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(54) Title: EDIBLE COMPOSITION



Fig 1

(57) Abstract: An edible composition comprises: at least 20 % by weight of a vegetable fat, from 0 to 5 % by weight of water and from 0 to 80 % by weight of other edible ingredients. The composition has a hardness of from 5 to 110 g, measured by a Brookfield Texture Analyser CT3 1000 at 20 °C using a 4.5 mm probe, 5 mm depth at a speed of 0.5 mm/s, and the fat has a solid fat content at 20 °C of from 5 to 22 %.

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EDIBLE COMPOSITION

This invention relates to an edible composition, to a method of making the composition and to the use of the composition as a structuring agent in a food product.

Oils and fats are important components of many food products and they can contribute structure, texture and flavour to the products as well as acting as a source of energy. Often, food products that contain liquid oils also contain a structuring agent. Structuring agents are generally fats that are solid at room temperature (20 °C) and that provide structure to the oil phase.

WO 2010/053360 describes a method of making a structuring agent for edible dispersions such as margarines or spreads using liquid or supercritical gas.

WO 2011/134627 discloses a storage stable mixture of a structuring agent in a liquid oil produced by mixing from 1 to 15 % by weight of fat particles with a liquid oil.

WO 2005/014158 relates to a process for the preparation of an edible dispersion comprising oil and structuring agent. In some of the examples, a mixture of fat and sunflower oil was micronized. The level of sunflower oil was at most 75 % by weight of the mixture. These examples were carried out for the purpose of studying oil exudation.

WO 02/100183 is concerned with micronized fat particles comprising fat and non-fat ingredients. In the process for producing the particles, a mixture is converted to flakes and then milled.

There remains a need for structuring fats that are in forms having a relatively low hardness so that they are easy to handle and process, for example by mixing, yet which can still provide a firm structure to food products. There is also a need for structuring fats which have a lower saturated fatty acid content (SAFA) and/or which can be used to make food products having a reduced SAFA.

According to the invention, there is provided an edible composition comprising:

at least 20 % by weight of a vegetable fat,

from 0 to 5 % by weight of water and

from 0 to 80 % by weight of other edible ingredients,

wherein the composition has a hardness of from 5 to 110 g, measured by a Brookfield Texture Analyser CT3 1000 at 20 °C using a 4.5 mm probe, 5 mm depth at a speed of 0.5 mm/s,
and the fat has a solid fat content at 20 °C of from 5 to 22 %.

Also provided by the invention is a method of making an edible composition of the invention which comprises forming a mixture comprising

at least 20 % by weight of a vegetable fat,

from 0 to 5 % by weight of water and

from 0 to 80 % by weight of other edible ingredients,

in the liquid state with liquefied or supercritical gas, with the liquefied or supercritical gas dissolved in the mixture, and converting the liquefied or supercritical gas in the mixture to the gaseous state and collecting the resulting product. The method preferably comprises supercritical melt micronisation.

A further aspect of the invention is the use of the composition of the invention as a structuring agent in a food product.

Also provided by the invention in another aspect is a process for making a structured food product which comprises combining the composition of the invention with one or more optional further ingredients.

The invention is based on the surprising finding of compositions that have low hardness, and so may be readily processed, yet are highly effective as structuring agents. This means that they can be readily mixed with other components, on account of their low hardness, yet still provide good structuring in the final food product. The effectiveness of the compositions for structuring means that they can use a relatively low amount of high melting fat component, which usually comprises significant levels of saturated fatty acids (SAFA). This means that the compositions can be used to produce structured food products having a relatively low SAFA content.

Without wishing to be bound by theory, it is believed that the physical structure of the compositions makes more effective use of the structuring properties of the higher melting components of the vegetable fat.

The edible composition

In one aspect, the present invention involves an edible composition. The edible composition comprises:

at least 20 % by weight of a vegetable fat,
from 0 to 5 % by weight of water and
from 0 to 80 % by weight of other edible ingredients.

Preferred edible compositions of the invention contain less than 4 % by weight water, such as less than 3 %, less than 2 % or less than 1 % by weight water. The compositions are preferably free of added water. The other edible ingredients will not be vegetable fats or water.

Unlike a simple dispersion of a fat in a liquid oil, the edible composition of the invention has a gel-like structure and a measurable hardness. The edible composition has a hardness of from 5 to 110 g, measured by a Brookfield Texture Analyser CT3 1000 at 20 °C using a 4.5 mm probe, 5 mm depth at a speed of 0.5 mm/s. Preferably, the edible composition has a hardness of from 8 to 100 g, more preferably from 10 to 90 g, even more preferably from 15 to 80 g, measured by a Brookfield Texture Analyser CT3 1000 at 20 °C using a 4.5 mm probe, 5 mm depth at a speed of 0.5 mm/s. This low hardness means that the composition can be readily processed when used as a structuring component in a food product.

The edible composition of the invention preferably takes the form of a homogeneous gel. By "homogeneous" it is meant that the gel appears to be a uniform mixture at a macroscopic level – at a microscopic scale, solid fat particles may be distinguishable from liquid oil but the two are uniformly mixed.

The edible composition may have a structure in which a matrix of solid fat particles (for example crystals) is present in a liquid fat phase.

The edible composition is preferably obtainable by a method comprising the steps of forming a mixture of the vegetable fat in the liquid state, with the liquefied or supercritical gas dissolved in the mixture, and converting the liquefied or supercritical gas in the mixture to the gaseous state. The gas is preferably carbon dioxide. The method

preferably comprises supercritical melt micronisation, such as described in the examples given below and in Example 1 of WO 2005/014158.

The edible composition may consist of, or substantially consist of, the vegetable fat i.e., it may not contain water or other edible ingredients. The edible composition may therefore contain only the vegetable fat. A composition that consists of the vegetable fat may be used, for example, as a fat component in a margarine or spread.

The edible composition preferably has a saturated fatty acid (SAFA) content of less than 30 % by weight, more preferably from 5 % to 30 % by weight, most preferably from 10 % to 25 % by weight, based on the total C12 to C24 fatty acids present. It will be appreciated that the SAFA content is based on the fatty acids that are present as fatty acyl groups in glycerides in the composition and/or in the vegetable fat it contains.

The term fatty acid, as used herein, refers to straight chain saturated or unsaturated (including mono- and poly- unsaturated) carboxylic acids having from 12 to 24 carbon atoms. The term is used herein to refer to the carboxylic acid residues bound to the glycerol moiety as acyl groups in glycerides.

A preferred composition of the invention comprises from 5 % to 30 % by weight SAFA; and from 70 % to 95 % by weight of total monounsaturated fatty acids (MUFA) and polyunsaturated fatty acids (PUFA), based on the total C12 to C24 fatty acids present.

A further preferred composition of the invention comprises from 5 % to 30 % by weight SAFA, from 20 % to 30 % by weight of monounsaturated fatty acids (MUFA) and from 40 % to 60 % by weight of polyunsaturated fatty acids (PUFA), based on the total C12 to C24 fatty acids present.

Another preferred composition of the invention comprises from 10 % to 25 % by weight SAFA and from 75 % to 90 % by weight of total monounsaturated fatty acids (MUFA) and polyunsaturated fatty acids (PUFA), based on the total C12 to C24 fatty acids present.

A preferred composition of the invention comprises, more preferably consists of, from 76 % to 98 % by weight of liquid oil and from 2 % to 24 % of a fat selected from palm oil stearin, shea stearin, enzymatically or chemically interesterified mixtures of palm oil stearin and palm kernel fat, enzymatically or chemically interesterified mixtures of palm

oil stearin and palm kernel stearin, and mixtures thereof. The fat preferably has a solid fat content at 20 °C of at least 40 %, preferably at least 50 %. The liquid oil is preferably sunflower oil.

Another preferred composition of the invention comprises, more preferably consists of, from 86 % to 94 % by weight of liquid oil and from 6 % to 14 % of a fat selected from palm oil stearin, shea stearin, enzymatically or chemically interesterified mixtures of palm oil stearin and palm kernel fat, enzymatically or chemically interesterified mixtures of palm oil stearin and palm kernel stearin, and mixtures thereof. The fat preferably has a solid fat content at 20 °C of at least 40 %, preferably at least 50 %. The liquid oil is preferably sunflower oil.

A further preferred composition of the invention comprises, more preferably consists of, from 76 % to 98 % by weight of liquid oil and from 2 % to 24 % of enzymatically or chemically interesterified mixtures of palm oil stearin and palm kernel fat, wherein the weight ratio of palm oil stearin to palm kernel fat is in the range of 1:1 to 3:1 and the palm oil stearin preferably has an iodine value (IV) in the range of from 20 to 50 (determined according to AOCS Recommended Practice Cd 1c-85). The liquid oil is preferably sunflower oil.

Another preferred composition of the invention comprises, more preferably consists of, from 76 % to 98 % by weight of liquid oil and from 2 % to 24 % of enzymatically or chemically interesterified mixtures of palm oil stearin and palm kernel stearin, wherein the weight ratio of palm oil stearin to palm kernel stearin is in the range of 1:1 to 3:1 and the palm oil stearin preferably has an iodine value (IV) in the range of from 6 to 20 (determined according to AOCS Recommended Practice Cd 1c-85). The liquid oil is preferably sunflower oil.

Another preferred composition of the invention comprises, more preferably consists of, from 86 % to 94 % by weight of liquid oil and from 6 % to 14 % of palm oil stearin having an iodine value (IV) in the range of from 8 to 20 (determined according to AOCS Recommended Practice Cd 1c-85). The liquid oil is preferably sunflower oil.

The composition may comprise other components, for example when it is intended for use in confectionery. For example, the composition may comprise up to 80 % by weight, such as up to 75 % by weight of edible ingredients other than the vegetable fat, preferably confectionery ingredients. Confectionery ingredients preferably include one or

more of: sugar, cocoa powder, milk powder and yoghurt powder; and, optionally, an emulsifier. Preferably, the amount of these ingredients ranges from 25 to 75 % by weight of the composition, such as from 50 to 72 %, or 60 to 70%, by weight of the composition.

Thus, another preferred edible composition of the invention comprises from 25 to 75 % by weight of confectionery ingredients including one or more of sugar, cocoa powder, milk powder and yoghurt powder, and from 25 to 75 % by weight of a vegetable fat blend which comprises, more preferably consists of, from 76 % to 98 % by weight of the fat blend of liquid oil and from 2 % to 24 % by weight of the fat blend of a fat selected from palm oil stearin, shea stearin, enzymatically or chemically interesterified mixtures of palm oil stearin and palm kernel fat, enzymatically or chemically interesterified mixtures of palm oil stearin and palm kernel stearin, and mixtures thereof. The palm oil stearin, shea stearin, enzymatically or chemically interesterified mixtures of palm oil stearin and palm kernel fat, enzymatically or chemically interesterified mixtures of palm oil stearin and palm kernel stearin, or mixture thereof, preferably has a solid fat content at 20 °C of at least 40 %, preferably at least 50 % and/or an IV in the range of 8 to 20 (determined according to AOCS Recommended Practice Cd 1c-85). The liquid oil is preferably sunflower oil.

Another preferred edible composition of the invention comprises from 50 to 70 % by weight of confectionery ingredients including one or more of sugar, cocoa powder, milk powder and yoghurt powder, and from 30 to 50 % by weight of a vegetable fat blend which comprises, more preferably consists of from 80 % to 90 % by weight of the fat blend of liquid oil and from 10 % to 20 % by weight of the fat blend of a fat selected from palm oil stearin, shea stearin, enzymatically or chemically interesterified mixtures of palm oil stearin and palm kernel fat, enzymatically or chemically interesterified mixtures of palm oil stearin and palm kernel stearin, and mixtures thereof. The palm oil stearin, shea stearin, enzymatically or chemically interesterified mixtures of palm oil stearin and palm kernel fat, enzymatically or chemically interesterified mixtures of palm oil stearin and palm kernel stearin, or mixture thereof, preferably has a solid fat content at 20 °C of at least 40 %, preferably at least 50 % and/or an IV in the range of 8 to 20 (determined according to AOCS Recommended Practice Cd 1c-85). The liquid oil is preferably sunflower oil.

The vegetable fat

The composition of the invention comprises at least 20 % by weight of a vegetable fat. The composition may consist of the vegetable fat (i.e., be 100 % vegetable fat) or may comprise other edible ingredients. When edible ingredients are present in the composition, the amount of the vegetable fat typically ranges from 20 % to 80 % by weight of the composition, more preferably from 25 % to 75 % by weight of the composition.

The vegetable fat may be a blend of one or more fats and oils. The terms "fat" and "oil" are used herein to refer to glycerides (preferably triglycerides) with oils being generally liquid at 20 °C and fats being generally solid or semi-solid at 20 °C.

The vegetable fat preferably comprises a blend of:

(a) from 76 % to 98 % by weight of an oil which is liquid at 20 °C; and

(b) from 2 % to 24 % by weight of a fat which is a solid or semi-solid at 20 °C and which has a saturated fatty acid content of from 40 % to 95 % based on fatty acids.

The oil which is liquid at 20 °C contains glycerides, typically greater than 90 % by weight triglycerides, or greater than 95 % by weight triglycerides with the balance being any diglycerides and any monoglycerides that may be present. Liquid oils of this type are well-known to those skilled in the art. The oil may be a single oil or a mixture of two or more different oils. The liquid oil may be any liquid oil (i.e., an oil that is liquid at 20 °C) containing triglycerides that is useful in a food product. The oil will typically contain less than 25 % by weight saturated fatty acids based on fatty acids. In other words, 75 % or more of the fatty acids present in the oil are unsaturated (mono- or poly- unsaturated). Suitable liquid oils include refined vegetable oils. Examples of suitable liquid oils include soybean oil, rapeseed oil, sunflower oil, safflower oil, corn oil, palm olein, shea olein, and mixtures thereof. Sunflower oil and safflower oil, and their mixtures, are particularly preferred. Preferably, the liquid oil comprises sunflower or consists of sunflower oil.

The fat which is a solid or semi-solid at 20 °C comprises glycerides, typically greater than 90 % by weight triglycerides, or greater than 95 % by weight triglycerides with the balance being diglycerides and any monoglycerides that may be present. The fat which is a solid or semi-solid at 20 °C may be a single fat or a mixture of two or more different

fats and/or oils. The fat which is a solid or semi-solid at 20 °C may be any edible fat that is in the solid state or predominantly in the solid state, preferably having a solid fat content of at least 40 %, more preferably at least 45 %, or at least 50 % at 20 °C. The fat which is a solid or semi-solid at 20 °C is capable of acting as a structuring agent in a food product. Preferred fats which are solid or semi-solid at 20 °C are palm oil stearin, shea stearin, enzymatically or chemically interesterified mixtures of palm oil stearin and palm kernel fat, enzymatically or chemically interesterified mixtures of palm oil stearin and palm kernel stearin, and mixtures thereof. Particularly preferred are: palm oil stearin having an iodine value (IV) in the range of from 8 to 20, more preferably from 10 to 18, such as from 12 to 16 (determined according to AOCS Recommended Practice Cd 1c-85); enzymatically or chemically interesterified mixtures of palm oil stearin and palm kernel stearin, wherein the weight ratio of palm oil stearin to palm kernel stearin is in the range of 1:1 to 3:1 and the palm oil stearin preferably has an iodine value (IV) in the range of from 6 to 20 (determined according to AOCS Recommended Practice Cd 1c-85); and enzymatically or chemically interesterified mixtures of palm oil stearin and palm kernel fat, wherein the weight ratio of palm oil stearin to palm kernel fat is in the range of 1:1 to 3:1 and the palm oil stearin preferably has an iodine value (IV) in the range of from 20 to 50 (determined according to AOCS Recommended Practice Cd 1c-85).

The fat which is a solid or semi-solid at 20 °C preferably has a saturated fatty acid (SAFA) content of from 40 % to 95 % based on the total C12 to C24 fatty acids present, more preferably a saturated fatty acid content of from 60 to 90 % based on the total C12 to C24 fatty acids present.

Preferably, the vegetable fat comprises from 85 % to 95 % by weight of the oil and from 5 % to 15 % of the fat. Surprisingly, edible compositions comprising vegetable fat having this level of liquid oil have a low hardness and/or viscosity and so are easy to handle, for example easy to mix with an aqueous phase, and yet are capable of giving a firmer structure to a food product than compositions that differ by having a lower level of oil compared to fat. More preferably, the composition comprises from 86 % to 94 % by weight of the oil and from 6 % to 14 % by weight of the fat, such as from 87 % to 93 % by weight of the oil and from 7 % to 13 % by weight of the fat, for example from 88 % to 92 % by weight of the oil and from 8 % to 12 % by weight of the fat.

The vegetable fat preferably comprises an oil selected from sunflower oil, soybean oil, rapeseed oil, safflower oil, corn oil, and mixtures thereof.

Preferably, the vegetable fat comprises a fat selected from palm oil stearin, shea stearin, enzymatically or chemically interesterified mixtures of palm oil stearin and palm kernel fat, enzymatically or chemically interesterified mixtures of palm oil stearin and palm kernel stearin, and mixtures thereof.

The vegetable fat may comprise a blend of an oil selected from sunflower oil, soybean oil, rapeseed oil, safflower oil, corn oil, and mixtures thereof and a fat selected from palm oil stearin, enzymatically or chemically interesterified mixtures of palm oil stearin and palm kernel fat, enzymatically or chemically interesterified mixtures of palm oil stearin and palm kernel stearin, and mixtures thereof.

More preferably, the vegetable fat comprises from 85 % to 95 % by weight of an oil selected from sunflower oil, soybean oil, rapeseed oil, safflower oil, corn oil, and mixtures thereof and from 5 % to 15 % by weight of a fat selected from palm oil stearin, shea stearin, enzymatically or chemically interesterified mixtures of palm oil stearin and palm kernel fat, enzymatically or chemically interesterified mixtures of palm oil stearin and palm kernel stearin, and mixtures thereof.

The vegetable fat has a solid fat content at 20 °C of from 5 to 22 %. Throughout this specification and claims, solid fat content is determined according to the method IUPAC 2.150a. Solid fat contents at x °C are sometimes denoted Nx. For example, a solid fat content at 20 °C is referred to as N20.

The vegetable fat preferably has an N0 of from 10 to 30 %, more preferably from 12 to 25 %.

The vegetable fat preferably has an N10 of from 8 to 25 %.

The vegetable fat preferably has an N25 of from 5 to 20 %.

The vegetable fat preferably has an N40 of from 3 to 15 %.

The vegetable fat preferably has the following solid fat content:

N0 of from 10 to 30 %; and/or
N10 of from 8 to 25 %; and/or
N25 of from 5 to 20 %; and/or
N40 of from 3 to 15 %.

More preferably, the vegetable fat has the following solid fat content:

N0 of from 12 to 25 %;

N10 of from 8 to 25 %;

N25 of from 5 to 20 %; and

N40 of from 3 to 15 %.

The vegetable fat preferably has a saturated fatty acid (SAFA) content of less than 30 % by weight, more preferably from 5 % to 30 % by weight, most preferably from 10 % to 25 % by weight, based on the total C12 to C24 fatty acids present. It will be appreciated that the SAFA content is based on the fatty acids that are present as fatty acyl groups in glycerides in the composition and/or in the vegetable fat it contains.

A preferred vegetable fat comprises from 5 % to 30 % by weight SAFA; and from 70 % to 95 % by weight of total monounsaturated fatty acids (MUFA) and polyunsaturated fatty acids (PUFA), based on the total C12 to C24 fatty acids present.

A further preferred vegetable fat comprises from 5 % to 30 % by weight SAFA, from 20 % to 30 % by weight of monounsaturated fatty acids (MUFA) and from 40 % to 60 % by weight of polyunsaturated fatty acids (PUFA), based on the total C12 to C24 fatty acids present.

Another preferred vegetable fat comprises from 10 % to 25 % by weight SAFA and from 75 % to 90 % by weight of total monounsaturated fatty acids (MUFA) and polyunsaturated fatty acids (PUFA), based on the total C12 to C24 fatty acids present.

The vegetable fat in the composition of the invention may comprise triglycerides in the solid and/or liquid state. Typically, the vegetable fat will be a mixture of solid particles in a liquid. The solid particles may be of a size that is too small to be seen by the eye without magnification. The solid particles may, for example, be single particles, for instance having a size of 0.1 to 5 μm.

The vegetable fat may form a continuous fat phase in the edible composition of the invention.

The vegetable fat preferably has a trans fatty acid content of less than 1 % by weight based on the total C12 to C24 fatty acids present.

The vegetable fat in the composition of the invention may comprise other triglyceride fats and oils in addition to the oil and the fat, preferably in an amount of up to 20 % by weight, such as up to 10 % by weight, of the vegetable fat. Preferably, however, the vegetable fat consists of the oil and the fat i.e., without other added fats or oils being present.

Method of making the edible composition

The method of making the edible composition of the invention comprises forming a mixture comprising

at least 20 % by weight of a vegetable fat,

from 0 to 5 % by weight of water and

from 0 to 80 % by weight of other edible ingredients,

in the liquid state, with the liquefied or supercritical gas dissolved in the mixture, and converting the liquefied or supercritical gas to the gaseous state and collecting the resulting product.

The mixture is provided in the liquid state by melting the mixture (or some of the components of the mixture). It will be appreciated that the mixture in the liquid state may contain some solids, for example when higher melting edible ingredients such as cocoa powder are present in the mixture.

The method preferably comprises supercritical melt micronisation, more preferably using carbon dioxide as the gas. A suitable method is described in the examples below and in Example 1 of WO 2005/014158.

The conversion of the liquefied or supercritical gas to the gaseous state involves expansion. The mixture that is formed in the liquid state with liquefied or supercritical gas is typically passed through an orifice (such as a nozzle) under conditions in which the liquefied or supercritical gas is converted to the gaseous state.

Typically, when the mixture contains only the vegetable fat, a mixture of vegetable fat and oil is prepared at a temperature above the melting point of the vegetable fat (i.e., at which at least 90 % by weight, more preferably at least 95 % by weight, of the vegetable fat is liquid) and the gas is added under pressure (usually in a sealed vessel such as an autoclave) to the molten mixture. Preferably, the gas is present in an amount of from 20 to 50 % by weight of the mixture. The resulting mixture of vegetable fat and gas is

preferably cooled to a temperature between 50 °C and 75 °C. The mixture is then preferably sprayed over a nozzle at 150 bar (15 MPa) to 300 bar (30 MPa) into a spray chamber and collected, for example in a cyclone.

When the method is used to make a composition of the invention comprising other ingredients, the mixture further comprises up to 80 % by weight of one or more edible ingredients, preferably selected from sugar, cocoa powder, milk powder and yoghurt powder, and optionally emulsifier, and mixtures thereof. In this way a composition is formed that may be directly used as a food product, such as a confectionery filling. The resulting product is then collected.

When the mixture comprises other ingredients, all of the components (including the ingredients, the oil and the fat) are typically loaded into a sealable vessel (such as an autoclave) and stirred, preferably at 50 to 80 °C, preferably for up to 2 hours (for example 5 minutes to 1 hour), preferably using a mechanical stirrer. The vessel is then preferably pressurized with gas up to 250 bar (25 MPa) with stirring. The composition is obtained by depressurizing the mixture, typically over a single orifice nozzle.

Use as a structuring agent

The edible composition of the invention may be used as a structuring agent, or as a fat component comprising a structuring agent, in a food product. The structuring properties of the fat are preferably activated during production of the food product.

The food product is preferably: a margarine or spread; a confectionery filling, a confectionery coating; an icing; or a laminated product such as puff pastry in which the edible composition of the invention acts as a laminating fat.

The structured food product may be made by a method which comprises combining the composition of the invention with one or more optional further ingredients.

In a margarine or spread, the further ingredients may include, for example, water, sodium chloride, colouring agent (e.g., beta-carotene), and emulsifier (e.g., lecithin).

In a confectionery filling, the further ingredients may include, for example, other fats and oils, water, sugar, cocoa powder, milk powder and emulsifier (such as lecithin). The confectionery filling may be an edible composition of the invention without further

ingredients, or it may be produced by adding further ingredients to the edible composition of the invention. Confectionery coatings may contain the same ingredients.

An icing typically comprises the edible composition of the invention and sugar.

Margarines and spreads

Spreads include margarines, fat continuous or water continuous or bicontinuous spreads and fat reduced spreads.

Spreads and margarines may be formed by mixing the edible composition of the invention with an aqueous phase and, optionally, additional oil. The amounts of vegetable fat and aqueous phase typically range from 10-90 % by weight vegetable fat and 90-10 % by weight aqueous phase, such as from 20-80 % by weight vegetable fat and 80-20 % by weight aqueous phase or from 30-70 % by weight vegetable fat and 70-30 % by weight aqueous phase. Further components of spreads and margarines include one or more of colouring agents (such as beta-carotene), flavouring agents (including salt) and emulsifiers (such as lecithin); typically, these components are present in an amount of less than 5 % (such as 1 to 3 %) by weight of the spread or margarine. The preparation of spreads and margarines from a vegetable fat and an aqueous phase is well-known to those skilled in the art.

An example of a spread (or margarine) that may be formed using an edible composition of the invention comprises from 10 to 90 % by weight vegetable fat (at least 50 % by weight of which is derived from an edible composition of the invention), from 10 to 90 % by weight water and from 1 to 10 % by weight of additives including one or more of colouring agents, flavouring agents and emulsifiers. It will be appreciated that the total amount of the components adds up to 100 %.

Surprisingly, the texture of a spread made using compositions of the invention having a higher ratio of liquid oil to fat and a lower hardness is firmer than the texture of a spread made from compositions having a lower ratio of liquid oil to fat and a higher hardness.

Confectionery fillings

Confectionery fillings preferably comprise one or more confectionery additives selected from sugar, cocoa powder, milk powder and yoghurt powder and, optionally, flavouring,

and emulsifier. Preferably, the confectionery fillings comprise at least sugar and cocoa powder and, optionally, one or more of the other components. Other confectionery fillings comprise at least sugar and flavouring and, optionally, one or more of the other components. Additional components such as colouring agents and preservatives may optionally be present in the fillings. Sugar includes sucrose, dextrose and fructose (preferably sucrose). Flavourings include, for example, strawberry, raspberry, vanilla, mint, orange, lemon, lime, coffee and the like. An example of a suitable emulsifier is lecithin. The confectionery fillings may contain nut solids (e.g., from peanuts, almonds, hazelnuts, walnuts, cashew nuts, pistachio nuts, macadamia nuts and pecan nuts), such as nut paste.

Preferred edible compositions of the invention for confectionery use comprise from 30 to 60 % by weight sugar, such as from 40 to 50 % by weight sugar.

The edible compositions of the invention for confectionery use preferably comprise from 1 to 20 % by weight, more preferably from 5 to 15 % by weight, cocoa powder.

The edible compositions of the invention for confectionery use preferably comprise from 1 to 20 % by weight, more preferably from 5 to 15 % by weight, milk powder (such as full cream milk powder).

An example of an edible composition of the invention for confectionery use comprises from 20 to 50 % by weight vegetable fat, from 30 to 60 % by weight sugar, from 1 to 20 % by weight cocoa powder and from 1 to 20 % by weight milk powder. It will be appreciated that the total amount of the components adds up to 100 %.

The confectionery filling may be an emulsion, such as a water-in-oil emulsion.

The confectionery filling may be a filling for a bakery product preferably adapted to be stored and/or sold and/or consumed at ambient temperature i.e., 10 °C to 30 °C. Bakery products include bread, cakes, biscuits and sponges. A bakery product may comprise a biscuit, sponge or wafer comprising two or more layers of biscuit, sponge or wafer, with the filling between adjacent layers. The bakery product may comprise two layers of biscuit, sponge or wafer with the filling sandwiched between the layers.

Confectionery fillings may be made by combining one or more confectionery additives selected from sugar, water, cocoa powder, milk powder, yoghurt powder, flavouring and

emulsifier, with the composition of the invention. Typically, the components will be mixed at a temperature of greater than 40°C, such as from 50-80°C.

Confectionery products may be made using the fillings by, for example, filling an edible substrate with a filling according to methods well known in the art. Suitable edible substrates include biscuits, wafers and chocolate shells.

Laminated products

Laminated products include puff pastry, croissants, Danish pastries and pies. Laminated products are typically bakery products having a laminated structure. When used in a laminated product, the edible composition typically consists of the vegetable fat.

The laminated products are generally made from dough. The dough preferably has a laminated structure. The dough comprises at least flour and water and preferably comprises flour in an amount of from 40 to 60 % by weight, water in an amount of from 20 to 50% by weight and fat in an amount of from 5 to 20% by weight based on the weight of the dough. Optionally, one or more further ingredients such as salt, flour modifier and emulsifier may be included in the dough.

The laminated products prepared comprise the edible composition of the invention as a laminating fat. A laminated dough may be prepared, for instance, by a method that comprises applying the composition of the invention to a plurality of layers of the dough to form a product in which layers of dough alternate with layers of composition of the invention. Typically, the method comprises applying the composition of the invention to the dough, folding the dough and rolling the folded dough.

The dough comprising the laminating fat, may be refrigerated, frozen or otherwise stored prior to use. The frozen dough may be packaged and sold to the consumer.

In order to form a laminated product, the laminated dough is baked, preferably in an oven. Suitable times and temperatures for baking specific bakery products will be well-known to those skilled in the art.

All publications, patents and patent applications are incorporated herein by reference. While in the foregoing specification this invention has been described in relation to certain preferred embodiments thereof, and many details have been set forth for

purposes of illustration, it will be apparent to those skilled in the art that the invention is susceptible to additional embodiments and that certain of the details described herein may be varied considerably without departing from the basic principles of the invention.

The listing or discussion of an apparently prior-published document in this specification should not necessarily be taken as an acknowledgement that the document is part of the state of the art or is common general knowledge.

The following non-limiting examples illustrate the invention and do not limit its scope in any way. In the examples and throughout this specification, all percentages, parts and ratios are by weight unless indicated otherwise. Percentages add up to 100 %.

EXAMPLES

Example 1

Micronized fat blends

Fat blends of hardstock fat (palm oil stearin having an iodine value (IV) of 14; also known as POsiv 14) and sunflower oil in various ratios (see Table 1) were mixed with 35% CO_2 and cooled to temperature between 57°C and 63°C. The resulting mixture was sprayed over a nozzle at 213 bar to 231 bar into a cooled spray chamber and collected in a cyclone. The resulting gel (-19 °C to -26 °C) was upon collection stored in a refrigerated storage room. The gels were produced on a continuous pilot scale.

Table 1: Properties of micronized fat blends

POsiv14 wt %	Sunflower oil wt %	Texture of the gel	Hardness grams
10	90	Homogenous stable gel	20.4
15	85	Stable gel; a little less homogenous than 10%	58.0
20	80	No gel; single solid particles visible	104.3
25*	75	No gel; consists of solid particles	not possible to measure

*comparative example

The hardness was measured by a Brookfield Texture Analyser CT3 1000 by using a 4.5 mm probe, 5 mm depth at a speed of 0.5 mm/sec at 20 °C.

Example 2

The solid fat contents of the micronised fat blends produced according to Example 1 were determined according to IUPAC 2.150a and compared to the solid fat contents of reference mixtures of the same components not subjected to micronization. The results were as follows:

	10/90 Example 1	15/85 Example 1	20/80 Example 1	25/75 Example 1
N0	13	18	24	28
N5	12	17	24	27
N10	11	16	23	26
N15	10	15	21	24
N20	9	13	20	23
N25	8	12	18	20
N30	7	11	16	18
N35	6	9	14	16
N40	5	8	12	14
	10/90 Reference	15/85 Reference	20/80 Reference	25/75 Reference
N0	13	18	23	28
N5	13	18	23	28
N10	11	17	21	26
N15	10	15	20	25
N20	9	14	18	23
N25	8	12	16	21
N30	7	11	14	19
N35	6	9	13	16
N40	5	7	10	14

This shows that the properties of the fat blends of Example 1 are not due to any change in the solid fat content of the fats.

The SAFA, MUFA and PUFA contents of the fat blends of Example 1 are given in the following table.

	SAFA	MUFA	PUFA
100% POsiv14	88.0	9.8	2.3
10/90	18.7	25.6	55.7
15/85	22.5	24.8	52.7
20/80	26.4	23.9	49.7
25/75	30.2	23.0	46.8

Example 3

Interesterified mixtures of: (A) 65 % by weight palm oil stearin having an IV of 35 with 35 % by weight palm kernel fat; and (B) 65 % by weight palm oil stearin having an IV of 14 with 35 % by weight of palm kernel fat; may be used to replace the POsiv14 in the blends of Example 1 for use in the invention. A and B and their blends with sunflower oil (SF) have the following SAFA, MUFA and PUFA contents:

	SAFA	MUFA	PUFA
100% A	70.6	24.0	5.3
10/90 A/SF	17.0	27.1	56.0
20/80 A/SF	22.9	26.7	50.4
100% B	85.3	12.3	2.4
10/90 B/SF	18.4	25.9	55.7
20/80 B/SF	25.9	24.4	49.8

Example 4

Making of a spread

For making a spread the above prepared micronized fat blends of Example 1 were further blended with sunflower oil (SF), where needed (i.e., in all cases except the blend of 10 % by weight hardstock and 90 % by weight sunflower oil), resulting in a vegetable fat having 10 % by weight hardstock and 90 % by weight sunflower oil.

A spread was prepared consisting of 50% by weight of the vegetable fat and 50% by weight of water by mixing the water into the vegetable fat by applying an Ultra-turrax (Ultra Turrax T25 Basic) for 3 to 10 minutes. With all four vegetable fats a spread could be prepared having decreased viscosity starting from the 10% micronized fat powder to the 25% fat powder. All spreads were still stable after one week. The texture of the spreads was assessed and the results are given in the following table.

Amount of hardstock of Micronized fat blends in wt %	Mixing with additional SF	Texture of spread
10	No additional SF added; solid gel	Firm
15	More liquid than 10%	Less firm
20	More liquid than 15%	Softer
25*	More liquid than 25 %	Very soft

*comparative example

Figures 1 to 4 show the spreads produced from the 10, 15, 20 and 25 % levels of micronized fat powder, respectively.

Example 5

Micronization of a complete chocolate filling composition

The following materials were loaded into an autoclave and stirred (300 rpm) at 65 °C for 30 minutes using a mechanical stirrer:

Amount in g	Ingredient
30	Sunflower oil (AH huismerk)
5	POs14 (Loders Croklaan)
45	45 gram baker's sugar (poedersuiker van Gilse)
10	Cocoa powder (Droste)
10	Milk powder

The autoclave was pressurized with CO_2 up to 190 bar (19 MPa) while stirring. The melt-micronized gel was obtained by depressurizing the mixture over a single orifice nozzle (0.125 mm) in a pre-cooled vessel (between -5 and -100°C) chamber. The cooling of the spraying vessel was ensured using a mixture of CO_2 and N_2. The obtained material had a gel like appearance and was further used as chocolate filling in a bakery application.

Example 6

The 10% hardstock:90% sunflower oil product produced according to Claim 1 was compared with a corresponding fat blend produced by simple mixing of the components. The difference between the two products is shown in Figure 5; the vegetable fat of the invention (shown in Figure 5A) has structure and a measurable hardness whereas the comparative product (shown in Figure 5B) is separated into two phases and is a low viscosity liquid with no measurable hardness.

Example 7

Chocolate filling with low SAFA content

A micronized fat blend was prepared as described in Example 1. Palm stearin (120 gram) with an iodine value (IV) of about 5 was blended with rapeseed oil (480 gram) and treated as described in Example 1 to produce the micronized fat blend.

A base chocolate filling was prepared by mixing the following ingredients in the ball mill at 240 rpm for 40 min:

Ingredient	Wt %
Cocoa powder	12
Fat (rapeseed oil)	24
Skimmed milk powder	6
Baker's sugar	48
Lecithin	0.4
Vanilla	0.02

Finally, the base filling was cooled to room temperature and to one part of this base filling was added about 10 % of the micronized fat blend to make the total up to 100 % with the

aim of having about 9 % SAFA in the final filling. The obtained mixture was mixed thoroughly using a spatula and deposited in a small cup for further evaluation.

A reference chocolate filling was prepared using the ball mill as described above according to the above mentioned recipe but using a filling fat providing about 41.5 % SAFA.

The products were evaluated by measuring the hardness as described in Example 1 at t =0 and t = 6 weeks and visually evaluating de-oiling:

Sample	SAFA (%)	De-oiling	Hardness (stored at 18°C)	
			t = 0	T = 6 weeks
Micronized	9.1	no	54	84
Reference	41.5	no	22	67

These results show that stable confectionery chocolate fillings can be produced with very low SAFA content according to the invention.

Claims

1. An edible composition comprising:
   at least 20 % by weight of a vegetable fat,
   from 0 to 5 % by weight of water and
   from 0 to 80 % by weight of other edible ingredients,
   wherein the composition has a hardness of from 5 to 110 g, measured by a Brookfield Texture Analyser CT3 1000 at 20 °C using a 4.5 mm probe, 5 mm depth at a speed of 0.5 mm/s,
   and the fat has a solid fat content at 20 °C of from 5 to 22 %.

2. Edible composition as claimed in Claim 1, wherein the fat has the following solid fat content:
   N0 of from 10 to 30 %;
   N10 of from 8 to 25 %;
   N25 of from 5 to 20 %; and
   N40 of from 3 to 15 %.

3. Edible composition as claimed in Claim 1 or Claim 2, which consists of the vegetable fat.

4. Edible composition as claimed in any one of the preceding claims, which comprises up to 75 % by weight of one or more edible ingredients selected from sugar, cocoa powder, milk powder, yoghurt powder and mixtures thereof.

5. Edible composition as claimed in any one of the preceding claims, which has a saturated fatty acid (SAFA) content of less than 30 % by weight, more preferably from 5 % to 30 % by weight, most preferably from 10 % to 25 % by weight, based on the total C12 to C24 fatty acids present.

6. Edible composition as claimed in any one of the preceding claims, wherein the vegetable fat comprises:
   (c) from 76 % to 98 % by weight of an oil which is liquid at 20 °C; and
   (d) from 2 % to 24 % by weight of a fat which is a solid or semi-solid at 20 °C and which has a saturated fatty acid content of from 40 % to 95 % based on fatty acids.

7. Edible composition as claimed in any one of the preceding claims, wherein the vegetable fat comprises an oil selected from sunflower oil, soybean oil, rapeseed oil, safflower oil, corn oil, palm olein, shea olein, and mixtures thereof.

8. Edible composition as claimed in any one of the preceding claims, wherein the vegetable fat comprises a fat selected from palm oil stearin, shea stearin, enzymatically or chemically interesterified mixtures of palm oil stearin and palm kernel fat, enzymatically or chemically interesterified mixtures of palm oil stearin and palm kernel stearin, and mixtures thereof.

9. Edible composition as claimed in any one of the preceding claims, wherein the vegetable fat comprises from 76 % to 98 % by weight of liquid oil, preferably sunflower oil, and from 2 % to 24 % of enzymatically or chemically interesterified mixtures of palm oil stearin and palm kernel fat, wherein the weight ratio of palm oil stearin to palm kernel fat is in the range of 1:1 to 3:1 and the palm oil stearin preferably has an iodine value (IV) in the range of from 20 to 50.

10. Edible composition as claimed in any one of Claims 1 to 8, wherein the vegetable fat comprises from 76 % to 98 % by weight of liquid oil, preferably sunflower oil, and from 2 % to 24 % of enzymatically or chemically interesterified mixtures of palm oil stearin and palm kernel stearin, wherein the weight ratio of palm oil stearin to palm kernel stearin is in the range of 1:1 to 3:1 and the palm oil stearin preferably has an iodine value (IV) in the range of from 6 to 20.

11. Edible composition as claimed in any one of Claims 1 to 8, wherein the vegetable fat comprises from 85 % to 95 % by weight of an oil selected from sunflower oil, soybean oil, rapeseed oil, safflower oil, corn oil, and mixtures thereof and from 5 % to 15 % by weight of a fat selected from palm oil stearin, shea stearin, enzymatically or chemically interesterified mixtures of palm oil stearin and palm kernel fat, enzymatically or chemically interesterified mixtures of palm oil stearin and palm kernel stearin, and mixtures thereof.

12. Edible composition as claimed in any one of the preceding claims, which is obtainable by a method comprising the steps of forming a mixture of the oil and the fat in the liquid state with liquefied or supercritical gas and converting the liquefied or supercritical gas in the mixture to the gaseous state.

13. Edible composition as claimed in Claim 12, wherein the method comprises supercritical melt micronisation, preferably using carbon dioxide.

14. Edible composition as claimed in any one of the preceding claims which is a homogeneous gel.

15. A method of making the edible composition of any one of Claims 1 to 14 which comprises forming a mixture comprising

at least 20 % by weight of a vegetable fat,

from 0 to 5 % by weight of water and

from 0 to 80 % by weight of other edible ingredients,

in the liquid state with liquefied or supercritical gas, with the liquefied or supercritical gas dissolved in the mixture, and converting the liquefied or supercritical gas in the mixture to the gaseous state and collecting the resulting product,

which method preferably comprises supercritical melt micronisation.

16. Use of the edible composition of any one of Claims 1 to 14 as a structuring agent in a food product, wherein the food product is preferably: a margarine or spread; a confectionery filling, a confectionary coating; an icing; or a laminated product.

17. A process for making a structured food product which comprises combining the edible composition of any one of Claims 1 to 14 with one or more additional ingredients, wherein the food product is preferably: a margarine or spread; a confectionery filling, a confectionary coating; an icing; or a laminated product.

18. Use as claimed in Claim 16 or process as claimed in Claim 17, wherein the food product is a confectionery filling.

19. Use as claimed in Claim 16 or process as claimed in Claim 17, wherein the food product is a margarine or spread.

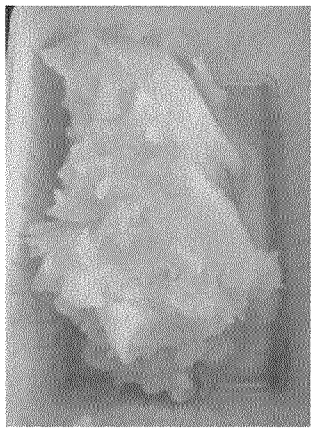


Fig 1

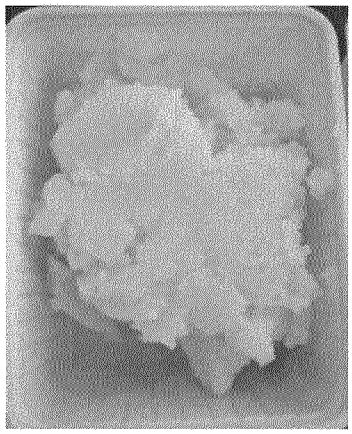


Fig 2



Fig 3

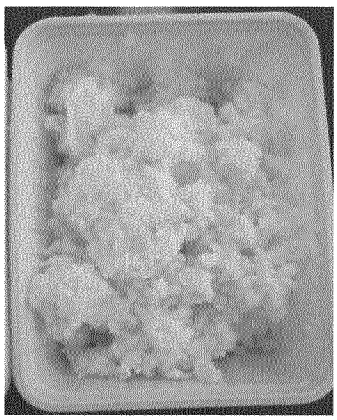


Fig 4

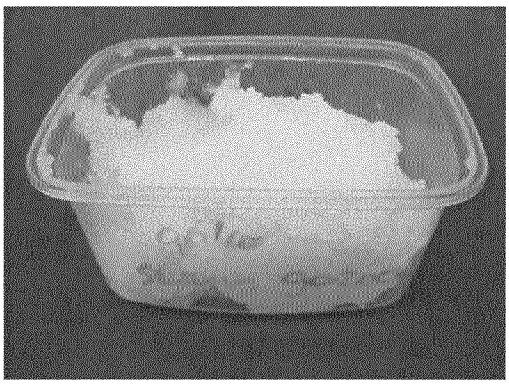


Fig 5A

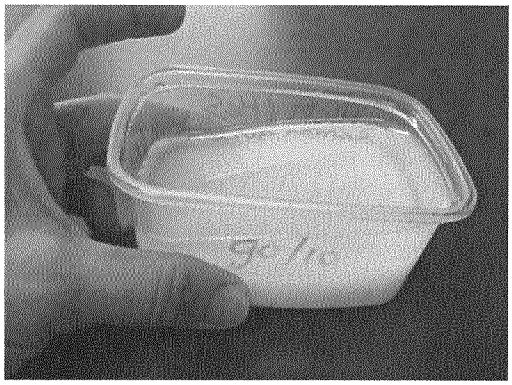


Fig 5B

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2014/061906

A. CLASSIFICATION OF SUBJECT MATTER
INV. A23D7/00 A23D7/005 A23G1/38
ADD.

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)
A23D 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 practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	WO 96/39856 A1 (UNILEVER NV [NL]; UNILEVER PLC [GB]) 19 December 1996 (1996-12-19) claims; example 18; table V	1-14, 16-19 15
X Y	EP 0 060 139 A2 (UNILEVER PLC [GB]; UNILEVER NV [NL]) 15 September 1982 (1982-09-15) claims; example 3; table III	1-14, 16-19 15
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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 June 2014	07/07/2014

Name and mailing address of the ISA/	Authorized officer
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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2014/061906

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Information on patent family members

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