BrewingScience
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Abstracts BrewingScience articles (November/December 2011)

W.S. Veraverbeke, J. De Cock, G. De Rouck, J.A. Delcour, H. Van Mellaert, G. Aerts and W.F. Broekaert

Partial Substitution of Barley Malt by Wheat Bran in the Grist Results in Lager Beer with Better Taste Profile and Higher Content in Arabinoxylan-Oligosaccharides (AXOS)

The use of wheat bran as a new adjunct in brewing at 25 % of total grist in combination with the use of a xylanase in the mashing step was tested by brewing control and bran-brewed lager beers. Sensory analysis revealed marked improvements in taste profile due to bran-brewing, with statistically significant increase in body, smoothness and warming notes, and a decrease in acetaldehyde, after-bitterness, drying and grainy attributes. A detailed physico-chemical analysis of the beers was performed. Key parameters on which a significant impact was demonstrated include increased content of arabinoxylan-oligosaccharides (AXOS), ferulic acid, and soluble protein, and lowered content of aldehydes, the latter indicative of reduced oxidation during brewing. Traditional but long forgotten use of wheat bran for brewing of small beers holds potential to make innovative beers with an interesting taste profile.

Descriptors: body, sensory analysis, wheat bran, xylanases

Source: BrewingScience – Monatsschrift für Brauwissenschaft, 64 (November/December 2011), pp. 168-174

K. Müller, S. Sängerlaub, A. Kramer, C. Huber and K. Fritsch

Temperature-dependent Oxygen Permeation through PET/MXD6-Barrier Blend Bottles with and without Oxygen Absorber

The oxygen permeability of PET bottles has a significant influence on the shelf-life of beverages that are sensitive to oxygen. To reduce the permeability, PET is blended with barrier materials like MXD6 (MXD6 is a mainly aliphatic polyamide resin which contains meta-xylylene groups). The aim of this study was to investigate the temperature dependence of oxygen permeation through PET/MXD6 blends. The oxygen content inside water-filled PET/MXD6-blend bottles with 2, 5 and 8 % wt. of MXD6 was determined at 5, 23, 38, and 55 °C. The MXD6 was applied both purely and with a catalyst that is enabling it to work as an oxygen absorber. The results were compared to PET bottles not containing MXD6. The oxygen partial pressure inside the bottles was measured as gaseous oxygen using an optical-chemical sensor. The activation energy of oxygen permeation was calculated to be in the range from 32.8 kJ/mol for PET bottles without MXD6 and up to 43.4 kJ/mol for PET bottles with 8 wt-% for the passive barrier of MXD6. In the barrier PET bottles with MXD6 in combination with a catalyst, the oxygen content in the water-filled PET bottles remained up to 0.2 mg O2/L dissolved oxygen for a period of 6 months, depending mainly on the MXD6 concentration. This range was consistent for all applied temperatures. These data serve as a basis for the prediction/calculation of oxygen permeability of PET barrier materials at different temperatures and further for developing a standardization of oxygen absorber characterization concerning absorber kinetics and oxygen barrier.

Descriptors: PET bottle, Oxygen absorber, Oxygen permeation, Activation energy, MXD6

Source: BrewingScience – Monatsschrift für Brauwissenschaft, 64 (November/December 2011), pp. 161-167

K. Schwarz and F.-J. Methner

Styrene Concentrations during Wheat Beer Production

The screening of styrene concentrations during different stages of wheat beer production shows that in opposite to thermal processes like mashing and wort boiling the primary and secondary fermentation contribute most to the styrene content in final beers. Therefore, the enzymatic decarboxylation of cinnamic acid by brewers' yeast is the predominant kind of reaction. Styrene concentrations in bottled beer were up to 25 ppb. In addition, the results of the screening were compared with the precursor concentration of cinnamic acid in the corresponding pitching wort. A linear correlation could not be found. Moreover, the influence of various manufacturing considerations like the kind of fermentation or the ratio of wheat grist load is shown. For example, the cinnamic acid content in wort decreases with an increasing amount of wheat malt.

Descriptors: styrene, wheat beer, aroma, cinnamic acid, 4-vinylguaiacol

Source: BrewingScience – Monatsschrift für Brauwissenschaft, 64 (November/December 2011), pp. 156-160

J. Matoušek, J. Patzak, T. Kocábek, Z. Füssy, J. Stehlík, L. Orctová and G.S. Duraisamy

Functional Analyses of Lupulin Gland-Specific Regulatory Factors from WD40, bHLH and Myb Families of Hop (Humulus lupulus L.) show Formation of Crucial Complexes Activating chs_H1 Genes

Complex lupulin gland-specific cDNA library from Osvald's clone 72 hop was constructed to dissect regulation of biosynthetic pathway(s) leading to the accumulation of hop bitter acids and prenylflavonoids with promising health-beneficial activities. From this cDNA library we isolated first hop-specific allelic isoforms of transcription factors (TF) bHLH (HlbHLH2, GeneBank AC:FR751553) and WD40 (HlWD40_1, AC:NM_122360) which are involved in combinatorial control of light-responsive and tissue-specific activation of phenylpropanoid pathway. HlbHLH2 and HlWD40_1 are quite lupulin gland-specific and, according to our transient expression experiments, they form specific complexes with another novel hop TF HlMyb2 (AC:FN646081) and previously isolated lupulin gland-specific HlMyb3 (AC:AM501509). The complex formation leads to strong activation of chalconsynthase gene (chs_H1) promoter. The interplay and regulation of expression of these crucial TF complexes could co-determine the rate of accumulation of valuable metabolites of lupulin.

Descriptors: Humulus lupulus L., N. benthamiana, lupulin metabolome, transcription factors, protein complexes, transient expression assay

Source: BrewingScience – Monatsschrift für Brauwissenschaft, 64 (November/December 2011), pp. 151-155

L.-A. Garbe and N. Rettberg

The Power of Stable Isotope Dilution Assays in Brewing

The quantification of trace substances in raw materials, mash, wort and beer is becoming more frequently required by brewers. Stable isotope dilution assay (SIDA) coupled to gas chromatography mass spectrometry or liquid chromatography mass spectrometry instrumentation is a sensitive and highly specific technique for precise quantification of trace substances from complex matrices. The current paper elucidates the basic principles of stable isotope dilution assays and presents practical applications related to brewing. It emphasizes the importance of isotope standards in multi-step sample clean-up procedures and answers the question why SIDA is (so far) not widely used in brewery quality control.

Descriptors: mass spectrometry, stable isotope dilution analysis, SIDA, beer staling, contamination

Source: BrewingScience – Monatsschrift für Brauwissenschaft, 64 (November/December 2011), pp. 140-150

B. Jaskula-Goiris, B. De Causmaecker, G. De Rouck, L. De Cooman and G. Aerts

Detailed Multivariate Modeling of Beer Staling in Commercial Pale Lagers

It is generally recognized that flavour quality and flavour(in)stability cannot be grasped by one parameter, since the multitude of flavour chemicals involved. To identify beer chemistry changes during staling in commercial pilsner beer, an integrated analytical-sensorial methodology using multivariate statistical analysis was applied on samples subjected to ageing at 30 °C. Application of this technique to model the taste(in)stability in an objective way, offers the opportunity to more thoroughly investigate the influence of raw materials, brewing methods and applied technologies on flavour stability. The models obtained showed differences in aging behaviour of six commercial pale lager beers. Furthermore, detailed multivariate analysis allowed us to identify chemical compounds related to beer staling and facilitates a better understanding of beer flavour (in)stability by pinpointing the impact of process parameters and applied technologies.

Descriptors: Beer ageing, flavour stability, pale lager, multivariate statistical analysis
Source: BrewingScience – Monatsschrift für Brauwissenschaft, 64 (November/December 2011), pp. 119-139

Abstracts BrewingScience articles (September/Oktober 2011)

K. Müller-Auffermann, M. Hutzler, H. Schneiderbanger and F. Jacob

Scientific Evaluation of Different Methods for the Determination of Yeast Vitality

In this paper, two non standard methods are introduced and described precisely for measuring the vitality of yeast. Both are simple and produce results in a very short time. For the purpose of demonstrating these methods, brewing yeasts were placed under specific types of stress in various situations and compared to yeast not under stress. Their capacity for producing CO_2 was measured, and the condition of their cell walls was determined parallel through potentiometric titration. The results show that both of the methods demonstrated in this paper are effective for determining the physiological condition of yeast. Relative to the untreated yeast, the yeast placed under stress produced less CO_2 in controlled small-scale fermentation trials. Also, the condition of their cell walls changed, which was made apparent by the volume titrant required in the potentiometric titration. It should also be mentioned, that the trials described here were in fact preliminary trials for establishing the methodology for the respective tests. In a future paper, a further test designed for practical application in the industry includes a measurement of the intracellular pH and fermentation pressure in addition to the other measurements performed here.

Desricptors: yeast, brewing yeast, vitality, viability, physiological condition, CO_2, CO_2 production, pressure, temperature, potentiometric titration, cell wall surface area, surface charge

Source: BrewingScience – Monatsschrift für Brauwissenschaft, 64 (September/October 2011), pp. 107-118

A. Schmelzle, B. Lindemann and F.-J. Methner

Sensory Descriptive Analysis and Investigation of Consumer Acceptance of German Pilsner

To derive differences between German pilsner beers which have effects on acceptance, sensory description is linked to consumer acceptance. The sensory perception of pilsner beer is described by sensorily-trained consumers. For the pilsner type of beer, an appropriate number of representative and characteristic attributes are compiled for the precise description of sensory perceptions. By investigating acceptance by untrained consumers (n=142) in blind and open product tests, estimations of pilsner beers are measured. The results can highlight promising pilsner varieties and identify those which are sensorily unconvincing. In addition, split analyses are performed concerning consumers' objectives and sensory expectations.
In the blind test, it was confirmed that consumers' acceptance of bitter pilsner (> 34 Bitterness Units, BU), leaving a coating mouthfeel, is lower than that of pilsner which is less bitter. If the brand name is known to consumers, they rate bitter pilsner (> 34 BU) with high acceptance. Additionally, pilsner varieties with an intense hop aroma and bitter pilsners (> 34 BU) are rated significantly better by consumers who drink beer for enjoyment. Consumers who state that they enjoy drinking a more bitter pilsner rate mild pilsners (< 20 BU) significantly lower. If consumers expect a hop aromatic pilsner, they also prefer these pilsner beers in blind taste tests.

Descriptors: pilsner, sensory evaluation, descriptive analysis, acceptance testing, bitter taste, hop aroma

Source: BrewingScience – Monatsschrift für Brauwissenschaft, 64 (September/October 2011), pp. 95-106

C. Schmidt, A. Lagemann, A. Stephan and G. Stettner

Impact of the Use of Inline Pre-isomerized Hop Products on Analytical and Sensory Markers for Beer Ageing

The main quality challenge of beer is the change of its chemical composition during storage. It is known that the typical bitterness of fresh beer declines in the intensity and changes in the quality with an increasing age of the beverage. The bitter tasting compounds *trans*-iso-α-acids converse into lingering and harsh bitter tasting tri- and tetracyclic degradation products. In order to investigate the

evaluation of beer flavour stability, the behaviour of *trans*-iso-α-acids, the *trans/cis* ratio of bitter acids, and the formation of tricyclocohumol and tricyclohumol as representatives of acidic-catalyzed degradation products of *trans*-iso-α-acids were chosen as analytical markers in wort, fresh beer as well as in 2 and 4 months aged beer samples with and without inline pre-isomerization. The characteristics of these analytical parameters were determined using HPLC-DAD and HPLC-MS/MS analysis. Supplementary to quantitative data, fresh beer as well as 2 and 4 months stored beer samples with or rather without the use of pre-isomerization were evaluated for the attributes aroma, taste, and beer ageing by a trained sensory panel.
The performed experiments with a hop yield enhancer in comparison to conventional hopping showed no effect on the flavour stability of Pilsener beer. Nevertheless, the tricyclic degradation products tricyclocohumol and tricyclohumol were suitable as solid analytical parameters to estimate the flavour stability during storage.

Descriptors: iso-α-acids, pre-isomerization, beer ageing, tricyclic degradation products, HPLC-MS/MS analysis, sensory evaluation

Source: BrewingScience – Monatsschrift für Brauwissenschaft, 64 (September/October 2011), pp. 89-94

C. Heim, M. Ureña de Vivanco, M. Rajab, K. Glas, H. Horn, B. Helmreich and T. Letzel

Ozone II: Characterization of In Situ Ozone Generation Using Diamond Electrodes

Ozone can be widely used for oxidation of diverse water constituents and mineralization of organic compounds and therefore for their elimination in drinking and process water as explained before in the review Ozone I: Characteristics/Generation/Possible Applications by Heim C. and Glas K., BrewingScience 2011 [1]. Electrolytic ozone generation in situ using boron-doped diamond electrodes is a relatively new and promising technology. The current article describes the formation of ozone directly from water with a DIACHEM® electrode. Ozone concentrations in water depend on the applied current on the one hand and on the water matrix on the other hand. The influence of organic and inorganic components on residual ozone concentrations in several water matrices was also investigated. The results form the basis to find reasonable applications of the described technology in the food and beverage industry.

Descriptors: ozone, oxidation, diamond electrode, water quality

Source: BrewingScience – Monatsschrift für Brauwissenschaft, 64 (September/October 2011), pp. 83-88

Abstracts BrewingScience articles (July/August 2011)

T. Kunz, H. Woest, E.-J. Lee, C. Müller, F.-J. Methner

Improvement of the Oxidative Wort and Beer Stability by Increased Unmalted Barley Proportion
The influence of unmalted barley on the brewing process and the quality of the resulting beer-like beverages was investigated with the main focus on the oxidative stability by using traditional beer analyses and EPR-Spectroscopy (EAP-, T450-value). Although all analytical values of the final beverages were within the normal range according to MEBAK, a slight decrease in total polyphenol and FAN content caused by an increased barley proportion in the grist was measured. In direct correlation an increase of higher molecular proteins and ß-glucan were detectable. Based on these results, it can be said that beers with a barley proportion up to 75 % will achieve comparable or higher final attenuation of the “beer” due to a combined effectiveness of malt and technical enzymes. The missing heat exposure and oxidative stress by the malting process resulted in lower values of TBI and wort respectively beer colour with increasing barley proportions in the grist. Furthermore, it was observable that an increase of barley content leads to higher oxidative stability (EAP-value) and a lower EPR signal intensity (T450-value) as an indicator for the radical generation in the wort and final beverage. In comparison to beer produced with 100 % of malt, the beers brewed with up to 50 % barley proportion were slightly preferred and up to 75 % comparable in sensory analyses. Only the brew with a barley proportion of 90 % showed a more astringent bitter taste.

Descriptors: unmalted barley, flavour stability, barley proportion, oxidative beer stability, brewing, Electron Spin Resonance Spectroscopy (EPR)

Source: BrewingScience – Monatsschrift für Brauwissenschaft, 64 (July/August 2011), pp. 75-82

C. Schwarz, M. Zarnkow, W. Back, T. Becker

Predicting Haze Stability in Wheat Beer using Light Scattering Analysis Techniques
Visible and intense turbidity is seen as a defining characteristic of German and Belgian wheat beers. To date, no reliable method has been established for predicting the haze stability of wheat beer. It would be very beneficial for breweries to be able to predict haze stability so as to ensure that the beer retained a satisfactory level of haze during its shelf life. To predict wheat beer haze, trials were undertaken, in which light scattering analysis techniques and particle size distribution measurements were made, for the purpose of characterizing the haze stability of wheat beer. The wheat beer samples assessed had substantial differences in haze stability durability, from 19 days up to more than 160 days, as judged by when 90° scatter light intensity drops bellow 30 EBC units. Interestingly, the classification of all samples by the 90°:25° ratio of scatter light intensity showed values from 0.5 up to 1.0 and it was observed that as haze stability increases, the ratio expressing the intensity of light scattering at 90°:25° also increases. Particle size distribution measurements showed for samples with high 90°:25° ratios of scatter light intensity (> 0.9) had monomodal distributions with high ratios of particles < 1 µm which was favourable indicator of beer haze durability*.

Descriptors: wheat beer, haze, haze measurement

Source: BrewingScience – Monatsschrift für Brauwissenschaft, 64 (July/August 2011), pp. 68-74

T. Kunz, E. J. Lee, V. Schiwek, T. Seewald, F.-J. Methner

Glucose – a Reducing Sugar? Reducing Properties of Sugars in Beverages and Food
The properties of reducing sugars are interesting for the shelf life of beverages, particularly beer, and for human nutrition. For the brewing process the different reducing potentials and the mode of action of fermentable sugars are vitally important, especially during wort boiling where the reactions of sugars are accelerated. Additionally, several breweries use non-fermentable sugars in the brewing process to imbue the beer with unique flavour, body and mouthfeel.
An optimised method to ascertain the reduction potential of sugars against Fe3+ at low pH was developed in this work.

Sugars behave differently at low pH compared to the generally known behaviour described by Fehling when using NaOH. At low pH conditions, the formation of the open chain aldehyde structure of glucose is inhibited. Fructose has a higher ability to generate the open structure, resulting in stronger reducing properties. The results show at pH 4.3 the strongest reduction potential results from isomaltulose (PalatinoseTM), followed by fructose, Vitalose® and maltotriose. The higher reduction potential of the "non-reducing" sucrose compared to glucose can be explained by the invert sugar's acid hydrolysation. Additional investigations give further evidence about the behaviour of fermentable sugars during the brewing process. Thereby is beside the described mode of action of glucose, fructose and sucrose, the detected stronger reduction potential of maltotriose versus maltose remarkable.
The optimised Chapon method can be used to support the investigation of the complex reaction mechanism of the different sugars in beverages like juice, wine and beer as well as during the brewing process and during storage.

Descriptors: reduction potential, reducing sugars, Chapon, Fehling, beverages, beer

Source: BrewingScience – Monatsschrift für Brauwissenschaft, 64 (July/August 2011), pp. 61-67

Abstracts BrewingScience articles (May/June 2011)

R. Folz, R. Hofmann and U. Stahl

Impact of Permeation of O_2 and CO_2 on the Growth Behaviour of Saccharomyces diastaticus in Beer

Different bottle types had been tested on their permeation characteristics (including oxygen ingress and carbonation retention) and the microbiological stability of the bottled beer. The microbiological stability was assessed by measuring the turbidity and the concentration of colony forming units (CFU). Measurement of the CO_2 content and the turbidity was done in beer; evaluation of the oxygen ingress had to be done in especially prepared distilled water since beer itself is oxygen-consuming. In case of microbiological growth the colonies were checked with macroscopic and microscopic methods for exclusion of unwanted microorganisms leading to an erroneous positive result.
The results of the study showed the combined influence of oxygen uptake and loss of carbon dioxide on the microbiological stability of beer. With the help of oxygen consuming and passive barrier materials the turbidity in the test beer with and without inoculated microorganisms could be kept at a lower level. Especially the inoculation with Saccharomyces diastaticus showed increasing turbidity and concentrations of colony forming units over time. For contamination with Saccharomyces diastaticus glass bottles and plastic bottles with combined passive gas and oxygen quenching barrier enhancement showed significantly lower turbidity and concentrations of colony forming units than the other tested bottle formulations.

Descriptors: PET, permeation, microbiological stability, oxygen, turbidity

Source: BrewingScience – Monatsschrift für Brauwissenschaft, 64 (May/June 2011), pp. 52-60

H. G. J. Welten and F. R. Sharpe

Report by the EBC Analysis Committee on the Determination of NDMA in Beer by GC-TEA or GC-MS Detection (2009 Collaborative Trial)

Approved by the Analysis Committee for inclusion in the EBC Analytica.

The determination of NDMA in beer by the method of GC-TEA or GC-MS was collaboratively tested by the EBC Analysis Committee according to ISO standard 5725-2: 1994. Repeatability (r95) and reproducibility (R95) values are presented. There is statistically significant evidence (Spearman rho = 0.83, p = 0.008) of dependence of repeatability on the mean value (repeatability is worse for bigger mean), there is also statistically significant evidence (Spearman rho = 0.94, p = 0.001) of dependence of reproducibility on the mean value (reproducibility is worse for bigger mean). This relationship between s and m can be represented by a straight line s = a + bm. Final repeatability standard

deviation = sr = 0.022 + 0.034 m. Final reproducibility standard deviation = sr = 0.054 + 0.117 m. Note that the precision becomes poor at concentrations below 0.5 µ/l.

Descriptors: NDMA in beer, Analytics, EBC Analytica, GC-TEA-Analysis, GC-MS-Analysis

Source: BrewingScience – Monatsschrift für Brauwissenschaft, 64 (May/June 2011), pp. 46-51

M. Verhülsdonk, K.-L. Rieck and K. Glas

Introduction to the Growth and Modelling of Biofilms in Ultrafiltration and Reverse Osmosis Plants

In the environment, there is actually no surface without the potential for adhesion of biofilms. Especially in membrane processes, biofilms have a negative effect on the performance, resulting in higher energy costs, higher efforts for cleaning and a lower durability of membranes. Within a research project, the possibilities of a process water production from brewery waste water will be explored. A part of this research project is the examination of biofouling for the purpose of process optimization. This essay gives an overview about biofilms and their effects on membrane processes as well as an introduction to biofilm modeling. In the next part of this article series, first results of the research project will be presented.

Descriptors: membranes, biofilm, biofouling, biofilm modelling, wastewater treatment

Source: BrewingScience – Monatsschrift für Brauwissenschaft, 64 (May/June 2011), pp. 41-45

Abstracts BrewingScience articles (March/April 2011)

A. Dammann, K. Schwarzer, U. Müller and J. Schneider

Flash Pasteurization of Beer – a Critical Review

The pasteurization of beer and in particular the flash pasteurization is a widely used technique for the biological product stabilization. In spite of the large extend of experience with the pasteurization the way how it is used in practice is a comparably rough method of low precision. In order to precisely adjust the two core process parameters temperature and exposition time detailed knowledge about the individual microbiological inactivation kinetics as well as about specific process and equipment characteristics is required. The article first considers the questions of the biologically demanded thermal load in terms of “required Pasteurization Units (PU)”. The assumed underlying thermal death kinetics and the determination of the necessary logarithmic cell count reduction are discussed. Every claim demanding for a particular target PU for specific kinds of beers (or other beverages) base naturally upon simplifications and assumptions concerning the initial and target cell counts and the D-values of present microorganism. The necessity of both species/strain and matrix specific D-values are pointed out.
In the second step the recalculation of the actually applied thermal load in terms of “effective PU” is critically reviewed. The origin of the questionable so called beer formula is revealed indicating the evident deviations to realistic calculations. In contrast to the assumption in the beer formula the z-value, describing the heat dependency of the D-value, is constant 7°C, it varies in a wide range with species and matrix. This leads to miscalculation of the “effective PU”. Furthermore the both parameters of the pasteurization process time and temperature are commonly simplified to average sizes. Investigations on residence time distributions (RTD) are evaluated and combined with thermal death kinetics of microorganism in order to show the relevance of RTD for the effectively applied thermal load and the “effective PU” respectively. Since the common way to determine the actual thermal effect (effective PU) are microbiological count reduction tests with a comparably low accuracy alternative approaches for an correct determination of the inactivation effect are proposed.

Descriptors: flash pasteurization/HTST, Pasteurization Units (PU), D and z-values, residence time distribution

Source: BrewingScience – Monatsschrift für Brauwissenschaft, 64 (March/April 2011), pp. 32-40

A. Justé, S. Malfliet, M. Lenaerts, L. de Cooman, G. Aerts, K. A. Willems and B. Lievens

Microflora during Malting of Barley: Overview and Impact on Malt Quality

Malt is an important industrial product with a huge market outlet. The diverse microbial communities naturally colonizing barley grains greatly influence malt quality and subsequently other products in the malt value chain, in particular beer. In this manuscript, an overview is given of current knowledge of barley and malt-derived microorganisms and their impact on malt properties. In addition, emphasis is put on strategies to enhance the malting process, including the use of starter cultures and the management of endogenous microflora. Molecular studies on microbial community composition and function throughout the process will contribute to efficient implementation of these strategies, ultimately leading to more efficient wort production and enhanced beer flavour quality and stability. More specifically, these studies may lead to the discovery of novel, industrially important microbial strains or enzymes.

Descriptors: microbial characterisation, microbial community, microflora management, process optimisation, starter culture

Source: BrewingScience – Monatsschrift für Brauwissenschaft, 64 (March/April 2011), pp. 22-31

J. Tippmann, J. Voigt, K. Sommer

Measuring Particle Size Distribution of Mash with Laser Diffraction to Evaluate the Process Success

The coherence of particle size distribution and reaction behaviour is well-known in process engineering as well as in the brewing industry [15, 17, 21]. Additionally, the particle size distribution can give precious information about the status quo of several processes. Usually, in the brewhouse, only the particle size distribution of the malt grist is measured by sieving [4]. But, the particle size distribution changes during the mashing process. To measure these changes, wet sieving methods are possible but too complex to get fast and authentic results. Thus a fast and reproducible method is missing for mash. Therefore, an analysis method with laser diffraction was developed, which give brewers now the possibility to analyse the status of the mashing process. Against the background, this analysis is not applicable in every brewhouse, a method was investigated to freeze the samples and analyse them in the laboratory. With this new knowledge, now it possible to find out correlations between the particle size distributions, mash conversion, viscosity and filtration performance.

Descriptors: particle measurement, milling, mashing, lautering, brewhouse

Source: BrewingScience – Monatsschrift für Brauwissenschaft, 64 (March/April 2011), pp. 13-21

Abstracts BrewingScience articles (January/February 2011)

C. Heim and K. Glas

Ozone I: Characteristics/Generation/Possible Applications

Due to its high oxidative potential, ozone is a highly reactive molecule that is able to oxidize and mineralize inorganic and organic materials. In water, ozone decomposes into oxygen for which reason it seems to be an ideal candidate for removal of persistent substances and microbes during water treatment. Today, ozone is widely applied in water processing of drinking and process water. Other possible applications for treatment and disinfection of surfaces in medical areas and food processing are currently under development and will be further described in the next part of this article series. This review gives an overview over the current state-of-the art in ozone production and possible operational areas.

Descriptors: ozone, ozone generation, oxidation, disinfection

Source: BrewingScience – Monatsschrift für Brauwissenschaft, 64 (January/February 2011), pp. 8-12

V. Psota, L. Sachambula and K. Kosar

Collection of Malting Barley Varieties in the Czech Republic in 2010

The present study reviews changes in the requirements for malting quality and collection of malting barley varieties in the Czech Republic in 2010. It gives micromalting results and results of malt and wort analyses of 22 most widespread and new malting barley varieties registered in the Czech Republic. Varieties causing haze were withdrawn from the collection. The actual collection includes two groups of malting barley varieties. The varieties with high activity of hydrolytic enzymes and high attenuation and the varieties recommended for production of beer with the Protected Geographical Indication Czech Beer, i.e. varieties with lower degree of final attenuation, lower values of Kolbach index, friability, etc.

Descriptors: barley, variety, malting quality

Source: BrewingScience – Monatsschrift für Brauwissenschaft, 64 (January/February 2011), pp. 1-7