

# WORLD BREWING CONGRESS 2016

## MAXIMIZING HOP POLYPHENOLS EXTRACTION DURING THE BOILING PROCESS

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### OVERVIEW

Hop polyphenols enhance flavor stability because of their antioxidant qualities, which suppress the formation of undesirable staling compounds, and there is abundant research on this. (e.g. "For the love of Hops", Stan Hieronymus, Brewers Publications).

Based on this assumption, SIMATEC has developed a way to extract the polyphenol part from hops used in boiling in a better way, and we have tested this with the University of Turin (Italy) to ensure repeatability of the experiments and proof of results.

Traditionally hops are introduced during the boiling at different intervals according to the brewer's recipe, postponing to the very end of this process the usage of aroma hops, if required.

SIMATEC decided to maintain this normal process of hops introduction during boiling, but developed a special automatic hop injector that introduces different hops at different times, and carries out a particular procedure to enhance polyphenols extraction.

This procedure consists of a heavy mixing of the hops amount with a small quantity of wort just before it is introduced into the boiling wort.

### DESCRIPTION OF METHODOLOGY

We took samples of the same recipe in three different batches. In each one, two further samples were taken: the first with no hop mixing, and the second with the usage of the hop mixer/injector.

The wort samples were measured for TPC (total polyphenolic compound).

The Folin-Ciocalteu reagent is used to determine the TPC. This reagent is mixed to the sample and a solution of sodium bicarbonate is added after agitation. After two hours the absorption of the final solution is read at 740nm. Interpolating this value with the calibration line, one obtains milligrams of Acid Gallic Equivalent for a liter of sample (mg GAE/L).

### CONCLUSION

The data sets examined confirm that the SIMATEC new design hop mixer handles hops during boiling in a way that maximizes the polyphenols extraction.

At this stage, this conclusion needs to be confirmed with a larger design of experiment and wider range of samples. Also, a more in depth analysis is required on which type of polyphenols we are extracting the most. We use this baseline as starting point and plan on updating the public on this subject.

Polyphenols  
TPC  
mg GAE/L

WITHOUT MIXING    WITH MIXING

wort A -test 1	413,8	514,9
wort A -test 2	398,8	525,6
wort A -test 3	379,2	503,8

