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(54) Title: A PROCESS FOR PRODUCING A HEALTH DRINK PRODUCT

(57) Abstract: The present invention relates to a process of producing a health drink product. More particularly the present invention relates to a process of producing a health drink product with low sugar content. Accordingly, the present invention provides A process for producing a malt-based product comprising the steps of subjecting a mixture comprised of malted barley and water to a heat treatment step for about 5 minutes to 30 minutes at a temperature in the range from 75°C to 90°C, wherein the malted barley comprising of alpha (a) and beta (β) amylase in an initial amount and further wherein the remaining amount of alpha (a) amylase in the mixture at the end of 5 minutes of the heat treatment is in the range from 10 to 25% of the initial amount.



A PROCESS FOR PRODUCING A HEALTH DRINK PRODUCT

Field of the Invention

The present invention relates to a process of producing a health drink product.

- 5 More particularly the present invention relates to a process of producing a health drink product with low sugar content.

Background and Prior Art

Health drinks products are quite popular throughout the world. Historically, it used to be consumed as quick substitution for a meal as these products are

- 10 easy to prepare. Most of the cases, consumer just need to add the product into a glass of hot water to prepare a drink ready for consumption.

There are a large varieties of health drink products available in the market. Out of these products, one popular segment is malt-based health drink product.

- 15 Most of these products contain cereals, hence considered to be healthy alternative to other drinks. These products can be prepared either as a hot drink or cold drink depending on the format of the product. The most prevalent format of these malt-based products as hot drinks.

- 20 Another way to consume these malt-based health drink product is adding it into a glass of milk to enhance the taste of the milk as some of the consumers do not like the taste of milk as such.

There are prior art documents which discloses malt based and cereal based

- 25 products and process associated with it.

US2017273337 (Quaker Oats, 2017) describes a method and composition for providing hydrolyzed starch and fiber. In one aspect, the method comprises

providing a first enzyme; a second enzyme; water; and a starting composition comprising at least one material selected from the group consisting of at least a portion of grain and at least a portion of pulse. Additional steps comprise hydrolyzing the fiber and starch in the at least one material through fiber and
5 starch hydrolysis reactions catalyzed by the first and second enzymes, respectively. Further steps comprise deactivating the first and second enzymes. In a second aspect, a composition comprises at least one material selected from the group consisting of at least a portion of grain and at least a portion of pulse. The average molecular weights of the hydrolyzed starch and fiber
10 molecules in the composition are fractions of the molecular weights of unhydrolyzed starch and fiber molecules, respectively.

WO09127687 (Nestlé, 2009) describes a cereal-based flakes which can be easily dispersed in a cold liquid, and which provide a smooth instant drink rich in
15 cereals, including wholegrain cereals. The invention also relates to a method for the preparation of a smooth cereal-based instant drink and to the manufacture of said flakes.

WO21058635 (Nestle, 2021) describes a cocoa and/or malt beverage products
20 comprising isomaltooligosaccharides and methods of producing such products. The products may be reduced in sugar compared to conventional cocoa and/or malt beverage products while providing a similar sweetness, texture, and taste as the conventional products.

25 To produce these malt-based product one of the essential steps is a mashing process. Mashing is a well-known in malt industries including beer industry. However, as this process uses malted barley, the end product is always high in sugar (in particularly maltose) content.

Now a days, consumer is quite thoughtful about consuming products which has high sugar content. At the same time, they are also in favour of consuming a health drink product.

- 5 Therefore, there is a need to provide a health drink product with inherently low sugar content.

It is therefore an object of the present invention to provide a health drink product.

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It is another object of the present invention to provide a health drink product comprises malted barley.

- It is yet another object of the present invention to provide a health drink product
15 comprises malted barley with inherently low sugar content.

It is yet a further object of the present invention to provide a health drink product comprises malted barley with inherently low sugar content and with easily digestible hydrolysed starch.

20

The present inventors while working on this problem have surprisingly found out that treating a mixture of malted barley and water at particular conditions produce a health drink product with low inherent sugar content and thereby satisfying one or more of the above said objects.

25 **Summary of the invention**

According to a first aspect of the present invention, there is provided A process for producing a malt-based product comprising the steps of subjecting a mixture comprised of malted barley and water to a heat treatment step for about 5 minutes to 30 minutes at a temperature in the range from 75°C to 95°C, wherein the

malted barley comprising of alpha (α) and beta (β) amylase in an initial amount and further wherein the remaining amount of alpha (α) amylase in the mixture at the end of 5 minutes of the heat treatment is in the range from 10 to 25% of the initial amount.

- 5 According to a second aspect of the present invention there is provided a health drink product as obtained/obtainable according to the process of the first aspect wherein the maltose content is less than 5% by weight of the product.

This and other aspects, features and advantages will become apparent to those of ordinary skill in the art from a reading of the following detailed description. For
10 the avoidance of doubt, any feature of one aspect of the present invention may be utilized in any other aspect of the invention. The word "comprising" is intended to mean "including" but not necessarily "consisting of" or "composed of." In other words, the listed steps or options need not be exhaustive. It is noted that the examples given in the description below are intended to clarify the invention and
15 are not intended to limit the invention to those examples *per se*. Similarly, all percentages are weight/weight percentages unless otherwise indicated. Except in the operating and comparative examples, or where otherwise explicitly indicated, all numbers in this description indicating amounts of material or conditions of reaction, physical properties of materials and/or use are to be
20 understood as modified by the word "about". Numerical ranges expressed in the format "from x to y" are understood to include x and y. When for a specific feature multiple preferred ranges are described in the format "from x to y", it is understood that all ranges combining the different endpoints are also contemplated.

25 Detailed description of the invention

The present invention provides a health drink product.

Health drink product is a food product preferably consumed as a beverage and constitutes good amount of nutrients. Sometimes consumer prefers to consume it as a short meal placement e.g., as breakfast replacement.

5 Malt based health drink product is the most popular in the market.

The present invention provides a process for producing a malt-based product comprising the steps of subjecting a mixture comprised of malted barley and water to a heat treatment step for about 5 minutes to 30 minutes at a temperature
10 in the range from 75°C to 95°C, wherein the malted barley comprising of alpha (α) and beta (β) amylase in an initial amount and further wherein the remaining amount of alpha (α) amylase in the mixture at the end of 5 minutes of the heat treatment is in the range from 10 to 25% of the initial amount.

15 Preferably the remaining amount of alpha (α) amylase in the mixture at the end of 5 minutes of the treatment is in the range from 12 to 25% of the initial amount, more preferably from 15 to 25% of the initial amount, furthermore preferably from 17 to 15% of the initial amount and most preferably from 20 to 25% of the initial amount.

20 Preferably, the remaining amount of beta (β) amylase in the mixture at the end of 5 minutes of the treatment is less than 12% of the initial amount, more preferably less than 10% of the initial amount, furthermore preferably less than 8% of the initial amount, even more preferably less than 6% of the initial amount and most preferably less than 5% of the initial amount.

25 The remaining amount of beta (β) amylase in the mixture at the end of 5 minutes of the treatment is preferably from 2 to 11% of the initial amount, more preferably from 2 to 8% of the initial amount, furthermore preferably from 2 to 6% of the initial amount and most preferably from 2 to 5% of the initial amount.

In the process, the temperature in the heat treatment step is preferably in the range from 80°C to 95°C, more preferably from 80°C to 90°C.

Preferably the duration of heat treatment is in the range from 5 minute to 25 minutes, more preferably from 5 minutes to 20 minutes, more preferably from 5 5 minutes to 15 minutes and most preferably from 5 to 10 minutes.

In a most preferred embodiment, the process is for producing a health drink product.

In a preferred embodiment the mixture of malted barley and water further comprises one or more starchy ingredients. Preferably the further starchy
10 ingredient is selected from wheat flour, wheat gluten, dark malt, or mixtures thereof.

Without wishing to be bound by theory it is believed that, in the temperature range as per the present invention, majority of starch in the composition hydrolysed into oligosaccharides which is easily digestible by the human body.
15 Therefore, the objective is not just about reducing sugars, it is about reducing sugars while hydrolysing the starch in a more digestible form. At the temperature range of the present invention most of the starches are hydrolysed into a digestible form. If the temperature of the process increased over 90°C (outside the claimed range) there is a possibility that most of the starch itself not
20 hydrolysed into a digestible form. This can be quantitatively measured. The temperature range of the present invention provides a diverse and particular ratio of monosaccharides, disaccharides and oligosaccharides along with short chain and long chain polysaccharides in presence of residual starch.

In a further preferred embodiment, the mixture comprises a protein. The most
25 preferred protein is soy protein.

The mixture further preferably comprises millets wherein preferably the maltose content is less than 5% by weight of the product.

The process according to the present wherein the pH of the treatment is preferably more than 4.5, more preferably more than 5 and most preferably more than 6.

In other words, the pH range of the treatment is preferably from 4.6 to 7, more preferably from 5 to 7 and most preferably from 6 to

Examples:

Two different processes were followed which are as follows:

For the purpose of the following experiments malted barley "Maltmaster" (EBC 5.0-6.0) Pale Ale malt obtained from United Kingdom (UK).

Example A

Malted barley (~10 % by weight) in filtered water was taken to prepare a starchy solution. After this, the solution was subjected to a heat treatment process as follows:

The initial temperature of the mixture was set to about 40°C.

The temperature was then set to about 65°C. It took about 20 minutes for the solution to attain temperature of 65°C. The temperature was hold there for about 40 minutes. Then the temperature was set to 75°C. It took about 20 minutes for the solution to attain temperature of 75°C. After the heat treatment process the extracted liquid was filtered and then followed by drying to obtain a dried extract (moisture content to less than 2% by weight).

Example 1

Malted barley (~10 % by weight) in filtered water was taken to prepare a starchy solution. After this, the solution was subjected to a heat treatment process as follows:

The initial temperature of the mixture was set to about 80°C. the solution was kept at this temperature for about 10 minutes.

The temperature was then set to about 65°C. It took about 20 minutes for the solution to attain temperature of 65°C. The temperature was hold there for about 5 40 minutes. Then the temperature was again increased to 75°C. It took about 20 minutes for the solution to attain temperature of 75°C. After the heat treatment process the extracted liquid was filtered and then followed by drying to obtain a dried extract (moisture content to less than 2% by weight).

- 10 The extracts obtained in Example A and Example 1 were then evaluated for their alpha amylase and beta amylase content using the following protocol.

Methodology for alpha and beta amylase enzyme activity:

- Alpha & Beta amylase activity measurement of the samples was performed
15 using BETAMYL-3 and CERALPHA methods. For this purpose, MALT-AMYLASE kit was obtained from Megazymes (K-MALTA 07/20).

Enzyme extraction was carried as mentioned below:

- 5g of samples was taken in a 50mL Tarson tube. After that 5.0 mL of Betamyl-
20 3® buffer A (part of the kit) was added. This was then vortexed briefly for about 5 seconds. This solution was then incubated for 1h at room temperature (around 25°C). After that it was again vortexed. It was then centrifuged at about 6800 G for 10 minutes. The supernatant was then collected. After that 0.2mL of the supernatant was taken and 4 mL of diluted Betamyl-3® buffer B (part of the
25 kit) was added. It was again vortexed to obtain Extract A (Crude Enzyme Extract). This crude enzyme extract was then used for the assay of both α -amylase and β -amylase as described below:

Assay of β -Amylase:

- 30 0.2 mL of Extract A was taken followed by addition of 0.2 ml of Betamyl-3® substrate solution (provided with the kit and was pre-incubated at 40°C for 5

minutes). The mixture was then vortexed. This was then incubated at 40°C for 10 minutes. After this, 3.0 mL of stopping reagent was added to the mixture and vortexed. For this purpose, stopping reagent prepared by dissolving 10 g of Tris buffer in 900 mL of distilled water. Adjust the pH to 8.5 & makeup the volume to 5 1L.

The absorbance of the reaction solutions and the reagent blank was taken at 400 nm against distilled water for the determination of β -Amylase content.

Assay of α -Amylase:

10 0.2 mL of Extract A was taken and 3.0 mL of diluted Ceralpha® Buffer A (provided with the kit) was added. After that 0.2 mL of this solution was taken in a test tube followed by additional of Ceralpha® substrate solution (provided with the kit and was preincubate at 40°C for 5min). The mixture was then vortexed. This was then incubated at 40°C for 10 minutes. After this, 3.0 mL of stopping
15 reagent was added to the mixture and vortexed. For this purpose, stopping reagent prepared by dissolving 10 g of Tris buffer in 900 mL of distilled water. Adjust the pH to 8.5 & makeup the volume to 1L.

The absorbance of the reaction solutions and the reagent blank was taken at 400 nm against distilled water for the determination of α -Amylase content.

20

The results are summarized in below table 1:

Table 1:

Example	α -Amylase initial amount (Enzyme Units/10g solution)	β -Amylase initial amount (Enzyme Units/10g solution)	α -Amylase after 5 mins of treatment (Enzyme Units/10g solution)	β -Amylase after 5 mins of treatment (Enzyme Units/10g solution)
A	178	42	177.1	41.3
1	178	42	27.6	1.7

From Table 1 it is evident that that there is hardly any change in the enzyme activity for the control process (Example A) after 5 minutes of the treatment. However, in case of example within the purview of the present invention the enzyme is substantially reduced in the solution. As per the Table 1, for Example 1 α -Amylase after 5 minutes is 23.20% (of initial amount) and β -Amylase is 4.05% (of the amount).

Example A and Example 1 was then measured for its sugar content using the protocol as described below:

10

Samples were tested for simple sugars using AACC 80-04.01 test methodology validated for malt-based beverages. Test method involves separation and quantification of fructose, glucose, sucrose, maltose, and lactose by high-pressure liquid chromatography system (Make: Perkin Elmer Series 200) after aqueous extraction from sample matrix and dilution with water-miscible mobile-phase. The sample dilutions were prepared according to the sugar content present in the matrices tested. Freshly prepared working standards (Fructose, Glucose, Sucrose, Maltose, Lactose) were used. Mobile phase was prepared by combining acetonitrile and distilled water (80:20 v/v). The samples were low fat hence the extraction procedure for low fat sample was followed in aqueous solution after sonication. Sample solutions were adjusted approximately 3-5 g to ensure good peak separation. System suitability checks such as theoretical plates, tailing factor and resolution were performed at the start of analysis. Diluted aqueous extracts were filtered and injected in the HPLC system with RI Detector, using supelcosil amino column, with 1 mL flow rate, at 30° C column temperature, for 50 minutes run time. Data was acquired from Chromera software and individual sugar content was calculated using a peak height of reference standard and peak height of sugar in the sample. Elution was in the order of fructose, glucose, sucrose, maltose, and lactose. The results are summarized below in Table 2.

15
20
25
30

Table 2:

Example	Total sugar (g/100g of solution)
A	4.99
1	1.91

From the above Table, it is evident that the sugar content in Example A is much higher than the sugar content in Example 1. In other words, the example within
5 the scope of the present invention (Example 1) produces a health drink product with inherently low sugar content.

Claims

1. A process for producing a malt-based product comprising the steps of subjecting a mixture comprised of malted barley and water to a heat treatment step for about 5 minutes to 30 minutes at a temperature in the range from 75°C to 95°C, wherein the malted barley comprising of alpha (α) and beta (β) amylase in an initial amount and further wherein the remaining amount of alpha (α) amylase in the mixture at the end of 5 minutes of the heat treatment is in the range from 10 to 25% of the initial amount.
2. The process according to claim 1 wherein the remaining amount of beta (β) amylase in the mixture at the end of 5 minutes of the treatment is less than 12% of the initial amount.
3. The process according to any one of the preceding claims 1 or 2 wherein the temperature in the heat treatment step is in the range from 80°C to 95°C.
4. The process according to claim 3 wherein the temperature in the heat treatment step is in the range from 80°C to 90°C.
5. The process according to any one of the preceding claims wherein the pH of the treatment is more than 4.5.
6. The process according to any one of the preceding claims 1 or 2 wherein the process is for producing a health drink product.
7. The process according to any one of the preceding claims wherein the mixture further comprises one or more starchy ingredients.

8. The process according to claim 4 wherein the other starchy ingredient is selected from wheat flour, wheat gluten, dark malt, or mixtures thereof.
9. The process according to claim 1 wherein the mixture further comprises a protein.
10. The process according to claim 5 wherein the protein is soy protein.
11. The process according to any one of the preceding claims wherein the mixture further comprises a millet.
12. A health drink product as obtained/obtainable according to the process as claimed in any one of the preceding claims 1 to 10 wherein the maltose content is less than 5% by weight of the product.

INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER					
INV.	A23L7/20	A23L2/38	A23L2/39	A23L2/46	A23L2/66
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ADD.					
According to International Patent Classification (IPC) or to both national classification and IPC					
B. FIELDS SEARCHED					
Minimum documentation searched (classification system followed by classification symbols) A23L C12C					
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched					
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal					
C. DOCUMENTS CONSIDERED TO BE RELEVANT					
Category*	Citation of document, with indication, where appropriate, of the relevant passages				Relevant to claim No.
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☒ Further documents are listed in the continuation of Box C.					
☒ See patent family annex.					
* Special categories of cited documents :					
"A" document defining the general state of the art which is not considered to be of particular relevance			"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention		
"E" earlier application or patent but published on or after the international filing date			"X" document of particular relevance;; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone		
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"O" document referring to an oral disclosure, use, exhibition or other means			"&" document member of the same patent family		
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Date of the actual completion of the international search 18 September 2024			Date of mailing of the international search report 01/10/2024		
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016			Authorized officer Bender, Pia		

INTERNATIONAL SEARCH REPORT

International application No

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Information on patent family members

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