Naming Acids and Bases

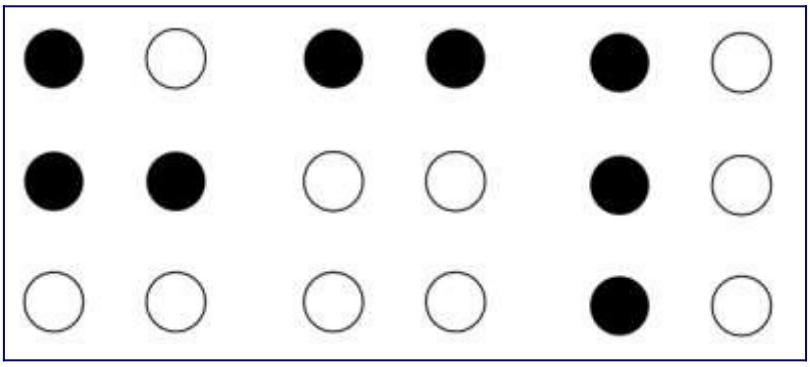
OK… good news and bad news:

The good news is that naming bases is going to be pretty simple for you. Namely, since most of them are hydroxides (NaOH, KOH, etc.), you just name them like you'd name any other ionic compound. The only real exception to this is ammonia, which has the formula NH_3. If you haven't already, you should probably just go ahead and memorize that one.

The bad news: Acids are a bit more complex to name. Let's see how this works:

Oxyacids: Our little oxygenated friends

As you're probably already aware, it's usually the case that acids have "H" as the first atom in their formula. That's not always the case, but it's not too bad a generalization to say that it's true.[1]



This trend even holds when you're using Braille!

Some of these acids contain oxygen. Some do not. If you've got an acid that contains oxygen, keep reading this section. If you've got something like "HF" that doesn't contain oxygen, scroll down to the next section.

Naming oxyacids

The formula for an oxyacid will always look like this:

[something][suffix] acid

Now, I realize that this isn't all that handy, so let's break this down:

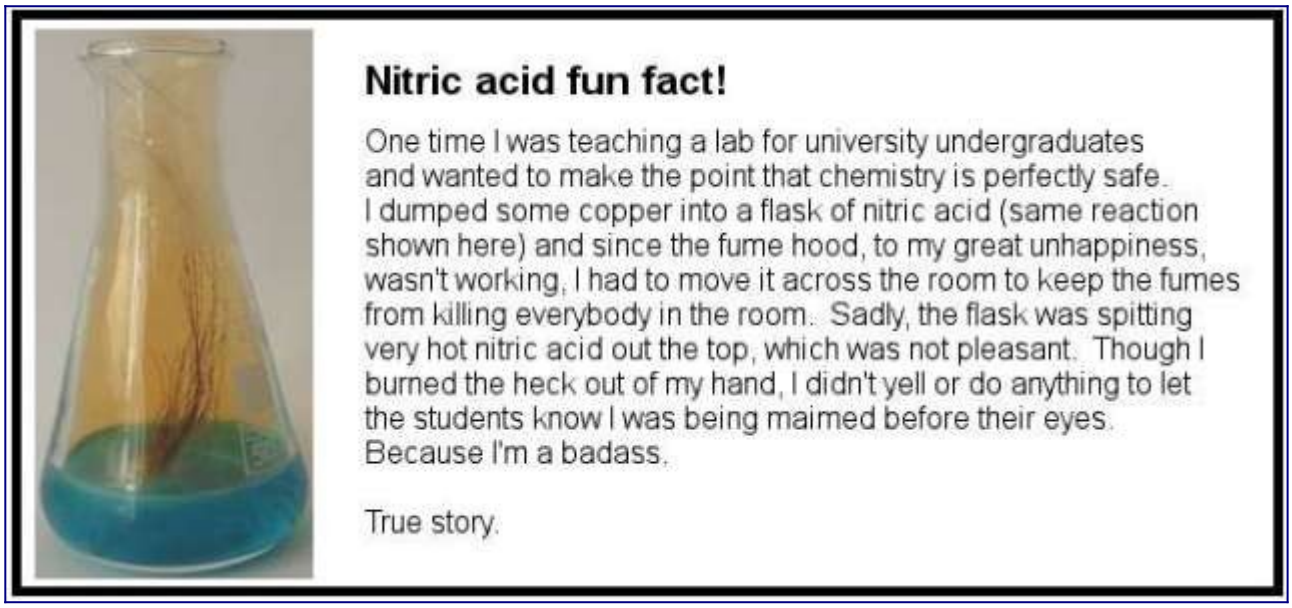
- **[something] refers to the part after the H in the formula.** If you have a nitrate ion in there, you'd say "nitr-" in this section to indicate that you've got something with nitrogen. If you've got a sulfate ion, you'd say "sulfur-" in this part.
- **[suffix] refers to an ending that indicates which specific ion is present.** For example, both the nitrate and nitrite ion will start with "nitr-", so it's important to have a suffix so we can tell them apart. The rules for this are that:

If the ion's name ends with "-ate", the suffix is "-ic."

If the ion's name ends with "-ite", the suffix is "-ous."

So, for example, if we have the formula HNO_3, we'd say that the [something] part is "nitr-" because it's the nitrate ion, and that the [suffix] part is "-ic" because the nitrate ion ends with -ate and we always replace -ate with -ic. Our big name: nitric acid.

Likewise, if we have HNO_2, we'd say that the compound is called "nitrous acid" because the "nitr-" indicates that nitrogen is there and the "-ous" tells us that the ion ends with "-ite."



Naming acids that don't have oxygen in them

If acids don't have oxygen in them, the general format for writing them is this:

hydro[something]ic acid

In this case, the [something] refers to whatever the anion is after the H.

For example, H_2S, is named "hydrosulfuric acid" because the [something] in this case is sulfur. Similarly, HBr is "hydrobromic acid."

Unless you're in really high-level chemistry, you can probably stop here and go do a practice sheet or something. However, if you're in a higher level chemistry class, keep reading.

No, seriously, if you're taking your first year of chemistry, please stop reading. Honest, there's nothing you need to know here.

Advanced naming

If you've been in chemistry a while, you know that there are several ways to name stuff. The way that you've probably been taught is the IUPAC method that's the international standard. However, there are other naming schemes out there that are the ones you'll actually see on reagent bottles. These are the things we're talking about now.[2]

It turns out that acids may have different names depending on how they're used. For example, if you're using HCN as an acid, it's usually referred to as "hydrocyanic acid." However, if you're not

using it for its acidic properties, you might just refer to it as “hydrogen cyanide.” These terms are interchangeable and both are in common use.

Other acids you may need to know:

- H_3P is phosphine
- H_3N is hydronitric acid (though this is very rarely used)
- H_2S is hydrogen sulfide (it’s almost never called hydrosulfuric acid)
- H_2O is water (it may be called hydroxylic acid as a joke)
- BH_3 is borane (I’ve never seen it written as H_3B or named as an acid)

As for bases, there are several different classes not covered above. One of them is the group of bases called hydrides, which consist of metal atoms with hydrogen attached, as in the case of NaH. These compounds are named in the same way as other ionic compounds, with the anion name “hydride.”

Another group of bases that you’ll need to be familiar with are the amines. Amines are organic compounds in which one or more of the hydrogen atoms in ammonia (NH_3) are replaced with organic groups. Naming simple amines is generally done by indicating which organic groups reside on the nitrogen atom, so if there are three ethyl groups present, the compound would be called triethylamine. Two ethyl groups would be diethylamine, and so forth. If you’re getting into organic chemistry, make a real point to learn these. Related to the amines are the amides, which are like carboxylic acids or esters in which the oxygen is replaced with nitrogen.

OK… that’s all. Go forth and name some compounds!

Footnotes:

1. Yes, I know that water starts with H. It’s also an acid. So there. (More to come when talking about Bronsted-Lowry acids and bases).

2. An example: You can, if you’d like, go into a lab and ask for a bottle of 2-propanone or dimethylketone. However, if you don’t want to be laughed at, it’s probably better to ask for acetone. Likewise, 2-propanol is isopropanol. You get the idea.