

## Teacher Background

### Chapter 6, Lesson 8

#### Strength vs. Concentration

##### ***Strength***

There are different kinds of acids. There are strong acids, weak acids, and acids in-between. The factor that determines the strength of an acid is its ability to donate a proton, increasing the amount of  $\text{H}_3\text{O}^+$  in water. A strong acid produces a lot of  $\text{H}_3\text{O}^+$  in water, while the same amount of a weak acid produces a smaller amount of  $\text{H}_3\text{O}^+$ .

##### ***Concentration***

Concentration is different from strength. Concentration has to do with the *amount* of acid added to a certain amount of water.

It is the combination of the concentration and the strength of an acid that determines the amount of  $\text{H}_3\text{O}^+$  in the solution. And the amount of  $\text{H}_3\text{O}^+$  is a measure of the acidity of the solution.

##### ***How strength and concentration work together***

Here's an example of how strength and concentration work together: Let's say you dissolve equal amounts of a strong acid and a weak acid in the same amount of water in separate containers. Since you used the same amount of each acid in the same amount of water, the solutions have the same *concentrations*.

But because one acid is *stronger* than the other, the solution made from the stronger acid will be more acidic than the solution made with the weaker acid.

This is true even though both solutions have the same concentration.

You could also dissolve a strong acid in a very large volume of water and dissolve the same amount of a weak acid in a small amount of water. In this case, the solution containing the strong acid may have such a low concentration that it is less acidic than the solution of the weaker acid that is more concentrated.

Strength and concentration work the same way for bases. When conducting chemical reactions with acids and bases, the strength of the acid and base as well as the concentration determine how acidic the acid solution is and how basic the base solution is.