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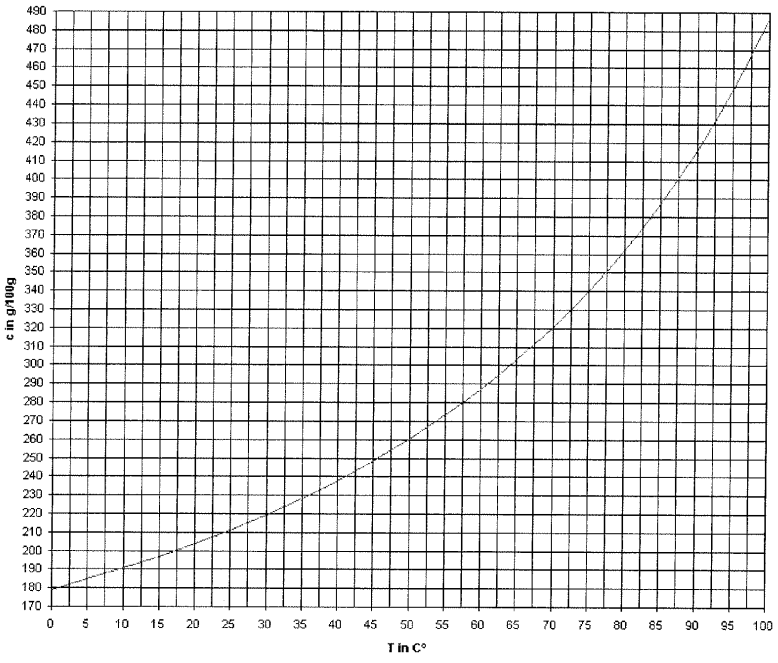
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(54) **A process for producing brown sugar from beet syrup**

(57) The present invention relates to a method for producing brown sugar from beet syrup, wherein the sugar, water and sugar beet syrup are mixed and boiled, and cold crystal granulated sugar is added to the boiling mixture and then the sugar inside the mixture gets crystallized and lastly the crystallized brown sugar mixture is dried.

FIGURE 1



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Description

[0001] The present invention relates to a method for producing brown sugar from beet syrup, wherein the sugar, water and sugar beet syrup are mixed and boiled, and cold crystal granulated sugar is added to the boiling mixture and then the sugar inside the mixture gets crystallized and lastly the crystallized brown sugar mixture is dried.

[0002] Brown sugar is a kind of sugar which is obtained by mixing the white crystal sugar with a certain amount of food grade syrup which underwent pretreatments. Since its color is brown, it is named as "brown sugar".

[0003] Sugar is one of the essential nutrients that people need only in certain amounts. However, its evolution into an industrial product has reduced the sugar to one single molecule of 99.9% food grade which is sucrose molecule that can be obtained from only two different plants currently; and turned it into a source of carbohydrate, too much of which can be a threat for human health.

[0004] However, in order for the body to function healthfully, the nature has created such a balance in the foods it provides that the agents that the body needs are available in optimum amounts in these foods. When we consider sugar and the sources from which sugar is obtained in this respect, during the process by which white sugar is obtained, mineral, protein, vitamin and many other factors beneficial for the human health are eluted. Minerals (iron, calcium, sodium, potassium and magnesium), protein and vitamins which are naturally available in sugar beet during the sugar production process and many valuable organic materials removed from the sugar are added to the brown sugar by adding syrup to the white sugar during the process of brown sugar production. Therefore, apart from sucrose, many beneficial organic materials that can be used as energy source are added to the sugar.

[0005] The darkness of color in brown sugar changes depending on the amount of syrup it contains. While "light brown sugar" contains syrup in a percentage of 3.5%, the amount of syrup that "dark brown sugar" contains is 6.5%.

[0006] Brown sugar is more hygroscopic compared to the brown sugar; in other words, its moisture holding capacity is high and for this reason aggregation risk is high as well.

[0007] The particle size of the brown sugar is variable but it generally has particles smaller than those of white sugar. The one used in the industry is the Brown sugar which composes of crystals of 0.35 mm.

[0008] It is more beneficial for health to consume brown sugar instead of white sugar. Refined sugar and refined carbohydrates mix with blood quickly and put a strain on pancreas by causing excessive insulin secretion. This increases the risk of Diabetes.

There are several types of brown sugar:

[0009]

Brown sugar: It is obtained from the sugar cane or the second syrup of sugar beet in a totally natural way.

Brown fractured sugar: The crystallization method of white fractured sugar is used; brown color is obtained by priory caramelizing the concentrated hot syrup.

Brown sugar made of sugar cane: Unprocessed crystallized brown sugar is produced directly from sugar cane syrup. This kind of sugar is generally used in exotic cuisines.

[0010] Within many production processes of brown sugar used in the state of art, in order to decrease the production cost and to adjust the amount of added syrup, brown sugar has been produced by means of the method of adding sugar cane (Saccharum officinarum) syrup to the refined white sugar. This process could also be applied theoretically with sugar beet (Beta vulgaris var. saccharifera) syrup; however it couldn't be carried into action due to some practical problems. The basic reason why sugar beet syrup couldn't be used practically for producing brown sugar was that sugar beet has a hygroscopical (moisture-holding) structure. For this reason, in the brown sugars produced by using the methods according to the state of art, a form of solid crystal sugar couldn't be created and the sugar which contains high amounts of moisture underwent bacteria- and ferment-based deformations and therefore became non-usable. Moreover, the fact that the produced brown sugar mixtures have hygroscopic structures caused the brown sugar crystals to combine and therefore get lumpy, and consequently it was not possible to produce a form of sugar with desired small crystals.

[0011] Sugar cane (Saccharum officinarum) plant is not grown in our country and in Europe, therefore a large part of the need for sugar in Turkey and in Europe is met with sugar beet produced within that country. However, since it is obligatory to use sugar cane syrup within the current methods of brown sugar production, the said countries had to import sugar cane or sugar cane syrup from abroad in order to use them during the production of brown sugar. This situation, on the other hand, caused extra expenses to the countries in financial respect.

[0012] Brown sugar production according to the state of art used to be carried out by mixing a certain amount of white granulated sugar with sugar cane syrup. The amount of syrup in the said mixture was in accordance with the color of the brown sugar to be produced. While in order to produce light brown sugar, it was enough to add syrup in an amount of 3.5% to the white sugar; by adding 6.5% syrup to the white granulated sugar, dark

brown sugar could be obtained. When it was desired to darken the color of the brown sugar, the amount of syrup added to the mixture was increased.

1. Description of the Figures

1. Sugar-water solubility graphic

[0013] In the method of producing brown sugar according to the present invention, there is no need to use sugar cane syrup any longer. Therefore, brown sugar can be produced by using only white sugar made of sugar beet, and sugar beet syrup. Consequently, the requirement to import sugar cane from abroad for the plants producing brown sugar in many countries has been abolished.

[0014] The present invention relates to a method for producing brown sugar from sugar cane syrup, during the production process of which no preservative chemicals and coloring chemicals are added to the brown sugar. For this reason the final product which is the brown sugar can be produced in a totally natural way.

[0015] In the brown sugar which is produced by means of the method for producing brown sugar from sugar beet according to the present invention, the problem of hygroscopic moisture is removed. In this way, the sugar crystals inside the brown sugar mixture are prevented from getting lumpy and it is possible to produce granulated brown sugar containing crystals in desired sizes and structures. Moreover, thanks to the fact that brown sugar mixture does not have a hygroscopic characteristic, the potential bacteria-, mold- and ferment-based deformations are prevented.

[0016] In the method of producing brown sugar from sugar beet syrup according to the present invention, primarily the crystallized granulated sugar in predetermined amounts is mixed with syrup again in predetermined amounts. Since the density of the syrup is high, it does not form a homogenous mixture with the granulated sugar. Therefore, in order to provide a homogenous mixture, water needs to be added in a predetermined amount. After a homogenous mixture has been generated, by boiling sugar, syrup and water mixture, a totally saturated solution is created. Without any interruption, granulated crystal sugar is added to the solution which is saturated by boiling and then the solution is stirred homogenously. Cold granulated crystal sugar is mixed with hot solution and therefore the cold crystal particles are melted with the help of the heat and then they combine with the crystals of the solution which will get cold and crystallized again, and as a result it achieves a harder structure. After the granulated crystal sugar has been added to the mixture, the new resulting mixture is cooled down to 25 °C. The cooled mixture is then taken to the drying oven. The drying process in the drying oven continues till the drying output moisture of the sugar-syrup mixture decreases down to 0,1%. During the drying process, whether the moisture level is decreased to the desired level is controlled continuously. Therefore the moisture level can be decreased to the desired level controllably. At the output of the drying, the brown sugar is sieved and is kept waiting till it cools down to room temperature and lastly it is packed.

[0017] In an embodiment of the present invention which is the method of producing brown sugar, 6,3 kg sugar beet syrup is used in order to produce approximately 105 kg brown sugar. The brix degree of the sugar beet syrup is about 80%. In other words, 6,3 kg sugar beet syrup comprises approximately 5 kg. solid sugar beet syrup (80%) and 1,3 kg. liquid (20%). As the specific gravity of the water is 1kg./L., 1,3 kg. water corresponds to 1,3 L. in terms of volume, for this reason in the description 1 kg water is considered as equal to 1 L.

[0018] In the brown sugar mixture mentioned in this embodiment, 6,3% syrup is used by weight. As it has been mentioned before, brown sugar mixtures are divided into two depending on their colors. The basic factor affecting the color of brown sugar is the amount of sugar beet syrup used in its production. In this embodiment of the present invention, the rate of 6,3% sugar beet syrup / total solution is selected which is a value close to dark Brown sugar.

[0019] Brix (%) shows the concentration percentage of the solid agent content which is soluble in the sample (water solution).

[0020] Resoluble solid matter consisting of sugar, salt and protein is used as a standard for the solubility of all solids in water.

[0021] 44 kg granulated crystal sugar is added to 6,3 kg syrup in order to produce approximately 105 kg brown sugar. As mentioned above, since the density of the syrup is high, no homogenous composition can be obtained from the mixture generated with crystallized granulated sugar. In order to generate a homogenous mixture, 9,1 L (9,1 kg) water is added to the syrup-crystal granulated mixture. When the water of 1,3 kg which is available in the syrup and which is added to the mixture is considered, the total amount of water inside the syrup-crystal granulated sugar-water mixture is 10,4 kg.

[0022] As it can be deduced from Sugar - Water solubility graphic (Figure 1), in order to obtain a saturated sugar-water solution, it is needed to add 485 g sugar and 69,4 g syrup into 100 mL. Water (at 100 °C temperature). By using the said graphic, it has been deduced that in order to generate a saturated solution at 100 °C, 44 kg crystal granulated sugar needs to be used for the above-mentioned 10,4 L water; and in order to provide the brown sugar to achieve the desired color, there needs to be 6,3 kg sugar beet syrup inside the total mixture. In the case that the amount of water used for the said mixture values is less than 10,4 L, the sugar inside the solution is not melted totally no matter how much the temperature or boiling-period of the solution is increased. Moreover, when the mixture is boiled for quite a long time, then the final product of the solution which is brown sugar will have an undesired caramel smell. In the case that the amount of the total water used is more than 10,4 L, in

order to provide a totally saturated sugar-water solution, the boiling duration needs to be increased. As a result of excessive boiling, the amount of water inside the mixture is decreased to the amount of water necessary for generating a saturated mixture by means of evaporation, and therefore a saturated solution can be obtained. In this case, the boiling duration is increased up to the level necessary for the excessive amount of water (the amount of water more than the amount necessary for a saturated solution) inside the mixture to evaporate. In order to remove the excessive amount of water inside the mixture, additional energy is used and therefore the productions costs increase. Thus it is very important to determine the amount of sugar beet syrup-water-crystal granulated sugar to be used inside the mixture.

[0023] 56 kg granulated crystal sugar is immediately added to the solution which is saturated by boiling and it is stirred in order to get a homogenous composition. The reason why cold crystal granulated sugar is mixed with hot solution is that the cold crystal particles melt thanks to the heat and it attains a harder structure by combining with the crystals of the solution which will cool down and crystallize. The mixture generated by adding cold crystal granulated sugar and stirring it, is then kept waiting till it cools down to 25 °C. The mixture which has been cooled down to 25 °C is then taken to the drying oven. The drying process in the drying oven continues till the output moisture becomes 0,1%. During the drying process, samples representing the whole mass are taken from the drying medium and moisture analysis is conducted periodically. Therefore the drying process continues until the moisture rate decreases to 0,1% and the constant moisture rate is kept under control. Following the drying process, nearly 105 kg (other than 105 kg brown sugar there is also water of approximately 0,1%, or 0,105 kg, however this amount of water have not been taken into consideration during the calculation process) brown sugar will have been produced. The particles having a size not appropriate to the desired crystal size inside the brown sugar mixture obtained as a result of the drying process are removed after sieving. Following the sieving process, the brown sugar mixture is kept waiting till it cools down to room temperature and lastly it is packed and put up for sale.

Claims

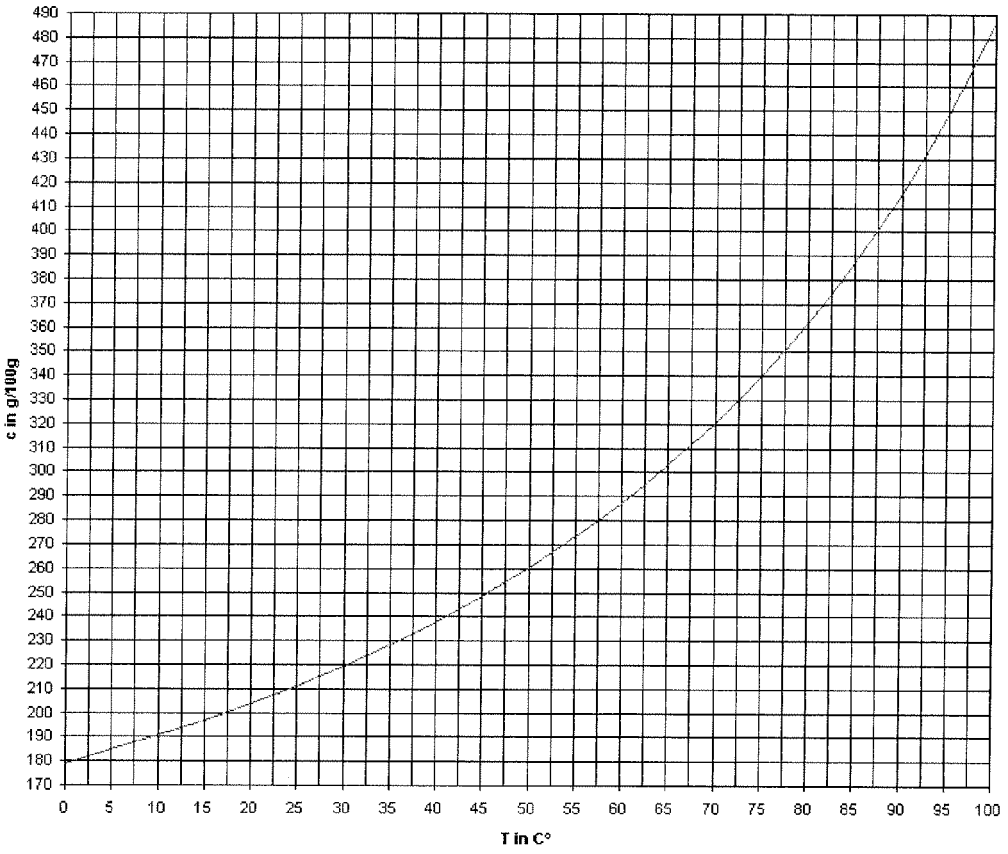
1. A process for producing brown sugar from beet syrup, **characterized in** comprising the following process steps,

    • mixing the pre-determined amount of crystal granulated sugar with beet syrup, the amount of which is again previously determined,
    • Generating a homogeneous mixture by adding pre-determined amount of water to this sugar-beet syrup mixture,
    • Saturating the solution by boiling this homogeneous mixture,
    • Adding granulated crystal sugar to the solution which is saturated after boiling immediately without waiting and then mixing it,
    • After adding granulated crystal sugar to the mixture, it is kept waiting until it cools down to preferably 25 °C,
    • Taking the cooled mixture to the drying oven and keeping the drying process continue until the drying output moisture decreases down to 0,1%,
    • Controlling continuously whether the moisture level decreases to the desired level during the drying process or not,
    • Sieving the brown sugar in accordance with the desired crystal size at the end of drying.

2. An embodiment according to the production process claimed in Claim 1, **characterized in** comprising the following process steps for producing 105 kg brown sugar,

    • Generating a homogeneous mixture by blending 6,3 kg beet syrup, 44 kg granulated sugar and 9,1 kg water,
    • Saturating this prepared mixture by boiling it,
    • Adding 56 kg granulated crystal sugar to the saturated mixture immediately and mixing it,
    • Cooling the prepared mixture down to 25 ° C,
    • Drying the cooled mixture in the drying oven until its output moisture becomes 0,1%,
    • Sieving the brown sugar in accordance with the desired crystal size at the end of the drying process.

FIGURE 1


c in g/100g
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EUROPEAN SEARCH REPORT

Application Number
EP 11 15 1869

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	US 3 619 293 A (NIIMI MASAHIRO ET AL) 9 November 1971 (1971-11-09) * column 1, line 49 - column 2, line 38 * * column 2, line 51 - column 3, line 4 * -----	1,2	INV. C13B30/00 C13B30/02 C13B50/00 C13B40/00
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	10 August 2011	Barac, Dominika

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EUROPEAN SEARCH REPORT

Application Number
EP 11 15 1869

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	10 August 2011	Barac, Dominika

CATEGORY OF CITED DOCUMENTS

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10-08-2011

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82