

Brewtan® B

Organoleptic stability when used during mashing-in Application fact-sheet

• INTRODUCTION

Nowadays, physico-chemical beer stabilisation is essential, as colloidal and flavour stability is considered worldwide as a quality label of beer, both among brewers as consumers. Beer should be enjoyable to drink, have a delightful flavour, attractive colour and good clarity even after transport to the other side of the world or after storage for months in supermarkets.

Brewtan® B is a high quality tannic acid grade. When used during mashing-in, it has mainly a positive impact on organoleptic stability and brings process improvements.

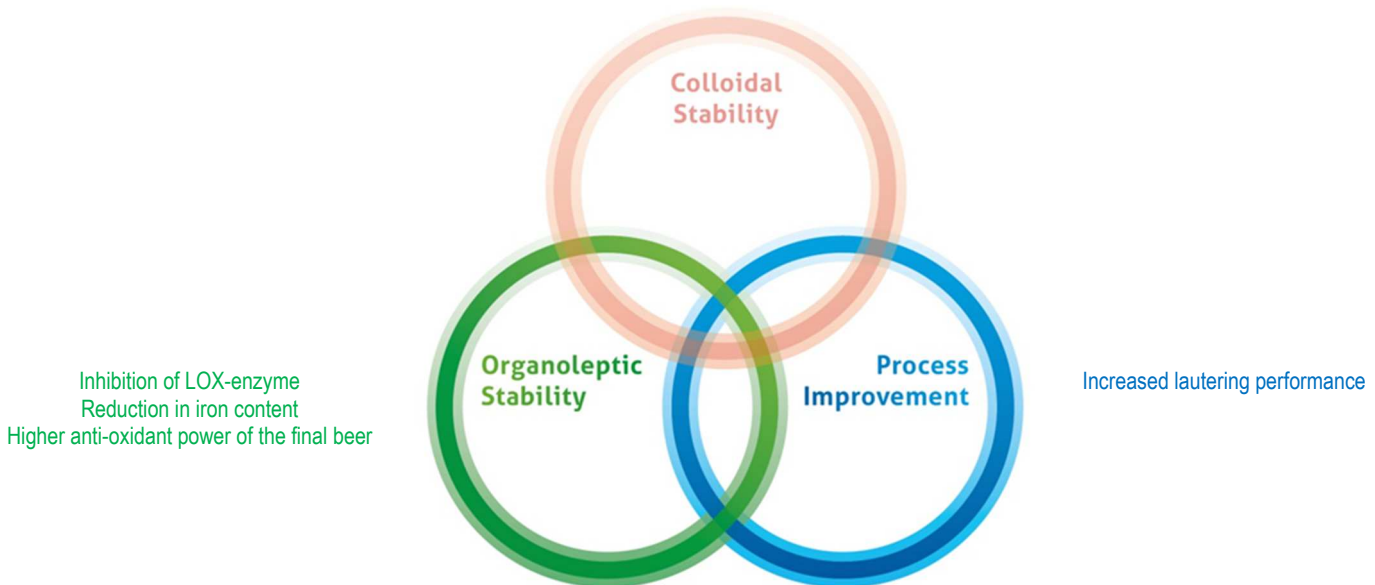


Figure 1.: Properties of *Brewtan B*®

• APPLICATION IN MASHING-IN

>> Practical implementation

Required equipment

Stainless-steel is recommended because dissolved iron forms a dark blue complex with gallotannins. The use of *Brewtan® B* in mashing-in doesn't need specific equipment, or any specific investment.

Preparation, dosing & sequence of addition

Typical dosage levels of *Brewtan® B* at mashing-in range between 1,5 – 4 g/hl. The quantity of *Brewtan® B* used is expressed relative to quantity of final 100% malt 12°P beer. The amount of added adjuncts and the gravity of the beer have to be taken into account.

Clear solutions can be obtained by slowly adding *Brewtan® B* to the brewing water while stirring to prevent lumps. We recommend a concentration of 10%. Lower concentrations render high addition volumes and higher concentrations increase the risk of local over dosage.

Add this solution to the mashing water – stir to homogenise - just before adding raw materials.

Impact of raw materials

Malt with a protein content of 9-12% is good brewery malt, lower than 9% gives foam problems, more than 12% gives very unstable beers. Malt with a high nitrogen content gives a lower brewhouse yield, will result in more soluble proteins and thus also more haze formation in the final beer. *Brewtan® B* can help to correct such fluctuations in malt quality by eliminating these excessive amounts of proteins.

• **IMPACT OF BREWTAN® B USE**

>> **Impact on organoleptic stability**

Impact on LOX-activity and lipid oxidation

Brewtan® B inhibits the LOX-activity very effectively. Figure 2. shows residual LOX-activity in the non-extracted material during the complete mashing process, with and without *Brewtan® B* additions. During the reference brew, the unextracted LOX-activity decreases as a function of time, while the results in Figure 2. show a decreased LOX-activity in the non-extracted material when brewing in the presence of *Brewtan® B*, especially during the first period of mashing. The LOX-activity increases at the final stage of brewing in both the reference as in the *Brewtan® B* treated wort.

Lipids containing unsaturated fatty acids are very sensitive to oxidative effects and easily generate volatile off-flavours with very low flavour thresholds. The LOX-enzyme is potentially active towards these lipids and fatty acids throughout the entire mashing and wort filtration processes, rendering the formation of off-flavours very likely. The presence of *Brewtan® B* from the onset of mashing-in reduces the oxidation of lipids because of its radical scavenging activity, while simultaneously acting as inhibitor of auto-oxidation processes⁽¹⁾.

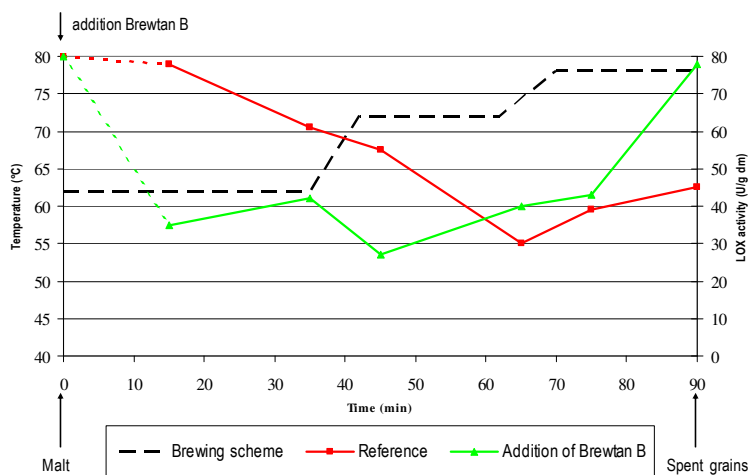


Figure 2.: Residual LOX-activity in the non-extracted material during mashing-in

Impact on iron content

Iron by ICP-MS	
Beer	Iron content (ppb)
Reference	67
2,5 g/hl mashing-in	27

The application of *Brewtan*[®] B at mashing-in helps significantly to reduce the iron levels in the final beer. Typically a reduction of around 50% in iron content is monitored as a result of its metal chelating abilities. Table 1. expresses the result when 2,5 g/hl of *Brewtan*[®] B was used at mashing-in.

Table 1.: Iron content

Impact on taste stability

Increased anti-oxidant power during mashing-in and wort filtration results in a remarkable improvement of flavour stability. The inhibition of lipid and protein oxidation is the main reasons for this phenomenon.

Sensory evaluation of fresh and corresponding aged beers after forced aging at 40°C, according to Araki et al (1999). 0: fresh, oxidised flavour not detectable; 1: very weakly aged; 2: weakly aged; 3: moderately aged; 4: strongly aged; 5: very strongly aged, undrinkable

	Mean ageing score	
	fresh	5 days at 40°C
reference	0	4,3
5 g/hl mashing-in	0	2,9

Table 2.: Results sensory evaluation

In pilot scale brewing tests all fresh beers were positively evaluated by a tasting panel of 7 experienced persons. A pleasant bitterness and aftertaste with analogous intensity was observed for all beers. The addition of gallotannins during brewing had absolutely no negative effect on beer taste. After 5 days of storage at 40°C, clear difference in beer stability could be observed. All beers, brewed with gallotannins, were rated with a better score than the reference beer.

Forced ageing (2 days at 40°C)	
Beer	Sum of ranking scores
Reference	28
5 g/hl mashing-in	10
2,5 g/hl mashing-in	13

Table 3.: Sum of ranking scores after forced ageing

In a following test the panellists were asked to rank three simultaneously served beers from the least to the most aged sample. The sum of the ranking scores are summarised in Table 3. These results indicate that application of *Brewtan*[®] B noticeably prolongs beer flavour stability⁽²⁾.

Impact on anti-oxidant power

Brewtan® B used at mashing-in improves the anti-oxidant power of the final beer. The *Brewtan® B* treated beers have in comparison to a reference beer a higher anti-oxidant power. Even the lowest dosage (2,5 g/hl) already shows an increase in anti-oxidant power of 20%.

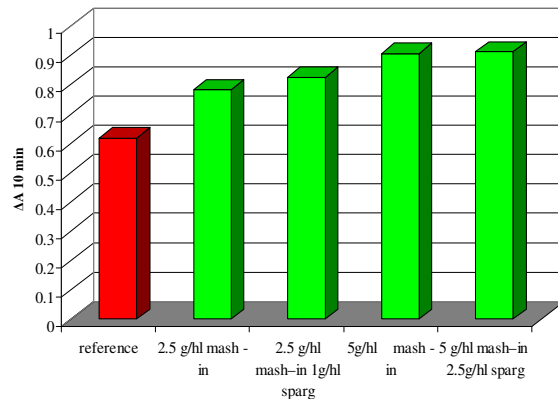


Figure 3.: Anti-oxidant power of beer in relation with the amount of *Brewtan® B* used

Impact on foam stability

The use of *Brewtan® B* has no negative influence

on the foam stability of the beer. Due to its high selectivity *Brewtan® B* doesn't interact with the foam active proteins in beer.

This does not come as a surprise considering that the proteins precipitated by tannic acid typically have an Ip-value of 3,3 – 6,5 with an optimum at 5,3 while the foam active proteins typically exhibit an Ip of 6,5 – 8,5.

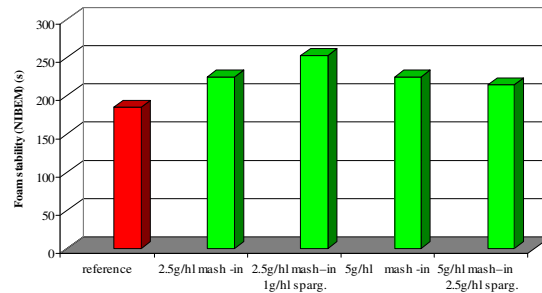


Figure 4.: Foam stability of beer in relation with the amount of *Brewtan® B* used

>> **Impact on process improvements**

Impact on lautering performance of the wort

Lautering performance was evaluated by measuring the run-off rate and extract decrease during sparging. The run-off rates and extract decreases are clearly influenced by the presence of gallotannins in both the brewing and sparging liquor. An increased run off rate of 30 to 40 % was observed in pilot brewing experiments. The lowest concentrations of *Brewtan® B* (2,5 g/hl at mashing in and 1,0 g/hl at sparging) already increased efficiency significantly. A further increase of *Brewtan® B* concentration only has a small additional effect⁽²⁾.

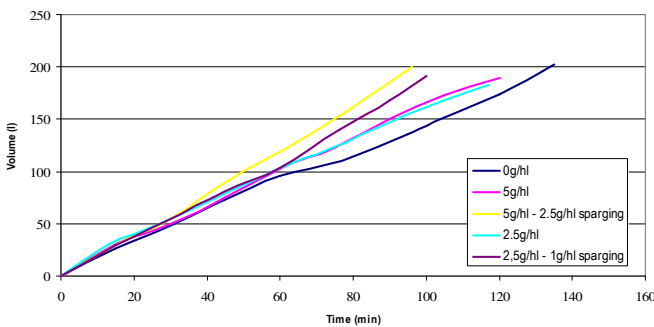


Figure 5.: Influence of *Brewtan® B* addition on the extract decrease during lautering (pH 5,6)

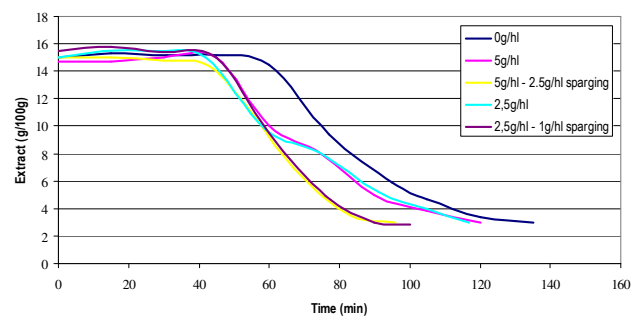


Figure 6.: Influence of *Brewtan® B* addition on the run-off rates during lautering (pH 5,6)

- **BIBLIOGRAPHY AND REFERENCES**

- (1) "Evaluation of addition of gallotannins in the brewing liquor for the improvement of flavour stability of beer", Guido Aerts, Luc De Cooman, Gert De Rouck, Zoltan Péntzes, Annemie De Buck, Roger Mussche & Joseph van Waesberghe
- (2) "Improved brewhouse performance and beer stability by addition of a minimal, but effective concentration of gallotannins to the brewing and sparging liquor", Guido Aerts, Luc De Cooman, Ilse De Pril, Gert De Rouck, Barbara Jaskula, Annemie De Buck, Brenda Van Hijfte, Christiaan De Pauw, Joseph van Waesberghe

• OVERVIEW

Figure 7. shows the different ways of incorporating gallotannins into the brewing process. This allows brewers to choose the most appropriate product for their requirements; it is also possible to combine two or more of these methods to give a combination of process and stability benefits.

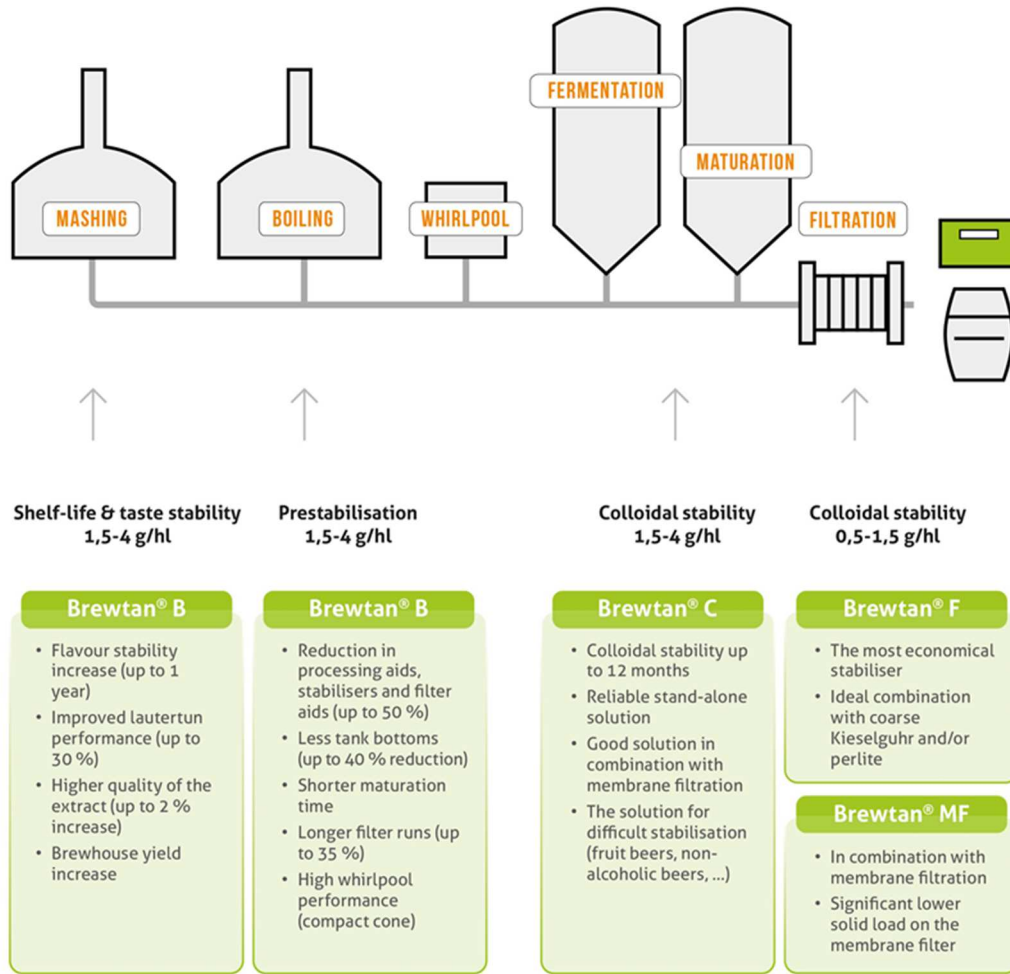


Figure 7.: *Brewtan®*, your natural beer stabiliser

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