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(54) Title: EFFERVESCENT CARAMEL PRODUCT

(57) Abstract: An effervescent caramel product having an aerated texture and producing effervescence in contact with saliva in mouth comprising a caramel having a water activity of from about 0.2 to 0.5 blended with a mixture comprising a water-soluble organic acid and a carbonate or bicarbonate capable of reacting to liberate carbon dioxide.

EFFERVESCENT CARAMEL PRODUCT

The present invention relates to an effervescent caramel product and a process for its manufacture.

BACKGROUND OF THE INVENTION

5 JP 74004377 B describes caramel sweets giving off carbon dioxide bubbles upon contact with saliva. Confectionaries with a very fresh taste are obtained by (1) mixing solid powdered acids (e.g. citric, tartaric) with water or ethanol; (2) drying and pulverizing; (3) mixing a solid carbonate (e.g. NaHCO_3) with water and binder; (4) mixing the acid and carbonate powders; (5) passing through a double-axle roller to form
10 half-dry thin sheets, and damping with ethanol; (6) coating with diluent salts and forming into a foamed powder using a pneumatic pulverizer, (7) mixing sugar, millet jelly, condensed milk, wheat flour, milk, etc. and boiling down to a caramel; (8) adding the powder obtained in step (6) to the caramel at 37-45°C; and (9) cooling to give the product of the invention. In this process, a standard caramel is used having a water
15 activity (a_w) of about 0.7, i.e. it contains a high free water content. Since the effervescent powder is highly reactive with free water, it is protected by encapsulation with diluent salts to give the foamed powder (6) which is added to the caramel. If the effervescent powder were not protected, it would react with the free water present in the caramel over time, e.g. during storage and its effervescent effect would be reduced or
20 lost before it reached the consumer.

Any discussion of the prior art throughout the specification should in no way be considered as an admission that such prior art is widely known or forms part of common general knowledge in the field.

25 Unless the context clearly requires otherwise, throughout the description and the claims, the words 'comprise', 'comprising', and the like are to be construed in an inclusive sense as opposed to an exclusive or exhaustive sense; that is to say, in the sense of "including, but not limited to".

SUMMARY OF THE INVENTION

30 We have found that by using a caramel having a water activity (a_w) of about 0.2 to 0.5, thus having a reduced free water content, the effervescent powder can be used

without encapsulation and the product has a long shelf life without substantial loss of the effervescent effect. In this invention, the word "effervescent" is meant to include "fizzy" or "releasing carbon dioxide bubbles" or other similar effects.

Accordingly, in its first aspect the present invention provides an effervescent
5 caramel product having an aerated texture and producing effervescence in contact with saliva in mouth comprising a caramel having a water activity of from about 0.2 to 0.5 blended with a mixture comprising a water-soluble organic acid and a carbonate or bicarbonate capable of reacting to liberate carbon dioxide.

In its second aspect, the present invention also provides for a process for
10 preparing an effervescent caramel product which comprises selecting a caramel having a low water activity of from about 0.2 to 0.5 and blending the caramel with a mixture comprising an organic acid and a solid carbonate or bicarbonate base for a sufficient time to distribute the mixture in the caramel and form the effervescent caramel product.

In its third aspect, the present invention provides for a process for preparing an
15 effervescent powdered mixture which comprises feeding the ingredients of an organic acid and a solid carbonate or bicarbonate base to an apparatus comprising a vessel which rotates the ingredients about an axis while simultaneously granulating the rotating ingredients with rotating blades, with the speed of rotation of the ingredients and of the blades being chosen to obtain a powder mixture of the desired particle size.

20 The invention also provides for an effervescent caramel product obtained by the process of the second aspect of the invention.

Lastly, the invention provides for an effervescent powdered mixture obtained by the process of the third aspect of the invention.

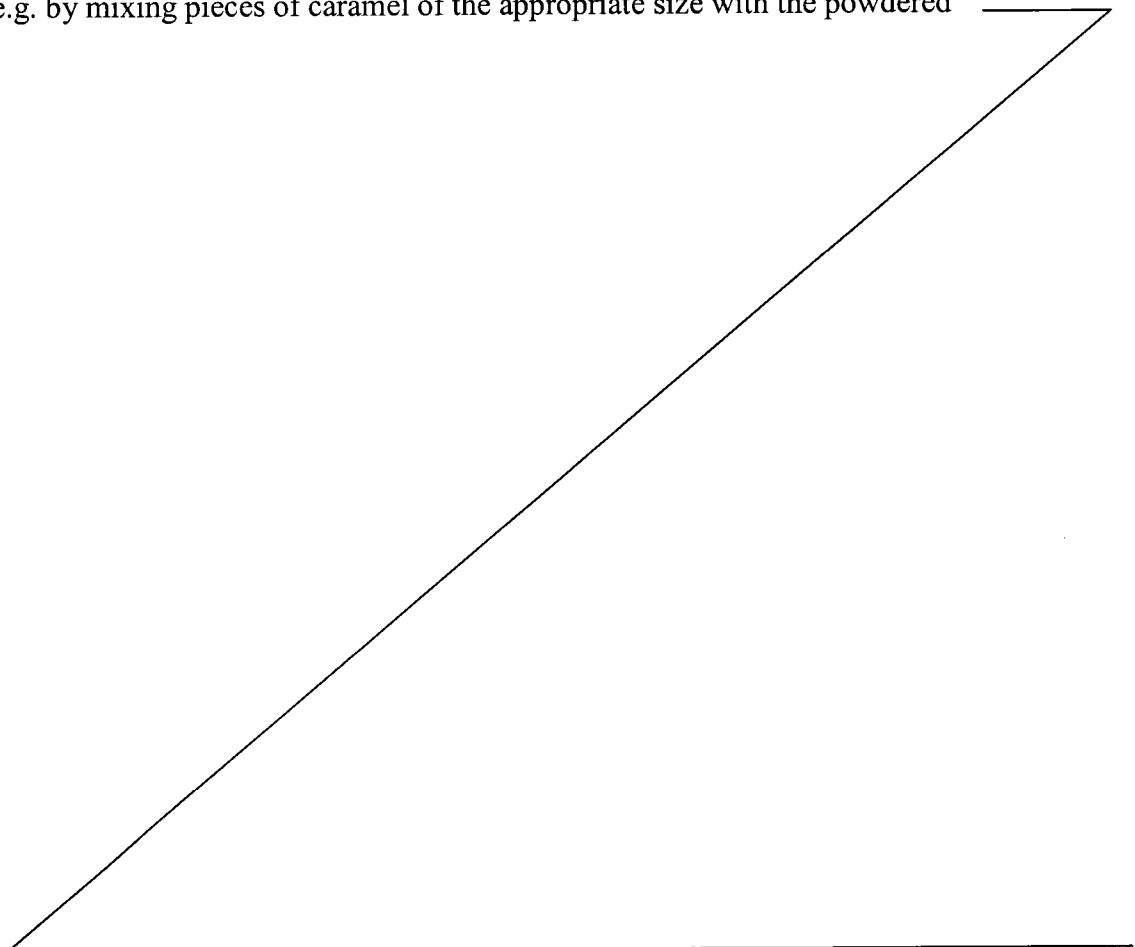
Caramels comprise as basic ingredients, sugar, glucose syrup, milk protein, fat
25 salt and water. The term caramel may include toffee and formulations well known to those skilled in the art and are described, for example, in Sugar Confectionery Manufacture, Second Edition, 1995, edited by E.B. Jackson, Blackie Academic and Professional, Chapter 8 and page 289. The water activity of the caramel is preferably from 0.3 to 0.4. For clarity, it should be understood that the term "caramel" excludes
30 products made by the breakdown of carbohydrate by heat or heat and alkali treatment, which products are predominantly used as colouring materials.

The mixture comprising an organic acid and a solid carbonate or bicarbonate base capable of reacting to liberate carbon dioxide is preferably in the form of a powder

when it is blended with the caramel. The ratio of acid to base should be chosen to provide a mixture which is capable of effervescing and is preferably about 50:50. Preferred organic acids are citric acid and tartaric acid. The preferred base is sodium bicarbonate. The mixture advantageously contains from 2 to 25% by weight and preferably from 5 to 20% by weight of a hydrogenated fat based on the weight of the mixture. Examples of hydrogenated fats include commercially available fats such as Biscuitine N from Loders-Crooklaan and Confao 12 from Aahrus Olie. Hydrogenated fats may be prepared by a process well-known in the oils & fats industry using hydrogen under pressure to modify the molecular structure of the fat to obtain various advantages such as lower melting point, better mouthfeel etc.

The amount of the mixture comprising an organic acid and a solid carbonate or bicarbonate base blended with the caramel may be from 2 to 25% by weight and preferably from 5 to 20% by weight based on the total weight of the effervescent caramel product.

The caramel may be blended with the mixture comprising an organic acid and a solid carbonate or bicarbonate base by mixing methods known to those skilled in the art, e.g. by mixing pieces of caramel of the appropriate size with the powdered



mixture comprising an organic acid and a solid carbonate or bicarbonate base in a dough mixer to form a paste, cooling and layering to the required thickness and cutting to the required dimensions, e.g. using a dough cutter.

5 The effervescent powdered mixture comprising an organic acid and a solid carbonate or bicarbonate base may be manufactured by any method standard to a person skilled in the art but preferably by a novel method using an apparatus which rotates the ingredients while simultaneously granulating the rotating ingredients with rotating blades.

10

Accordingly, the present invention provides a process for preparing an effervescent powdered mixture comprising a fatty acid and a solid carbonate or bicarbonate base characterised in that the ingredients are fed to an apparatus comprising a vessel which rotates the ingredients about an axis while
15 simultaneously granulating the rotating ingredients with rotating blades, the speed of rotation of the ingredients and of the blades being chosen to obtain a powder of the desired particle size.

A suitable vessel is a bowl cutter (also known as a bowl chopper) which is a well
20 known machine developed for and supplied to the meat industry.

Conveniently, the fatty acid and the base are added to the vessel and blended by the mixing action of the vessel and heated to from 55° to 70°C, preferably from 60° to 65°C. The hydrogenated fat is melted and added, e.g. by spraying or
25 pouring onto the dry blend in the vessel, to the heated blend in the vessel and dispersed in the dry blend by the mixing action of the vessel. The mixture of organic acid, base and hydrogenated fat is then cooled, e.g. to from about 20° to 40°C. The powder is conveniently added at room temperature to the caramel.

30 In this invention, during the contacting with the rotating blades, the ingredients may be mixed, the particle size of the ingredients may be reduced by grinding and particles, which may or may not have been previously ground, may be granulated to form agglomerates.

35 Conveniently, the ingredients are rotated about a first axis and the blades are rotated about a second axis in a different plane to the first axis, for instance

perpendicular to the first axis. Preferably, the first axis is vertical as that the ingredients are rotated substantially horizontally and the blades are rotated about a horizontal axis.

5 The vessel may be rotated at any suitable speed. It will be appreciated that speeds which are too low may not give adequate performance within acceptable times while speeds which are too high would provide no real benefit for the additional energy consumption. Also, optimum speeds may vary depending upon the nature of the ingredients, the amount of ingredients, and other process parameters.
10 However a speed of 2 to 30 rpm would generally be acceptable. For example the speed may be about 5 to 25 rpm; particularly about 10 to 20 rpm.

The blades may be rotated at any suitable speed to achieve adequate granulation of the ingredients. Optimum speeds will vary depending upon the nature of the
15 ingredients, the amount of ingredients, the number of blades, and other processing parameters. However the optimum speed can be readily determined by the person skilled in the art for any particular application. It will be appreciated that speeds which are too low will not give adequate granulation within acceptable times. Speeds which are too high, however, would unnecessarily consume energy for
20 little benefit and would also make control of the process more difficult. The speeds may also vary with time to adjust to the different ingredients as they are added. For example, speeds in the range of 20 rpm to 10,000 rpm may be used, and preferably from 2000rpm to 5000rpm.

25 The number of blades used may also be selected as desired e.g. from 1 to 8 blades. However the use of too few blades may not give sufficiently high granulating rates. Too many blades on the other hand may cause the ingredients mixture to stick in between adjacent blades. When an even number of blades is used, the blades may be arranged in pairs, each pair fitted on a central axis of rotation 2 to 8
30 blades and preferably 4 to 6 blades are found to be acceptable for most applications; especially 6 blades arranged in three pairs of two blades. Of course, in very large scale operations, more blades may be used.

35 The vessel for rotating and granulating of the ingredients may have a capacity of from about 10 to 1000 litres. As stated above, a suitable apparatus is a bowl cutter

and commercial bowl cutters usually have capacities from about 50 to 750 litres or more.

Typically, a bowl cutter consists of a half-torroid shaped bowl capable of revolving slowly around vertical axis e.g. from 5 to 30 rpm and typically from 10 to 20 rpm, in which a set of three rotary knife blades revolve about a horizontal axis extending radially inward from the circumference of the bowl. A steel lid lowers over the back half of the bowl, enclosing the blades to form a cutting chamber. As the bowl rotates, the material in the bowl is continuously transported through the cutting chamber a set number of times as determined by the number of bowl revolutions. The intensity of granulating/mixing is determined by the speed of knife rotation. Since this is variable over a large range (0-6500 rpm) the bowl cutter has an extremely versatile capability. On a machine having a capacity of 60 litres there were 6 knives of 350 mm diameter, giving a tip-speed of 120 m/sec. at 6500 rpm. For a machine having a capacity of 200 litres a tip-speed of 120 m/sec. was obtained at 4150 rpm. The construction is of stainless steel, and is hose-proof for wet cleaning.

The preparation of the effervescent powder used in this invention will now be described, by way of example only, with reference to the drawing in which:

Figure 1 is a perspective, part view of an apparatus for carrying out the process, and

Figure 2 is a transverse section through the blade shaft to show a pair of blades.

The apparatus consists of a mixing bowl 2 which is arranged to be upwardly open. The bottom surface of the bowl 2 is connected by a shaft (not shown) to a suitable drive mechanism 4 which is able to rotate the bowl 2 in the direction of arrow A about a vertical axis. The drive mechanism 4 may include a speed adjustment system by means of which the speed of rotation of the bowl 2 may be set to a desired value.

In the hollow 6 of the bowl 2, a central projection 8 extends upwardly from the bottom of the bowl 2 along the axis of rotation of the bowl 2. The central projection 8 curves outwardly with increasing depth into the hollow 6 of the bowl

2. The central projection 8 ensures that the ingredients in the bowl 2 rotate with the bowl 2 rather than falling into the centre of the bowl 2.

5 A blade shaft 10 extends radially inwardly over the opening of the bowl 2, from the circumference of the bowl 2 to just short of the central projection 8. The axis of rotation of the blade shaft 10 is vertical and perpendicular to the axis of rotation of the bowl 2. The blade shaft 10 is connected to a suitable drive mechanism (not shown) to rotate the blade shaft 10 in the direction of arrow B. The drive
10 mechanism includes a speed adjustment system (not shown) by means of which the speed of rotation of the blade shaft 10 may be set to a desired value.

15 Three pairs of cutting blades 12 are fixed onto the blade shaft 10 with each blade 12 at an angle of 60° to each adjacent pair of blades 12. The blades 12 are of length so that, at their deepest projection into the bowl 2, they almost reach the bottom of the bowl 2.

The bowl 2 has a suitable covering (not shown) to prevent the ingredients from being expelled from the bowl 2 during processing.

20 The apparatus is commercially available and suitable examples are SEYDELMANN series of mixer/cutters obtainable from Maschinen fabrik Seydelmann KG, D-7000 Stuttgart.

The following Examples further illustrate the present invention. Parts and percentages are given by weight.

Example 1

5

An effervescent powder is prepared in the following manner:

1. Blend 900 parts sodium bicarbonate and 900 parts citric acid together in a bowl cutter.
2. Heat up the blend in the bowl cutter up to 63°C.
3. Melt 200 parts hydrogenated fat up to 75°C while the dry blend is being heated
4. Spray or pour the fat onto the dry blend in the bowl cutter. The fat is dispersed using the mixing action of the bowl cutter
5. Cool the mixture to 34°C to obtain the effervescent powder.

Example 2

A caramel is prepared from the following ingredients by the method indicated:

	%
Invert syrup 74% TS	15.8
Sweetened Skimmed Condensed Milk	8.4
Fat (eg.CBE (Illexao 30/69))	10.8
Glucose syrup 63 DE	61.8
Glycerol	2.4
Salt	0.8
Total	100.00
Yield	82.00

1. Melt the CBE
2. Add CBE to all other ingredients
3. Pour into a BCH pan manufactured by BCH which is a steam heated vessel with a strong mixing mechanism that helps to mix and heat a product at the same time and mix at speed 12.

25

4. Switch ventilation on and cook up to 128°C
5. When 128°C is reached turn the steam off and pour the caramel into a bucket
6. Spread the caramel on a cold metal table and leave to cool

5 The effervescent powder is prepared from the effervescent powder and the caramel prepared above as follows:

1. Cut the caramel into pieces of 8 to 10 centimetres
2. Put into the dough mixer (Z-arm mixer) with the effervescent powder and start
10 at slow speed
3. Leave to mix
4. When the mix becomes a smooth, golden paste state with no traces of the powder left, stop and take the caramel out of the mixer.
5. Put it on a table and layer it to the required thickness between two metal slats
15 and with a metal pin
6. Using a dough cutter, cut out pieces of the fizzy caramel to the required dimensions.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. An effervescent caramel product having an aerated texture and producing effervescence in contact with saliva in mouth comprising a caramel having a water activity of from about 0.2 to 0.5 blended with a mixture comprising a water-soluble organic acid and a carbonate or bicarbonate capable of reacting to liberate carbon dioxide.
5
2. An effervescent caramel product according to claim 1 wherein the mixture is in the form of a dry encapsulated powder that is blended with the caramel.
3. An effervescent caramel product according to claim 1 or claim 2 wherein the
10 organic acid is citric acid or tartaric acid and the base is sodium bicarbonate.
4. An effervescent caramel product according to any one of the preceding claims wherein the mixture comprising an organic acid and a solid carbonate or bicarbonate base contains from 2 to 25% by weight of a hydrogenated fat based on the weight of the powder mixture and fat.
- 15 5. An effervescent caramel product according to any one of the preceding claims wherein the amount of the mixture is from 2 to 20% by weight based on the total weight of the effervescent caramel product.
6. A process for preparing an effervescent caramel product which comprises selecting a caramel having a low water activity of from about 0.2 to 0.5 and blending the
20 caramel with a mixture comprising an organic acid and a solid carbonate or bicarbonate base for a sufficient time to distribute the mixture in the caramel and form the effervescent caramel product.
7. A process according to claim 6 which comprises mixing pieces of caramel of the appropriate size with a dry powdered mixture that is not encapsulated in a dough mixer
25 to form a paste, cooling and layering the paste to a desired thickness and cutting the paste thickness to form caramel products of required dimensions.
8. A process according to claims 6 or claim 7 wherein the organic acid is citric acid or tartaric acid and the base is sodium bicarbonate.
9. A process according to claim 6 wherein the mixture contains from 2 to 20% by
30 weight of a hydrogenated fat based on the weight ratio of the effervescent caramel product.

10. A process according to claim 6 wherein the amount of the mixture is present in an amount of from 2 to 20% by weight based on the total weight of the effervescent caramel product.
11. A process for preparing an effervescent powdered mixture which comprises
5 feeding the ingredients of an organic acid and a solid carbonate or bicarbonate base to an apparatus comprising a vessel which rotates the ingredients about an axis while simultaneously granulating the rotating ingredients with rotating blades, with the speed of rotation of the ingredients and of the blades being chosen to obtain a powder mixture of the desired particle size.
- 10 12. A process according to claim 11 wherein the vessel is a bowl cutter.
13. A process according to claim 11 or claim 12 wherein the organic acid and the base are added to the vessel and blended by the mixing action of the vessel and heated to 55° to 70°C, a hydrogenated fat is melted and added to the heated dry blend in the vessel, and dispersed in the dry blend by the mixing action of the vessel, after which the mixture
15 of organic acid, base and hydrogenated fat is then cooled.
14. A process for preparing an effervescent caramel product which comprises selecting a caramel product having a low water activity of from about 0.2 to 0.5; blending the caramel with the powder mixture of any one of claims 11 to 13 for a sufficient time to distribute the mixture in the caramel and form the product.
- 20 15. A process according to claim 14 which comprises mixing pieces of caramel of the appropriate size with the powdered mixture in a dough mixer to form a paste, cooling and layering the paste to a desired thickness and cutting the paste thickness to form effervescent caramel products of desired dimensions.
16. A process according to claim 14 wherein the organic acid is citric acid or tartaric
25 acid and the base is sodium bicarbonate in the powder mixture.
17. A process according to any one of claims 14 to 16 wherein a hydrogenated fat is melted and added to the powder mixture and then cooled prior to mixing with the caramel.
18. A process according to claim 17 wherein the mixture contains from 2 to 25% by
30 weight of the hydrogenated fat based on the weight of the powder mixture and fat.
19. A process according to any one of claims 14 to 18 wherein the amount of the powder mixture is present in an amount of from 2 to 20% by weight based on the total weight of the effervescent caramel product.

20. Effervescent caramel product obtained by the process of any one of claims 6 to 10.
21. Effervescent powdered mixture obtained by the process of any one of claims 11 to 13.
22. An effervescent caramel product substantially as herein described with reference
5 to any one of the embodiments of the invention illustrated in the accompanying drawings and/or examples.
23. A process of preparing an effervescent caramel product substantially as herein described with reference to any one of the embodiments of the invention illustrated in the accompanying drawings and/or examples.
- 10 24. A process for preparing an effervescent powdered mixture substantially as herein described with reference to any one of the embodiments of the invention illustrated in the accompanying drawings and/or examples.
25. Effervescent powdered mixture obtained by a process of the invention substantially as herein described with reference to any one of the embodiments of the
15 invention illustrated in the accompanying drawings and/or examples.

DATED this 31st day of AUGUST, 2005

Shelston IP

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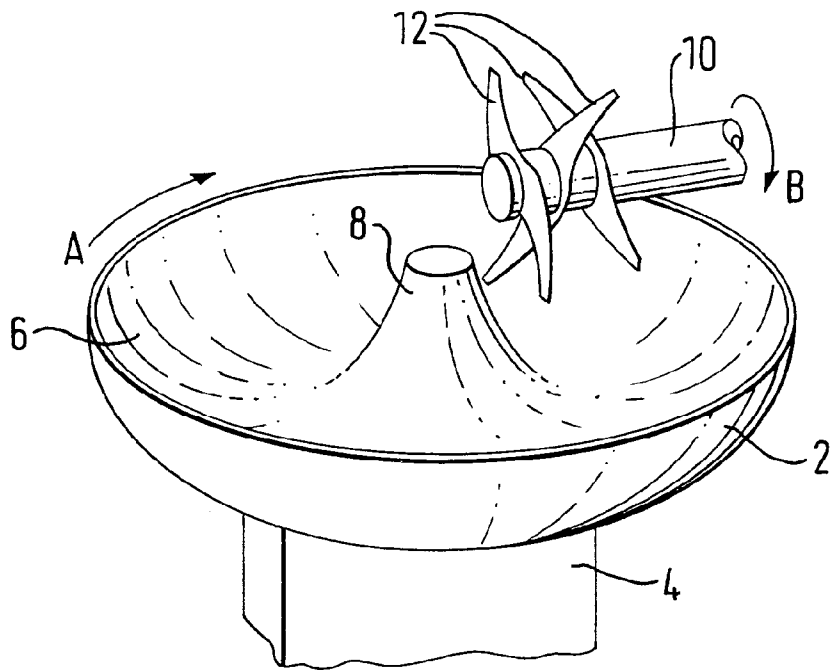


FIG. 1

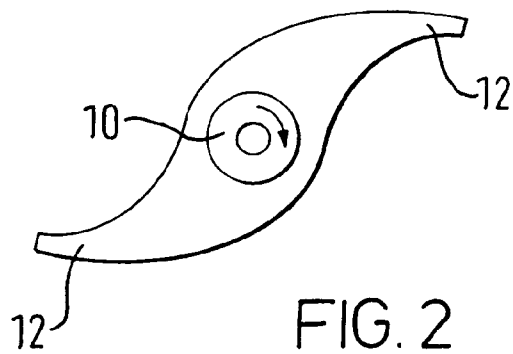


FIG. 2