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(57) Abstract

A gasified formulation, aseptically–packaged, comprises the components of ice–cream, and includes a stabiliser and/or emulsifier that maintains the formulation at a temperature above freezing, up to 25 °C. This composition does not need freezing, during transport, storage or display in a retail outlet; it is frozen only when required, before consumption.

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ICE-CREAM FORMULATION AND PACKAGING

Field of the Invention

This invention relates to an ice-cream formulation, and in particular to a formulation that can be conveniently stored, prior to use, and to its packaging.

Background of the Invention

Many desserts that are best eaten cold, including mousses and other aerated products, can be prepared and stored at room temperature. They can be chilled by the user, shortly before consumption. However, ice-cream melts at ambient temperature, and does not regain its original structure and texture if it is then refrozen. It is therefore necessary for manufacturers, transporters, retailers and consumers to maintain ice-cream frozen, before it is eaten. Further, consumers may be disinclined to purchase ice-cream if there is any likelihood of their being unable to transfer the ice-cream from a retailer's freezer to their own freezer within, say, 1-2 hours. This is especially the case on a warm day, when ice-cream is most wanted by the consumer.

The last problem is addressed in WO-A-8601688. The solution is to use "a stabilizing and thickening composition including a salt which acts as a protein stabilizer, a gelling agent constituted by an alkali metal alginate, and a thickening agent selected from the group of chemically modified starches", to include a high concentration of sugars (e.g. over 25% w/w sucrose and fructose), and to avoid air. The product therefore has a solid consistency, and is invariably intensely sweet. The avoidance of air means that the product is in fact no longer ice-cream, and is thus designated "ice-cream confectionery".

Summary of the Invention

This invention is based on the realisation that, by suitable formulation of an ice-cream mix, including the overrun (air/gas incorporation) under aseptic conditions, and using appropriate packaging, its structure can be

maintained above freezing, especially at ambient temperature. By this simple expedient, the need to keep ice-cream frozen at every stage, except immediately prior to consumption, is obviated. Even when frozen and subsequently thawed, it does not lose its structure and quality, and can therefore be successfully reused.

These advantages are achieved using standard ice-cream components, without the need for a high concentration of sugars, or for starches, and yet ice formation to any perceptible extent can be avoided. The product is thus economical, in terms of production, transport and storage, and provides increased consumer convenience. In addition to the economic factor, the invention saves energy and is therefore environmentally-friendly.

According to the present invention, a gasified formulation of ice-cream components is aseptically-packaged, and includes stabiliser and/or emulsifier components that maintain the structure of the formulation at ambient temperature, e.g. at above 0°C, up to 25°C. The formulation is sterile.

In general terms, the present invention comprises the formulation of ice-cream components, including the stability and/or emulsifier, and gasifying the formulation before it is frozen. Packaging and gasification may be done at much the same time, but this is not essential.

Description of the Invention

A product of the invention may be prepared by mixing the components, and sterilising and packaging the mixture. The gas may be introduced with the other components, or later, immediately before packaging. The mixing may be conducted in conventional apparatus.

The gas that is used in the present invention is preferably inert. Most preferably, for economy and convenience, the gas is nitrogen. The use of air may necessitate the incorporation of an antioxidant. If necessary or desired, the gas may be sterilised/filtered before use. The degree of overrun may typically be up to

150%, e.g. 100%. Gasification is typically conducted at 5-15°C.

It is important to maintain sterility/aseptic conditions. The use of such conditions is well known to those skilled in the art, and it is of course a characteristic of the invention that the gasified mixture is appropriately packaged, so that its aseptic state is maintained.

In general terms, the components of the ice-cream formulation are conventional. Thus, for example, the composition comprises fat, sugar, non-fat milk solids, stabiliser and emulsifier.

The product may be made using standard dairy ingredients including milk, separated milk, buttermilk, cream, milk powder, evaporated milk or sweetened condensed milk. Egg yolk and/or albumin may be included. Vegetable fat may be used instead of milk fat, or a mixture of such fats.

The amount of fat may be 5 to 20%, e.g. 5-10%. The amount of added sugar, e.g. sucrose, will usually be less than 20%, e.g. about 16%. The amount of milk solids not fat (MSNF) may be 10 to 14%, e.g. 12%. The amount of emulsifier and/or stabiliser may be 0.1 to 5%, e.g. 0.5 to 3% or 1 to 2%. Glucose may be present, e.g. in an amount of 2% (all these percentages are by weight with respect to the ice-cream formulation). Another suitable component is glycerol, e.g. in an amount of 0.5 to 5%. The balance is water.

The emulsifier/stabiliser combination should be such that the formulation (which may be said to have a foamed or whipped consistency) retains its gasified structure during ambient storage, prior to freezing. The choice of each component can readily be made by one of ordinary skill in the art.

Emulsifiers that may be used are well known. Examples include milk protein, vegetable protein, lecithin, mono/diglycerides, acetic acid esters of mono/diglycerides,

lactic acid esters of mono/diglycerides, citric acid esters of mono/diglycerides, diacetyltartaric acid esters of mono-diglycerides, polyglycerol esters, propylene esters, propylene glycol esters, sorbitan esters, polyoxyethylene sorbitan esters, Na and Ca stearoyl lactylates, sucrose esters and sucroglycerides.

Stabilisers that may be used are also well known. Examples include proteins such as gelatine, milk protein or egg albumin; plant exudates such as gum arabic, gum ghatti, gum karaya or gum tragacanth; seed gums such as locust bean gum, guar gum, psyllium seed gum, quince seed gum or tamarind seed gum; seaweed extract such as agar, alginates, carrageenan or furcelleran; pectins such as low methoxyl or high methoxyl-type pectins; cellulose derivatives such as sodium carboxymethylcellulose, microcrystalline cellulose, methyl and methylethylcelluloses, or hydroxypropyl and hydroxypropylmethylcelluloses; and microbial gums such as dextran, xanthan or β-1,3-glucan. If necessary or desired, stabilising salts such as the sodium or potassium polyphosphates and/or sodium or potassium citrate may be used, preferably in an amount of 0.05 to 0.15%, e.g. 0.1%.

When a formulation of the invention is frozen, it is very desirable to avoid the formation of large ice crystals. The choice of emulsifier/stabiliser helps to avoid this potential problem. A water-soluble stabiliser such as gelatin controls ice crystal formation during freezing; other edible material that serves to render the composition relatively viscous under the manufacturing conditions may also be used instead. In this context, a particularly preferred component of the formulation of the invention is gelatin, e.g. in an amount of 0.5 to 5%, e.g. 0.5 to 2%, by weight. This may be introduced as a component of a commercial stabiliser such as Cremodan® Mousse 30.

In addition to the components described above, a formulation of the invention may comprise flavouring and/or colouring. Typical flavourings include mint, vanilla,

chocolate, coffee and fruit flavours such as strawberry. Pieces of nut, chocolate, fruit, ginger or other additives known to be used in ice-cream, may also be included. Sterility should be maintained.

A product of the invention may be provided in any desired form, as a plain ice-cream product of any desired shape, or layered or enrobed with other materials such as chocolate. It may also be packaged in large or individual containers, on a stick, or in a flexible tube. It may be part of a larger item, e.g. a cake.

A product of the invention can be stored and transported at, say, up to 15°C or 25°C. If the product is likely to encounter temperatures much above 25°C before consumption, it may be desirable to prevent expansion and loss of gas by packaging it under pressure, e.g. in a can.

A composition of the invention may conveniently be packaged in individual "pots"; for example, a group of four such pots, or of longer moulds, is frangibly connected. Differently flavoured compositions may be produced, on sticks.

The following Examples illustrate the invention.

Example 1

A formulation is prepared containing 10% fat (all milk fat, all vegetable fat, or a 50:50 mixture) and 12% milk solids not fat (MSNF). In addition, 10% sugar (sucrose), 2% glucose, 0.25 to 0.5% emulsifier such as egg yolk, glyceryl monostearate or lecithin and 0.25 to 0.5% stabiliser such as alginate or gelatin are added. The components are thoroughly mixed in a conventional mixing vessel.

The product is sterilised by UHT, at 120°C for 2 sec, and cooled. Inert, sterile gas (nitrogen) is introduced, to 100% overrun, immediately before aseptic packaging. The whipped product may be held under ambient conditions for up to 1 year before consumption.

Before eating the packaged product, it is placed in a domestic (or commercial) deep freeze unit and frozen or

chilled, e.g. at 4°C, before being eaten. The frozen product is essentially indistinguishable from conventional ice-cream.

For a commercial product, having the same characteristics, the UHT sterilisation is conducted at 149°C.

The compositions of Examples 2 and 3 may be treated in the same way.

Example 2

Composition: milk fat 10%; MSNF 11%; sucrose 10%; glucose 2%; glycerol 2%; stabiliser/emulsifier (Cremodan® Mousse 30) 3%; flavour to taste.

Example 3

Composition: milk fat 15%; MSNF 10%; sucrose 10%; glucose 2%; glycerol 2%; egg yolk 1%; stabiliser/emulsifier (Cremodan® Mousse 30) 3%; flavour to taste.

The amount of glycerol may be varied, in either Example 2 or Example 3, in order to regulate hardness. For example, if removed, the final frozen ice-cream will be harder. It is present as a softening agent. Example 3 may be described as a luxury product, due to its high fat content and the inclusion of egg yolk.

Example 4

Composition: vegetable fat 5%; MSNF 11%; sucrose 16%; glucose 2.5%; Cremodan® Mousse 3%; flavour to taste. This composition was processed as in Example 1; the cooled, sterilised product was aged for 4 hours at 4°C, to aid the incorporation of gas which was conducted using a Mondomix.

In all Examples, the amount of glucose may be varied. If omitted, its absence may be compensated for by the use of glycerol and/or sucrose.

CLAIMS

1. A gasified formulation, aseptically-packaged, comprising the components of ice-cream, and including a stabiliser and/or emulsifier that maintains the formulation at a temperature above freezing, up to 25°C.

2. A formulation according to claim 1, wherein the gas is nitrogen.

3. A formulation according to claim 1 or claim 2, which comprises fat, sugar, non-fat milk solids, and emulsifier/stabiliser.

4. A formulation according to any preceding claim, which includes glycerol.

5. A formulation according to any preceding claim, which includes a water-soluble stabiliser.

6. A formulation according to claim 5, wherein the stabiliser is gelatin.

7. A formulation according to any preceding claim, wherein the package is held under pressure.

8. A method for producing ice-cream, which comprises mixing the components defined in any of claims 1 to 6, packaging the mixture, under sterile conditions, and introducing a gas with the other components or immediately prior to packaging, before freezing.

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A23G9/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 A23G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
11 March 1998	24/03/1998

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