

Boiling And Kettle Additions QUAFF 5-27-08

Reasons to Boil:

Stops enzymatic activity created in the mash.

Kills bacteria, fungi, and wild yeast.

Coagulates undesired proteins and polyphenols in the hot break.

Extracts, isomerizes, and dissolves the hop alpha-acids.

Promotes the formation of melanoidins* and caramelizes some of the wort sugars (which may or may not be desirable depending on the beer style one is attempting to make and can be controlled by the duration and intensity of the boil).

Evaporates undesirable harsh hop oils, sulfur compounds, ketones* and esters.

Boil for clarity; if wort is not boiled for at least one full hour there will not be an adequate hot break to remove undesired proteins.

Evaporates water vapor, condensing the wort to proper volume and gravity, this is a side effect but is only achieved through a vigorous boil.

Boiling wort promotes pH drop, which at conclusion of boil should be 5.2-5.5, this helps to promote proper cold break and normal active fermentation.

*melanoidins – compounds produced by heat acting on amino acids and sugars, this adds darker color and maltier flavors. This can be achieved by boiling first runnings and reducing the initial volume. Good for scotch ales, stouts, and most dark beers.

*ketones - A carbonyl carbon bonded to two carbon atoms, the simplest ketone is acetone.

Kettle Additions

When adding sugar additions to your kettle one should consider what the desired end color should be. Darker beers such as imperial stouts, old ales and barley wines can have the sugars added at any point of the boil as any caramelization of the sugars will not adversely affect the color, where as adding sugars to a Belgian golden strong early in the boil could add color and reduce the light color trying to be attained.

It is also good practice to turn off the heat source when adding sugars to avoid any of the sugars sticking to the bottom of the kettle and doing more than just caramelizing the sugars and possibly burning the sugars creating some undesirable flavor compounds.

Spices added to the boil should be added towards the end of boil with enough time remaining to ensure sanitation but to also avoid boiling off too much of the volatile flavor and aroma compounds that are desired from these spice additions.

Hop additions are easily broken down into timed segments to achieve the desired affect of the variety of hops used.

Bittering- 90-60 minutes of boil, be aware of amount used when doing a 90 minute bittering addition as there will be more alpha-acids isomerized contributing to a more intense bitterness than a 60 minute addition would provide.

30-10 –flavor contribution with less bitterness contribution but losing some aroma compounds.

10-0 – aroma contribution, adding hops at this point helps keep volatile aromas from being boiled off.

Hop utilization is reduced by; reducing contact time of hops with boiling wort; reducing temp of wort; increasing wort gravity; using whole hops instead of pellets; increasing the hop rate (once a certain IBU level is hit, the IBUs up and above that become theoretical IBUs; using hop bags; and using hop bags.

When boiling for color remember to not start hop additions until the last 90-60 minutes is remaining.

Kettle finings, such as Irish Moss and Whirl-floc should be added at 15 minutes remaining to sanitize and break down finings so that can coagulate when chilled to attach to solids and settle out in the cold break. If using an immersion chiller it is good practice to put these additions in at this point.