Papers Recently Published in Related Journals

Below are abstracts and table of contents for papers recently published in related journals: *Journal of the American Society of Brewing Chemists*, *Journal of the Institute of Brewing*, and *Brewing Science – Monatsschrift für Brauwissenschaft*.

Journal of the American Society of Brewing Chemists

Volume 66(3), 2008

Full abstracts for these papers can be found at http://www.asbcnet.org/journal/toc/2008/jno308tc.htm

Barley Malt Polysaccharides Inducing Premature Yeast Flocculation and Their Possible Mechanism. *H. Koizumi, Y. Kato, and T. Ogawa.* J. Am. Soc. Brew. Chem. 66:137-142, 2008.

The Standard Reference Method of Beer Color Specification as the Basis for a New Method of Beer Color Reporting. *A. J. deLange.* J. Am. Soc. Brew. Chem. 66:143-150, 2008.

A Comparison of Barley Malt Quality Measurements and Malt Sugar Concentrations. *S. H. Duke and C. A. Henson.* J. Am. Soc. Brew. Chem. 66:151-161, 2008.

Relationship Between Starch Granule Size Distribution and Selected Malting Parameters. *V. Psota, J. Chmelík, I. Bohačenko, and J. Hartmann.* J. Am. Soc. Brew. Chem. 66:162-166, 2008.

Investigation of New Indexes to Evaluate Aging of Bottled Lager Beer. *J. Liu, J. Dong, Q. Li, J. Chen, and G. Gu.* J. Am. Soc. Brew. Chem. 66:167-173, 2008.

Bitterness-Modifying Properties of Hop Polyphenols Extracted from Spent Hop Material. *I. R. McLaughlin, C. Lederer, and T. H. Shellhammer.* J. Am. Soc. Brew. Chem. 66:174-183, 2008.

Detection of *FLO* Genes in Lager and Wild Yeast Strains. *L. C. Damas-Buenrostro, G. Gracia-González, C. E. Hernández-Luna, L. J. Galán-Wong, B. Pereyra-Alférez, and J. A. Sierra-Benavides.* J. Am. Soc. Brew. Chem. 66:184-187, 2008.

Rapid Determination of Low-Level Sulfur Compounds in Beer by Headspace Gas Chromatography with a Pulsed Flame Photometric Detector. *H. Li, S. Jia, and W. Zhang.* J. Am. Soc. Brew. Chem. 66:188-191, 2008.

Behaviors of 3-Mercaptohexan-1-ol and 3-Mercaptohexyl Acetate During Brewing Processes. *T. Kishimoto, M. Morimoto, M. Kobayashi, N. Yako, and A. Wanikawa.* J. Am. Soc. Brew. Chem. 66:192-196, 2008.

Barley Analysis Check Service. J. Am. Soc. Brew. Chem. 66:197, 2008.

Beer Analysis Check Service. J. Am. Soc. Brew. Chem. 66:198-199, 2008.

Craft Beer Analysis Check Service. J. Am. Soc. Brew. Chem. 66:200, 2008.

Hop Analysis Check Service. J. Am. Soc. Brew. Chem. 66:201, 2008.

Malt Analysis Check Service. J. Am. Soc. Brew. Chem. 66:202, 2008.

Journal of the Institute of Brewing

Volume 114(2), 2008

Links to the full abstracts of these papers can be found at http://www.scientificsocieties.org/jib/contents/2008_114_2.htm

Effect of Medium Composition on Glucoamylase Production During Batch Fermentation of Recombinant *Saccharomyces cerevisiae*. *P. M. Kilonzo, A. Margaritis, and M. A. Bergougnou.* J. Inst. Brew. 114:83-96, 2008.

Beer with Reduced Ethanol Content Produced Using *Saccharomyces cerevisiae* Yeasts Deficient in Various Tricarboxylic Acid Cycle Enzymes. *R. Selecký, D. Šmogrovičová, and P. Sulo.* J. Inst. Brew. 114:97-101, 2008.

Slow Fermentation in French Cider Processing due to Partial Biomass Reduction. *A. Nogueira, J. M. Le Quéré, P. Gestin, A. Michel, G. Wosiacki, and J. F. Drilleau.* J. Inst. Brew. 114: 102-110, 2008.

Preparation of an Alcoholic Beverage from Tea Leaves. *J. W. K. K. Jayasundara, R. P. Phutela, and G. S. Kocher.* J. Inst. Brew. 114:111-113, 2008.

Factors Affecting *Zymomonas mobilis* subsp. *francensis* Growth and Acetaldehyde Production. *M. Coton, J. M. Laplace, H. Guichard, and E. Coton.* J. Inst. Brew. 114:114-121, 2008.

Thioredoxin in Barley: Could It Have a Role in Releasing Limit Dextrinase in Brewery Mashes? *C. B. Heisner and C. W. Bamforth.* J. Inst. Brew. 114:122-126, 2008.

Characteristics of High Cell Density Fermentations with Different Lager Yeast Strains. *P. J. Verbelen, S. Van Mulders, D. Saison, S. Van Laere, F. Delvaux, and F. R. Delvaux.* J. Inst. Brew. 114:127-133, 2008.

The Influence of Heavy Metal Ions on Beer Flavour Stability. *C. Zufall and Th. Tyrell.* J. Inst. Brew. 114:134-142, 2008.

Comparison of Procedures for Resveratrol Analysis in Beer: Assessment of Stilbenoids Stability through Wort Fermentation and Beer Aging. *V. Jerkovic, F. Nguyen, A. Timmermans, and S. Collin.* J. Inst. Brew. 114:143-149, 2008.

Comparison of Antioxidant Activity of Barley (*Hordeum vulgare L.*) and Malt Extracts with the Content of Free Phenolic Compounds Measured by High Performance Liquid Chromatography Coupled with CoulArray Detector. *M. Dvořáková, M. Douanier, M. Jurková, V. Kellner, and P. Dostálek.* J. Inst. Brew. 114:150-159, 2008.

Antioxidant Characteristics of Hops and Hop Products. *K. Krofta, A. Mikyška, and D. Hašková.* J. Inst. Brew. 114:160-166, 2008.

Identification of the Main Degradation Products of Patulin Generated Through Heat Detoxication Treatments. *S. Collin, E. Bodart, C. Badot, A. Bouseta, and S. Nizet.* J. Inst. Brew. 114: 167-171, 2008.

Characterization of Volatile and Semi-Volatile Compounds in Chinese Rice Wines by Headspace Solid Phase Microextraction Followed by Gas Chromatography–Mass Spectrometry. *T. Luo, W. Fan, and Y. Xu.* J. Inst. Brew. 114:172-179, 2008.

Flavour Instability of Pale Lager Beers: Determination of Analytical Markers in Relation to Sensory Ageing. *S. Malfliet, F. Van Opstaele, J. De Clippeleer, E. Syryn, K. Goiris, L. De Cooman, and G. Aerts.* J. Inst. Brew. 114:180-192, 2008.

Brewing Science – Monatsschrift für Brauwissenschaft

Volume 61(3/4) 2008

Chill-haze – Identification and Determination of Haze-active Constituents by HPLC and Mass Spectrometry. Part I: The role of polyphenols and the astonishing impact of hop components on chill haze formation. *S. Loch-Ahring, F. Decker, S. Robbert, and J. T. Andersson.* Brew. Sci. (Monatsschr. Brauwiss.) 61(3/4):32-48, 2008.

The formation of haze is a serious problem of bright beers because it limits the storage life of the bottled or barrelled product. The problem is particularly evident in the bottle. Haze (chill haze) is said to be caused by different substances and mechanisms. The most commonly held opinion makes a protein polyphenol interaction responsible for its formation. Therefore efforts of the brewing industry are targeted towards a minimization of one or both of these components by filtration through PVPP (polyvinylpolypyrrolidone) and diatomite (Celite). The objective of this study was to trace the influence of polyphenols as well as other phenolic substances on the colloidal stability of beer and to lay the foundation for tracing them throughout the brewing process. In regard to chill haze performance and brewing stabilisation, the repeated reference to polyphenols led us to examine the polyphenol content of isolated chill haze in detail. Based on an existing method normally used to determine the polyphenol composition of beer and wort, a modified approach was developed to examine polyphenols in chill haze. To examine the possible influence of polyphenols on chemo-physical endurance, beer samples taken throughout the brewing process, isolated chill haze and permanent beer turbidity were determined by HPLC-DADQTOF- MS, UPLC-DAD-QTOF-MS and nano ESI chip-QTOF-MS. This is the first part of our work and only discusses the polyphenol analysis in wort, beer and isolated haze performed by HPLC-DAD-QTOFMS and nano ESI chip-QTOF-MS. Haze properties were not studied using kinetics but analytical methods with the aim to identify single components. The influence of some polyphenols on the formation of haze clouding was observed. The strong influence of hop substances on the colloidal stability could be demonstrated.

Study on the Applicability of Isomaltulose (Palatinose™) in Beer and Beer Specialties, and Its Remarkable Results. *R. Pahl, F.-J. Methner, J. Schneider, J. Kowalczyk, S. Hausmanns, and A. Radowski.* Brew. Sci. (Monatsschr. Brauwiss.) 61(3/4):49-55, 2008.

The functional disaccharide isomaltulose (Palatinose™) was tested to determine its suitability as an ingredient in beer and beer specialties, and its potential fermentability by typical beer contaminants, and typical beer production yeasts. It was shown that all tested beer contaminants were in the majority of the cases completely unable to ferment isomaltulose. The same was true for most of the tested brewing yeasts. As a result of the nonfermentability, promising results were obtained with respect to the microbiological stability, and to the sensorial profile and taste of beer and beer specialties.

Protein Changes During Malting of Barley Using Novel Lab-on-a-Chip Technology in Comparison to Two-Dimensional Gel Electrophoresis. *Ch. Klose, B. D. Schehl, and E. K. Arendt.* Brew. Sci. (Monatsschr. Brauwiss.) 61(3/4):56-65, 2008.

During the malting process storage proteins are degraded by proteolytic enzymes into small peptides and amino acids. The activity of these enzymes was measured at various stages during malting of barley and was found to be increased. To visualize proteolytic degradation, proteins of unmalted, germinating and malted grains were fractionated. After extracting the proteins on the basis of their solubility (Osborne fractionation) protein fractions were analysed using a Lab-on-a-Chip technique, which separates the proteins, based on their molecular weight, by capillary electrophoresis. This new technique for the analysis of proteins was supported by using two-dimensional gel electrophoresis. In addition, amino acid analysis on barley and barley malt was carried out. In general a degradation of the proteins to small peptides and amino acids could be observed in all fractions. In the albumin and globulin fraction also a protein increase was observed, which is due to the fact that these fractions contain the majority of the metabolically active proteins. The Lab-on-a-Chip analysis technique was found to be appropriate for analysis of degrading or increasing proteins, as it revealed rapid, repeatable and reliable results, which could be validated by using common protein analysis techniques such as two-dimensional gel electrophoresis and amino acid analysis.

Evaluation of a New Optical Sensor for Measuring Dissolved Oxygen by Comparison with Standard Analytical Methods. *J. Titze, H. Walter, F. Jacob, A. Friess, and H. Parlar.* Brew. Sci. (Monatsschr. Brauwiss.) 61(3/4):66-80, 2008.

The determination of the concentration of dissolved oxygen (O_2) plays an important role in different stages of beer production. Only precise, stable and fast measurement procedures for determining the oxygen content in beer are therefore suitable for the use in breweries. A research project was carried out in order to evaluate the newly developed oxygen measurement system built in the CO_2/O_2 Gehaltemeter type c-DGM of Haffmans BV by comparison with other standard analytical references such as the Orbisphere 3650 from Hach Ultra Analytics GmbH and the DIGOX 6 from Dr. Thiedig & Co. The purpose of this study was to determine the precision and accuracy as two main criteria for the evaluation of a suitable oxygen measurement in the brewing industries, since the precision describes the quality of a measurement procedure and the accuracy the level of agreement between the indicated and real value. The measurement system of the c-DGM was compared with the certified reference systems during a series of tests. The measurement methods of the reference systems are specified in Brautechnische Analysenmethoden, volume II of the Mitteleuropäische Brautechnische Analysenkommission (MEBAK) and are considered to be the recognized procedure for oxygen regulation in the brewing industry. It was observed that in comparison to the reference systems, the oxygen measurement system built in the c-DGM exhibited an effective work performance regarding precision and accuracy, and moreover signalized a fast response and low calibration efforts.

Volume 61(5/6) 2008

Design of a Pilot Setup to Sort Damaged Returned Empty Beverage Crates in an Automatic Filling Line. *M. Schmidt, C. Eder, and A. Delgado.* Brew. Sci. (Monatsschr. Brauwiss.) 61(3/4):81-93, 2008.

The inspection of returned beverage crates as well as bottles in industrial automatic filling lines is mainly performed by imaging systems. These systems are not able to detect invisible damages or embrittlement. A powerful novel system based on the principle of mechanical vibration analysis for the detection of small and concealed damages is presented. The selection of individual crates is performed automatically by a pre-trained artificial neural network (ANN). Numerical finite element simulations form a basic insight into the vibration behaviour of the crates and help to plan a pilot setup. This leads to a final recognition rate of more than 99% over all checked crates in a prototype for industrial use.

The Use of Response Surface Methodology to Optimise Malting Conditions of Tef (*Eragrostis tef* (Zucc.) Trotter) as a Raw Material for Gluten-free Foods and Beverages. *M. Zarnkow, C. Almaguer, F. Burberg, W. Back, E. K. Arendt, S. Kreisz and M. Gastl.* Brew. Sci. (Monatsschr. Brauwiss.) 61(3/4):94-104, 2008.

Celiac disease is a condition, in which case the person's body reacts to the prolamins of wheat, rye, barley, and oats. The only way to treat CD is a total lifelong avoidance of gluten consumption. In this study Tef (*Eragrostis tef* L.), which belongs to the family poaceae that is regarded as gluten free, was used as raw material. The objective of this study was to optimize the malting conditions to produce a gluten free malt of high quality for gluten free foods. Tef, with a thousand kernel weight of 0.3–0.4 g, needed special arrangements like small sieves etc. Tef has a remarkable agronomical advantage that the water requirement is probably the lowest of any major cereal. Response surface methodology was used to investigate the influence of the three malting parameters, vegetation

time, degree of steeping and temperature on the quality of tef malt. Each predictor variable was tested at three levels. Vegetation times were 4, 5 and 6 days, degrees of steeping were 46, 50 and 54 % and vegetation temperatures were 16, 20 and 24 °C. Kilning temperatures of 65 °C were used. The used analyses were based on methods outlined in EBC or by MEBAK. The raw material was yielded 2006 in Utah, USA. A range of malt quality parameters was determined including extract, apparent attenuation limit, gelatinisation temperature, α-amylase activity, β-amylase activity, limitdextrinase activity, Kolbachindex, alpha amino nitrogen, viscosity, and colour. The achieved values slightly deviate from the calculated ones. The obtained attributes were 52.1 % extract, 69.1 % AAL, 84 U/g α-amylase activity, and 187 U/g β-amylase activity, 1062 U/kg limit dextrinase activity, 5.9 EBC colour, 285 mg/100 g FAN and 2.782 mPa × s viscosity. This publication shows clearly that on the one hand RSM is a prove method for testing the malting conditions of unknown cereals and on the other hand *Eragrostis tef* is a crop with a potential as a raw material for malting purposes.

Measurement of Water Vapour Ingress in PET Bottles and Correlation with Oxygen and Carbon Dioxide Permeation. *J. Schneider, I. Weber and R. Pahl.* Brew. Sci. (Monatsschr. Brauwiss.) 61(3/4):105-112, 2008.

The beer and beverage industry is using ever more barrier enhanced plastic bottles for the filling of its products. The quality of the products can be considerably affected by the permeation of oxygen into the bottle and carbon dioxide out of it. The quality control of the bottles with particular emphasis on the gas barrier is thus of great importance. However, the conventional gas permeation measuring method needs too much time. In order to respond effectively and quickly to barrier defects, bottle production or incoming goods inspection measuring time must be shortened, for example by 2 hours. A physical problem of a quick measurement of oxygen is the comparably long unsteady state of permeation due to desorption of oxygen into the bottle after filling. In order to overbear this difficulty methods are tested which use other gases or as in this instance water vapour. Instead of a complete permeation only the migration of water from PET into the bottle inner is measured. The ruggedness of the method meets the requirements of the practical measurement conditions. The correlation of the water vapour migration rate with the permeation of carbon dioxide and oxygen measured with a real-time method is linear. Active barriers employing scavenger material can not be detected by the water vapour ingress measurement.

The Influence of Hop Products on Beer Flavour Stability. *C. Zufall, K. Wackerbauer and C. Brandt.* Brew. Sci. (Monatsschr. Brauwiss.) 61(3/4):113-120, 2008.

The use of reduced iso-alpha-acids in brewing has become more widespread in past years, although their characteristics during beer ageing are not completely known. During our investigations, important differences in ageing characteristics were detected not only between the categories of reduced and non-reduced hop extracts, but also within the group of beers containing reduced hop products. Forced ageing in the absence of light had the strongest impact on beers hopped with CO_2-extract, followed by iso-alpha-extracts. Rho, Tetra and Hexa showed a significantly better stability with the tendency to improve from Rho- over Tetra- to Hexahydroisohumulone. Under light exposure, besides showing lightstruck flavour, beers hopped with CO_2-extract were the first to show cardboardy oxidation aroma, while beers containing only reduced hop products were virtually unaffected. Extended periods of light exposure, however, led to the formation of methyl-furfuryl-disulphide (MFDS) off-flavour, also in lightstable beers, as previously reported [1]. The findings from sensory analysis could be confirmed by instrumental analysis of chemiluminescence behaviour. The results indicate clearly that the choice of hop products has a decisive influence on beer flavour stability.