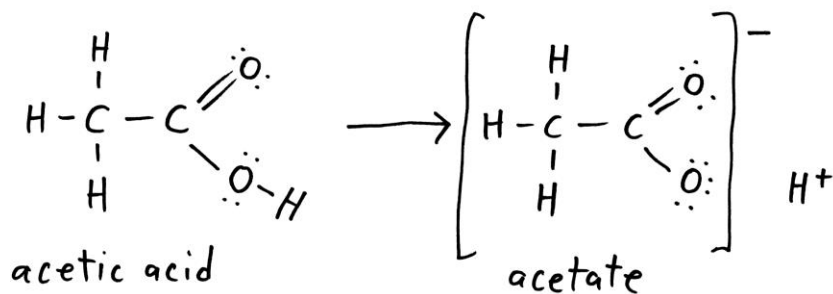
1. nitr
2. ic
3. acid.

Thus, the name of HNO_3 would be nitric acid.

You should be able to write the names of the following ternary acids given the formula, or write the formula given the name. Memorize the names and formulas of the following acids:

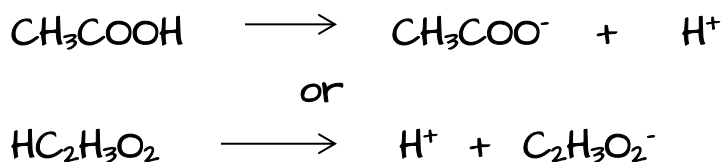
H_2CO_3	carbonic acid
HNO_3	nitric acid
H_2SO_4	sulfuric acid
H_3PO_4	phosphoric acid
HClO_3	chloric acid
$\text{HC}_2\text{H}_3\text{O}_2$ or CH_3COOH	acetic acid

Notice that the formula for acetic acid can be written as $\text{HC}_2\text{H}_3\text{O}_2$ or CH_3COOH . The latter formula gives more information about the structure of acetic acid. The pictures below show the Lewis structure of acetic acid and its dissociation into acetate and hydrogen ion.



Notice that the hydrogen ion was previously attached to an oxygen atom. Hydrogen is more likely to dissociate from a molecule if it is attached to an oxygen atom. In particular, hydrogen is more likely to dissociate if it is part of a carboxyl group. The carboxyl group is shown as COOH in the formula CH_3COOH .

The dissociation of acetic acid can be represented as



There are other ternary acids that contain polyatomic ions whose names end with "ite." These polyatomic ions contain one less oxygen atom than the polyatomic ions whose names end in "ate." For example, nitrate has the formula NO_3^- , but nitrite has the formula NO_2^- .

Here are the names and formulas of some polyatomic ions that end in "ite" instead of "ate":

PO_3^{3-}	phosphite
NO_2^-	nitrite
SO_3^{2-}	sulfite
ClO_2^-	chlorite

Ternary acids that contain polyatomic ions whose names end with "ite" are named in a similar fashion to those whose names end with "ate." You add "ous" to the end instead of "ic." For example, H_2SO_4 is called "sulfuric acid." But H_2SO_3 is called "sulfurous acid."

Memorize the names and formulas of the following ternary acids which contain polyatomic ions whose names end with "ite":

HNO_2	nitrous acid
H_2SO_3	sulfurous acid
H_3PO_3	phosphorous acid
HClO_2	chlorous acid