

What's an equation, really?

Now that you've learned to balance equations, it's time to actually figure out what they are. This is something that most teachers never actually tell you about, mostly because it's not something that either chemists or teachers are really trained to think about. This situation arises because we all possess many dark secrets and won't share them with just *anybody*.



"No matter what you do, Sarah, never EVER share the location of the restroom with anybody else."

Fortunately for you, I'm willing to buck the trend and teach you about equations. Why? Because I'm awesome.

What's an equation?

Every New Year's day, I cook chili for my family. This chili is absolutely amazing and has been passed down through zero generations of my ancestors. You see, my ancestors were really bad at cooking, so I had to come up with my own recipe.



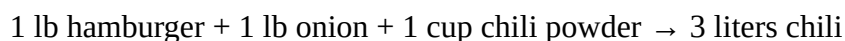
"We, the ancestors of Mr. Guch, have come to tell you our pot roast recipe."

I'm not going to go through the whole recipe ([it's located here](#), if you're interested in awesome chili), but will mention a few of the basic ingredients:

- 1 lb browned hamburger
- 1 lb chopped onion
- 1 cup chili powder

There are, of course many other ingredients, but we'll pretend that's it for the sake of brevity. Anyway, when I want to make this chili I mix all of this stuff together in a big pot and let it slowly simmer over the stove for about 12 hours. When I'm done, I end up with about 3 liters of chili.

I don't like writing things, so I'm lazy and will just put it like this:



My wife, on the other hand, doesn't cook well. About the only thing she can make is macaroni and cheese, which requires boiling a cup of noodles and when it's cooked, draining out the water and stirring in a packet of premade cheese sauce. It makes about a quart of mac and cheese. Or, in simpler form:



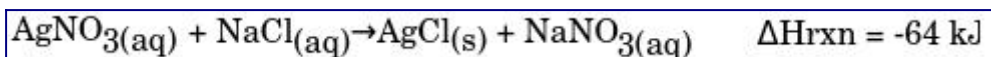
You're probably already figuring out why I told you these two recipes. Yes, you got it: These are written in the form of chemical equations. Which leads us to the big truth that you should always remember no matter what:

Chemical equations are recipes for making chemical compounds!

Seriously. That's it. I'm not making an analogy or expressing this in some oversimplified way to make it seem easier to confused students. The honest and genuine truth is that chemical equations are recipes for making chemical compounds. No more, no less.

How this works

Let's look at a pretty standard chemical equation:



This equation has all of the same features that any recipe has. For example:

- Ingredients: Each of the chemical compounds on the left (called the "reagents" or "reactants") represent one of the things we start with.
- What we make: The compounds on the right (called the "products") represent what's made in the reaction.
- It tells you something about what the ingredients and stuff you make will look like: The little (aq) and (s) at the bottom of each compound means that these ingredients are aqueous (dissolved in water) or solids. In the same way, (l) means liquid and (g) means gas.
- It tells you about the cooking process: The ΔH term at the right of the equation tells you whether energy is given off (in an exothermic process, as it is in this case) or is absorbed (in an endothermic process)

So, again, this is really just a recipe for making AgCl and NaNO_3 . And all equations, no matter where you find them, are also recipes.

Photo credits:

- Secret knowledge of the well-dressed guy: *Image courtesy of franky242 at FreeDigitalPhotos.net.*
- My relatives: *Image courtesy of satit_srihin at FreeDigitalPhotos.net.*