

A BINDER COMPOSITION PREPARATION FOR USE IN READY-TO-EAT HEALTH SNACK FOOD AND A METHOD OF PREPARATION THEREOF

Field of the invention

The present invention relates to a binder composition for use in ready to eat health snack foods and to a process for the preparation of said composition.

Background of the invention

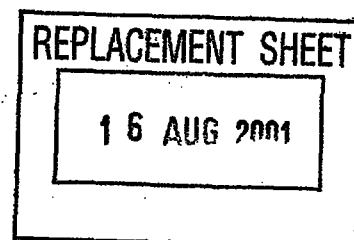
Snack foods are easily consumed, readily available small sized products, in liquid or solid form, requiring little or no preparation for consumption. Cereal and granola bars are popular snack items. Snack items have not been generally regarded as true foods and their nutritive value has been rarely emphasized. The tendency to consume more nutritious foods has led to the development of new snack foods such as chocolate covered cereal bars, or those containing dry fruits and nuts. Mixtures of nutmeats, cereals and/or dried or sugar-infused fruits have also become popular snacks or quick energy foods.

In view of the popularity of snack foods, they can be an ideal medium to provide nutritional supplements. The protein and vitamin content can be enriched in order to enhance energy content. Such snack foods could play an important role in physical and mental well being of both children and adults.

Mixtures containing nuts, cereals, such as granola, and fruit are referred to as "trail mixes". Due to difficulties associated in packaging and preserving such loose mixtures of differently textured and sized ingredients, methods have been sought to bind the various ingredients into food bars which are convenient to handle and consume and which may be easily packaged, shipped and displayed.

Several types of binding matrix have been used to produce snack foods of this nature. One example of this food is the nut bar which typically consists of nutmeats bound together by an edible matrix. The most common matrix for this type of food bar is formed almost entirely of sucrose which is applied to the nuts as a syrup and which becomes crystalline upon evaporation of the water. Such food-bars rapidly develop a crunchy, crisp texture on storage.

The granola bars, which is another form of a ready-to-eat food bar typically consists of a major portion of granola, e.g. rolled oats and/or wheat, and minor amounts of fruit and/or nuts. These bars are commonly bound by a baked matrix comprising crumbs of the cereal product saturated with sugar and vegetable oils. Such bars might also contain processed cereals such as puffed wheat or rice. These bars have dry and friable texture.



In some snack foods, spongy and sticky texture is achieved by using gelatin-based binders. A binder can also acquire its binding properties with the use of jaggery, citric acid, glucose syrup, and polyols.

Jaggery a dark, coarse, unrefined sugar (sometimes referred to as palm sugar) can be made either from the sap of various palm trees or from sugar-cane juice. It is made by crushing the canes and evaporating the juice by boiling. It is primarily used in India, where many categorize sugar made from sugar cane as jaggery and that processed from palm trees as *gur*. Jaggery has a sweet, wine like fragrance and flavour that lends distinction to whatever food it embellishes. Jaggery contains more than 90% sucrose. Similar to sugar, jaggery when heated in water can be formed into a syrup of varying concentrations and binding properties.

Citric acid occurs naturally in lemon juice. Citric acid can be used to bring about inversion of sucrose. In this process sucrose, which is a disaccharide, can be broken down into a mixture of two monosaccharides, known as glucose and fructose. This is also called as invert sugar. This reaction can be induced deliberately as a means of developing desirable characteristics in a sweetmeat. An example is where significant quantities of invert sugar are required in a syrup phase to produce a flowing eating texture. Since invert sugar contains fructose it enhances the sweetness of the product in which it is present.

Glucose syrup is produced continuously in high volume refineries or by batch processes. The starting material may be from any food grade starch mainly maize or potato. Conversion to glucose syrup is by acid hydrolysis or enzymatic techniques. Different specifications of glucose syrup have functionalities which allow high-boiled sweet manufacturing ranging from batch to continuous and depositing methods. Glucose syrup is a very versatile material. It adjusts the plasticity of the cooked mass before forming sweets shapes and cooked syrup viscosity before depositing. A wide variety of glucose syrups are available for use in toffees, and although their properties vary considerably they all have the same effect on sugar solubility. The main differences are the effects on texture and sweetness.

Sorbitol is a naturally occurring sugar alcohol found in certain edible fruits, vegetables, and berries. It is manufactured by catalytic hydrogenation of glucose. In many countries sorbitol is used as a sweetener in various food applications. They also have emulsifying, stabilising, humectancy and thickening properties. Sorbitol is available in both crystalline and liquid form.

Reference is made to Glenn D. LaBaw, and Stephen E. Meyer (US Patent 4784867) wherein food ingredients such as nuts, fruits, cereals and the like are made into bars using

binder composition of water, fat, sucrose and partially caramelized non-crystallizing sugar. The draw back of the binder is that it produces flexible and moist bars.

Reference is made to Milton L. Cook, William L. Keyser, Paul Swanson, Michael W. Zielke and Walter J. Zielinski (US Patent 4451488) wherein a food bar is made using a binder comprising of at least two polyhydric alcohols in varying ratios are used. The draw back of the binder is it produces product with soft and chewy texture.

Reference is made to Vernon H. Ode (US Patent 3903398) wherein a ready-to-eat food bar is prepared using a binder consisting of a sweetened, low moisture whole milk product. The drawback is the binder imparts a chewy texture to the food bar.

Reference is made to James R. Hayward, William L. Keyser and Walter J. Zielinski (US Patent 4145448) wherein gelatin-based marshmallow-type matrices are used to bind cereal products and vitamins. The drawback is such products are spongy and sticky in texture.

Reference is made to US Patent No. 4055669 wherein a ready-to-eat granola bar consisting of rolled oats and wheat, and minor amounts of fruit and nuts. The binding is achieved using crumbs of a cereal product saturated with sugar and vegetable oils. The drawback is these bars are typically dry and friable in texture.

Objects of the invention

The main object of the present invention is to provide a binder composition preparation for use in ready to eat health snack food.

Another object of the present invention is to provide a binder which contains jaggery syrup and acts to bind a health snack food.

Yet another object of the present invention is to provide a binder which will preserve the texture and moistness of the product.

Summary of the invention

Accordingly the present invention provides a binder composition for use in a ready to eat health snack food, said binder composition comprising:

- (a) Jaggery - 30.0 to 35.0 wt %
- (b) crystalline citric acid - 0.015 to 0.030 wt %
- (c) Liquid glucose 0.60 to 1.20 wt %
- (d) Liquid sorbitol 1.10 to 2.10 wt %
- (e) Water 30 to 40 wt %

The invention also relates to a process for the preparation of a binder composition, said process comprising, (i) powdering jaggery, (ii) dissolving the powdered jaggery in 30-40% water, (iii) heating to 55 - 65°C to dissolve all the jaggery, (iv) straining the dissolved

jaggery through 120 – 150 μ sieve twice to remove any foreign matter, (v) adding 0.015 to 0.30% citric acid to the dissolved and strained jaggery solution, (vi) adding 0.60 to 1.20% liquid glucose to the dissolved and strained jaggery solution, (vii) heating the dissolved and strained jaggery solution containing citric acid and liquid glucose to 74-82° Brix, (viii) adding 1.10 to 2.10% liquid sorbitol to the hot jaggery syrup, to obtain the said binder composition.

In another embodiment of the invention jaggery is dissolved in 32 – 38% water at 58 – 62°C.

In yet another embodiment of the invention the dissolved jaggery is strained through 130 – 140 μ sieve.

In still another embodiment of the invention 0.016 to 0.026% citric acid is added to the dissolved and strained jaggery solution.

In still another embodiment of the invention 0.64 to 1.14% liquid glucose is added to the dissolved and strained jaggery solution.

In yet another embodiment of the invention dissolved and strained jaggery solution containing citric acid and liquid glucose is heated till the syrup acquires a total solid content of 79 – 81° Brix.

In yet another embodiment of the invention 1.20 to 2.00% liquid sorbitol is added to the hot jaggery syrup at 100 – 110°C.

The composition of the invention is a synergistic composition with properties over and above those of the aggregate properties of the individual ingredients.

Detailed description of the invention

The present invention provides a novel composition for use a binder for use in ready to eat health snacks comprising a mixture of jaggery, citric acid, liquid glucose, and liquid sorbitol at optimum levels, combinations and temperature.

The following examples are given by way of illustration of the present invention and therefore should not be construed to limit the scope of the present invention.

EXAMPLE 1

Ingredients and quantity used in the following example are given below.

Ingredient	Quantity (g)
Jaggery	30.0
Citric acid (crystalline)	0.016
Liquid glucose	0.64
Liquid sorbitol	1.20
Water	10.0

In the present example 30.0 g jaggery was powdered in a hammer mill and dispersed in 10 ml water. The jaggery solution was heated to 60°C to completely dissolve all the jaggery. This solution was strained through a 135 μ sieve to remove all the foreign material present in the jaggery solution. To the strained jaggery solution 0.016 g of crystalline citric acid dissolved in 5 ml water was added. To the above solution 0.64 g of liquid glucose was also transferred. The above mixture containing jaggery, citric acid and liquid glucose was heated until the total solid content of this solution, when measured in a refractometer, was 80° Brix. At this stage the jaggery solution is converted to a syrup form. To the above jaggery syrup 1.20 g of liquid sorbitol was added maintaining the temperature of the jaggery syrup at 110°C. This forms the binder for use in a ready to eat health snack food.

The above binder at 110° C was added to the ready- to-eat health snack food premix and processed as described in the co-pending patent application _____.

The tablets obtained using the above binder were fragile having a breaking strength of 1.0 kg. Sensory studies showed that texture of the tablets were not acceptable.

EXAMPLE 2

Ingredients and quantity used in the following example are given below.

Ingredient	Quantity (g)
Jaggery	33.62
Citric acid (crystalline)	0.021
Liquid glucose	0.84
Liquid sorbitol	1.37
Water	12.0

In the present example 33.62 g of jaggery was powdered in a hammer mil and dispersed in 12 ml water. The jaggery solution was heated to 60°C to completely dissolve all the jaggery. This solution was strained through a 135 μ sieve to remove all the foreign material present in the jaggery solution. To the strained jaggery solution 0.021 g of crystalline citric acid dissolved in 5 ml water was added. To the above solution 0.84 g liquid glucose was also added. The above mixture containing jaggery, citric acid and liquid glucose was heated until the total solid content of this solution, when measured in a refractometer, was 80° Brix. At this stage the jaggery solution is converted into a thicker syrup. To the above jaggery syrup 1.37 g of liquid sorbitol was added maintaining the temperature of the jaggery syrup at 110°C. This forms the binder for use in a ready to eat health snack food.

The above binder at 110° C was added to the ready to eat health snack food premix and processed as described in the co-pending patent application No. _____.

The tablets formed using the above binder were compact having a smooth and bright surface. Sensory evaluation of the tablets showed that they had a firm bite and did not crumble into powder while eating. The sensory studies showed that the texture of the product was highly acceptable. Objective analysis showed that they had a breaking strength of 1.7 kg.

EXAMPLE 3

Ingredients and quantity used in the following example are given below.

Ingredient	Quantity (g)
Jaggery	35.0
Citric acid (crystalline)	0.026
Liquid glucose	1.14
Liquid sorbitol	2.00
Water	14.0

In the present example 35.0 g jaggery was powdered in a hammer mill and dispersed in 14 ml water. The jaggery solution was heated to 60° C to completely dissolve all the jaggery. This solution was strained through a 135 μ sieve to remove all the foreign material present in the jaggery solution. To the strained jaggery solution 0.026 g of crystalline citric acid dissolved in 5 ml water was added. To the above solution 1.14 g liquid glucose was also transferred.

The above mixture containing jaggery, citric acid and liquid glucose was heated till the total solid content of this solution, when measured in a refractometer, was 80° Brix. At this stage the jaggery solution was converted to a thicker syrup. To the above syrup 2.00 g of liquid sorbitol was added maintaining the temperature of the jaggery syrup at 110°C. This forms the binder for use in a ready to eat health snack food.

The above binder at 110°C was added to the ready to eat health snack food premix and processed as described in the co-pending patent application No. _____.

The tablets obtained using the above binder were compact having a smooth and bright surface. Sensory evaluation of the product showed that the tablets were hard to bite and were not acceptable. The product also had slight sour taste due to the presence of more citric acid in the formulation. Objective evaluation of the tablets showed that they had a breaking strength of 2.5 kg.



CLAIMS

1. A binder composition for use in a ready to eat health snack food, said binder composition comprising Jaggery - 30.0 to 35.0 wt %; Crystalline citric acid - 0.015 to 0.030 wt %; Liquid glucose - 0.60 to 1.20 wt %; Liquid sorbitol - 1.20 to 2.00 wt %; Water - 30 to 40 wt %.
2. A process for the preparation of a binder composition comprising Jaggery - 30.0 to 35.0 wt %; Crystalline citric acid - 0.015 to 0.030 wt %; Liquid glucose - 0.60 to 1.20 wt %; Liquid sorbitol - 1.10 to 2.10 wt %; Water - 30 to 40 wt %; said process comprising (i) powdering jaggery, (ii) dissolving the powdered jaggery in 30-40% water, (iii) heating to 55 - 65° C to dissolve all the jaggery, (iv) straining the dissolved jaggery twice through 120 - 150 μ sieve to remove any foreign matter, (v) adding 0.015 to 0.30% citric acid to the dissolved and strained jaggery solution, (vi) adding 0.60 to 1.20% liquid glucose to the dissolved and strained jaggery solution, (vii) heating the dissolved and strained jaggery solution containing citric acid and liquid glucose to 74-82° Brix, (viii) adding 1.10 to 2.10% liquid sorbitol to the hot jaggery syrup.
3. A process as claimed in claim 2 wherein jaggery is dissolved in 32 - 38% water at 58 - 62°C.
4. A process as claimed in claim 2 or 3 wherein the dissolved jaggery is strained through 130 - 140 μ sieve.
5. A process as claimed in any one of claims 2 to 4 wherein 0.016 to 0.026% citric acid is added to the dissolved and strained jaggery solutions.
6. A process as claimed in any one of claims 2 to 5 wherein 0.64 to 1.14% liquid glucose is added to the dissolved and strained jaggery solution.
7. A process as claimed in any one of claims 2 to 6 wherein dissolved and strained jaggery solution containing citric and liquid glucose is heated till the syrup acquires a total solid content of 79 - 81° Brix.
8. A process as claimed in any one of claims 2 to 7 wherein 1.20 to 2.00% liquid sorbitol is added to the hot jaggery syrup at 100 - 110°C.
9. A ready to eat health snack food including a binder composition prepared in accordance with a process of any one of claims 2 to 8.
10. A ready to eat health snack food including a binder composition according to claim 1.