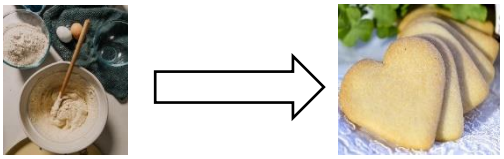
Stoichiometry Analogy

Stoichiometry involves calculations to predict how much of a specific chemical can be made from measured reactants or how much of a particular reactant is needed to make a specific chemical. The calculations involve multiple steps using ratios and rearranging equations. Apart from being a fundamental skill in chemistry, the thinking and math in stoichiometry provides scaffolding for calculations such as medication calculations, that pre-health students will encounter in their target programs in health sciences.

I use analogies fairly consistently in my chemistry classes because many students have difficulty visualizing atoms and molecules. In this example, many students understand the concept of recipe, even if they do not cook or bake themselves. I like chocolate and so I used chocolate chip cookies as the example, hoping that the chocolate would appeal to some students as well.

Baking chocolate chip cookies is a chemical reaction. Stoichiometry in chemistry is like predicting how much cookie dough you can make from a recipe.
For example, if you follow a chocolate chip cookie recipe, using the correct ingredients, you will make chocolate chip cookies!

What would happen if you followed the chocolate chip cookie recipe, but **omitted the chocolate chips?**



You'll end up with plain cookies, not chocolate chip cookies.
Principle #1: if you change the ingredients (reactants), you'll end up with different products (plain cookies).

But what would happen if you **doubled <u>all</u> the ingredients** in your recipe ?

You will make **double the amount of cookie dough** (and hopefully double the number of cookies!).
Principle #2: if you keep the ratios between the ingredients (reactants) the same, you'll make more or less of the same product (chocolate chip cookies)

Stoichiometry and baking are similar because **Principles #1 & 2** apply to both. Chemical reactions are like recipes. They enable us to predict how much product (cookie dough) we can make with given amounts of specific reactants (ingredients). Similarly, if we're given a certain amount of product (cookie dough), we can work backwards to determine the amounts of ingredients used.