

Tech Corner

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Are hops important in brewing good beer? Absolutely, hops are important in brewing because they provide a bitterness that complements the sweet malt used to brew beer. Also, hops act as a preservative for beer. In fact, the India Pale Ale beer style owes its elevated hop bitterness to the fact that George Hodgson began exporting pale ales to East India around 1790. Aware of the preservative quality of hops, Hodgson increased the hop bitterness in pale ales to survive the long journey and the IPA style was born.

The species of hops used for brewing is *Humulus Lupulus*. The lupulin resin from the hop contains alpha acids and essential oils. The alpha acids contribute to the bitterness in beer, while the essential oils provide aroma and flavor to beer.

Around 90% of the bitterness from hops is due to alpha acids. When you purchase hops at the homebrew store, look for the alpha acid percent on the bag, which represents the percent of alpha acids by weight. The alpha acids in hops do not dissolve very well in water or beer, however, when we boil the wort to make beer, the boiling process changes the hops that are added to the brew kettle into isomerized alpha acids, where isomerized means that the molecules are the same but rearranged. These isomerized alpha acids are more soluble in the wort.

An easy way to measure hop bitterness in beer is Homebrew Bittering Units or HBUs, which is defined as the ounces of hops used in the beer recipe multiplied by the alpha acid percent. For example, if you add 1.5 ounces of Cascade hops with a 5.5% alpha acid percent, then the number of HBUs is equal to 1.5×5.5 , or 8.25 HBUs. Unfortunately, this measure of bitterness is a little crude because it does not take into account many of the variables that influence bitterness, like the amount of time the hops are boiled in the brew kettle. The International Bittering Units or IBUs is a more accurate standard for measuring hop bitterness in beer. The IBU metric is defined as the concentration of isomerized alpha acids in the finished beer in milligrams per liter. Hops used for bittering are normally added to the brew kettle very early in the boiling process.

The essential oils that produce the hop aroma and flavor in beer are very volatile and will not survive a long boil in the brew kettle. So, aroma and flavor hops should be added very late in the boil or during fermentation. The process of adding hops during fermentation is called dry hopping. Noble hops are prized for their aroma and flavor properties. Examples of noble hops are: Hallertauer Mittelfrüh, Czech Saaz, Spalt, and Tettnanger.

For home brewers, hops are typically purchased in one of two forms: whole hops or pellets. Pellets are more common, probably due to the fact that they take up less space and are easier to store.

If you have to store hops then ideally you should store them in a freezer in a vacuum sealed bag. Over time hops become oxidized and begin to smell like old gym socks or cheesy. Needless to say, if your hops begin to smell cheesy then you should throw them out and buy fresh hops, that is, unless you are brewing a lambic, which uses hops aged for three years.

Finally, some beer styles are strongly identified with a particular hop. For example, Bohemian Pilseners are usually brewed with the noble hop Saaz because this hop adds a very smooth bitterness and flavor profile to the style.

If you would like to read more about hops here is a good resource:

Using Hops, The Complete Guide to Hops for the Craft Brewer, by Mark Garetz