



## GETTING TECHNICAL WITH BEER

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### The Fundamentals of pH in Brewing

#### What is pH?

The measure of the acidity or alkalinity of a solution is called pH, short for “power of hydrogen.” It is the amount of hydrogen ions ( $H^+$ ) present in solution—or in brewing water for our purposes.

#### Best pH Ranges

A pH of 7.0 is considered neutral. Any decrease in value is acidic, and any increase is alkaline. Beer is naturally acidic with a typical pH of 5.0 - 5.5 prior to fermentation. A beer with a final pH around 4.0 - 4.5 has more resistance to microbial spoilage, increased foam stability, smoother bitterness, softer malt flavor, and better colloidal stability.

#### Adjusting Mash pH

Mash pH (not the water) is the most important factor for consistent, quality beer. Your target mash pH should be around 5.1 - 5.3. Take measurements at room temperature unless you use a meter with auto temperature compensation (ATC). The natural mash pH is most often within this range, so few changes to the mash should be necessary. Lighter colored malts tend to have a higher pH, while darker malts tend to be more acidic and have a lower pH.

You can make small adjustment to your mash pH with calcium salts or acid additions. Calcium salts are the better choice to adjust the mash pH if style permits. Acid such as lactic or phosphoric can adjust pH but precipitate out some calcium ions that are vital for proper starch conversion, so keep their use to a minimum when possible.

#### Adjusting Sparge Water pH

The second most important pH adjustment performed by brewers is the adjustment of sparge water pH. Adjusting the sparge with acid to a pH to 5.6 will help prevent washing out harsh tannins from the mash and will increase wort collected before the runoff drops below 1.010 SG or 2.5 Brix. Two popular acid choices are lactic and phosphoric acid.

#### How to Measure pH

Indicators or pH papers give a rough indication of pH by changing color as the pH level varies. These indicators have limitations on their accuracy and can be difficult to interpret. More accurate pH measurements can be taken with pH meters. They have a pH measuring electrode and a reference electrode contained in one small unit with an LCD display and are available with or without auto temperature compensation (ATC). Units with ATC are preferred because of their ability to automatically compensate for temperature changes for easier testing.

#### Making Adjustments

The pH scale is logarithmic and not linear. When adjusting water pH with acids, keep in mind that small changes in pH will cause huge changes in hydrogen ion concentration. Keep your acid adjustments small and continuously check your readings.

Fine tuning both the mash and sparge water pH process will help achieve the best quality beer. Now, let's get brewing!



#### Continued Reading

The following books have excellent information on pH and adjustments.

##### *How to Brew*

By John J. Palmer  
(Brewers Publications)

##### *New Brewing Lager Beer*

By Gregory J. Noonan  
(Brewers Publications)



#### About the Author

John Lundy has been home brewing for 15 years. He is 2006 president of the Treasure Coast BrewMasters ([www.tcbrewmasters.org](http://www.tcbrewmasters.org)) and manages Home Brew Unlimited, a Web site chronicling his home brew experience and rating breweries and brew pubs around the country. Log on to [www.homebrewunlimited.com](http://www.homebrewunlimited.com).

