Description

Title of Invention: OIL-AND-FAT COMPOSITION

Technical Field

[0001]

Related Application

This application claims priority to Japanese Patent Application No. 2024-050906, filed on March 27, 2024. The priority application is incorporated herein by reference in its entirety.

[0002]

The present invention relates to an oil and/or fat composition.

Background Art

[0003]

In oil and/or fat processed foods such as frozen confectionery and chocolates, the oils and/or fats constituting the foods play an important role in determining physical properties such as hardness, melting point, and melting behavior. Therefore, to impart desired physical properties to foods, manufacturers have made full use of oil and/or fat processing techniques to design oils and/or fats using various vegetable oils and/or fats as raw materials.

[0004]

For example, oils and/or fats may be incorporated into frozen confectionery to improve their physical properties and flavor. As described in Patent Document 1, commonly used oils and/or fats include: (1) liquid oils represented by soybean oil and rapeseed oil, which have extremely low melting points and therefore melt readily in the mouth even in the frozen temperature range; (2) SUS-type triglycerides characterized by sharp meltability in the mouth near body temperature (where S is a saturated fatty acid and U is an unsaturated fatty acid, and the triglyceride has U bonded at the 2-position and S bonded at the 1- and 3-positions); (3) lauric oils and/or fats such as coconut oil and palm kernel oil; and (4) solid fats represented by palm oil.

[0005]

However, in Patent Document 1, the liquid oils in (1) have an insufficient crystal content even at low temperatures, while the SUS-type triglycerides in (2), the lauric oils and/or fats in (3), and the solid fats in (4) do not melt completely in the oral cavity cooled by frozen confectionery. Accordingly, adjustment of meltability in the mouth may be required.

[0006]

In Patent Document 1, caprylic acid and capric acid, which are short-chain fatty acids, are introduced into hydrogenated palm kernel oil, hydrogenated coconut oil, and the like by interesterification to improve meltability in the mouth. Patent Document 2 discloses frozen confectionery containing cocoa butter and having sharp meltability in the mouth. Patent Documents 3 and 4 disclose frozen confectionery that provide a strong cooling sensation by

mixing SUS-type triglycerides and lauric oils and/or fats at a specific ratio (Comparative Examples 9 and 11).

[0007]

Chocolates may be mentioned as another example. Various cocoa butter alternatives are incorporated into chocolates to impart various functions. In particular, to impart sharp meltability in the mouth, lauric oils and/or fats are widely used as cocoa butter alternatives, as disclosed in Patent Document 5 and the like. Chocolates containing such oils and/or fats are known to exhibit good meltability in the mouth even when refrigerated or frozen oil and/or fat processed foods are eaten.

[0008]

As described above, lauric oils and/or fats may impart good meltability in the mouth even when refrigerated or frozen oil and/or fat processed foods are eaten. However, in foods using lauric oils and/or fats, the oils and/or fats may be hydrolyzed because of inappropriate manufacturing or storage conditions or moisture migration from combination confectionery or bread, thereby producing an offensive odor (soapy odor) and markedly reducing product value.

Citation List

Patent Documents

[0009]

Patent Document 1: JP 2009-195221 A

Patent Document 2: JP H04-316453 A

Patent Document 3: JP H08-298934 A

Patent Document 4: JP 2023-111093 A

Patent Document 5: JP H08-89172 A

Summary of Invention

Technical Problem

[0010]

The present inventors examined the above prior art. The technique of Patent Document 1 is effective as compared with the case in which no short-chain fatty acid is introduced; however, its high saturated fatty acid content results in a high melting point. In addition, the oil and/or fat exhibits melting behavior peculiar to an interesterified oil, leaving room for improvement in terms of sharp meltability in the mouth.

[0011]

In Patent Document 2, cocoa butter is indeed characterized by sharp melting at around 35°C. However, when cocoa butter is eaten in a frozen state, the temperature in the oral cavity drops considerably below body temperature and takes a considerable time to recover to around 35°C; consequently, meltability in the mouth is instead impaired. In addition, cocoa butter has a

strong characteristic aroma, which gives rise to another problem in that the flavors of frozen confectionery to which it can be applied are limited.

[0012]

Patent Documents 3 and 4 disclose frozen confectionery that provide a strong cooling sensation by mixing SUS-type triglycerides and lauric oils and/or fats at a specific ratio (Comparative Examples 9 and 11). Although these frozen confectionery received high eating evaluation scores and were relatively effective, they were perceived as melting gradually in the mouth, presumably because of the wide variety of triglyceride species. The present inventors therefore recognized that further investigation was still warranted to produce a confectionery that provides both sharp meltability in the mouth and a strong cooling sensation.

[0013]

Another noteworthy fact is that palm oil and palm kernel oil are used in many oil and/or fat processed foods, including the frozen confectionery and chocolates described in the patent documents above. These oils and/or fats are highly useful because of their characteristic oil and/or fat compositions, prices, and other properties, and are used worldwide. However, in recent years, there has been a need for eating qualities that cannot be achieved with palm oil and palm kernel oil, as well as a need, particularly in Europe, for vegetable oils and/or fats as alternatives to palm oil. To reliably provide the innovative value demanded by a rapidly diversifying market, it is also important to achieve, using oils and/or fats that have not previously been widely used, physical properties and eating qualities that could not previously be achieved.

[0014]

In addition, in oil and/or fat processed foods containing lauric oils and/or fats, meltability may deteriorate, and deterioration of appearance (fat bloom) and internal structure (formation of coarse crystals) may progress rapidly, partly because the structures of the major triglycerides differ greatly between the lauric oils and/or fats and cocoa butter or other edible oils and/or fats. As a result, the appearance and eating qualities may deteriorate.

To address problems experienced when eating oil and/or fat processed foods containing lauric oils and/or fats, including problems with meltability in the mouth during eating, the present inventors sought to solve the problems by reducing the amount of lauric oils and/or fats used.

[0015]

In view of the prior art described above, an object of the present invention is to provide an oil and/or fat composition that enables extremely sharp melting in the mouth during eating, when used in oil and/or fat processed foods such as frozen confectionery and chocolates.

In a preferred aspect, a vegetable oil and/or fat is used as an alternative to palm oil.

Solution to Problem

[0016]

As a result of intensive studies to solve the above problem, the present inventors found that an oil and/or fat composition having a specific composition of oils and/or fats can solve the problem, and thus completed the present invention.

[0017]

That is, the present invention includes the following contents.

(1) An oil and/or fat composition satisfying all of (A) to (C) below.

(A) An XU2 content of 40 mass% or more

(B) A content mass ratio of polyunsaturated fatty acids to unsaturated fatty acids in constituent fatty acid composition of 0.15 or less

(C) A content mass ratio of stearic acid to palmitic acid in constituent fatty acid composition of 0.00 to 0.30

Here, "XU2" represents a triglyceride having one molecule of X and two molecules of U bonded thereto, where X is a saturated fatty acid having 16 or more carbon atoms and U is an unsaturated fatty acid.

(2) The oil and/or fat composition according to (1), further satisfying the following requirement (D): the content of saturated fatty acids having 8 to 12 carbon atoms in the constituent fatty acid composition is 5 mass% or less.

(3) The oil and/or fat composition according to (1), further satisfying the following requirement (E): the content mass ratio of PO2 to XU2 is 0.40 to 0.95.

Here, "PO2" represents a triglyceride having one molecule of palmitic acid and two molecules of oleic acid bonded thereto.

(4) The oil and/or fat composition according to (2), further satisfying the following requirement (E): the content mass ratio of PO2 to XU2 is 0.40 to 0.95.

(5) The oil and/or fat composition according to (1), wherein an oil and/or fat containing 40 mass% or more of PO2 is used as a raw material.

(6) The oil and/or fat composition according to any one of (2) to (4), wherein an oil and/or fat containing 40 mass% or more of PO2 is used as a raw material.

(7) An oil and/or fat processed food including the oil and/or fat composition according to any one of (1) to (5).

(8) An oil and/or fat processed food including the oil and/or fat composition according to (6).

(9) The oil and/or fat composition according to any one of (1) to (5), comprising 50 mass% or more of a processed oil and/or fat obtained from the fruit or seed kernels of pequi (scientific name: Caryocar brasiliense, Caryocar villosum, or Caryocar coriaceum).

(10) The oil and/or fat composition according to (6), comprising 50 mass% or more of a processed oil and/or fat obtained from the fruit or seed kernels of pequi (scientific name: Caryocar brasiliense, Caryocar villosum, or Caryocar coriaceum).

Advantageous Effects of Invention

[0018]

According to the present invention, it is possible to provide an oil and/or fat composition that enables extremely sharp melting in the mouth during eating when used in oil and/or fat processed foods such as frozen confectionery and chocolates.

In a preferred aspect, the problem of the present invention may be solved by using, as a main component in place of palm oil, a processed vegetable oil and/or fat obtained from the fruit or seed kernels of pequi (scientific name: Caryocar brasiliense, Caryocar villosum, or Caryocar coriaceum).

Brief Description of Drawings

[0019]

FIG. 1 shows DSC (differential scanning calorimetry) analytical data for oil and/or fat compositions obtained in [Study 2]. The figure shows the analytical results for Oil and/or fat composition Examples 2, 3, and 4 and Oil and/or fat composition Comparative Examples 4 and 10. In the figure, these are denoted by E2, E3, E4, CE4, and CE10, respectively.

Description of Embodiments

[0020]

The present invention will be described in detail below.

In the present description, “from (a number) to (a number)”, which indicates a numerical range, includes the number after “from” as the lower limit of the numerical range and the number after “to” as the upper limit of the numerical range.

An arbitrary combination may be adopted as the upper limit and the lower limit in the numerical range.

[0021]

The oil and/or fat composition of the present invention satisfies all of (A) to (C) below. An oil and/or fat composition exhibiting sharp meltability may be obtained by satisfying all of the numerical ranges below.

(A) An XU2 content of 40 mass% or more

(B) A content mass ratio of polyunsaturated fatty acids to unsaturated fatty acids in the constituent fatty acid composition of 0.15 or less

(C) A content mass ratio of stearic acid to palmitic acid in the constituent fatty acid composition of 0.00 to 0.30

Here, “XU2” represents a triglyceride having one molecule of X and two molecules of U bonded thereto, where X is a saturated fatty acid having 16 or more carbon atoms and U is an unsaturated fatty acid.

[0022]

Regarding (A), the XU2 content is preferably 42 mass% or more, more preferably 43 mass% or more, more preferably 44 mass% or more, 45 mass% or more, more preferably 40

mass% or more and 70 mass% or less, 42 mass% or more and 70 mass% or less, 42 mass% or more and 68 mass% or less, 43 mass% or more and 70 mass% or less, 43 mass% or more and 68 mass% or less, 44 mass% or more and 70 mass% or less, 44 mass% or more and 68 mass% or less, 45 mass% or more and 70 mass% or less, 45 mass% or more and 68 mass% or less, 46 mass% or more and 70 mass% or less, 46 mass% or more and 68 mass% or less, 47 mass% or more and 70 mass% or less, 47 mass% or more and 68 mass% or less, 48 mass% or more and 70 mass% or less, 48 mass% or more and 68 mass% or less.

[0023]

Regarding (B), the content mass ratio of polyunsaturated fatty acids to unsaturated fatty acids in the constituent fatty acid composition is preferably 0.14 or less. As used herein, the term "polyunsaturated fatty acid" means an unsaturated fatty acid having two or more unsaturated bonds. Specific examples include linoleic acid, linolenic acid, arachidonic acid, docosahexaenoic acid (DHA), eicosapentaenoic acid (EPA), and docosapentaenoic acid (DPA).

[0024]

Regarding (C), the content mass ratio of stearic acid to palmitic acid in the constituent fatty acid composition is preferably 0.01 to 0.30, more preferably 0.01 to 0.28, more preferably 0.01 to 0.27, and more preferably 0.01 to 0.26.

[0025]

In a preferred aspect, in addition to satisfying all of (A) to (C), the oil and/or fat composition of the present invention satisfies the following requirement (D): the content of saturated fatty acids having 8 to 12 carbon atoms in the constituent fatty acid composition is 5 mass% or less, more preferably 4 mass% or less, more preferably 3 mass% or less, and more preferably 2 mass% or less.

[0026]

In another preferred aspect, in addition to satisfying all of (A) to (C), the oil and/or fat composition of the present invention satisfies the following requirement (E): the content mass ratio of PO2 to XU2 is 0.40 to 0.95.

Here, "PO2" represents a triglyceride having one molecule of palmitic acid and two molecules of oleic acid bonded thereto.

[0027]

In another preferred aspect, in addition to satisfying all of (A) to (C), the oil and/or fat composition of the present invention satisfies the following requirement (F): the total content of palmitic acid and stearic acid in the constituent fatty acid composition is 25.0 to 40.0 mass%.

[0028]

Provided that the above requirements are satisfied, the raw material used for the oil and/or fat composition of the present invention is not particularly limited as long as it is an edible oil and/or fat. Examples include various natural animal and vegetable oils and/or fats, such as vegetable oils and/or fats and marine oils, and oils and/or fats obtained from microorganisms and algae.

Oils and/or fats obtained from plants, microorganisms, and algae having oil and/or fat compositions modified to satisfy the above characteristics by traditional breeding techniques using natural or artificial mutants or by new breeding techniques represented by genetic engineering and genome editing techniques may also be used.

[0029]

Examples of raw materials for the oil and/or fat composition of the present invention include oils and/or fats obtained by interesterifying a palmitoleic-acid-containing oil and/or fat, such as sea buckthorn fruit oil (seaberry fruit oil), bacuri fat, macadamia nut oil, hazelnut oil, or seal oil, with an oil and/or fat rich in palmitic acid (P), such as palm oil. Further examples of raw materials that eliminate the need for a processing step such as interesterification include processed oils and/or fats obtained from the fruit or seed kernels of pequi (scientific name: Caryocar brasiliense, Caryocar villosum, or Caryocar coriaceum), which are rich in P and oleic acid (O) but contain almost no polyunsaturated fatty acids such as linoleic acid. Pequi fruit oil or oil obtained from pequi seed kernels is particularly preferred for industrial reasons because fractionation with or without a solvent yields, as a low-melting fraction, an oil and/or fat composition that exhibits the effects of the present invention and, as a high-melting fraction, a fraction usable as a cocoa butter alternative (POP: 70 to 85 wt.%; POSt: 5 to 10 wt.%, where St represents stearic acid). Note that the technical concept of the present invention is not limited by these examples.

[0030]

In a preferred aspect of the oil and/or fat composition of the present invention, an oil and/or fat containing 40 mass% or more of PO2 is preferably used as a raw material. Use of such an oil and/or fat as a raw material facilitates production of the oil and/or fat composition of the present invention. The PO2 content of the raw material used is preferably 45 mass% or more, more preferably 50 mass% or more, more preferably 52 mass% or more, and more preferably 55 mass% or more.

[0031]

As the oil and/or fat containing 40 mass% or more of PO2, it is preferable to use a processed oil and/or fat obtained from the fruit or seed kernels of the pequi.

In a more preferred aspect, the oil and/or fat composition of the present invention preferably contains 50 mass% or more of the processed oil and/or fat obtained from the fruit or seed kernels of the pequi.

[0032]

One preferred aspect of the oil and/or fat composition of the present invention is an oil and/or fat composition for which the analytical values obtained by [SFC Analytical Method] below satisfy all of the following.

• SFC at 10°C is 25% or more.

• (SFC at 5°C) - (SFC at 15°C) is 45% or more.

[SFC Analytical Method]

As used herein, SFC was measured after the oil and/or fat was solidified at -20°C for 1 hour and then held at each measurement temperature for 30 minutes. The analysis was performed at measurement temperatures of 0°C, 5°C, 10°C, and 15°C. The analyzer used was “minispec mq20” available from Bruker Corporation.

[0033]

One preferred aspect of the oil and/or fat composition of the present invention is an oil and/or fat composition for which the SFC at 5°C, which is an analytical value determined by [SFC Analytical Method] described above, is 45% or more. The SFC at 5°C is more preferably 46% or more, even more preferably 46% or more and 75% or less, and still more preferably 46% or more and 72% or less.

[0034]

One preferred aspect of the oil and/or fat composition of the present invention is an oil and/or fat composition for which the SFC at 15°C, which is an analytical value determined by [SFC Analytical Method] described above, is 15% or less. The SFC at 15°C is more preferably 14% or less and still more preferably 13% or less.

[0035]

In a more preferred aspect, the SFC at 10°C is 25% or more and 60% or less, even more preferably 25% or more and 55% or less, and still more preferably 30% or more and 53% or less.

[0036]

In a more preferred aspect, (SFC at 5°C) - (SFC at 15°C) described above is 45% or more and 80% or less, even more preferably 45% or more and 77% or less, and still more preferably 45% or more and 75% or less.

[0037]

One preferred aspect of the oil and/or fat composition of the present invention is an oil and/or fat composition for which the analytical values obtained by [DSC Evaluation Method] below satisfy all of the following.

• The peak top temperature is 10°C or more and 20°C or less.

• (Peak top temperature) - (endset temperature) is 3.0°C or less.

[DSC Evaluation Method] Changes in the endothermic response of an oil and/or fat sample of approximately 25 mg were analyzed under a nitrogen atmosphere, and the peak top temperature and endset temperature of the melting peak having the largest area, as well as the difference therebetween, were evaluated. The measurement temperature conditions were as follows: initial temperature, 80°C (held for 5 minutes); cooling rate, 2°C/min; minimum temperature, -20°C (held for 60 minutes); heating rate, 5°C/min; and final temperature, 60°C. The analyzer used was a “DSC 3+” available from METTLER TOLEDO. As used herein, the term “endset temperature” refers to the intersection of the baseline and the tangent to the curve extending from the peak top to the point of complete melting.

[0038]

One preferred aspect of the oil and/or fat composition of the present invention is an oil and/or fat composition for which the endset temperature, which is an analytical value determined by [DSC Evaluation Method] described above, is 10°C or more and 20°C or less. The endset temperature is more preferably 10°C or more and 19°C or less, 11°C or more and 20°C or less, 11°C or more and 19°C or less, 12°C or more and 20°C or less, 12°C or more and 19°C or less, 13°C or more and 20°C or less, or 13°C or more and 19°C or less.

[0039]

In a more preferred aspect, the peak top temperature is 10°C or more and 18°C or less, or 10°C or more and 17°C or less.

[0040]

Other oils and/or fats may be used in the oil and/or fat composition of the present invention within a range that does not impair the effects of the present invention. Examples of usable oils and/or fats include vegetable oils and/or fats, such as soybean oil, high-erucic-acid rapeseed oil, rapeseed oil, corn oil, cottonseed oil, peanut oil, sunflower oil, high-oleic sunflower oil, peanut oil, almond oil, avocado oil, hazelnut oil, walnut oil, rice bran oil, safflower oil, high-oleic safflower oil, olive oil, sesame oil, palm oil, Phulwara butter, pequi fruit oil, pequi kernel oil, pistachio oil, buckwheat oil, andiroba oil, mahua butter, sea buckthorn fruit oil, pili nut oil, coconut oil, palm kernel oil, macauba kernel oil, tucuma (Astrocaryum aculeatum) kernel oil, babassu oil, cohune oil, murumuru butter, mango kernel oil, Salvadora persica kernel oil, ucuuba (Virola surinamensis) kernel oil, shea butter, sal fat, and cocoa butter; animal oils and/or fats, such as milk fat, beef tallow, and lard; a medium-chain triglyceride (MCT) oil; algal oil; oil and/or fat derived from microbial fermentation; their hydrogenated oils, fractionated oils, hydrogenated fractionated oils, fractionated hydrogenated oils, and processed oils and/or fats produced by interesterification or the like; and blends thereof. When such other oils and/or fats are included, their content is preferably 20 mass% or less, more preferably 10 mass% or less, still more preferably 5 mass% or less, and most preferably 0 mass%, based on the total amount of the oil and/or fat composition.

[0041]

In one aspect, the oil and/or fat composition of the present invention may be used in various oil and/or fat processed foods. As used herein, an “oil and/or fat processed food” is not particularly limited except that it contains an oil and/or fat as an essential component. Preferred examples of oil and/or fat processed foods include frozen confectionery and chocolates, in which the sharp meltability of the oil and/or fat composition of the present invention may be exhibited.

[0042]

As used herein, the term “frozen confectionery” is not particularly limited and encompasses any confectionery eaten in a frozen temperature range. Typical examples include ice cream, ice milk, and lacto ice as defined in the “Ministerial Ordinance Concerning Compositional Standards, etc. for Milk and Milk Products,” commonly referred to as the “Ministerial Ordinance Concerning Milk, etc.,” and frozen confectionery as defined in the

Ministry of Health and Welfare Notification entitled “Standards and Criteria for Food and Food Additives, etc.”

Ice cream products, such as ice cream, ice milk, and lacto ice, generally contain a fat source, non-fat milk solids, sugar, an emulsifier, and water as main components. Ice cream products are typical examples of frozen confectionery, and their components include milk fat, non-fat milk solids, sweeteners, stabilizers, emulsifiers, flavoring agents, coloring agents, water, and the like.

[0043]

The oil and/or fat composition of the present invention may be used in the production of frozen confectionery. An exemplary method for producing frozen confectionery is as follows. First, raw materials are mixed, dissolved, and dispersed to prepare an emulsion. The prepared emulsion is subjected to treatments such as sterilization and homogenization and then cooled to prepare a raw material mixture (also referred to as a frozen confectionery mix). The raw material mixture is usually used after a storage step called aging. Frozen confectionery may be produced by freezing the raw material mixture at a factory and distributing and selling it as a final frozen confectionery product, or by distributing the raw material mixture as such, freezing it at a store, and then selling it as a final frozen confectionery product. The oil and/or fat composition of the present invention may be used in producing the raw material mixture.

[0044]

The amount of the oil and/or fat composition of the present invention incorporated into frozen confectionery is preferably 80 mass% or more of the oils and/or fats contained in the frozen confectionery, more preferably 90 mass% or more, more preferably 95 mass% or more, and still more preferably 100 mass%.

[0045]

The term “chocolates” as used herein is not limited to “pure chocolate”, “chocolate”, “quasi-chocolate”, and “chocolate-using foods” as defined by the Japan National Chocolate Industry Fair Trade Council, and refers to food products, including also oil and/or fat processed foods, that contain an oil and/or fat as an essential component and use cocoa mass, cocoa, whole milk powder, dried fruit juice powder, dried vegetable powder, plant milk powder, cocoa butter, cocoa butter alternatives, hard butter and the like. Accordingly, the term may also generally refer to foods in which edible substances are dispersed in an oil and/or fat-based matrix, including, for example, matcha-flavored foods and strawberry-flavored foods obtained by mixing powders derived from vegetables or fruits.

[0046]

The amount of the oil and/or fat composition of the present invention incorporated into chocolates is not particularly limited. In particular, sharp melting characteristics may be imparted when the amount is 20 mass% or more, and more preferably 25 mass% or more, of the oil and/or fat content of the chocolates. As used herein, the oil and/or fat content of chocolates includes the

fat content (cocoa butter) derived from cocoa raw materials such as cocoa mass and cocoa, as well as the fat content derived from raw materials incorporated into the chocolates.

[0047]

The method for producing the chocolates using the oil and/or fat composition of the present invention may be carried out in the same manner as in producing common chocolates. Specifically, the chocolate product may be obtained by appropriately selecting and mixing, with the oil and/or fat containing the oil and/or fat composition of the present invention as an essential component, (a part of) cocoa mass, various powdered foods such as cocoa, saccharides, and powdered milk, and raw materials such as an emulsifier, a flavoring agent, and a coloring agent; subjecting the mixture to roll refining as a refining step; adding the remaining raw materials as appropriate; and then performing conching or mixing treatment as a mixing step. Alternatively, for example, a production method in which a mixing step and a refining step are performed in parallel using a ball mill, a bead mill, or the like may also be used.

[0048]

An emulsifier commonly used in the production of chocolates may be used in chocolates containing the oil and/or fat composition of the present invention. Examples include a polyglycerol fatty acid ester, a sucrose fatty acid ester, an organic acid monoglycerol fatty acid ester, polysorbate, and a polyglycerol condensed ricinoleic acid ester. These may be used in combination of two or more types.

[0049]

In one aspect, the chocolates of the present invention may be chocolates used in frozen confectionery. The form and method of use are not particularly limited. For example, applications include a “coating application,” in which frozen confectionery is dipped in melted chocolates to coat the surface of the frozen confectionery with the chocolates, and an “incorporation (dropping) application,” in which melted chocolates are added dropwise to and mixed with fluid frozen confectionery such as ice cream, whereupon the chocolates solidify and are present as granules or fragments in the frozen confection. The combination form of frozen confectionery and chocolates is not particularly limited, and examples thereof include not only a case where the surface of the frozen confectionery is uniformly covered, but also an aspect in which the frozen confectionery and chocolates are locally combined, such as an aspect in which when only a part of the surface of the frozen confectionery is covered, or when the chocolates are kneaded into the frozen confectionery and used, by increasing the dropping amount, granular or fragmentary chocolates are hard to be separated from each other to form a marble shape or a thin plate shape in the frozen confectionery. As used herein, an aspect in which the chocolates of the present invention are combined with frozen confectionery as described above is defined as “composite frozen confectionery.”

[0050]

In a preferred aspect, the oil and/or fat composition of the present invention may exhibit the effects of the present invention to a greater extent when used in frozen confectionery or

composite frozen confectionery. The mechanism by which such effects are exhibited is presumed to be as follows. Frozen confectionery and composite frozen confectionery are maintained at storage temperatures in the frozen or refrigerated temperature range until immediately before eating. Therefore, when frozen confectionery or composite frozen confectionery is eaten, the temperature in the oral cavity drops faster and to a lower level. This impairs the meltability of the oils and/or fats contained in the frozen confectionery or composite frozen confectionery, leading to poor meltability in the mouth. It is therefore presumed that the effects of the present invention are more readily exhibited in frozen confectionery and composite frozen confectionery.

Examples

[0051]

Hereinafter, the present invention will be described in more detail with reference to Examples of the present invention.

[0052]

○ Analytical method

[Method for analyzing fatty acid composition]

As used herein, the fatty acid composition of the oil and/or fat was analyzed in accordance with the method specified in the JOCS Standard Methods for the Analysis of Fats, Oils and Related Materials (1996 Edition), 2.4.1.2 Methyl Esterification Method (Boron Trifluoride-Methanol Method), published by the Japan Oil Chemists' Society.

[Triglyceride Composition Analytical Method (HPLC)]

As used herein, the triglyceride composition of the oil and/or fat was analyzed in accordance with 2.4.6.2 Triacylglycerol Composition (High-Performance Liquid Chromatography) in the Standard Methods for the Analysis of Fats, Oils and Related Materials established by the Japan Oil Chemists' Society.

[SFC Analytical Method]

As used herein, SFC was measured after the oil and/or fat was solidified at -20°C for 1 hour and then held at each measurement temperature for 30 minutes. The analysis was performed at measurement temperatures of 0°C, 5°C, 10°C, and 15°C. The analyzer used was “minispec mq20” available from Bruker Corporation.

[DSC (Differential Scanning Calorimetry) Analytical Method]

As used herein, DSC was performed by analyzing changes in the endothermic response of an oil and/or fat sample of approximately 25 mg under a nitrogen atmosphere, and the peak top temperature and endset temperature of the melting peak having the largest area, as well as the difference therebetween, were evaluated. The measurement temperature conditions were as follows: initial temperature, 80°C (held for 5 minutes); cooling rate, 2°C/min; minimum temperature, -20°C (held for 60 minutes); heating rate, 5°C/min; and final temperature, 60°C. The analyzer used was a “DSC 3+” available from METTLER TOLEDO.

[0053]

○ Oil and/or fat used for examination

Oil and/or fat A

The medium-melting fraction obtained by subjecting an oil and/or fat prepared by random interesterification of palm oil to multistage fractionation using a solvent was designated as oil and/or fat A.

Oil and/or fat B

A medium-melting fraction of fractionated palm oil (iodine value: 34, available from Fuji Oil Co., Ltd.) was designated as oil and/or fat B.

Oil and/or fat C

High-oleic sunflower oil was interesterified with stearic acid using a lipase having 1,3-position selectivity, and the fatty acids were removed by distillation. The resulting oil and/or fat fraction was subjected to multistage fractionation using a solvent, and the resulting low-melting fraction was designated as oil and/or fat C.

Oil and/or fat D

A low-melting fraction of palm oil (iodine value: 67, available from Fuji Oil Co., Ltd.) was designated as oil and/or fat D.

Oil and/or fat E

A medium-melting fraction of fractionated palm oil (iodine value: 40, available from Fuji Oil Co., Ltd.) was designated as oil and/or fat E.

Oil and/or fat F

A low-melting fraction of palm oil (iodine value: 55, available from Fuji Oil Co., Ltd.) was designated as oil and/or fat F.

Oil and/or fat G

Palm oil (iodine value: 52, available from Fuji Oil Co., Ltd.) was designated as oil and/or fat G.

Oil and/or fat H

Palm olein (iodine value: 56, available from Fuji Oil Co., Ltd.) was designated as oil and/or fat H.

Oil and/or fat I

The low-melting fraction obtained by subjecting pequi kernel oil to fractionation using a solvent was designated as oil and/or fat I.

Oil and/or fat J

The low-melting fraction obtained by subjecting pequi fruit oil to fractionation using a solvent was designated as oil and/or fat J.

Oil and/or fat K

Macadamia nut oil was interesterified with palmitic acid using a lipase having 1,3-position selectivity, and the fatty acids were removed by distillation. The resulting oil and/or fat

fraction was subjected to multistage fractionation using a solvent, and the resulting low-melting fraction was designated as oil and/or fat K.

Oil and/or fat L

Fully hydrogenated palm kernel oil prepared by a common method was designated as oil and/or fat L.

Oil and/or fat M

The low-melting fraction obtained by subjecting palm kernel oil to fractionation using a solvent was designated as oil and/or fat M.

[0054]

Table 1 (unit: mass%) shows the results obtained by analyzing the resulting oils and/or fats in accordance with the above [Method for analyzing fatty acid composition], and Table 2 (unit: mass%) shows the results obtained by analyzing them in accordance with the above [Triglyceride Composition Analytical Method (HPLC)].

In Table 2, "U3" represents a triglyceride having three molecules of U bonded thereto, where U is an unsaturated fatty acid.

"SU2" represents a triglyceride having one molecule of S and two molecules of U bonded thereto, where S is a saturated fatty acid and U is an unsaturated fatty acid.

"XU2" represents a triglyceride having one molecule of X and two molecules of U bonded thereto, where X is a saturated fatty acid having 16 or more carbon atoms and U is an unsaturated fatty acid.

"PO2" represents a triglyceride having one molecule of palmitic acid and two molecules of oleic acid bonded thereto.

"S2U" represents a triglyceride having two molecules of S and one molecule of U bonded thereto, where S is a saturated fatty acid and U is an unsaturated fatty acid.

"S3" represents a triglyceride having three molecules of S bonded thereto, where S is a saturated fatty acid.

[0055]

[Table 1]

	Oil and/or fat A	Oil and/or fat B	Oil and/or fat C	Oil and/or fat D	Oil and/or fat E	Oil and/or fat F	Oil and/or fat G	Oil and/or fat H	Oil and/or fat I	Oil and/or fat J	Oil and/or fat K	Oil and/or fat L	Oil and/or fat M
C8:0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	4.3
C10:0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.1	3.4
C12:0	0.0	0.0	0.0	0.3	0.1	0.4	0.2	0.3	0.0	0.0	0.0	49.9	45.3
C14:0	0.9	0.7	0.0	0.8	0.8	1.5	0.9	0.8	0.1	0.0	0.6	15.8	12.6
C16:0	60.1	57.1	2.8	32.6	49.1	41.8	45.2	41.3	30.1	27.9	34.0	8.1	8.0
C16:1	0.2	0.1	0.0	0.3	0.2	0.2	0.2	0.2	0.9	1.2	18.4	0.0	0.0
C18:0	4.5	6.5	30.0	2.9	4.7	4.2	4.1	3.7	2.7	1.6	0.9	17.8	2.4

C18:1	28.7	31.8	62.3	48.3	37.6	37.7	39.5	43.4	59.2	66.0	40.9	1.4	20.2
C18:2	4.8	2.9	2.1	13.5	6.6	13.4	8.9	9.4	6.0	2.1	2.0	0.0	3.0
C18:3	0.1	0.0	0.0	0.1	0.1	0.2	0.0	0.0	0.4	0.6	0.2	0.0	0.0
C20:0	0.5	0.5	0.4	0.5	0.4	0.3	0.5	0.6	0.2	0.2	0.7	0.2	0.1
C20:1	0.1	0.0	0.1	0.1	0.1	0.2	0.1	0.1	0.3	0.4	1.3	0.0	0.1
C22:0	0.0	0.1	1.8	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.2	0.0	0.0
C24:0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0

[0056]

[Table 2]

	Oil and/or fat A	Oil and/or fat B	Oil and/or fat C	Oil and/or fat D	Oil and/or fat E	Oil and/or fat F	Oil and/or fat G	Oil and/or fat H	Oil and/or fat I	Oil and/or fat J	Oil and/or fat K
U3	1.0	0.7	5.3	11.9	4.4	6.0	7.2	8.2	16.5	15.6	8.2
SU2	11.0	3.6	85.5	54.8	21.9	33.9	34.7	39.8	53.1	62.0	64.5
XU2	11.0	3.6	85.5	54.8	21.9	33.9	34.7	39.8	53.1	62.0	64.5
PO2	7.9	2.5	3.0	34.1	14.5	20.1	21.9	22.8	45.2	56.4	27.9
S2U	72.2	89.9	6.6	21.7	66.4	46.2	42.6	39.3	22.1	12.1	21.2
S3	4.2	1.6	0.0	0.0	0.7	0.0	4.8	1.0	0.1	0.1	0.0

[0057]

Formulation of oil and/or fat composition

Using the resulting oils and/or fats A to M, the oils and/or fats were mixed according to Table 3 (unit: parts by mass) to obtain oil and/or fat compositions for use in the studies described below.

The fatty acid compositions of the resulting oil and/or fat compositions are shown in Table 4 (unit: mass%), and the triglyceride compositions are shown in Table 5 (unit: mass%). The numerical values were calculated based on the fatty acid composition analytical results (Table 1) and triglyceride composition analytical results (Table 2) for oils and/or fats A to M, and the formulation ratios (Table 3).

Oils and/or fats L and M, which are lauric oils and/or fats containing 40 mass% or more of lauric acid in the constituent fatty acid composition, were used as Reference Examples for comparison in [Study 1] to [Study 3].

[0058]

[Table 3]

	Oil and/or fat composition Example							Oil and/or fat composition Comparative Example									Reference Example	
	1	2	3	4	5	6	7	1	2	3	4	5	6	7	8	9	10	1	2

Oil and/or fat A	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0
Oil and/or fat B	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0
Oil and/or fat C	10	0	0	0	0	0	0	0	0	100	0	0	0	0	0	20	0	0	0
Oil and/or fat D	0	35	20	0	0	0	0	0	0	0	100	0	0	0	0	0	50	0	0
Oil and/or fat E	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	50	0
Oil and/or fat F	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0
Oil and/or fat G	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0
Oil and/or fat H	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	30	80
Oil and/or fat I	90	65	80	100	0	50	0	0	0	0	0	0	0	0	0	80	50	0	0
Oil and/or fat J	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oil and/or fat K	0	0	0	0	0	50	100	0	0	0	0	0	0	0	0	0	0	0	0
Oil and/or fat L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0
Oil and/or fat M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	20

[0059]

[Table 4]

	Oil and/or fat composition Example							Oil and/or fat composition Comparative Example									
	1	2	3	4	5	6	7	1	2	3	4	5	6	7	8	9	10
C8:0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C10:0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C12:0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.4	0.2	0.3	0.0	0.1
C14:0	0.1	0.4	0.3	0.1	0.0	0.4	0.6	0.9	0.7	0.0	0.8	0.8	1.5	0.9	0.8	0.1	0.5
C16:0	27.4	31.0	30.6	30.1	27.9	32.1	34.0	60.1	57.1	2.8	32.6	49.1	41.8	45.2	41.3	24.7	31.3
C16:1	0.8	0.7	0.8	0.9	1.2	9.6	18.4	0.2	0.1	0.0	0.3	0.2	0.2	0.2	0.2	0.7	0.6
C18:0	5.5	2.8	2.8	2.7	1.6	1.8	0.9	4.5	6.5	30.0	2.9	4.7	4.2	4.1	3.7	8.2	2.8
C18:1	59.5	55.4	57.1	59.2	66.0	50.1	40.9	28.7	31.8	62.3	48.3	37.6	37.7	39.5	43.4	59.8	53.8
C18:2	5.6	8.6	7.5	6.0	2.1	4.0	2.0	4.8	2.9	2.1	13.5	6.6	13.4	8.9	9.4	5.2	9.8
C18:3	0.4	0.3	0.4	0.4	0.6	0.3	0.2	0.1	0.0	0.0	0.1	0.1	0.2	0.0	0.0	0.3	0.3
C20:0	0.2	0.3	0.3	0.2	0.2	0.4	0.7	0.5	0.5	0.4	0.5	0.4	0.3	0.5	0.6	0.2	0.3
C20:1	0.3	0.2	0.3	0.3	0.4	0.8	1.3	0.1	0.0	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.2
C22:0	0.2	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.1	1.8	0.0	0.0	0.0	0.1	0.1	0.4	0.0
C24:0	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.1	0.0

[0060]

[Table 5]

	Oil and/or fat composition Example							Oil and/or fat composition Comparative Example									
	1	2	3	4	5	6	7	1	2	3	4	5	6	7	8	9	10
U3	15.4	14.9	15.6	16.5	15.6	12.4	8.2	1.0	0.7	5.3	11.9	4.4	6.0	7.2	8.2	14.2	14.2
SU2	56.4	53.7	53.5	53.1	62.0	58.8	64.5	11.0	3.6	85.5	54.8	21.9	33.9	34.7	39.8	59.6	54.0
XU2	56.4	53.7	53.5	53.1	62.0	58.8	64.5	11.0	3.6	85.5	54.8	21.9	33.9	34.7	39.8	59.6	54.0
PO2	41.0	41.3	43.0	45.2	56.4	36.6	27.9	7.9	2.5	3.0	34.1	14.5	20.1	21.9	22.8	36.8	39.7
PO2/XU2	0.77	0.77	0.81	0.85	0.91	0.64	0.43	0.72	0.69	0.04	0.62	0.66	0.59	0.63	0.57	0.69	0.74
S2U	20.6	22.0	22.0	22.1	12.1	21.7	21.2	72.2	89.9	6.6	21.7	66.4	46.2	42.6	39.3	19.0	21.9
S3	0.1	0.1	0.1	0.1	0.1	0.1	0.0	4.2	1.6	0.0	0.0	0.7	0.0	4.8	1.0	0.1	0.1

[0061]

Evaluation Items

The analytical values from Tables 4 and 5 were organized based on the following evaluation items and are shown in Table 6.

(A) XU2 content

(B) Content mass ratio of polyunsaturated fatty acids to unsaturated fatty acids in the constituent fatty acid composition

(C) Content mass ratio of stearic acid to palmitic acid in the constituent fatty acid composition

(D) Content of saturated fatty acids having 8 to 12 carbon atoms in the constituent fatty acid composition

(E) Content mass ratio of PO2 to XU2

(F) Total content of palmitic acid and stearic acid in the constituent fatty acid composition

[0062]

[Table 6]

	Oil and/or fat composition Example							Oil and/or fat composition Comparative Example									
	1	2	3	4	5	6	7	1	2	3	4	5	6	7	8	9	10
(A)	56.4	53.7	53.5	53.1	62.0	58.8	64.5	11.0	3.6	85.5	54.8	21.9	33.9	34.7	39.8	59.6	54.0
(B)	0.09	0.14	0.12	0.10	0.04	0.08	0.06	0.15	0.08	0.03	0.22	0.15	0.27	0.19	0.18	0.09	0.16
(C)	0.20	0.09	0.09	0.09	0.06	0.06	0.03	0.07	0.11	10.7	0.09	0.10	0.10	0.09	0.09	0.33	0.09
(D)	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.4	0.2	0.3	0.0	0.1
(E)	0.77	0.77	0.81	0.85	0.91	0.64	0.43	0.72	0.69	0.04	0.62	0.66	0.59	0.63	0.57	0.69	0.74
(F)	32.9	33.8	33.4	32.9	29.5	33.9	34.9	64.6	63.6	32.8	35.5	53.8	46.0	49.2	45.0	32.8	34.2

[0063]

[Evaluation Criteria for Analytical Values of Oil and/or Fat Compositions]

The resulting oil and/or fat compositions were evaluated according to the following requirements (A) to (F).

(A) The XU2 content is 40 mass% or more.

(B) The content mass ratio of polyunsaturated fatty acids to unsaturated fatty acids in the constituent fatty acid composition is 0.15 or less.

(C) The content mass ratio of stearic acid to palmitic acid in the constituent fatty acid composition is 0.00 to 0.30.

(D) The content of saturated fatty acids having 8 to 12 carbon atoms in the constituent fatty acid composition is 5 mass% or less.

(E) The content mass ratio of PO2 to XU2 is 0.40 to 0.95.

(F) The total content of palmitic acid and stearic acid in the constituent fatty acid composition is 25.0 to 40.0 mass%.

[0064]

Discussion of Table 6

• Oil and/or fat compositions in Oil and/or fat composition Examples 1 to 7 satisfied all of the requirements (A) to (C).

• Oil and/or fat composition Examples 1 to 7 also satisfied the requirements (D) to (F).

• Oil and/or fat composition Comparative Examples 1 to 10 failed to satisfy at least one of the requirements (A) to (C).

[0065]

[Study 1] Evaluation 1 of Oil and/or Fat Composition

[0066]

Examination method

The resulting oil and/or fat compositions were analyzed in accordance with the above [SFC Analytical Method], and the results are shown in Table 7 (unit: %). In the table, the calculated value of (SFC at 5°C) - (SFC at 15°C) is shown as “SFC5-15.” The analytical results were evaluated according to [SFC Evaluation Criteria].

[0067]

[SFC Evaluation Criteria]

An oil and/or fat composition of the present invention was considered acceptable when all of the following criteria were satisfied.

• SFC at 10°C is 25% or more.

• (SFC at 5°C) - (SFC at 15°C) is 45% or more.

The following items were also evaluated.

• SFC at 5°C is 45% or more.

• SFC at 15°C is 15% or less.

[0068]

[Table 7]

	Oil and/or fat composition Example							Oil and/or fat composition Comparative Example										Reference Example	
	1	2	3	4	5	6	7	1	2	3	4	5	6	7	8	9	10	1	2
0°C	65.2	55.2	58.0	61.7	69.3	68.2	73.4	90.1	96.9	90.8	37.0	84.9	46.8	76.7	70.7	66.8	52.3	79.3	69.6
5°C	57.5	46.0	48.9	53.2	61.5	61.2	70.2	91.2	96.5	90.6	16.7	80.5	33.2	69.2	60.8	60.9	45.4	70.9	57.5
10°C	41.5	30.3	34.0	35.8	43.8	40.8	51.1	91.6	93.8	87.1	2.0	71.3	18.5	54.8	41.1	45.7	21.6	55.5	34.3
15°C	12.2	0.0	1.9	4.8	11.3	0.2	0.1	86.8	88.4	80.6	0.2	56.9	5.0	38.3	23.0	20.8	0.0	33.7	12.8
SFC5-15	45.3	46.0	47.0	48.4	50.2	61.0	70.2	4.5	8.1	10.0	16.5	23.6	28.2	30.9	37.7	40.1	45.4	37.2	44.7

[0069]

Discussion of Table 7

• Oil and/or fat composition Examples 1 to 7, which satisfied [Evaluation Criteria for Analytical Values of Oil and/or Fat Compositions], also satisfied all the criteria in [SFC Evaluation Criteria] and were evaluated as acceptable.

• Oil and/or fat composition Comparative Examples 1 to 10 failed to meet [SFC Evaluation Criteria].

• Under [SFC Evaluation Criteria], oil and/or fat compositions in Oil and/or fat composition Examples 1 to 7 also satisfied the requirements that the SFC at 5°C be 45% or more and the SFC at 15°C be 15% or less.

• Reference Examples using lauric oils and/or fats failed to meet [SFC Evaluation Criteria].

[0070]

[Study 2] Evaluation 2 of Oil and/or Fat Composition

[0071]

Examination method

The resulting oil and/or fat compositions were analyzed in accordance with the above [DSC (Differential Scanning Calorimetry) Analytical Method], and the peak top temperature, endset temperature, and difference therebetween are shown in Table 8 (unit: °C). In the table, “peak top temperature” is indicated as “TOP,” “endset temperature” as “END,” and (peak top temperature) - (endset temperature) as “TOP-END.”

The analytical results were evaluated according to [DSC Evaluation Criteria].

[0072]

[DSC Evaluation Criteria]

An oil and/or fat composition of the present invention was considered acceptable when all of the following criteria were satisfied.

• The peak top temperature is 10°C or more and 20°C or less.

• (Peak top temperature) - (endset temperature) is 3.0°C or less.

The following additional evaluation criterion was also evaluated.

• The endset temperature is 10°C or more and 20°C or less.

[0073]

[Table 8]

	Oil and/or fat composition Example							Oil and/or fat composition Comparative Example										Reference Example	
	1	2	3	4	5	6	7	1	2	3	4	5	6	7	8	9	10	1	2
TOP	12.1	13.0	14.1	15.2	16.1	14.8	14.6	27.8	17.0	23.4	4.0	17.9	8.1	7.6	7.0	-0.9	10.9	12.1	9.9
END	14.8	15.0	15.8	16.7	17.9	16.7	17.1	36.0	21.7	26.1	10.7	24.2	10.7	11.9	11.5	3.7	14.2	23.4	16.8
TOP-END	2.6	2.0	1.7	1.6	1.8	1.9	2.5	8.2	4.7	2.7	6.7	6.2	2.6	4.3	4.6	4.7	3.3	11.4	6.9

[0074]

Discussion of Table 8

• Oil and/or fat composition Examples 1 to 7, which satisfied [Evaluation Criteria for Analytical Values of Oil and/or Fat Compositions], also satisfied all the criteria in [DSC Evaluation Criteria] and were evaluated as acceptable.

• Oil and/or fat composition Comparative Examples 1 to 10 failed to meet [DSC Evaluation Criteria].

• Under [DSC Evaluation Criteria], oil and/or fat compositions in Oil and/or fat composition Examples 1 to 7 also satisfied the additional evaluation criterion that the endset temperature be 10°C or more and 20°C or less.

• Reference Examples using lauric oils and/or fats failed to meet [DSC Evaluation Criteria].

[0075]

Discussion of FIG. 1

FIG. 1 shows the analytical results for Oil and/or fat composition Examples 2, 3, and 4 and Oil and/or fat composition Comparative Examples 4 and 10. In the figure, they are denoted as E2, E3, E4, CE4, and CE10, respectively.

As shown by the analytical data in FIG. 1, it is clear that, compared with the Comparative Examples, the oil and/or fat compositions of the Examples exhibit sharp meltability in the range of approximately 10°C to 15°C.

[0076]

[Study 3] Evaluation in Frozen Confectionery

[0077]

Examination method

Using Oil and/or fat composition Examples 1 to 7 and Oil and/or fat composition Comparative Examples 1 to 10 obtained above as the oil and/or fat portion and following the formulation shown in Table 9 (unit: parts by mass), Frozen Confectionery Examples 1 to 7 and Frozen Confectionery Comparative Examples 1 to 10 were prepared in accordance with [Method for Preparing Frozen Confectionery] below, with only the oil and/or fat portion differing.

The prepared frozen confectionery were evaluated in accordance with [Evaluation Method for Frozen Confectionery] below, and the evaluation results obtained according to [Evaluation Criteria for Frozen Confectionery] below are shown in Table 10.

The following ingredients were used to prepare the frozen confectionery.

Frozen confectionery stabilizer (San Best NN-305, available from San-Ei Gen F.F.I., Inc.)

Emulsifier (EMULSY P-100, available from Riken Vitamin Co., Ltd.)

[0078]

[Table 9]

Oil and/or fat portion	10
Skimmed milk powder	8
Granulated sugar	10
Powdered starch syrup	5
Emulsifier	0.2
Stabilizer	0.3
Vanilla flavor	0.05
Ion exchange water	66.45

[0079]

[Method for Preparing Frozen Confectionery]

1. Skimmed milk powder, granulated sugar, powdered starch syrup, an emulsifier, and a stabilizer were mixed.

2. The mixture prepared in 1 was added to warmed ion-exchange water (product temperature: 70°C or higher).

3. The oil and/or fat was added while stirring with a homomixer at 5000 rpm.

4. The mixture was stirred for 19 minutes.

5. After 19 minutes, the vanilla flavor was added.

6. Stirring was stopped 1 minute after addition of the flavor.

7. The mixture was passed through a high-pressure homogenizer (120 kgf/cm) in one pass.

8. The mixture was aged overnight under refrigeration to obtain a frozen confectionery mix.

9. The resulting frozen confectionery mix was frozen in a De'Longhi ice cream maker for 15 to 30 minutes.

10. The mixture was shock-frozen at -40°C for 60 minutes.

11. The mixture was frozen and stored to obtain frozen confectionery.

[0080]

[Evaluation Method for Frozen Confectionery]

The melting sensation of the frozen confectionery stored at -20°C for 24 hours was evaluated by 6 trained panelists according to [Evaluation Criteria for Frozen Confectionery] below, and the score determined by consensus was used as the final evaluation.

In this evaluation, the meltability of the confectionery in the oral cavity during eating was evaluated.

[0081]

[Evaluation Criteria for Frozen Confectionery]

5: Melts very sharply

4: Melts sharply

3: Neither sharp nor slow

2: Melts somewhat slowly and leaves a residual sensation in the mouth

1: Melts slowly and leaves a strong residual sensation in the mouth

A score of 4 or higher was considered acceptable.

[0082]

[Table 10]

	Frozen Confectionery Examples							Frozen Confectionery Comparative Examples									
	1	2	3	4	5	6	7	1	2	3	4	5	6	7	8	9	10
Oil and/or fat used	Oil and/or fat composition Example							Oil and/or fat composition Comparative Example									
	1	2	3	4	5	6	7	1	2	3	4	5	6	7	8	9	10
Evaluation result	4	4	4	5	4	4	4	3	2	2	3	3	3	3	3	3	3

[0083]

Discussion of Table 10

• Frozen Confectionery Examples prepared using Oil and/or fat composition Examples 1 to 7 of the present invention, which were evaluated as acceptable according to [SFC Evaluation Criteria] and [DSC Evaluation Criteria], were also evaluated as acceptable.

• Frozen Confectionery Comparative Examples prepared using Oil and/or fat composition Comparative Examples 1 to 10 were evaluated as unacceptable.

• Frozen confectionery was prepared in the same manner using the oils and/or fats of the Reference Examples. It received a score of “3” according to the above evaluation criteria and was therefore evaluated as unacceptable.

[0084]

[Study 4] Evaluation in Chocolates

[0085]

Examination method

Using Oil and/or fat composition Examples 3, 4, and 7 and Oil and/or fat composition Comparative Examples 4, 8, and 10 obtained above as the oil and/or fat portion, chocolates were prepared by a common method using the same formulation shown in Table 11 (unit: parts by mass), with only the oil and/or fat portion differing. The prepared chocolates were evaluated in

accordance with [Method for evaluating chocolates] below, and the evaluation results obtained according to [Evaluation Criteria for Chocolates] below are shown in Table 12.

[0086]

[Table 11]

Sugar	46.2
Oil or fat	10.0
Cocoa butter	3.0
Cocoa mass	40.2
Emulsifier (lecithin)	0.55
Flavor agent	0.05

[0087]

Method for evaluating chocolates

The prepared chocolates were melted at 55°C and then cooled to 32°C with stirring. Chocoseed LT (available from Fuji Oil Co., Ltd.) was added in an amount of 0.2 wt.%, followed by stirring to perform tempering. The chocolates were then filled into molds and solidified by cooling at 10°C for 30 minutes. Thereafter, a product released from the mold was aged at 20°C for 1 week. The chocolates were then refrigerated at 4°C and frozen at -20°C. Sensory evaluations of the chocolates stored for 24 hours under “refrigerated” and “frozen” conditions were each performed by 6 trained panelists according to [Sensory Evaluation Criteria for Chocolates] below, and the score determined by consensus was used as the final evaluation.

In this evaluation, the meltability of the chocolates in the oral cavity during eating was evaluated.

[0088]

[Sensory Evaluation Criteria for Chocolates]

5: Melts very sharply

4: Melts sharply

3: Neither sharp nor slow

2: Melts somewhat slowly and leaves a residual sensation in the mouth

1: Melts slowly and leaves a strong residual sensation in the mouth

A score of 4 or higher was considered acceptable.

[0089]

[Table 12]

		Chocolate product example			Chocolate product comparative example		
Oil and/or fat used		1	2	3	1	2	3
		Oil and/or fat composition Example			Oil and/or fat composition Comparative Example		
		3	4	7	4	8	10
Evaluation result	Refrigeration temperature	4	4	5	2	2	3
	Freezing temperature	4	4	5	2	2	2

[0090]

Discussion of Table 12

• Chocolate Examples prepared using Oil and/or fat composition Examples 3, 4, and 7 of the present invention, which were evaluated as acceptable according to [SFC Evaluation Criteria] and [DSC Evaluation Criteria], were also evaluated as acceptable.

• Chocolate Comparative Examples prepared using Oil and/or fat composition Comparative Examples 4, 8, and 10 were evaluated as unacceptable.

Industrial Applicability

[0091]

The present invention may provide an oil and/or fat composition that enables extremely sharp melting in the mouth during eating, when used in oil and/or fat processed foods such as frozen confectionery and chocolates.

Claims

[Claim 1]

An oil and/or fat composition satisfying all of the following requirements (A) to (C):

(A) an XU2 content of 40 mass% or more;

(B) a content mass ratio of polyunsaturated fatty acids to unsaturated fatty acids in constituent fatty acid composition of 0.15 or less; and

(C) a content mass ratio of stearic acid to palmitic acid in constituent fatty acid composition of 0.00 to 0.30,

wherein "XU2" represents a triglyceride having one molecule of X and two molecules of U bonded thereto, where X is a saturated fatty acid having 16 or more carbon atoms and U is an unsaturated fatty acid.

[Claim 2]

The oil and/or fat composition according to claim 1, further satisfying the following requirement (D): the content of saturated fatty acids having 8 to 12 carbon atoms in constituent fatty acid composition is 5 mass% or less.

[Claim 3]

The oil and/or fat composition according to claim 1, further satisfying the following requirement (E): the content mass ratio of PO2 to XU2 is 0.40 to 0.95,

wherein "PO2" represents a triglyceride having one molecule of palmitic acid and two molecules of oleic acid bonded thereto.

[Claim 4]

The oil and/or fat composition according to claim 2, further satisfying the following requirement (E): the content mass ratio of PO2 to XU2 is 0.40 to 0.95.

[Claim 5]

The oil and/or fat composition according to claim 1, wherein an oil and/or fat containing 40 mass% or more of PO2 is used as a raw material.

[Claim 6]

The oil and/or fat composition according to any one of claims 2 to 4, wherein an oil and/or fat containing 40 mass% or more of PO2 is used as a raw material.

[Claim 7]

An oil and/or fat processed food comprising the oil and/or fat composition according to any one of claims 1 to 5.

[Claim 8]

An oil and/or fat processed food comprising the oil and/or fat composition according to claim 6.

[Claim 9]

The oil and/or fat composition according to any one of claims 1 to 5, comprising 50 mass% or more of a processed oil and/or fat obtained from the fruit or seed kernels of pequi (scientific name: Caryocar brasiliense, Caryocar villosum, or Caryocar coriaceum).

[Claim 10]

The oil and/or fat composition according to claim 6, comprising 50 mass% or more of a processed oil and/or fat obtained from the fruit or seed kernels of pequi (scientific name: Caryocar brasiliense, Caryocar villosum, or Caryocar coriaceum).