

Description

TECHNICAL FIELD

5 The present invention relates to a fruit juice mix suitable for hard pack applications. Further this invention relates to the specialty class or superior or novelty hard pack formulations to compete with the superior or novelty grades of ice cream or the so-called novelty products such as chocolate-coated stick products, and the like.

10 BACKGROUND ART

Fruit juices including mixtures are available on the market in various forms such as unsweetened, frozen and unfrozen, including concentrated and fully diluted. These fruit juices, in the frozen state, are characterised generally as exhibiting a crystalline structure in many cases that breaks into layers or lamina which frequently exhibits a needle-like structure with the crystals being most noticeable. Thus, these commercial frozen juices can, with their needle-like crystal structure, cause injury to the mouth. On the other hand, the frozen juices sold with a stick frozen therein are described as being quiescent in nature but exhibit the harsh feel in the mouth of crystalline ice or needles as contrasted with the soothing feel of the instant whipped or whipped frozen product. The prior art, such as DE-A-2 352 034, teaches how to avoid or reduce the above disadvantages and have generally added solids for the purpose of aiding the sweetening and freezing of the juices where these solids or additives are other than fruit juice origin and contains refined sugar, corn sweeteners, and the like, including artificial colors and flavors.

After World War II, there was an upsurge in popularity of soft frozen ice cream and drinks, which led to a desire to produce a soft frozen all-natural fruit juice, such as GB-A-1 331 518. This desire has not been adequately attained because those who practiced the prior art found natural fruit juice would not produce a product acceptable to the consumer. When a person eats a frozen product, the taste buds are partially anesthetized and the juice concentrate has to be diluted to attain desired sweetness, or balance the tartness and flavor, high potency sweeteners or dextrose, sucrose, fructose, lactose and similar sugars are used.

DE-A-2 352 034 and GB-A-1 331 518 referred to above, both relate to milk shake preparations in which sugar is added to the mix.

Specifically in DE-A-235 034 the milk shake composition includes corn syrup, sugar, sorbitol, and glycerol, all sugars.

GB-A-1 331 518, in addition to the use of sugar, also discloses a "slush" product.

EP-A-0 187 438 supplies a commercially satisfactory and viable all fruit juice, soft serve product. This invention, however, supplies a modification thereof that gives a superior hard pack product and allows speciality products to be made.

According to the present invention a frozen, hard pack, fruit product comprises:

a frozen, hard pack, fruit juice product comprising:

at least one type of fruit juice;

40 a fruit juice flavor enhancer selected from the group consisting of flavoring, spices, flavor enhancers and edible organic acids and mixtures thereof;

from 0.5 percent to 1.5 percent by weight of at least one stabilizer based upon the total weight of said product with the provision that the product contains at least 0.02 percent xanthan gum;

45 from 0.05 percent to 0.50 percent by weight of whipping agent protein based upon the total weight of said product;

an amount of water to adjust the overall brix value of said product to the range of 10 to 35, and said product being essentially free of added sugar and corn sweetener additives and having overrun of at least 20 percent wherein said frozen fruit juice product has a smooth creamy appearance and good low temperature storage properties.

50 We therefore provide a fruit juice product substantially free of added sugar and corn sweetener additives in which the brix range is adjusted by adding water.

Conveniently stabilizers are selected from a group consisting of guar gum, locust bean gum, carrageenan, an alginate, a cellulose gum, a pectin, and combinations thereof.

55 The water is used to regulate the brix level and adjust solids to proper freezing and sweetness levels to permit them to be consumed without further dilution and to give good storage characteristic and melt down features with the absences of deleterious effects.

A special embodiment of the general invention hereof having the aspect of providing novel drinks and creams either whipped, frozen, thickened, chilled or cultured with the flavor and appearance of a juice

having the colours such as the red, orange or yellow juices of strawberries, oranges or peaches and competitive with the so-called superior or premium grades of ice cream.

A fruit mixture essentially contains all natural ingredients. By natural ingredients it is meant that it is obtained from a fruit, vegetable or related edible plant by crushing, squeezing and related operations. It then may be filtered, strained, passed through a sieve, resin beds, clay or diatomaceous earth bed filters, ion exchanged resins to give a juice, a juice concentrate, purees, and concentrates or so-called modified juices. Although the fruit juice mixture generally may be frozen and edible as such, that is as a soft serve, it is preferably in this invention to use the mix for a aerated hard pack or novelty from such as frozen on a stick or in mixtures as a ripple type product or fruit part creams. The mixture contains at least one type of fruit juice although a combination of various juices as well as types thereof can be utilized. By the term fruit juice it is meant any type of juice which is extracted from fruit by any conventional means such as pressing. That is, the juice itself contains types of saccharides preferably a majority of monosacchrides which naturally occurs in that type of juice, as extracted from plants by any one of the well known methods. Specific types of juices which can be utilized in the present invention include fruit juice, concentrated fruit juice, fruit puree, fruit puree concentrate, juices which have been modified, that is modified juice, as well as modified concentrated juice and the like. Modified juices would include ion exchange treated and/or ultrafiltered juices. Examples of a few of the many specific juices which can be utilized in the present invention include, for example, peach concentrate, pear concentrate, blackberry puree, cranberry juice, orange juice concentrate, grape concentrate, lemon juice and apple juice concentrate. Of course, many other types of juices whether in the form of a puree, concentrate, or a juice can be utilized depending upon the desired end flavor.

The type of juice source, such as fruit juice, fruit juice concentrate, fruit puree, fruit puree concentrate, fruit juice concentrated puree, modified juice as well as their concentrates has a sweetness due to the natural saccharide content contained therein. The degree of sweetness is generally listed by a brix value. Brix is generally defined as the percent of soluble solids primarily made up of natural sugars. The fruit juice mixture of the present invention, generally has an overall brix value of from about 10 to about 35 generally the range will be 21 to 25, once the other ingredients, such as water, stabilizers, natural flavors and the like, as noted hereinbelow, have been added to the juices. In other words, a sufficient amount of water and the like is added to dilute the concentrated juice from the source such that it has a brix value of from about 10 to about 35 and generally 20 to 30. A blend having a brix value of 35 or greater generally tends to be too sweet and is difficult to freeze. On the other hand, the juice mixture having a brix value of less than 10 generally tends to be too sour as well as too icy when frozen. A more desirable brix range is from about 20 to about 27 with 23 to 26 being preferred. The brix value of approximately 25 is optimum for most juices. These brix values are obtained without the use of lactose or refined sugar or corn sweeteners, as is the practice in making ice cream.

Stabilizers are used in the present invention to give body as well as good texture, heat shock stability and improve stability of overrun and melt down to the overall mixture. The stabilizers are derived from natural sources such as plants and the like, although some of the stabilizers may have been modified in order to render them stable and food-grade functional or clean. Examples of stabilizers which are utilized and generally preferred in the present invention include guar gum, locust bean gum, and carrageenan. Especially preferred is xanthan gum as it gives less body and results in a lower viscosity of the mix as well as gives easier air or gas emulsibility and greater stability to the emulsion without generation of great elasticity or gumminess. In addition to these basic types of stabilizers, other types can be utilized such as various alginates which are generally made from seaweed, various cellulose gums, various pectins, and the like. Such stabilizers are well known to those skilled in the art as well as the literature. The stabilizers render the juice mix uniform and also tend to control the stability and the consistency of the mix when frozen. That is, a more creamy consistency is generally obtained with less visible ice crystals, when the above gums are used in combination with xanthan gum a superior hard pack product is obtained.

Conveniently the juice type is selected from the group consisting of fruit juice, fruit juice concentrate, fruit juice puree, fruit juice puree concentrate, modified juice, and modified juice concentrate.

The overall amount of said stabilizers usually may be from about .30 percent to about .60 percent by weight.

Preferably the protein comprises a vegetable protein, such as soy protein or wheat protein, but we also envision being able to use protein from animal sources such as milk protein or egg albumen.

The protein preferably is at a level of at least 0.05 percent based on the total weight of the mixture.

The total amount of all stabilizers utilized is generally at least 0.05 percent to about 1.5 percent with the desired range being 0.3 to 0.6 percent by weight based upon the weight of the entire juice mix. Lesser amounts tend to result in separation of the various ingredients whereas higher amounts tend to result in a

very viscous mixture which is difficult to mix. Lesser amounts also tend to yield whipped aerated hard pack product with weak body, coarse or icy consistency, and poor meltdown stability while higher amounts tend to result in gummy or elastic body and unnatural meltdown qualities. If the amount of an individual stabilizer utilized is reduced, it is usually compensated by the use of a similar increased amount of another stabilizer so that the overall amount generally remains the same. Typically, the total amount of guar gum utilized is approximately (.026 kg/litre)(7 gms./gal) to about .045 kg/litre (12 gms./gal) with from about 0.17 percent to about 0.23 percent of this gum being preferred. The amount of the carrageenan is from about 0.05 to about 0.30 percent with from about 0.08 percent to about 0.14 percent of this gum being preferred. The remaining stabilizer xanthan gum, in amounts of 0.02 to .3 percent of total product gives a very good hard pack product.

Another ingredient which is utilized is vegetable protein such as soy protein. Generally, any modified type of soy protein can be utilized. The purpose of the soy protein is to improve and control the whipability of the fruit juice mix for whipped and/or frozen and hard pack applications to make it creamier. It thus enhances the overrun upon whipping of the frozen material to take up air such that a creamier, ice cream like appearance or whipped cream type consistency is achieved. The amount of soy protein is generally from about 0.05 percent to about 0.5 percent, with from about .01 kg/litre (3) to about .049 kg/litre (13 grams) per gallon of formulation being utilized. Approximately .004 (4) to .006 or .007 kg (6 or 7 grams) is highly preferred.

The amount of water will vary over a wide range, depending on the concentration of the juice mixtures to bring the product to the desired brix range.

Other ingredients which may be utilized are natural flavors and/or spices to establish standardized optimum flavor levels for said flavor. Examples of natural flavors include nutmeg and cinnamon in small amounts such as from about 0.05 percent to about 0.07 percent by weight, and natural flavors derived from concentrates of essential oils or botanicals or essences. For hard pack, it is some times desirable to increase the flavoring levels by approximately 20 to 50 percent. Hence, the hard pack formulation frequently will contain 0.05 to 1.50 percent by weight of the flavoring ingredients. Naturally, other specialty type ingredients can also be utilized in similar amounts. Any natural flavoring ingredient can be used to make flavors, ranging from tropical fruits, pumpkin, to pizza, if desired.

Generally, small amounts of various flavor enhancers or modifiers, generally food grade acids, can be utilized to impart tartness, enhance flavor, prevent oxidation of the ingredients or the like. For example, citric acid and other organic acids such as malic acid may be utilized to impart tartness or accentuate the flavor of the mixture. The amounts of such acids generally range from about 0.05 to 1.0 percent by weight apart from the levels of total acids from juice sources, etc. The titratable acidity of the mix would generally range from .15 to .8 percent and preferably 0.4 to 0.65 percent. In order to prevent oxidation of the ingredients, commonly called browning, ascorbic acid can be utilized as in an amount from about .02 to about 0.10 weight percent, and preferably from about .05 percent to about 0.08 percent by weight based upon the total weight of the overall fruit juice mixture.

These acids are also utilized to ensure that the pH of the mix is below pH 4.6 and preferably below pH 4.0 for the purpose of microbiological control. Another advantage is that generally lower processing temperatures can be utilized at these pH levels with aseptic processing of this mix thus imparting less heat derived stress on the fruit juice system. The acids are also used to standardize the titratable acidity or tartness perception of the finished mix as variations occur in raw material maturity.

MIXING

The mixing procedure for forming the fruit juice mix is generally as follows:

The primary fruit juice or concentrate thereof, such as apple juice concentrate, is added to a makeup tank. Next, all of the remaining fruit juices or concentrates, viz., modified or puree, are added. Then all the remaining liquid ingredients, including purees, flavors, enhancers, colors and the like are added and mixed for approximately 5 minutes or more depending on size of mixture and efficiency of the mixing equipment. Approximately 50 percent by weight of the water is added holding out a sufficient amount of water to be utilized in mixing with the stabilizers. One-half of the withheld water is usually at about 10°C to about 37°C and the stabilizer is slowly added thereto, generally maintaining a good vortex in the stabilizer mixing tank. After the stabilizer has been thoroughly dispersed and no lumps are contained therein, usually about 10 minutes, the water dispersion of the stabilizer is slowly added to the water diluted mix and thoroughly incorporated therein. The balance of the water is used to wash out the stabilizer mixing tank and to ensure all the stabilizer is transferred to the diluted juice tank. The last water addition is stirred to give a uniform mix. This mix may be refrigerated to await containerization in suitable shipping packaging. Before

packaging, the mix is deaerated through aeration equipment such as Dole Vacuum Deaerator at vacuums of $0.5 \cdot 10^3$ Pa (15 inch Hg), then raised to commercial sterilization temperature, about 84°C (183°F) to about 96°C (205°F) for about 2 minutes to about 8 seconds and then cooled and aseptically packaged to await use or shipment to the point where it will be frozen into hard pack form. Alternatively, the product at about 84°C (183°F) to 96°C (205°F) is added to the container and the closed container is then cooled to the storage temperature in what is generally called the hot pack system to await use or shipment to the use point.

Alternatively, the fruit juice mix could be made at the hard pack freezing location and processed at either hot or cold temperatures depending on the type of stabilizers used and the microbiological aspects of the mix.

At the hard pack freezing location, the juice is poured into a machine known to the ice cream trade as an ice cream type making machine. Here it is cooled and frozen as well as whipped with air or gas to produce a frozen favorable mixture of either soft serve or hard frozen mixture, depending on recipe, on the temperature and the time in the machine and the equipment being used. Those of ordinary skill in the ice cream trade will immediately see other apparatus that could be used to process the juice mixes of this invention, including the whipped creams and soft and hard frozen creams.

The invention will be better understood by reference to the following representative and illustrative examples where all parts and percentages are by weight unless otherwise designated.

EXAMPLE 1

A wild berry flavored fruit mixture capable of being frozen to yield a hard pack product was made utilizing the following mixing procedure rather than the more generalized one above.

In a batching kettle, 1.7 kg (3.75 pounds) of malic acid was dissolved in 1135.5 litres (300 gallons) of water to give a malic acid solution. Then, 268.8 litres (71.0 gallons) of the concentrate of apple juice, 70 brix deionized 37 litres (9.76 gallons) wild berry #227 flavor were added with agitation to the malic acid solution and stirred until a smooth blend was obtained. 227.1 litres (Sixty gallons) of deionized concentrate of apple juice, 70 Brix, was added to a mixing vat with the mixer speed raised to high and then the gums were added individually: xanthan gum - 1.27 kg (2.8 pounds) guar gum - 4.4 kg (9.7 pounds), and carrageenan - 1.86 kg (4.1 pounds) and stirred until smooth.

Then, 113.6 litres (30 gallons) of water and 3 kg (6.6 pounds) of soy protein, were added to the mixing vat. When the blend appeared to be smooth, it was pumped through a strainer bag to the batching kettle. The agitation in the batching kettle was continued for 5-10 minutes as 113.6 litres (30 gallons) of remaining water, and 1.56 kg (1.25 pounds) of malic acid was added and stirred in to give 1893 litres (500 gallons) of mixture. This mixture had a brix range of 23.6 to 24.4, a pH of 3.6 to 4.1 and a titratable acidity of 0.46 to 0.54 and wild berry flavor. This mixture was then hard frozen and placed in cold storage at about minus 20°C for several days and then removed from cold storage and allowed to warm to minus 18°C . The product exhibited excellent hard pack properties such as being free of appreciable ice crystal growth, stringiness or gumminess and when scooped out into a dish with an ice cream scoop, melted down without losing its creamy appearance for an appreciable time.

The recipe may be mixed, frozen and processed in any machine designed to freeze ice cream or yogurt to give a frozen aeriated mix having a very good, soft consistency and a delicious flavor.

EXAMPLE 2

The ingredients of Table I were mixed in the batching kettle as described in Example 1.

TABLE I

Water	1041 litres (275.0 gal.)
Malic Acid	1.7 kg (3.75 lbs.)
Concentrate, Apple 70 BX Deionized	304.6 litres (67.5 gal.)
Puree, Strawberry Seedless 7 BX	104 kg (224.0 lbs.)
Flavor, Strawberry #825	45 litres (11.9 gal.)
Color, Beet B-40	3.8 litres + .71 litres (1.0 gal + 25.0 fl.oz.)

Then the ingredients in Table II A, B and C were mixed in the marshmallow mixer in sequence A, B and

C as described in Example 1 and then pumped to the batching kettle to form a strawberry hard pack product having a strawberry flavor, a brix of 23.0 to 24.3 and a pH of 3.5 to 4.5.

TABLE II(A)

Concentrate - Apple Juice 70 BX deionized	227 litres (60.0 gal.)
Xanthan Gum	1.27 kg (2.8 lbs.)
Guar Gum	4.4 kg (9.7 lbs.)
Carrageenan	1.86 kg (4.1 lbs.)

TABLE II(B)

Water	132.5 litres (35.0 gal.)
Soy Protein	4.7 litres (1.25 gal.)

TABLE II(C)

Water	98.4 litres (26.0 gal.)
Malic Acid	.57 kg (1.25 lbs.)

As is apparent from the above examples, it should be appreciated that numerous other formulations and flavors can be made within the scope of the present invention utilizing all natural ingredients, including juices, purees, modified juices and the like, natural stabilizers, proteins, viz., soy protein, natural flavor, water and the like.

When using the so-called modified juices such as juices that have been passed through an ion exchange resin to contact the juice with the resin which removes color and flavor bodies, readily oxidized or unstable bodies and the weak fruit acids, it is desired to use the mixing procedure of Example 3. As is well known, absorbants such as charcoal or special carbons as well as the absorbent resins such as the well known anion and cation resins and porous membranes or packing of ultrafiltration methods are used to purify juice products. In the instant invention, optimization of the acid-sweetness ratio and removal of color and flavor are achieved by this same technique. We have discovered that juices which have been subjected to an absorbent treatment of about 10°C to about 60°C and filtering away of the absorbent or permitting the juice to flow away from the resin or porous membrane or packing offers unique opportunities for making products having unique properties such as storage stability at temperatures above the freezing temperature of the juice mixture and especially hard pack material. Also, the modified juices are excellent for enhancing or fortifying the mixture. Specifically, a relatively long life strawberry, peach or orange drink or hard pack mix is possible where the drink can be held at room temperature in a manner simulating the practice with aseptic packed apple and/or pear juice or white or purple grape juice or can be frozen and handled as a hard pack product.

EXAMPLE 3

A peach flavored hard pack product was made by charging the ingredients in Table III(A) below to a batching kettle with agitation in the order listed in the table to give a smooth blend.

TABLE III(A)

Water	681 litres (180.0 gal.)
Ascorbic Acid	1 kg (2.2 lbs.)
Concentrate, Apple Juice 70 BX deionized	215.8 litres (57.0 gal.)
Puree, Peach 10 BX (1,220 lbs.)	645.5 litres (142.0 gal.)
Flavor, Peach #215	22.71 litres (6.0 gal.)
Flavor, Peach #237	7.57 litres (2.0 gal.)
Annatto, Hansen's (color additive)	121.1 litres 32.0 fl. oz.
Beet Color, Hansen's - B-40	.43 litres 15.3 fl.oz.

Then, the gums, i.e., xanthan gum 1.27 kg (2.8 pounds), guar gum 4.4 kg (9.7 pounds) and carrageen 1.86 kg (4.1 pounds) were mixed with 227.1 litres (60 gallons) of apple juice concentrate 70 brix in a mixing vat followed by 113.6 litres (30.0 gallons) of water and 3.49 kg (7.7 pounds) of soy protein to give a smooth blend. The blend was pumped through a strainer to the batching kettle where 87 litres (23.0 gallons) of water was added to give 1893 litres (500 gallons) of peach flavored hard pack mix.

Alternately, this juice mixture may be heat treated at about 90-95° C for about half a minute, cooled and packed in aseptic containers such as about 18.9 litres (50) gallon bags and stored or shipped to the customer. At the customer's, the juice mixture was charged to a continuous ice cream freezing machine to form a soft creamy all-fruit juice, peach flavored frozen cream that could be sold and eaten like ice cream. The taste and flavor was good and simulated the taste of peaches. Preferably, the soft frozen cream is placed in cold storage to form a hard pack product.

EXAMPLE 4

The procedure of Example 3 may be used with deionized apple juice 72 brix to form a peach flavored juice mixture or with the procedure of Example 1 to produce a strawberry juice mixture suitable for hard pack by adjusting water content to give a brix preferably of 21 to 24. It should be appreciated that either high acid or low acid apple juice may be used with suitable adjustment of the acid level to give a titratable acid level within range of 0.4 to 0.7 and a pH of preferably 2.5 to about 4.6.

Instead of deionized juice of Example 4, a juice which has been subjected to ultrafiltration may be used to produce products of this invention.

EXAMPLE 5

An example which would not have to utilize deionized or ultrafiltered juice such as Apple Hard Pack Mix comprised of

Water	1348.2 kg (2972.4 lbs.)
Apple Juice Concentrate 70 Brix	707.1 kg (1558.9 lbs.)
Apple Essence	20.59 kg (45.4 lbs.)
Xanthan Gum	1.27 kg (2.8 lbs.)
Guar Gum	4.40 kg (9.7 lbs.)
Carrageenan	1.86 kg (4.1 lbs.)
Soy Protein	3.5 kg (7.7 lbs.)
Brix	20-30
Titrateable Acids	0.15 - 0.8
pH	2.5 - 4.6

Frozen to overrun of 20 to 150 percent. Processed in same manner as others.

EXAMPLE 6

		kg/litres (Grams/Gallons)
Pear Concentrate 70 Bx Deionized		4.60 (1,217.1)
Blackberry Puree		.78 (207.0)
Wildberry Flavor, Natural		.31 (82.8)
Microcrystalline Cellulose 591		.156 (41.3)
Stabilizer Blend CC101*		.078 (20.6)
Ascorbic Acid		.008 (2.0)
Water		9.70 (2,568.3)
Total		15.632 (4,139.1)
Brix	23.0	
pH	4.2	
Titrateable Acidity	.52	

*Stabilizer CC101 contains methyl cellulose gum, locust bean gum, guar gum, karaya gum and pectin.

Add 1/2 water to high speed mixer. Add microcrystalline cellulose. Blend 20 minutes until smooth. Add to batching tank with Pear Concentrate, Blackberry Puree, Natural Flavor, and Ascorbic Acid.

Add remaining water to high speed mixing vat. Add stabilizer blend. Blend 5 minutes until smooth. Add to blending tank. Blend 5 minutes, Pump to aseptic processor.

EXAMPLE 7

		kg/litre (Grams/Gallons)
Water		10.214 (2,698.3) g.
Ascorbic Acid		.007 (2.0)
Citric Acid		.045 (12.0)
Apple Concentrate 70 Bx Deionized		5.299 (1,400.0)
Lemon Concentrate		.004 (1.2)
Lemon Flavor Natural		.037 (10.3)
Turmeric		.017 (4.5)
Soy Protein		.010 (3.0)
Guar Gum		.025 (6.6)
Xanthan Gum		.007 (1.9)
Carrageenan		.010 (2.8)
Microcrystalline Cellulose (Avicel RC591)		.118 (31.4)
Total		15.793 (4,174.0)
Brix	25.0	
Titrateable Acidity	.51	
pH	3.8	

Add 1/2 water to high speed mixing tank. Add microcrystalline cellulose and blend for 20 minutes until smooth. Add to batching kettle with apple concentrate, turmeric, flavor, lemon concentrate and acids. Add remaining water to high speed mixing vat. Add dry blended gums to water. Blend for 5 minutes until

smooth. Add protein and blend 1 minute until smooth. Add to mixing tank and blend 5 minutes. Pump to aseptic processor.

The formulas of Examples 6 and 7 showed excellent freezing characteristics, texture and body, melt down, and heat shock stability. The shelf life storage tests and heat shock stability are slightly better than formulas not utilizing microcrystalline cellulose.

The formula of Example 6 which utilizes microcrystalline cellulose, does not require whipped protein for creamy texture and good aeration stability. Example 7 utilizes microcrystalline cellulose with reduced protein level.

Other forms of hard pack are as follows:

(1) Use of present mix which would be utilized in the same package with two different overruns. Product of 70 to 90 percent overrun could be swirled with product of 20 to 40 percent overrun in a proportion of 2 parts to 1 part. This can be accomplished through an ice cream plant with two different freezing barrels which feed at two different speeds through one filler into the same package. The lower overrun will have a higher flavor and color intensity swirled (like rainbow sherbet) or side by side (like neopolitan) with the lighter, creamier higher overrun product. This concept could utilize the same flavor mix or a number of different flavor mixes such as wildberry and lemon.

(2) Use of the mix of the instant invention which would be frozen at 70 percent overrun through a freezer barrel with a variegating sauce (following the same marketing concepts) added by way of a variegating pump. In this concept, the variegating sauce may be the same formula as the present mix or modified to perform closer to that of a traditional variegating sauce. Variegating sauces are fed into the frozen product as it comes from the freezing barrel prior to the filler for the package. The variegating sauce is nonaerated or frozen when it is fed into the frozen whipped hard pack. Listed below is the formula for a variegating sauce following the marketing concepts:

STRAWBERRY VARIEGATING SAUCE

	Percentage
Strawberry Puree Seedless	40.00
Apple Concentrate 70BX deionized	49.80
Water	6.20
Pectin Low Methoxyl	.50
Locust Bean Gum	.50
Malic Acid	.10
Strawberry Flavor Natural	2.60
Beet. Color	.30
Total	100.00

Most variegating sauces are like jams and do not contain fruit particulates. Most variegating pump nozzles cannot accept very large particulates where the sauce is pumped into the frozen whipped stream. The variegate is normally refrigerated.

(3) Another variation could be made that would utilize fruit particulates which have been processed with deionized apple or pear concentrate to produce a higher brix fruit particulate which is fed into the frozen end product by means of a fruit feeder. The fruit feeder is a device made to introduce and disperse particulates into the stream of the frozen whipped product (without grinding them up) as it comes from the freezing barrel. The frozen whipped product would be our standard hard pack mix frozen at 70 percent overrun.

The fruit particulates, such as sliced or whole strawberries, are processed with the concentrates to raise the brix from its natural 7-10 percent level to 20-40 percent brix. This allows the fruit particulate to remain softer in the frozen state than its natural brix which is icy and approximately as hard as an ice cube.

Listed below is the formula for processed sliced strawberries:

Percentage

Sliced Strawberries	74.7
Deionized Apple Conc. 70 Brix	25.0
Beet Color	<u>0.3</u>
Total	100.0
Brix - 23.5 percent	
pH - 4.0 percent	

The strawberries need to sit in the concentrate in refrigeration for at least 2-4 days for the transfer of solids to occur.

Better yet is to pass the strawberries in concentrate through a vacuum step which will pull moisture from the berry and allow higher solids from the concentrate to replace it.

(4) Novelties

Our present tests for novelties utilize our present hard pack mix whipped and frozen to 40 percent overrun. At above this overrun, the novelties is too fragile and breaks from the stick. A coating of water or 50 percent water-50 percent fruit juice mix can be made to coat and seal the novelty bar. The hard frozen whipped novelty is simply dipped into the coating tank which freezes a coating of the lower brix coating over its surface.

The particulates and ripples discussed in (2) and (3) can also be utilized in the novelty filler molds, etc. The two part overrun concept suggested in (1) could also be used on two separate frozen mixes.

The sliced strawberries could be concentrated by vacuum without the use of the deionized juice concentrate until the natural brix fall between 20-40 brix in this way accomplishing the same concept as above.

While in accordance with the patent statutes only the best mode and preferred embodiment of the invention has been illustrated and described in detail, it is to be understood that the invention is not limited thereto or thereby, but that the scope of the invention is defined by the appended claims.

Claims

1. A frozen, hard pack, fruit juice product comprising:
 - at least one type of fruit juice;
 - a fruit juice flavor enhancer selected from the group consisting of flavoring, spices, flavor enhancers and edible organic acids and mixtures thereof;
 - from 0.5 percent to 1.5 percent by weight of at least one stabilizer based upon the total weight of said product with the provision that the product contains at least 0.02 percent xanthan gum;
 - from 0.05 percent to 0.50 percent by weight of whipping agent protein based upon the total weight of said product;
 - an amount of water to adjust the overall brix value of said product to the range of 10 to 35, and said product being essentially free of added sugar and corn sweetener additives and having overrun of at least 20 percent wherein said frozen fruit juice product has a smooth creamy appearance and good low temperature storage properties.
2. The fruit juice product according to claim 1, wherein said stabilizers are selected from the group consisting of guar gum, locust bean gum, carrageenan, an alginate, a cellulose gum, a pectin, and combinations thereof.
3. The fruit juice product according to claims 1 or 2, wherein said juice type is selected from the group consisting of fruit juice, fruit juice concentrate, fruit puree, fruit puree concentrate, modified juice, modified juice concentrate, and combinations thereof.
4. The fruit juice product according to any of claims 1 to 3, wherein the overall amount of said stabilizers

Percentage

	Sliced Strawberries	74.7
5	Deionized Apple Conc. 70 Brix	25.0
	Beet Color	<u>0.3</u>
	Total	100.0
10	Brix - 23.5 percent	
	pH - 4.0 percent	

15 The strawberries need to sit in the concentrate in refrigeration for at least 2-4 days for the transfer of solids to occur.

Better yet is to pass the strawberries in concentrate through a vacuum step which will pull moisture from the berry and allow higher solids from the concentrate to replace it.

(4) Novelties

Our present tests for novelties utilize our present hard pack mix whipped and frozen to 40 percent overrun. At above this overrun, the novelties is too fragile and breaks from the stick. A coating of water or 50 percent water-50 percent fruit juice mix can be made to coat and seal the novelty bar. The hard frozen whipped novelty is simply dipped into the coating tank which freezes a coating of the lower brix coating over its surface.

The particulates and ripples discussed in (2) and (3) can also be utilized in the novelty filler molds, etc. The two part overrun concept suggested in (1) could also be used on two separate frozen mixes.

30 The sliced strawberries could be concentrated by vacuum without the use of the deionized juice concentrate until the natural brix fall between 20-40 brix in this way accomplishing the same concept as above.

While in accordance with the patent statutes only the best mode and preferred embodiment of the invention has been illustrated and described in detail, it is to be understood that the invention is not limited thereto or thereby, but that the scope of the invention is defined by the appended claims.

35 Claims

1. A frozen, hard pack, fruit juice product comprising:
at least one type of fruit juice;

40 a fruit juice flavor enhancer selected from the group consisting of flavoring, spices, flavor enhancers and edible organic acids and mixtures thereof;

from 0.5 percent to 1.5 percent by weight of at least one stabilizer based upon the total weight of said product with the provision that the product contains at least 0.02 percent xanthan gum;

from 0.05 percent to 0.50 percent by weight of whipping agent protein based upon the total weight of said product;

45 an amount of water to adjust the overall brix value of said product to the range of 10 to 35, and said product being essentially free of added sugar and corn sweetener additives and having overrun of at least 20 percent wherein said frozen fruit juice product has a smooth creamy appearance and good low temperature storage properties.

- 50 2. The fruit juice product according to claim 1, wherein said stabilizers are selected from the group consisting of guar gum, locust bean gum, carrageenan, an alginate, a cellulose gum, a pectin, and combinations thereof.

- 55 3. The fruit juice product according to claims 1 or 2, wherein said juice type is selected from the group consisting of fruit juice, fruit juice concentrate, fruit puree, fruit puree concentrate, modified juice, modified juice concentrate, and combinations thereof.

4. The fruit juice product according to any of claims 1 to 3, wherein the overall amount of said stabilizers



is from .35 percent to .60 percent by weight with the provision that the product contain 0.02 to 0.3 percent of xanthan gum.

- 5 5. The fruit juice product according to any one of claims 1 to 4, wherein said stabilizers are guar gum, carrageenan, and xanthan gum, wherein the amount of said guar gum ranges from 0.17 to 0.23 percent by weight, wherein the amount of carrageenan ranges from 0.05 to 0.30 percent by weight and 0.07 to 0.30 percent by weight of xanthan gum.
- 10 6. The fruit juice product according to any one of claims 1 to 5, wherein the overall brix value of said product is from 20 to 30.
7. The fruit juice product according to any one of claims 1 to 6, wherein the overall brix value of said product is from 20 to 26.
- 15 8. The fruit juice product according to any one of claims 1 to 7 further including citric acid, malic acid, an ascorbic acid and another organic acids inherent in fruits to give a titratable acid level of 0.15 to 0.8 percent.
- 20 9. The fruit juice product according to any one of claims 1-8, wherein said fruit juice product as a mixture has a sweetness value on a dry basis of 25 to 45 percent fructose, 10 to 30 percent glucose, and no more than 10 percent of other sweeteners of the saccharose class.
- 25 10. The fruit juice product according to any one of claims 1-9, wherein said overrun is between 20 to 150 percent.
11. The fruit juice product of any one of claims 1-10, wherein said product has a brix value of 21 to 25 to give a cream having a high overrun and reduced tendency to form ice crystals on aging.
- 30 12. The fruit juice product of any one of claims 1-11, wherein at least one of the juices present has been contacted with an ion exchange resin or subjected to ultrafiltration.
13. The fruit juice product of claim 12 further including a characterizing flavoring ingredient to compliment any flavor removed by contact of the juice with the ion exchange resin or ultrafiltration.
- 35 14. The fruit juice product of any one of claims 1-13 further including an amount of acid added to adjust the pH to 2.5 to 5.5.
- 40 15. The fruit juice product of any one of claims 1-14 wherein said fruit juice is a deionized or ultrafiltration juice selected from apple, grape or pear juice blended with a minor amount of a red, orange or yellow colored juice, said red, orange or yellow colored juice being blended therein as a concentrate, puree or a mixture, said product having a brix of 23 to 26.
- 45 16. The first juice product of any one of claims 1-15 further including at least first and second fruit juice products having different brix values from each other formulated as separate products and frozen together as one product with different layers.
17. The fruit juice product of claim 16, wherein said layers have a different overrun whereby said brix content or said overrun determines the taste of said layers.
- 50 18. The fruit juice product of any one of claims 1-16, wherein said fruit juice product is a confection including pieces of fruit, said pieces of fruit impregnated with a juice concentrate, or deionized or ultrafiltered fruit juice concentrate in turn having a brix value greater than that of said product.
- 55 19. The fruit juice product of any one of claims 1-16 or 18, wherein said fruit juice product is a frozen novelty confectionary product further including a hand held member with said product frozen thereon and a non-fruit juice confectionary product coating said fruit juice product.
20. The fruit juice product of any one of claims 1-16, 18, or 19, wherein said product is aseptically



packaged as a mixture for subsequent consumption in its frozen state.

Patentansprüche

- 5 1. Ein gefrorenes Hartpackungs-Fruchtsaft-Produkt umfassend:
 - wenigstens einen Typ Fruchtsaft;
 - einen Fruchtsaft-Aromaverstärker ausgewählt aus der Gruppe bestehend aus Geschmacksstoff, Gewürz, Aromaverstärker und eßbare organische Säuren und Mischungen daraus;
 - zwischen 0,5 bis 1,5 Gew.-% wenigstens eines Stabilisators bezogen auf das Gesamtgewicht des
10 genannten Produktes mit der Maßgabe, daß das Produkt wenigstens 0,02 % Xanthangummi enthält;
 - zwischen 0,05 und 0,50 Gew.-% eines Whippingmittel-Proteins bezogen auf das Gesamtgewicht des genannten Produktes;
 - eine Menge Wasser, um den Gesamt-Brix-Wert des genannten Produktes auf den Bereich von 10
15 bis 35 einzustellen,

und wobei das genannte Produkt im wesentlichen frei von zugesetztem Zucker und Mais-Süßungsmittelzusätzen ist und eine Whipping-Volumen-Zunahme von wenigstens 20 % hat, bei der das genannte gefrorene Fruchtsaft-Produkt eine weiche, cremige Erscheinungsform und gute Tieftemperatur-Lagereigenschaften hat.
2. Das Fruchtsaft-Produkt gemäß Anspruch 1, bei dem die genannten Stabilisatoren aus der Gruppe bestehend aus Guargummi, Johannisbrotgummi, Karrageenmoos, einem Alginat, einem Cellulosegummi, einem Pektin und Kombinationen davon ausgewählt sind.
- 25 3. Das Fruchtsaft-Produkt gemäß Ansprüchen 1 oder 2, bei dem der genannte Safttyp aus der Gruppe bestehend aus Fruchtsaft, Fruchtsatzkonzentrat, Fruchtpüree, Fruchtpüreekonzentrat, modifiziertem Saft, modifiziertem Saftkonzentrat und Kombinationen daraus ausgewählt ist.
- 30 4. Das Fruchtsaft-Produkt gemäß irgendeinem der Ansprüche 1 bis 3, bei dem die Gesamtmenge der genannten Stabilisatoren 0,35 bis 0,60 Gew.-% beträgt, mit der Maßgabe, daß das Produkt 0,02 bis 0,3 % Xanthangummi enthält.
- 35 5. Das Fruchtsaft-Produkt gemäß irgendeinem der Ansprüche 1 bis 4, bei dem die genannten Stabilisatoren Guargummi, Karrageenmoos und Xanthangummi sind, wobei die Menge des genannten Guargummis von 0,17 bis 0,23 Gew.-% reicht, die Menge an Karrageenmoos von 0,05 bis 0,30 Gew.-% und an Xanthangummi von 0,07 bis 0,30 Gew.-%.
- 40 6. Das Fruchtsaft-Produkt gemäß irgendeinem der Ansprüche 1 bis 5, bei dem der Gesamt-Brix-Wert des genannten Produktes 20 bis 30 beträgt.
7. Das Fruchtsaft-Produkt gemäß irgendeinem der Ansprüche 1 bis 6, bei dem der Gesamt-Brix-Wert des genannten Produktes 20 bis 26 beträgt.
- 45 8. Das Fruchtsaft-Produkt gemäß irgendeinem der Ansprüche 1 bis 7, welches ferner Zitronensäure, Äpfelsäure, eine Ascorbinsäure und eine weitere fruchteigene organische Säure einschließt, um einen titrierbaren Säureanteil von 0,15 bis 0,8 % zu ergeben.
9. Das Fruchtsaft-Produkt gemäß irgendeinem der Ansprüche 1 bis 8, wobei das genannte Fruchtsaft-Produkt als eine Mischung einen Süßwert auf Trockenstoffbasis von 25 bis 45 % Fructose, 10 bis 30 %
50 Glucose und nicht mehr als 10 % anderer Süßungsmittel der Saccharose-Klasse hat.
10. Das Fruchtsaft-Produkt gemäß irgendeinem der Ansprüche 1 bis 9, bei dem die genannte Whipping-Volumen-Zunahme zwischen 20 bis 150 % ist.
- 55 11. Das Fruchtsaft-Produkt irgendeines der Ansprüche 1 bis 10, wobei das genannte Produkt einen Brix-Wert von 21 bis 25 hat, um eine Creme zu geben, die eine hohe Whipping-Volumen-Zunahme besitzt und eine verringerte Tendenz, beim Altern Eiskristalle zu bilden.



12. Das Fruchtsaft-Produkt irgendeines der Ansprüche 1 bis 11, bei dem wenigstens einer der vorhandenen Säfte mit einem Ionenaustauschharz in Berührung gebracht oder einer Ultrafiltration unterworfen wurde.
- 5 13. Das Fruchtsaft-Produkt des Anspruchs 12, welches ferner einen charakterisierenden Aroma-Inhaltsstoff beinhaltet, um jedes Aroma zu ergänzen, das durch Kontakt des Saftes mit dem Ionenaustauschharz oder durch Ultrafiltration entfernt wurde.
- 10 14. Das Fruchtsaft-Produkt irgendeines der Ansprüche 1 bis 13, welches ferner eine Menge zugesetzter Säure beinhaltet, um den pH auf 2,5 bis 5,5 einzustellen.
- 15 15. Das Fruchtsaft-Produkt irgendeines der Ansprüche 1 bis 14, bei dem der genannte Fruchtsaft ein deionisierter oder ultrafiltrierter Saft ist, ausgewählt aus Apfel-, Grapefruit- oder Birnen-Saft, vermischt mit einer geringeren Menge eines rot, orange oder gelb gefärbten Saftes, und wobei dieser rot, orange oder gelb gefärbte Saft darin als ein Konzentrat, Püree oder eine Mischung eingemischt ist, wobei das genannte Produkt einen Brix von 23 bis 26 hat.
- 20 16. Das erste Saft-Produkt irgendeines der Ansprüche 1 bis 15, welches ferner wenigstens erste und zweite Fruchtsaft-Produkte beinhaltet, die voneinander verschiedene Brix-Werte aufweisen und als getrennte Produkte formuliert und gemeinsam als ein Produkt mit unterschiedlichen Schichten gefroren sind.
- 25 17. Das Fruchtsaft-Produkt nach Anspruch 16, bei dem die genannten Schichten eine unterschiedliche Whipping-Volumen-Zunahme haben, wobei der genannte Brix-Gehalt oder die genannte Whipping-Volumen-Zunahme den Geschmack der genannten Schichten bestimmt.
- 30 18. Das Fruchtsaft-Produkt nach irgendeinem der Ansprüche 1 bis 16, wobei das genannte Fruchtsaft-Produkt eine Zubereitung ist, die Fruchstückchen beinhaltet, wobei die genannten Fruchstückchen mit einem Saftkonzentrat oder deionisiertem oder ultrafiltriertem Fruchtsatzkonzentrat getränkt sind, welche ihrerseits einen Brix-Wert größer als den des genannten Produktes haben.
- 35 19. Das Fruchtsaft-Produkt irgendeines der Ansprüche 1 bis 16 oder 18, wobei das genannte Fruchtsaft-Produkt ein gefrorenes als Neuheit konfektioniertes Produkt ist, das ferner ein in der Hand zu haltendes Teil aufweist, auf dem das genannte Produkt aufgefroren ist und wobei eine Nicht-Fruchtsaft-Produktzubereitung das Fruchtsaft-Produkt überzieht.
- 40 20. Das Fruchtsaft-Produkt irgendeines der Ansprüche 1 bis 18 oder 19, wobei das genannte Produkt als eine Mischung für den nachfolgenden Verzehr in seinem gefrorenen Zustand aseptisch verpackt ist.

40 Revendications

1. Produit en forme de jus de fruits congelé sous forme de bloc dur, comprenant :
 - au moins un type de jus de fruits;
 - un agent intensifiant le goût du jus de fruits, choisi dans le groupe comprenant un agent de sapidité, des épices, des agents intensifiant l'arôme et des acides organiques consommables et des mélanges de ces substances;
 - entre 0,5 pour cent et 1,5 pour cent en poids d'au moins un agent de stabilisation sur la base du poids total dudit produit, pourvu que ce dernier contienne au moins 0,02 pour cent de gomme de xanthane;
 - entre 0,05 pour cent et 0,50 pour cent en poids d'une protéine formant agent moussant sur la base du poids total dudit produit;
 - une quantité d'eau permettant de régler la valeur brix globale dudit produit dans la gamme de 10 à 35, et ledit produit étant sensiblement exempt de tout sucre ajouté et de tout additif édulcorant tiré du maïs et présentant une dilatation de volume d'au moins 20 pour cent, et dans lequel ledit produit en forme de jus de fruits congelé possède une apparence lisse et crémeuse et de bonnes propriétés de stockage à basse température.
2. Produit en forme de jus de fruits selon la revendication 1, dans lequel lesdits agents de stabilisation



sont choisis dans le groupe comprenant la gomme de guar, la gomme de caroube, le carrageen, un alginat, une gomme de cellulose, une pectine et des combinaisons de ces substances.

3. Produit en forme de jus de fruits selon la revendication 1 ou 2, dans lequel ledit type de jus est choisi dans le groupe comprenant le jus de fruits, le concentré de jus de fruits, la purée de fruits, le concentré de purée de fruits, un jus modifié, un concentré de jus modifié et des combinaisons de ces substances.
4. Produit en forme de jus de fruits selon l'une quelconque des revendications 1 à 3, dans lequel la quantité totale desdits agents de stabilisation est comprise entre 0,35 pour cent et 0,60 pour cent en poids, pourvu que le produit contienne 0,02 à 0,3 pour cent de gomme de xanthane.
5. Produit en forme de jus de fruits selon l'une quelconque des revendications 1 à 4, dans lequel lesdits agents de stabilisation sont la gomme de guar, le carrageen, et la gomme de xanthane, la quantité de ladite gomme de guar étant comprise entre 0,17 et 0,23 pour cent en poids, la quantité de carrageen étant comprise entre 0,05 et 0,30 pour cent en poids et la quantité de la gomme de xanthane étant comprise entre 0,07 et 0,30 pour cent en poids.
6. Produit en forme de jus de fruits selon l'une quelconque des revendications 1 à 5, dans lequel la valeur brix globale dudit produit est comprise entre 20 et 30.
7. Produit en forme de jus de fruits selon l'une quelconque des revendications 1 à 6, dans lequel la valeur brix globale dudit produit est comprise entre 20 et 26.
8. Produit en forme de jus de fruits selon l'une quelconque des revendications 1 à 7 contenant en outre de l'acide citrique, de l'acide maléique, un acide ascorbique et d'autres acides organiques propres aux fruits de manière à fournir un niveau acide titrable de 0,15 à 0,8 pour cent.
9. Produit en forme de jus de fruits selon l'une des revendications 1 à 8, dans lequel ledit produit en forme de jus de fruits à l'état de mélange possède un caractère sucré sur une base à sec de 25 à 45 pour cent de fructose, 10 à 30 pour cent de glucose et pas plus de 10 pour cent d'autres édulcorants de la classe du saccharose.
10. Produit en forme de jus de fruits selon l'une quelconque des revendications 1 à 9, dans lequel ladite dilatation de volume est comprise entre 20 et 150 pour cent.
11. Produit en forme de jus de fruits selon l'une quelconque des revendications 1 à 10, dans lequel ledit produit possède une valeur brix comprise entre 21 et 25 de manière à former une crème présentant une dilatation de volume importante et une tendance réduite à former des cristaux de glace lors de son vieillissement.
12. Produit en forme de jus de fruits selon l'une quelconque des revendications 1 à 11, dans lequel au moins l'un des jus de fruits présents a été mis en contact avec une résine échangeuse d'ions ou a été soumis à une ultrafiltration.
13. Produit en forme de jus de fruits selon la revendication 12, comprenant en outre un ingrédient de sapidité caractéristique servant à compléter le goût atténué par la mise en contact du jus avec la résine échangeuse d'ions ou en raison de l'ultrafiltration du jus.
14. Produit en forme de jus de fruits selon l'une quelconque des revendications 1 à 13, comprenant en outre une quantité d'acide ajouté permettant de régler le pH entre 2,5 et 5,5.
15. Produit en forme de jus de fruits selon l'une quelconque des revendications 1 à 14, dans lequel ledit jus de fruits est un jus désionisé ou un jus ayant subi l'ultrafiltration, choisi parmi un jus de pomme, de raisin ou de poire mélangé à une faible quantité d'un jus coloré rouge, orange ou jaune, ledit jus coloré rouge, orange ou jaune étant mélangé au jus de fruits sous la forme d'un concentré, d'une purée ou d'un mélange, ledit produit possédant une valeur brix comprise entre 23 et 26.
16. Produit en forme de jus de fruits selon l'une quelconque des revendications 1 à 15, contenant en outre



au moins des premier et second produits en forme de jus de fruits possédant des valeurs brix différentes et formulés sous la forme de produits séparés et congelés conjointement pour former un produit formé de différentes couches.

- 5 17. Produit en forme de jus de fruits selon la revendication 16, selon lequel lesdites couches présentent des dilatations de volume différentes, ladite valeur brix ou ladite dilatation de volume déterminant le goût desdites couches.
- 10 18. Produit en forme de jus de fruits selon l'une quelconque des revendications 1 à 16, dans lequel ledit produit en forme de jus de fruits est une fabrication contenant des morceaux de fruits, lesdits morceaux de fruits étant imprégnés avec un concentré de jus ou un concentré de jus de fruits désionisé ou soumis à une ultrafiltration et possédant à son tour une valeur brix supérieure à celle dudit produit.
- 15 19. Produit en forme de jus de fruits selon l'une quelconque des revendications 1 à 16, ou 18, dans lequel ledit produit en forme de jus de fruits est un nouveau produit de confiserie congelé comprenant un élément que l'on tient à la main et autour duquel ledit produit est congelé, et un produit de confiserie non constitué par un jus de fruits et enrobant ledit produit formé par un jus de fruits.
- 20 20. Produit formé par un jus de fruits selon l'une quelconque des revendications 1 à 16, 18 ou 19, dans lequel ledit produit est emballé d'une manière aseptique sous la forme d'un mélange destiné à être consommé ultérieurement dans son état congelé.

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