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DETERMINATION OF THE FILTERABILITY OF BEER

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A method for the determination of the filterability of beer has been evaluated by members of the European Brewery Convention Analysis Committee. The method is based on the filtration of a beer sample, with a standard amount of diatomaceous earth (DE), under standardised conditions.

Repeatability of the test was quite good, however the predictive value of the test is still questionable since no direct correlation could be established between the different filtercake values and industrial filtration problems.

No collaborative test was performed as the filterability has to be determined on unfiltered beer; the test is easy to run, and as for the other filterability tests, day to day practice in a brewery will reveal its usefulness.

Key Words: *Filterability, beer, beer (analysis method for).*

INTRODUCTION

The prediction of the filterability of beer is of practical interest for the brewer. In general, two different ways of measurement are available; in the first approach filterability is determined by filtering beer samples on a membrane as filtering agent; in the second approach, diatomaceous earth (DE) is used as filter medium.

The main difference between membrane—and De—filtration is that the former is a pure surface filtration while the latter has a surface as well as a deep bed filter capacity. DE filtration is closer to day to day practice but the standardisation of the filter aid is much more difficult.

In this respect, the team of Dr. Pfenninger[5] carried out considerable research and established a good correlation between the EBC—routine method and the EBC—reference method (Permeability Meter). Based on this work a method is described to measure the filterability of a certain type of DE. Once this parameter is fixed, filtration trials with beer, using the same DE composition, would give an expression of the filterability of beer.

Many authors use the membrane Esser test[2] or a slight modified version to predict the filterability. They found a good correlation between the filterability values and increasing amounts of β-glucans. Annemüller[1], used a 0.3 µm Synpor membrane instead of a 0.2 µm Sarorius membrane, and found a good repeatability of the method using homogenous beer samples. The variance coefficient of the filterability is lower than 5%.

Annemüller claims to have a good correlation between the so-called filterability figure obtained in a full scale unit and the value determined with the Esser test. The real filterability however depends also on other factors such as the real filtration rate, the pressure difference at the beginning and the end of the filter run, the amount of DE used per hl and finally of the turbidity of the beer used.

Siebert *et al.*[4] found a correlation between the membrane method and the DE method except for samples with different levels of haze. For hazy beers a prefiltration with a membrane of 0.65 µm was required to prevent early clogging of the membrane by yeast deposits.

The aim of the Subcommittee was to describe a standard procedure to predict and measure beer filterability using the EBC filter.

EXPERIMENTAL

The method used was a modified version of the one described by Raible *et al.*[3] In this test the EBC filter is used with Celite 577 (John Mansville) as DE and a Schleicher & Schull nr. 604 filter paper as support. Prior to filtration, 1 gram of DE per 100 gram of beer is added.

By plotting t/M versus M, t being the time of filtration and M the amount of filtrate obtained per square cm of filter area, a straight line is obtained.

The overall equation is: $t/M = a.M + b$.

The coefficient 'a' is the filtercake value; the higher the value of 'a' the more difficult the filtration of the sample.

A repeatability and reproducibility test have been done on filtered beer samples but the number of participants was too few to obtain statistically significant results. Collaborative trials on unfiltered beer to determine repeatability and reproducibility values cannot be done.

RESULTS AND DISCUSSION

The regression coefficient of the curve $t/M = a.M + b$, is in all tests near to 1 (>0.998), a set of two measurements at a different time interval is sufficient to obtain the value of the filtercake coefficient.

In different test runs a standard deviation of 0.02 was obtained for a mean value for 'a' of 0.903 (2.2%). For a mean value of 0.511 for 'a', a standard deviation of 0.188 (3.7%) was established.

An interlaboratory test on filtered beer samples resulted in a mean value for $a = 1.21$ and a standard deviation of 0.20 (17.5%).

The predictive value of the test is still questionable since no direct correlation was found between the filtercake values and real filtration problems in practice.

CONCLUSIONS

The current method described is another alternative for measuring the filterability of beer; practical experience is required in order to establish the link between filtercake values obtained and real filtration performances.

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