DE-AERATION OF WATER AND BEER

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INTRODUCTION

Free oxygen is a notorious beer spoiler, except in the very first phase of the yeast multiplication. Both the chemical stability of the beer and the stability of the beer aroma are hampered when free oxygen is present in beer. The mechanical process of removing the free, dissolved oxygen from beer and water is traditionally called "De-aeration", and the de-aerated water is called D-water. The importance of the de-aeration has grown steadily due to the increasing focus on flavour stability of beer and the brewers' reluctance to add antioxidants (Ascorbic acid or Sulphur dioxide) to the beer. Carbon dioxide and D-water are used to an increasing extent to shield beer in tanks, pipes, filters and fillers.

THE ISO-MIX PROCESS

Recently, the Iso-Mix process has offered an additional mechanical process to de-aerate D-water - and even the beer itself before filling. This new process allows levels of 0.01 mg oxygen/liter instead of the 0.1 mg/l, which used to be considered the best practice.

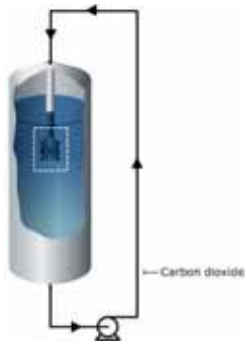

Fig. A

As shown in Fig. A the de-aeration is made through a recirculation of the water (or beer) via a pump and an Iso-Mix turbine. In this circuit CO2 is introduced at a rather high pressure. Due to the very efficient distribution of very small bubbles in the tank, oxygen is stripped away in a short space of time and with a modest use of CO2.

For the D-water the Iso-Mix-process offers a lower Capex and a more efficient scavenging than the classic equipment for de-aeration of water. During the process the pressure in the tank must be kept constant to allow CO2 to escape from the tank together with the eliminated oxygen. If desired, the CO2 can be sent to a reclaiming unit. Naturally, the turbine and the recirculation pump can be used as well for the subsequent washing of the tank. The process is unique for direct de-aeration of beer. However, the Iso-Mix-process causes some foaming of the beer in the beer tank. For this reason the tank must have a head space of 25 – 50% to avoid beer losses.

The foam stability of the beer is theoretically at risk due to the foaming in the beer tank; however, trials have showed only an insignificant decrease in foam stability.

RESULTS

The following two sets of trial results will illustrate the process:

A. 300 hl of **cold water** can be treated for 45 minutes at a recirculation of 250 hl/h at 4 bar. 100 kg CO2 is introduced in the circuit of which 65 kg CO2 is used to carbonate the water, whereas the rest is escaping. The content of dissolved oxygen is reduced from 6 to 0.05 mg/l.
B. 150 hl **beer** in a 300 hl beer tank (BBT) can be treated for 30 minutes at a recirculation of 250 hl/h at 4 bar. 70 kg CO2 is introduced in the circuit of which none is used for carbonation, as the pressure in the tank is kept near to equilibrium. All CO2 added is escaping. The content of dissolved oxygen is reduced from 0.3 to 0.1 mg/l. The foam stability of the beer is reduced from 280 to 270 sec (Nibem)

CONCLUSION

The new Iso-Mix Process can be installed in a brewery with low Capex. The results are excellent for de-aeration of water as well as of beer. The Iso-Mix *equipment* is considered well proven for de-aeration, for mixing as well as for tank washing.

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