(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 607 991 A2**

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: **94100888.0**

(51) Int. Cl.[5]: **C13F 3/02**

(22) Date of filing: **21.01.94**

(30) Priority: **22.01.93 FI 930267**

(43) Date of publication of application:
27.07.94 Bulletin 94/30

(84) Designated Contracting States:
BE DE DK FR GB SE

(71) Applicant: **SUCROS OY**
Kyllikinportti 2
SF-00240 Helsinki(FI)

(72) Inventor: **Yli-Kyyny, Mauri**
Purjetie 1 b F 90
SF-00960 Helsinki(FI)
Inventor: **Tiainen, Ilkka**
Pohjoiskaari 19 F 21
SF-00200 Helsinki(FI)

(74) Representative: **Hansen, Bernd, Dr.**
Dipl.-Chem. et al
Hoffmann, Eitle & Partner,
Patentanwälte,
Arabellastrasse 4
D-81925 München (DE)

(54) **Brown cube sugar and method for producing it.**

(57) The invention relates to brown cube sugar produced with crystalline white sugar and a syrup containing colours, flavours and trace elements as ingredients. The invention also relates to a method for producing brown cube sugar, wherein crystalline white sugar is treated with steam or a steam-water mixture with simultaneous agitation, a syrup containing colours, flavours and trace elements is mixed with the moist sugar, and the mixture is formed into cubes by methods known per se in the art of cube sugar production.

EP 0 607 991 A2

The present invention relates to brown cube sugar, having as ingredients ordinary crystalline white sugar and sugar syrup. The invention also relates to a method for producing brown cube sugar, wherein crystalline white sugar is moistened by steam/steam-water treatment, whereafter sugar syrup is dosed and mixed thereinto, and the resultant mixture is formed into cubes and dried by conventional techniques used in the art of cube sugar production.

Ordinary white cube sugar is produced from refined crystalline sugar. It comprises pure carbohydrate and contains no trace elements, minerals, flavours or colours of the sugar cane or sugar beet employed as the raw material, since these substances remain in the molasses after the separation of sugar. Yet many consumers desire a product including, in addition to sugar, other naturally occurring nutrients and flavours. For this reason, several varieties of brown cube sugar have been introduced into the European market. They are brown in colour; therefore they also correspond in appearance to the consumer's idea of a natural product.

Conventional white cube sugars are produced commercially by compression into bars, compression into moulds and vibration into moulds (cf. Chen, J.C.P., *Meade–Chen Cane Sugar Handbook*, John Wiley & Sons, Inc., New York, 1985, pp. 628-629). Processes for producing cube sugar often derive their name from the creator of the equipment or the process; processes generally used include the Höweler, Vibro and Elba processes. In the first-mentioned process, crystalline white sugar is moistened with water or by steam-water treatment and compressed in moulds into bars that are dried and cut into cubes. In the Vibro process, moulds laid on a flat base are filled with moistened sugar by a vibrating action, one sugar cube being formed in each mould, the sugar spilled over the edges of the mould is removed, and the cubes are discharged from the moulds by vibration, dried, and cooled. In the Elba process, crystalline white sugar is moistened and each cube is compressed in a separate mould, whereafter the cubes are dried and cooled.

The quality (hardness, dissolving time) of sugar cubes can be regulated by means of the crystalline white sugar employed as the raw material, the amount of moisture and the process parameters (moisturizing time and temperature, proportion of steam and water in the moisturizing step, compressive force).

Commercial brown cube sugars are typically produced from cane crude sugar by compression into moulds. This method is attended by the disadvantage that the product has a coarse texture, since fine granular sugar presents caking problems in the production process on account of the molasses layer surrounding the sugar crystals. Neither can the taste of the product be controlled, but it is determined by the raw material employed. For this reason, beet crude sugar is not suitable for the production of cube sugar of this type at all, since beet molasses contains ingredients having a very unpleasant taste. Further, the products that have hitherto been available have an unsatisfactory appearance: they have a non-uniform colour and a coarse surface. Further, it is a very decided disadvantage that cubes can be produced from crude sugar only by compression methods (Höweler and Elba) but not by the Vibro method, since the cubes so obtained do not remain intact.

Therefore, it is an object of the present invention to provide brown cube sugar having a uniform and smooth texture and appearance, the taste, colour and trace element content of which can be easily controlled and which can also be produced from beet sugar. It is a further object of the invention to provide brown cube sugar that can also be produced with the Vibro equipment, which yields small rapidly dissolving sugar cubes of regular shape.

In initial tests conducted to achieve the above objects, sample batches of brown cube sugar were produced from a mixture of crystalline white sugar and molasses obtained from sugar separation, employing the Vibro equipment. The moisture content of the mixture to be formed into cubes was controlled by varying the amount of molasses employed. The resultant products met the requirements set on brown cube sugar with regard to taste, colour and appearance. They were, however, too sensitive to moisture: when the relative humidity exceeded about 45%, the cubes bound moisture from the air and were softened.

In further tests it was unexpectedly found that when crystalline white sugar was moistened with a steam-water mixture prior to the addition of molasses, a product was obtained that remained hard under storage conditions when the relative humidity was not more than about 60%.

The invention thus relates to brown cube sugar prepared using as raw materials crystalline white sugar and a syrup containing colours, flavours and trace elements.

The invention further relates to a method for producing brown cube sugar, being characterized in that crystalline white sugar is treated with steam or a steam-water mixture with simultaneous agitation, a syrup containing colours, flavours and trace elements is mixed with the moist sugar, and the mixture is formed into cubes by a process known per se in the art of cube sugar production.

The fact that the moistening of crystalline white sugar prior to the addition of syrup markedly improves the stability of the product against moisture is presumed - without wishing to be bound to this theory - to be

consequent upon the fact that in the moistening step part of the sugar is dissolved, and when the water is evaporated during the drying, this dissolved sugar is crystallized, bonding the undissolved sugar grains to one another. If only crystalline white sugar and molasses are employed in the production, no dissolution and hence no crystallization takes place, since molasses is a supersaturated solution of sugar. Thus, in the prepared sugar cubes molasses fills up the spaces between the sugar crystals and, on account of its hygroscopicity, induces softening of the cubes when they are stored in a moist room.

In the production of brown cube sugar according to the invention, the sugar-syrup mixture is formed into cubes preferably by the vibration process. Therein the sugar-syrup mixture is vibrated into moulds in Vibro equipment. The cubes discharged from the moulds by a vibrating action are passed into a drying tunnel. Immediately thereafter they are packed, and the product dries into final hardness during storage.

Factors influencing the quality and production technology of the product include the quality of the crystalline white sugar and syrup employed as raw materials, the mixing temperature, the temperature and moisture content of the steam-water mixture and the mixing time.

The crystalline white sugar employed in the production of brown cube sugar according to the invention may be of different sucrose contents and grain sizes, for example a crystalline white sugar having a mean grain size of 0.30-0.70 mm, preferably 0.36-0.40 mm, and a coefficient of variation of 25-45%.

The syrup employed may be a sugar syrup, for example food-grade molasses derived from cane sugar. Also small amounts of starch syrup can be added to the sugar syrup.

By the steam or steam-water treatment of the crystalline white sugar, the temperature and humidity of the sugar are adjusted to be suitable. A suitable temperature is 40-60 °C, preferably 50-55 °C, and the quantity of steam or steam-water mixture employed is such as to impart to the sugar-syrup mixture a humidity of about 2-3.5% by weight, preferably 2.7-3.0% by weight.

The syrup is heated to approximately the same temperature as the sugar has, and it is added to the sugar in an amount of 2-10% by weight, preferably about 5% by weight based on the total weight of the mixture.

Bars (Höweler) or cubes (Elba) are compressed from the mixture, or the mixture is formed by the vibration method (Vibro) into cubes and the cubes are dried by heating at a temperature of about 100-150 °C to a moisture content of 0.3-2.0% by weight. The final balancing of the moisture content takes place during storage.

The invention will be illustrated in greater detail by means of the following example, which is not intended to restrict the scope of the invention.

Example

150 kg of crystalline white sugar having a mean grain size of 0.36-0.40 mm, coefficient of variation of 27-33%, were dosed in a mixer. Thereafter 2-3 kg of water were added in the form of a steam-water mixture with simultaneous agitation. 8 kg of cane sugar molasses were mixed with the moist sugar. The molasses had the following characteristics:

Dry solids content	78.0-81.0%
Conductivity ash	7-11%
Total sugar content	68-75%
Invert sugar content	17-23%
Colour, ICUMSA	70000-150000

The mixture was stirred for 7 minutes at a temperature of 50-56 °C, after which cubes were formed from the mixture in Vibro equipment, and the cubes were dried at a temperature of 110-140 °C to a moisture content of 1.0-1.7% and packed immediately thereafter.

The brown sugar cubes obtained hardened into final hardness during storage. The cubes were shelfstable at a relative humidity below 60% without becoming softened. The product also had a fine and smooth texture and an excellent taste and appearance.

Claims

1. Brown cube sugar, **characterized** by being obtainable by using as raw materials ordinary crystalline white sugar and a sugar syrup containing colours, flavours and trace elements.

2. Brown cube sugar as claimed in claim 1, **characterized** in that the crystalline white sugar has a mean grain size of 0.30-0.70 mm, preferably 0.36-0.40 mm, and a coefficient of variation of 25-45%.

3. Brown cube sugar as claimed in claim 1 or 2, **characterized** in that the syrup is a food-grade molasses.

4. Brown cube sugar as claimed in any one of claims 1-3, **characterized** in that the syrup is a molasses derived from cane sugar.

5. Brown cube sugar as claimed in any one of claims 1-4, **characterized** in that the crystalline white sugar is beet sugar.

6. A method for producing brown cube sugar, **characterized** in that crystalline white sugar is treated with steam or a steam-water mixture with simultaneous agitation, a syrup containing colours, flavours and trace elements is mixed with the moist sugar, and the mixture is formed into cubes by a process known per se in the art of cube sugar production.

7. A method as claimed in claim 6, **characterized** in that the mixture is formed into cubes by the vibration method with Vibro equipment.

8. A method as claimed in claim 6 or 7, **characterized** in that steam or a steam-water mixture is employed in an amount sufficient for imparting to the sugar-syrup mixture a moisture content of about 2-3.5% by weight, preferably 2.7-3.0% by weight.

9. A method as claimed in any one of claims 6-8, **characterized** in that the crystalline white sugar has a mean grain size of 0.30-0.70 mm, preferably 0.36-0.40 mm, and a coefficient of variation of 25-45%.

10. A method as claimed in any one of claims 6-9, **characterized** in that the syrup is a food-grade molasses.

11. A method as claimed in any one of claims 6-10, **characterized** in that the syrup is a molasses derived from cane sugar.

12. A method as claimed in any one of claims 6-11, **characterized** in that the crystalline white sugar is beet sugar.