

Abstracts from Other Journals

This section contains summaries of recent papers published in a number of other Journals considered of interest to our readers, as well as a selection of patents that have been applied for or recently granted. If you would like to serve as an abstractor for the Journal of the Institute of Brewing, please contact Richard E. Wheeler.

R.E.W.

ABSTRACTORS FOR THIS ISSUE

T. Bühler, I. Campbell, F. Jack, I. Russell, G.G. Stewart and R.E. Wheeler

1) Beer – Composition

Occurrence of biogenic amines in beer: causes and proposals for remedies. G. GASARASI, M. KELGTERMANS, K.J. VERSTREPEN, J. VAN ROY, F.R. DELVAUX, and G. DERDELINCKX (*Monatsschrift für Brauwissenschaft* **56**, No 3/4, 58–63, 2003).

Biogenic amines are compounds synthesized by eukaryotic and prokaryotic cells that can affect human health. Histamine and tyramine are the most important and can cause important problems such as headaches, and severe forms of allergy. Secondary biogenic amines can also be involved in the synthesis of nitrosamines in the stomach. In beer, the presence of biogenic amines is mainly due to the activity of contaminants that develop during fermentation but their synthesis was also detected during malting. The microorganisms involved are the Enterobacteria sp., possibly active at the early stage of the fermentation, and many lactic acid bacteria. Some strains of *S. cerevisiae* produce different biogenic amines, mainly putrescine, spermidine and spermine. Some speciality beers such as sour beers and beers produced by mixed cultures are characterized by the constitutive presence of biogenic amines due to the metabolism of the typical microflora involved. This paper demonstrates that it is possible to reduce the level of the biogenic amines significantly (by up to 95 %) in speciality beers by keeping the process as traditional as possible. Mainly by assembling the freshly cooled wort with old beer containing lactic acid bacteria, which are characterised by their lack of amino acid decarboxylase activity.

T.B./R.E.W.

2) Brewing – Fermentation

Reduction of vicinal diketones by yeast in dependence of carbon dioxide pressure. G. SEPELOVÁ, M. CVEN-GROŠCHOVÁ and D. ŠMOGROVICOVÁ (*Monatsschrift für Brauwissenschaft* **56**, No 3/4, 44–47, 2003).

One of the possibilities for making beer production more effective is by lowering the time taken for diacetyl and 2,3-pentanedione reduction. These compounds, collectively referred as vicinal diketones, are very important since their taste limits are very low and they generate undesirable changes to beer flavour, which are referred to as buttery, cottage cheese or “whey” taste. The aim of the

work was to study the influence of carbon dioxide pressure during the active carbohydrate fermentation, and at the end of fermentation, on vicinal diketones reduction. We compared vicinal diketones reduction in young beers fermented under carbon dioxide pressure of 100 kPa during the whole main fermentation and in beers fermented without carbon dioxide pressure until extract concentration decreased to 7.5°P, and then under a carbon dioxide pressure of 50 kPa. Experiments were completed on wort fermentations of gravities 12.5°P and 13.5°P. The lower carbon dioxide pressure accelerated vicinal diketones reduction and speeded up the end of fermentation. Wort concentration had no influence on vicinal diketones reduction in the wort gravities studied. (12.5°P and 13.5°P).

T.B./R.E.W.

Investigations on the determination of the flocculation behaviour of brewers' yeast. K. WACKERBAUER, and M. BECKMANN (*Monatsschrift für Brauwissenschaft* **56**, No 3/4, 48–57, 2003).

The determination of the flocculation behaviour of brewers' yeast represents an important part of brewery quality management, because alterations of this characteristic yeast property will directly influence the fermentation process, the filterability of beer, and final beer quality. In this research work, three laboratory methods for measuring yeast flocculation were tested and evaluated. As a comparison, we simultaneously conducted fermentation trials in EBC-Fermentation Test Tubes and stainless steel CCTs. Both the determination of cell surface hydrophobicity according to Akiyama-Jibiki and the modified Helm's Test according to D'Hautcourt and Smart were practical and reliable methods, which therefore can be recommended. As a result of our findings, the modified Helm's Test according to Mota and Soares was found to be less suitable, because of its partly inaccurate results.

T.B./R.E.W.

3) Microbiology

Beginnings of microbiology and biochemistry: the contribution of yeast research. J.A. BARNETT (*Microbiology*, 2003, 149, 557–567).

Although early studies on the alcoholic fermentation were made by chemists, most notably Lavoisier, after the

development of microscopy in the early 19th century the relationship of yeast to fermentation was quickly established. Subsequently much of the science of microbiology arose from Pasteur's studies on alcoholic beverages (but of course the simultaneous study of medical bacteriology was at least as important). Fischer's development of carbohydrate chemistry and Büchner's discovery of the enzymic activity of cell-free extracts of yeast also developed from studies on the alcohol fermentation. Abstracting a review is an impossible task therefore I refer anyone interested in the history of biochemistry and microbiology to this comprehensive review.

I.C.

A history of research on yeasts 5: The fermentative pathway. J.A. BARNETT (*Yeast*, 2003, 20, 509–543).

The development of the biochemistry of metabolism is reviewed, covering the discovery of the metabolic pathways of sugar metabolism and the activities of the relevant enzymes and coenzymes.

I.C.

Formation of ethyl acetate and isoamyl acetate by various species of wine yeast. C. PLATA, C. MILLAN, J.C. MAURICIO and J.M. ORETGA (*Food Microbiology*, 20, 217–224, 2003).

Formation of ethyl acetate and isoamyl acetate by seven wine yeast strains in a model grape juice was examined during fermentation. The amounts in which the two esterases were produced during fermentation were found to depend on the particular yeast strain, its specific production rate and its rate of survival in the wine. *Kloeckera apiculata* exhibited the highest ability for acetate formation. *Hansenula subpelliculosa*, *Kluyveromyces marxianus*, *Torulaspota delbrueckii* and *Saccharomyces cerevisiae* produced intermediate levels and *Pichia membranefaciens* and *Candida guilliermondii* very low levels of the two esters measured in this study.

G.G.S.

Effect of the nitrogen source on the fatty acid composition of *Saccharomyces cerevisiae*. M.J. TORIJA, G. BELTRAN, M. NOVO, M. POBLET, N. ROZES, J.M. GUILLAMON and A. MAS (*Food Microbiology*, 20, 255–258, 2003).

The source and content of nitrogen in the medium are very important in the development of alcoholic fermentations since they both affect the growth of *Saccharomyces cerevisiae*. Furthermore, the composition of the growth medium and the environmental conditions are known to affect the cell membrane fatty acid composition. The aim of this work was to study how the nitrogen source affects the membrane fatty acid composition. A mixture of amino acids and ammonia delayed the yeast growth when a high concentration of yeast assimilable nitrogen was present in the media. Cells grown in the mixed nitrogen source had a lower content of total fatty acids with a higher unsaturation degree than the cells grown slowly on ammonia.

G.G.S.

Gene array-based identification of changes that contribute to ethanol tolerance in ethanologenic *Escherichia coli*: comparison of K011(parent) to LY01 (resistant mutant). R. GOZALEZ, H. TAO, J.E. PRUVIS,

S.W. YORK, K.T. SHANMUGAM and L.O. INGRAM (*Biotechnology Progress*, 19, 612–623, 2003).

Escherichia coli is the workhorse for modern industrial biotechnology. Strains of this organism are currently used to produce high value recombinant products for medical applications, amino acids and other products. *E. coli* is now being developed for the production of commodity chemicals such as ethanol, L-lactic acid, succinate and propanediol. An *E. coli* strain (K011) has been engineered (LY01 mutant) for the production of ethanol. Gene analyses have been employed to identify expression changes that occurred in the mutant. The increased ethanol tolerance in LY01 appears to result from multiple changes affecting diverse physiological and metabolic functions. They include increased glycine metabolism, increased production of the osmolyte betaine from choline, increased ethanol tolerance, more efficient metabolism of serine and pyruvate and decreased production of organic acids. Assorted changes related to cell envelope studies that may contribute to ethanol tolerance were also noted. The beneficial action of betaine and glycine as osmoprotectants suggests a possible linkage between osmotolerance and ethanol tolerance. Studies are in progress to explore the mechanism and beneficial actions of protective osmolytes on ethanol tolerance and ethanol production.

G.G.S.

Fed-batch cultivation of *Saccharomyces cerevisiae* in a hyperbaric bioreactor. I. BELO, R. PINHEIRO and M. MOTA (*Biotechnology Progress*, 19, 665–671, 2003).

Fed-batch is the dominating mode of operation in high-cell density cultures of *Saccharomyces cerevisiae* in processes such as the production of baker's yeast and recombinant proteins, where the high oxygen demand of these cultures makes its supply an important and difficult task. The aim of this work was to study the use of hyperbaric air for oxygen mass transfer improvement on *S. cerevisiae* fed-batch cultivation. The utilisation of hyperbaric air for oxygen mass transfer rate from the gas phase to the culture medium, eliminates the need to increase the stirring and/or the aeration rates or to blend pure oxygen with the inlet air. All these aspects constitute important savings in operating costs.

G.G.S.

4) Sensory Evaluation

Proficiency testing for sensory profile panels: measuring panel performance. J.A. MCEWAN, E.A. HUNTER, L.J. VAN GEMERT and P. LEA (*Food Quality and Preference*, 2002, 13, 181–190).

The major obstacle to the development of proficiency tests for sensory profile panels has been the lack of a "true value" against which results can be compared. In chemical analyses this "true value" is the level of analyte present. However, sensory tests are more complex, with data depending on human perceptions. Profiling tests are further complicated by problems with terminology, namely different panels using attributes in different ways. This study evaluates the use of validation panels to determine "expected results", which can be used as performance measures. The data studied were descriptive profiles of 6 red wines, produced by 12 panels (part of the EU supported

ProfiSens project). Four of these panels were selected for validation purposes. Using their data “expected results” were determined, based on a series of 5 key steps. From this performance criteria were established, against which the remaining panels were evaluated. Results of this study demonstrated the feasibility of proficiency testing for sensory profiling, while highlighting areas where further research is required.

F.R.

Proficiency testing for sensory ranking panels: measuring panel performance. J.A. MCEWAN, R. HEINIÖ, E.A. HUNTER and P. LEA (*Food Quality and Preference*, 2003, **14**, 247–256).

Although the benefits of evaluating sensory panel performance are obvious, proficiency tests are not widely used. The major obstacle has been the lack of a “true value” against which results can be compared. This “true value” is difficult to establish, since sensory data depend on human perceptions, rather than chemical or physical measures. This paper outlines the use of validation panels, and the 4 key steps required to determine “expected results” based on their data. The data used in this study comprised of rank values for the sweetness of apple juice produced by 14 panels (part of the EU supported ProfiSens project). Four panels were selected for validation purposes. Their data was used to establish “expected results” and performance criteria, against which the other panels were evaluated. Although successful, this research revealed areas where fine-tuning is required. It also highlights important areas of control, such as choice of samples and selection of validation panels.

F.R.

5) Patents issued and patent applications

The following samplings of abstracts from recently issued patents and patent applications were selected from the United States Patent and Trademark Office Website (<http://www.uspto.gov/patft/>) and from Europe’s Network of Patent Databases (<http://gb.espacenet.com>). Full patent information is available at these sites (online and at no cost) if more details are desired.

Method of using wood chips in brewing malt beverages. N.J. HUIGE, J.R. SEABROOKS and D.S. RYDER, Miller Brewing Company, Milwaukee (*United States Patent Application 20,030,008,036*, January 9, 2003).

A process is disclosed whereby wood chips are used in the brewing process to produce a beer which is more pleasing and mellow than conventional beers. The wood chips are preferably toasted oak chips. Specifically, this new process utilizes wood chips to provide such characteristics to the malt beverage. Preferably, the wood chips are oak chips and advantageously the wood chips are toasted. Although extracts of the wood chips may be used to impart the desired characteristics to the malt beverage, in a preferred embodiment of the invention, the wood chips are added directly to hot wort. The addition of wood chips to hot wort can be easily and advantageously integrated into normal brewing operations since sterilization of the wood chips will occur in hot wort and the wood chips can then, for example, be removed from the wort along with the trub. The wood chips can be added to the hot wort in the

brew kettle or in the hot wort tank. The malt beverages made utilizing this new process possess certain desirable flavour characteristics not found in malt beverages made by conventional methods.

I.R.

Zero oxygen permeation plastic bottle for beer and other applications. P.J. CAHILL, G.E. ROTTER and S.Y. CHEN, BP Corporation North America Inc., Chicago, IL (*United States Patent 6,558,762*, May 6, 2003).

This invention relates to novel bottles and a process for the production of multilayered substantially zero oxygen permeation plastic bottles. Substantially zero oxygen permeation means that the oxygen which finds its way to the bottled product is an amount which is only barely measurable with instruments which measure such permeation. In the absence of a specific amount of oxygen, substantially zero oxygen permeation will be considered to be 1 ppm of oxygen, in terms of the weight of the bottled product, for the target shelf life of the bottled product. The multilayered plastic bottles of this invention are suitable for recycle with other polyester bottles, have excellent rigidity, have good clarity when such clarity is desired, resist delamination, do not need tie layers, and also have the ability not only to keep oxygen (from air) from entering the bottle cavity but also have the ability to consume or deplete the presence of unwanted oxygen in the bottle cavity. The novel bottles of this invention involve the use of modern multilayer bottle making processes and equipment in conjunction with deployment of at least one layer (of the multilayered plastic bottle) which comprises a copolyester oxygen scavenging formulation which is an active oxygen scavenger. Active oxygen scavengers consume (or otherwise deplete) oxygen from a given environment. As noted in the co-pending application, a zero oxygen permeation multilayer bottle will have enough oxygen scavenging capacity to consume any unwanted (head space) oxygen in a bottle cavity and still have enough capacity remaining to consume oxygen at the rate at which it reaches the scavenger layer from air external to the container for the necessary shelf life of the filled bottle.

I.R.

Solid fermentation-promoting substance and method for preparation thereof. H. KADO, S. ISHII, K. TAKOI, T. MASUDA and Y. MITANI, Sapporo Breweries Limited, Tokyo (*United States Patent 6,517,875*, February 11, 2003).

This invention relates to a fermentation-promoting substance capable of activating yeast for use in the production of fermented products, accelerating the rate of fermentation, and shortening the period of fermentation. More specifically, it relates to a fermentation-promoting substance derived from a residue such as spent grains and trub, that contains the grain shells of cereals in use obtained during the production of fermented liquor, like beer, which employ the cereals, as well as to a method for preparation of the fermentation-promoting substance, a method for the production of a fermented product using the same, and a method for restoring the activity of a yeast using the same. If a residue such as spent grains, which has been obtained from the process of the production of fermented liquor, is treated with acid to yield supernatant and the supernatant

is further subjected to neutralization treatment, then a substance contributable to the promotion of fermentation can selectively be extracted in the form of insoluble salts from the residue; and at the same time, it is possible to effectively remove unwanted substances such as proteins and lipids that are not connected with but rather have an impediment effect on the promotion of fermentation. It has further been discovered that the above-stated objectives are attained by using the thus-obtained solid fermentation-promoting substance.

I.R.

Drinking glass treated to encourage bubble formation.
C. JOHNSON and R. BROWNE (*GB Patent 2,380,396, April 9, 2003*).

A standard Pint drinking glass which is altered by means of chemical etching or engraving at the bottom. This enables the bubbles from the beer being drunk to form a complete head on the pint of beer, all the way down the glass. The Pint of beer never runs out of a good head at the top. The etching or engraving may be in the form of a company name.

I.R.