

The Brewing Process

Now that we're familiar with the ingredients that go into beer, let's talk a bit about how those ingredients become that lovely liquid we all know and love. Here's a brief rundown on how your beer gets from grain to glass:

Milling: All the grain used in a beer's recipe is roughly cracked in a mill prior to brewing in order to expose the reserve of starch held within each grain.

Mashing: Cracked grain is mixed with hot water (known as "hot liquor" when it's used for brewing) and left to sit for about an hour. In that time, the heat of the water activates enzymes within the grain that convert the grain's starch into sugar. That sugar is released into the water and will be later used for fermentation. The grain/water mixture is known as "the mash."

Lautering: The sugary liquid portion of the mash, known as "wort" (pronounced "wert"), is drained from the grain into a separate kettle in which it will be boiled. This process occurs in three steps: **mashout** (raising the temperature of the mash to stop enzymatic activity), **recirculation** (taking the initial spurt of very cloudy wort that drains from the mash and pumping it back in to help clarify it), and **sparging** (rinsing the grain bed with hot water to extract residual sugar).

Boiling: Wort is then boiled, usually for about 60-90 minutes, in order to sterilize it and so that hops can be introduced. Hops are usually added at several different points in the boil in order to extract oils and resins, which impart aroma and bitterness to the wort. Hops also help to prevent beer spoilage—they have antimicrobial qualities!

Whirlpool: The now-boiled wort is pumped through the kettle in a circular motion so that the leftover bits of grain and hops (called "trub," pronounced "troob") collect in the bottom-center of the kettle. This makes it easier for the brewer to remove clear wort.

Chilling: To prepare the now-clear wort for fermentation, it must be quickly cooled to about 70°F—yeast don't perform well in hotter conditions. Chilling is typically done by pumping the wort through a heat exchanger cooled by water.

Aeration and Pitching: The wort is then aerated with sterile bottled oxygen to provide a healthy environment for the yeast, which are then added. Brewers refer to the addition of yeast as "pitching."

Fermentation: Over the next 1-4 weeks, the yeast metabolize sugar in the wort, producing alcohol and carbon dioxide. Lager-type beers are then dropped to cold temperatures for several weeks or more to smooth out flavors in the beer.

Clarification (optional): Before packaging, beer is often clarified. This is most commonly done by filtration, but enzymes or additives can alternatively be introduced to help haze-producing particulate matter fall out of suspension for easy removal. Beer is also commonly left un-clarified—it is up to the preference of the brewer.

Carbonation: Beer is carbonated in one of two ways: through natural conditioning or by force carbonating. Naturally conditioned beer is sealed in its serving vessel with living yeast and fermentable sugar—yeast consume the sugar, releasing carbon dioxide. In a sealed vessel, the gas has nowhere to escape and is absorbed into the liquid as carbonation. Alternatively, pressurized carbon dioxide can be applied to a finished beer until it is absorbed—that's called forced carbonation.

Packaging: Now a finished, boozy, bubbly final product, the beer is packaged in bottles, cans, or kegs and shipped off to importers, distributors, or retail accounts for sale.