

Tea Creamer compositions and uses thereof

Technical field of the invention

The present invention relates to processes for providing tea creamer compositions. In particular the present invention relates to the use of such creamer compositions in tea mixes

Background of the invention

Creamers are widely used as whitening agents with hot and cold beverages such as, for example, coffee, cocoa, tea, etc. They are commonly used in place of milk and/or dairy cream. Creamers may come in a variety of different flavors and provide mouthfeel, body, and a smoother texture. Creamers can be in liquid or powder forms. A liquid creamer may be intended for storage at ambient temperatures or under refrigeration, and should be stable during storage without phase separation, creaming, gelation and sedimentation. The creamer should also retain a constant viscosity over time. When added to cold or hot beverages such a tea, the creamer should dissolve rapidly, provide a good whitening capacity, and remain stable with no feathering and/or sedimentation while providing a superior taste and mouthfeel. Mouthfeel, also denoted richness, texture or creaminess, is usually provided by the oil emulsion present in the creamer.

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Tea mixes are powdered products used to prepare e.g. chai and other tea beverages containing a milk component. They normally consist of a simple dry mixture of tea powder, creamer powder (milk component) and sweetener (e.g. sugar).

JP2005341933 relates to a beverage composition containing vegetable oil and fat that is subjected to retort or UHT sterilization.

EP0296849 relates to a process for preparation of an instant tea product comprising: (a) from 2 to 25% by weight of fat, (b) from 5 to 25% by weight of an edible emulsifying proteinaceous material, (c) from 10 to 40% by weight of a hydrolyzed starch, (d) from 10 to 40% by weight of tea solids, (e) from 0 to 10% by weight of water and (f) from 0 to 30% by weight of milk sugar.

WO2006021293 relates to a composition comprising at least 0.001 mg/g statin wherein the composition is a particulate comprising a matrix material in an amount of 10-70 wt% and fatty matter dispersed in the matrix material, wherein the amount of fatty matter and statin together is 30-90 wt% and wherein the matrix material comprises protein or a carbohydrate

5 or a combination thereof.

Improved aroma release would be advantageous, and in particular a more efficient and/or reliable process for providing compositions with improved aromas would be advantageous.

Summary of the invention

10 A tea creamer component usually contains oil and the present invention relates to a process wherein tea particles are added into the oil part of a creamer. The tea particles are mixed with oil during production of the creamer and then the oil and tea mixture may be wet ground to achieve the desired particle size of tea particles and to ensure proper dispersion into the oil phase. The oil and micronized tea mixture is then used to produce a creamer
15 with tea aroma as conventionally for producing a powdered or liquid creamer. The creamer may be used as an ingredient in food or beverage products, in the case of a powdered creamer the creamer may e.g. be mixed with tea powder and sweetener to produce a beverage powder useful for producing a tea beverage containing creamer. The creamer could also be sold as a finished product in its own right. Thus, the invention relates to a
20 process for improving the taste and/or aroma profile of a creamer composition.

Thus, an object of the present invention relates to processes for providing creamers with improved aroma profiles.

25 In particular, it is an object of the present invention to provide creamers that solves the above mentioned problems of the prior art with aroma release.

Thus, one aspect of the invention relates to a process for providing a tea creamer composition, the process comprising

30 a) mixing in a first mixing step an oil component with with dried cut leaves of a tea, thereby providing a first composition comprising micronized tea

- incorporated in the oil component wherein the micronized tea has a mean diameter value Dv_{50} of less than 20 μm as measured by laser diffraction;
- b) providing a aqueous creamer component;
- c) mixing in a second mixing step the first composition with the aqueous creamer component;
- d) homogenising the composition of step c), thereby providing an oil-in-water emulsion;
- e) optionally, adding a sweetener source to the oil-in-water emulsion;
- f) optionally, pasteurizing the oil-in-water emulsion;
- g) optionally, drying the oil-in-water emulsion; and
- h) providing a creamer composition.

Another aspect of the present invention relates to an oil-in-water emulsified creamer composition comprising

- an oil component comprising micronized tea incorporated therein; and
- a creamer component.

Further aspects of the present invention relates to uses of the creamer compositions of the invention, food ingredients and food products comprising the creamer compositions.

The present invention will now be described in more detail in the following.

Brief description of the figures

Figure 1 shows a diagrammatic representation of the problem with methods illustrated in prior art such as dry mix grinding (A). This sample shows flocculation and sedimentation.

- While the sample of the present invention (B) shows a consistent uniform product which is achieved by encapsulating the tea particles in the oil, or attaching the tea particles to the oil droplets, and introducing this to the beverage component as described below. The rounded particles represent the oil droplets in the emulsion. If the emulsion is not stable, the droplets merge together.

Figure 2: Particle size distribution of micronized tea in palm kernel oil, measured by laser diffraction (Malvern Mastersizer 2000)

Figure 3: Particle size distribution of dry milled tea, measured by laser diffraction (Malvern Mastersizer 2000)

Figure 4: Mass of sediments measured with the help of a sedimentation balance for a reference dry milled black tea powder and for the same tea micronized in oil.

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Detailed description of the invention

Process for providing creamer compositions

- As mentioned above, the present invention relates to process for providing creamer compositions with an enhanced taste and/or aroma profile. Thus, an aspect of the present invention relates to a process for providing a creamer composition, the process comprising
- a) mixing in a first mixing step an oil component with tea, thereby providing a first composition comprising micronized tea incorporated in the oil component;
 - b) providing a aqueous creamer component;
 - c) mixing in a second mixing step the first composition with the aqueous creamer component;
 - d) homogenising the composition of step c), thereby providing an oil-in-water emulsion;
 - e) optionally, adding a sweetener source to the oil-in-water emulsion;
 - f) optionally, pasteurizing the oil-in-water emulsion;
 - g) optionally, drying the oil-in-water emulsion; and
 - h) providing a creamer composition.

The term “tea” refers to dried cut leaves of a tea bush, such tea refers to for example black tea, white tea, green tea, Oolong tea. Such a tea does not refer to an instant tea wherein the instant tea is produced by drying a tea extract.

Black tea includes Assam, Nepal, Darjeeling, Nilgiri, Turkish, Keemun, and Ceylon teas. The tea leaves may be in a dried and/or fermented form.

The term “micronized tea” refers to ground tea with a mean diameter value Dv50 of less than 20 μm as measured by laser diffraction, such as a Dv50 in the range of 1-20 or 1-10 μm .

- 5 The order of mixing the different components may vary. Preferably, the oil phase and an aqueous phase are prepared separately. Emulsifiers are usually mixed into the oil but may also be added to the aqueous phase. Protein and other creamer components are dissolved in the aqueous phase. The two phases are then mixed and homogenized to produce an emulsion, which can be used in liquid form or dried. The tea particles may be incorporated
- 10 into (and milled in) only a part of the oil and additional oil may be added afterwards. Thus, in an embodiment one or more further oil components are added after step d), such as before pasteurization and/or drying.

- The tea particles are preferably micronized after addition to the oil (e.g. by milling), but
- 15 the tea particles may also be provided to the oil in a micronized form.

Emulsifiers are preferably added to the first composition in step a), but it may also be added in other steps. Thus, in an embodiment the one or more emulsifiers are added

- to the first composition in step a); and/or
- 20 - to the aqueous creamer component in step b); and/or
- during the mixing step c); and/or
- during the homogenisation step d).

- The creamer composition of the invention may comprise low molecular weight emulsifiers. By a low molecular weight emulsifier is meant an emulsifier with a molecular
- 25 weight below 1500 g/mol. Emulsions are thermodynamically unstable, and the phases of an emulsion will separate with time. By an emulsifier is meant a compound that stabilises the interface between the two phases of the oil-in-water emulsion and reduces the rate of phase separation. In an embodiment the emulsifiers are selected from the group consisting monoglycerides, diglycerides, acetylated monoglycerides, sorbitan trioleate, glycerol
- 30 dioleate, sorbitan tristearate, propyleneglycol monostearate, glycerol monooleate and monostearate, sorbitan monooleate, propylene glycol monolaurate, sorbitan monostearate, sodium stearyl lactylate, calcium stearyl lactylate, glycerol sorbitan monopalmitate,

diacetylated tartaric acid esters of monoglycerides, lecithins, lysolecithins, succinic acid esters of mono- and/or diglycerides, lactic acid esters of mono- and/or diglycerides, lecithins, lysolecithins, proteins and sucrose esters of fatty acids, lecithin (e.g. soy lecithin, canola lecithin, sunflower lecithin, and/or safflower lecithin), lysolecithins, and

5 combinations thereof.

The mixing step a) may be performed by different means. In an embodiment the first mixing step a) is done by milling to micronize the tea component. In the present context the term “micronize” relates to a process wherein the particles are processed to an average
10 particle size below 100 micrometers (μm), such as in the range 0.1-50 μm , such as in the range 1-30 μm , such as in the range 1-20 μm . Similar the term “micronized” relates to particles with an average particle size below 100 micrometers (μm), such as in the range 0.1-50 μm , such as in the range 1-20 μm , or such as in the range 1-20 μm . Milling is preferably performed in a ball mill by wet milling or dry milling. Alternatively, micronized
15 tea particles can be obtained separately by dry milling, (i.e. jet milling, cryo milling) and can then be mixed into the oil.

The oil component of step a) may be selected from different sources. In one embodiment the oil component of step a) comprises oil selected from the group consisting of palm
20 kernel oil, canola oil, soy bean oil, sunflower oil, safflower oil, cotton seed oil, palm oil, milk fat, corn oil, and/or coconut oil. The oil is preferably present in the creamer composition in an amount of at most about 50% (weight/weight), the amount of oil in the creamer composition may e.g. be between 1% and 40% (weight/weight), such as in the range 5-40%, such as in the range 10-40, such as in the range 5-30%, or such as in the
25 range between 10-30%. In the present context when oil is included in the weight/weight percentages the % relates to the non-water part but including oil (solid content + oils). The total amount of oil component comprising micronized tea therein in the creamer composition may also vary. Thus, in yet a further embodiment the creamer composition comprises at least 5% (w/w) of the oil component comprising micronized tea therein, such
30 as in the range 5-50%, such as 5-40%, such as 5-30%, such as in the range 5-20%, or such as in the range 5-15%. In another embodiment the creamer composition comprises at least

20% (w/w) of the oil component comprising micronized tea therein. It is to be understood that these weight % includes both the oil and the micronized tea therein.

In the context of the present invention, mentioned percentages are weight/weight
5 percentages of dry solids (on a dry matter basis) unless otherwise stated.

In one embodiment of the present invention, the creamer comprises species such as ginger, cardamom, cinnamon, pepper or combinations thereof.

10 The process of the invention also includes the addition of a creamer component, preferably in an aqueous form. By a creamer composition/ is meant a composition that is intended to be added to a food composition, such as tea, to impart specific characteristics such as colour (e.g. whitening effect), flavour, texture, mouthfeel and/or other desired characteristics. The creamer component provided in step b) is in a liquid form, but the final
15 creamer composition of the invention may be in a liquid form or in a powdered (dry) form. In the present context dried tea is to be understood as having a moisture content below 10%, preferably below 5% or more preferably below 3% water.

The creamer component may be any ingredient or combination of ingredients useful for
20 inclusion in a creamer composition. Thus, in an embodiment the creamer component of step b) is or comprises a protein, a hydrocolloid, a buffering agent, and/or a sweetener.

The creamer composition preferably comprises protein in the range 0.5-15%, such as 1.5-10% such as 1.5-5%preferably between about 0.1-3% protein, such as between about 0.2-
25 2% protein, more preferably between about 0.5% (weight/weight) and about 1.5% protein. The protein may be any suitable protein, e.g. milk protein, such as casein, caseinate, and whey protein; vegetable protein, e.g. soy and/or pea protein; and/or combinations thereof. The protein is preferably sodium caseinate. The protein in the composition may work as an emulsifier, provide texture, and/or provide whitening effect. Too low levels of protein may
30 reduce the stability of the liquid creamer. At too high protein levels the viscosity of the product may be higher than desired and too high for liquid processing.

The creamer composition (e.g. provided in the creamer component) may comprise a hydrocolloid. Hydrocolloids may help to improve physical stability of the composition. Suitable hydrocolloids may e.g. be carrageenan, such as kappa-carragenan, iota-carragenan, and/or lambda-carragenan; starch, e.g. modified starch; cellulose, e.g.

- 5 microcrystalline cellulose, methyl cellulose, or carboxy-methyl cellulose; agar-agar; gelatine; gellan (e.g., high acyl, low acyl); guar gum; gum Arabic; kojic; locust bean gum; pectin; sodium alginate; maltodextrin; tragacanth; xanthan; or a combination thereof.

- The creamer (e.g. provided in the creamer component) of the present invention may further
- 10 include a buffering agent. The buffering agent can prevent undesired creaming or precipitation of the creamer upon addition into a hot, acidic environment such as tea. The buffering agent can e.g. be monophosphates, diphosphates, sodium mono- and bicarbonates, potassium mono- and bicarbonates, or a combination thereof. Preferred buffers are salts such as potassium phosphate, dipotassium phosphate, potassium
- 15 hydrophosphate, sodium bicarbonate, sodium citrate, sodium phosphate, disodium phosphate, sodium hydrophosphate, and sodium tripolyphosphate. The buffer may e.g. be present in an amount of about 0.1 to about 3% by weight of the creamer.

- The creamer composition (e.g. provided in the creamer component) of the present
- 20 invention may further include one or more additional ingredients such as flavors, sweeteners, colorants, antioxidants (e.g. lipid antioxidants), or a combination thereof. Sweeteners can include, for example, sucrose, fructose, dextrose, maltose, dextrin, levulose, tagatose, galactose, corn syrup solids and other natural or artificial sweeteners. Sugarless sweeteners can include, but are not limited to, sugar alcohols such as maltitol,
- 25 xylitol, sorbitol, erythritol, mannitol, isomalt, lactitol, hydrogenated starch hydrolysates, and the like, alone or in combination. Usage level of the flavors, sweeteners and colorants will vary greatly and will depend on such factors as potency of the sweetener, desired sweetness of the product, level and type of flavor used and cost considerations. Combinations of sugar and/or sugarless sweeteners may be used. In one embodiment, a
- 30 sweetener is present in the creamer composition of the invention at a concentration ranging from about 5-90% by weight of the total composition, such as in the range 20-90%, preferably such as 20-70%. In another embodiment, the sweetener concentration ranges

from about 40% to about 60% by weight of the total composition. In a preferred embodiment the sweetener of step e) is glucose syrup.

In a preferred embodiment the creamer component comprises sodium caseinate,

- 5 dipotassium phosphate, sodium hexametaphosphate, trisodium citrate, sodium chloride and water. In yet an embodiment the creamer component of step b) is a non-dairy creamer.

When sodium caseinate is processed, it is so materially altered that both dairy scientists and government regulators no longer regard it as a true dairy substance. This is why sodium caseinate can be an ingredient in non-dairy products according to FDA's

- 10 regulation.

Examples of typical creamer compositions are presented in table below.

Table 1: Filled dairy creamers

Ingredients (in % by weight)	Filled dairy (FDC)
Milk solids non-fat (SNF)	30 - 70
Casein / caseinate	optional
Lactose /sweet whey / sucrose	10 - 40
Glucose syrup	optional
Milk fat	1 - 10
Vegetable fat	15-40
Emulsifiers	optional
Buffer salts	yes
Flavours	optional
Sodium chloride	optional
Colorants	optional
Flowing agents	optional
Moisture	1-3

- 15 Table 2: Full dairy creamers

Ingredients (in % by weight)	Full dairy
Milk solids non-fat (SNF)	30 - 70
Casein / caseinate	optional
Lactose /sweet whey / sucrose	0 - 40
Glucose syrup	no

Milk fat	15 - 30
Emulsifiers	optional
Buffer salts	yes
Flavours	optional
Colorants	optional
Flowing agents	optional
Moisture	1-3

The skilled person may produce other variants of creamers. Thus, the above creamer compositions are mere examples of creamer compositions.

- 5 The process may also include a pasteurizing step. Thus, in yet another embodiment the pasteurizing step f) is performed at a minimum temperature of 81°C for at least 5 seconds. The process may also include a drying step. Thus, in a further embodiment the drying step g) is performed by spray drying, vacuum band drying, roller drying or freeze drying or.

10 Product obtained/obtainable by process

The product obtained by the process according to the invention has properties different from creamers where tea is not captured in the oil phase of the oil-in- water emulsion.

Oil-in-water emulsified creamer composition

As mentioned above, the process according to the invention provides an oil-in-water

- 15 emulsified creamer composition with unique sensory parameters. Thus, in a further aspect the invention relates to an oil-in-water emulsified creamer composition comprising
- an oil component comprising micronized tea incorporated therein; and
 - an aqueous creamer component, e.g. comprising sodium caseinate.

- 20 As previously mentioned the creamer may also be in a dried form. Therefore in yet an aspect the invention relates to an oil-in-water emulsified dry creamer composition comprising

- an oil component comprising micronized tea incorporated therein; and
- a creamer component, e.g. comprising sodium caseinate.

25

The amount of micronized tea may also be defined in relation to the amount of oil in which it is incorporated. Thus, in another embodiment the weight/weight ratio (or ratio by

weight) between the amount of micronized tea incorporated in the oil to the amount of oil is in the range 0.01:1 – 2:1, such as 0.05:1 – 2:1, such as 0.1:1 – 2:1, such as 0.1:1 – 1:1, such as 0.4:1 – 1:1, such as 0.6:1 – 1:1, such as 0.8:1 – 1, or such as 1:1.

- 5 In the context of the present invention, the terms “ratio by weight” “(weight/weight)” or “weight/weight ratio” refers to the ratio between the weights of the mentioned compounds.

It is to be understood that the creamer compositions of the invention may both be in a dry format (moisture content below 10%, preferably below 5%, and even more preferably
10 below 3%) or in a liquid state.

Examples of preferred creamer compositions of the invention include:

A creamer composition according to the invention comprising

- 15 - 5-50% (w/w) of the oil component comprising micronized tea incorporated therein, wherein the micronized tea constitutes 2.5-60% of the total weight of the oil component comprising micronized tea incorporated therein; and
- one or more protein components, e.g. including sodium caseinate.

20 A creamer composition according to the invention comprising

- 5-50% (w/w) of the oil component comprising micronized tea incorporated therein, wherein the micronized tea constitutes 2.5-60% of the total weight of the oil component comprising micronized tea incorporated therein; and
- 10-50% (w/w) of one or more protein components, e.g. including sodium caseinate.

25

A creamer composition according to the invention comprising

- 5-50% (w/w) of the oil component comprising micronized tea incorporated therein, wherein the micronized tea constitutes 2.5-60% of the total weight of the oil component comprising micronized tea incorporated therein;
30 - 10-50% (w/w) of one or more protein components, e.g. including sodium caseinate; and
- 10-70% (w/w) of a sugar source, such as glucose syrup.

Examples of preferred tea compositions comprising the creamers of the invention include:

A tea mix composition according to the invention comprising

- 5 - 5-40% (w/w) of the oil component comprising micronized tea incorporated therein, wherein the micronized tea constitutes 2.5-60% of the total weight of the oil component comprising micronized tea incorporated therein;
 - a creamer component, e.g. comprising sodium caseinate.
- 10 A tea mix composition according to the invention comprising
- 5-40% (w/w) of the oil component comprising micronized tea incorporated therein, wherein the micronized tea constitutes 2.5-60% of the total weight of the oil component comprising micronized tea incorporated therein;
 - 10-50% (w/w) of a creamer component; e.g. comprising sodium caseinate; and
 - 15 - 10-85% (w/w) of a sugar source, such as sucrose.

A tea mix composition according to the invention comprising

- 5-40% (w/w) of the oil component comprising micronized tea incorporated therein, wherein the micronized tea constitutes 2.5-50% of the total weight of the oil
- 20 component;
- 10-50% (w/w) of a creamer component; e.g. comprising sodium caseinate; and
- 10-85% (w/w) of a sugar source, such as sucrose.

In a specific embodiment all tea in the tea mix is micronized tea incorporated in the oil.

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It is also to be understood that the tea compositions of the invention may both be in a dry format (moisture content preferably below 5%) or in a liquid state.

The amount of the tea incorporated (e.g. dispersed) in the oil component may constitute a

30 significant part of the total amount of tea present in the tea mixes. Thus, in an embodiment the amount of micronized tea incorporated in the oil constitutes from 10-100% (w/w) of the total amount of tea in the tea mix, such as 20-100%, such as 40-100%, such as 60-

100%, such as 80-100%, such as 90-100%, such as 10-80%, such as 10-60%, such as 10-40%, such as around 100%. As shown in examples 1 and 2, creamers have been produced where the micronized tea constitutes from 15-100% of the total amount of tea in the tea mixes. It is noted that taste/aroma improvements are seen in all the tested samples when
5 compared to the control.

Uses

The creamer composition according to the invention may find different uses.

In an aspect the invention relates to the use of a creamer composition according to the
10 invention in a beverage mix, such as a tea mix.

Food ingredient

The creamer composition according to the invention may also form part of a food ingredient. Thus, an aspect of the invention relates to a food ingredient comprising the
15 creamer composition according to the invention. In an embodiment the creamer composition constitutes from 5-100% by weight of the food ingredient. In case of 100% the creamer constitutes a food ingredient in its own right.

Food product

20 The creamer composition according to the invention may also form part of a food product. Thus, an aspect of the invention relates to a food product comprising the food ingredient according to the invention.

Process for providing tea mixes

25 The invention also relates to a process for providing tea mixes. Thus, still an aspect of the invention relates to a process for providing a tea mix, the process comprising mixing a creamer composition according to the invention with tea, thereby providing a tea mix. In a more specific embodiment the tea mix comprises in the range 5-99% by weight tea derived from the creamer and 1-95% by weight tea, such as 20-80% by weight tea derived from the
30 creamer and 20-80% by weight tea, such as 30-70% by weight tea derived from the creamer and 30-70% by weight tea, such as 40-60% by weight tea derived from the

creamer and 40-60% by weight tea, such as 60-99% by weight tea derived from the creamer and 1-40% by weight tea, such as 80-99% by weight tea derived from the creamer and 1-20% by weight tea.

- 5 It should be noted that embodiments and features described in the context of one of the aspects of the present invention also apply to the other aspects of the invention.

All patent and non-patent references cited in the present application, are hereby incorporated by reference in their entirety.

10

The invention will now be described in further details in the following non-limiting examples.

Examples

15 Example 1

Process for providing tea creamer

Methods

- Black tea was ground using a Frewitt hammer mill (screen size: 2 mm) and then mixed with pre-heated palm kernel oil and micronized using a wet bead mill (Alpine Hydro-Mill
20 90 AHM) (T=55°C, zirconium oxide bead 1.7/1.9 mm, 3000 RPM). In parallel typical filled-dairy creamer ingredients (skim milk powder, milk fat, sodium phosphate, sodium tripolyphosphate and sodium chloride) were mixed in water and stirred in a vessel at 50°C. These two mixes were then mixed and stirred at 50°C with the addition of sucrose. The final mix was homogenized (APV-HTST) and pasteurized (APV-HTST at 85°C during 5
25 sec). The pasteurized mix was then spray-dried (NIRO SD-6.3-N) at 160°C. Additional sugar was added to the dry product.

The above process was performed to produce the compositions presented in table 3.

Table 3: Creamer compositions (contents per portion of 6 g)

Variant no.	1	2	3
	REF (0%	4% MT	9% MT

	MT*)		
Micronized tea	0 g	0.25 g	0.53 g
Sugar	1 g	1 g	1 g
Oil	1.6 g	1.3 g	1.1 g

*MT=Micronized tea

The composition (variant 3 given in Table 3) exhibited a smooth and stable suspension. Sedimentation was absent for this composition during consumption. The micronized tea incorporated into the creamer oil delivers tea taste and aroma in addition to mouthfeel

5 improvements.

Example 1A

Process for providing a creamer containing micronized tea particles

Methods

- 10 Black tea (Finlay Gokal, origin India) was ground using a Frewitt hammer mill (screen size: 2 mm) and then mixed with pre-heated palm kernel oil and micronized using a wet bead mill (Alpine Hydro-Mill 90 AHM) (T=65°C, zirconium oxide beads 1.7/1.9 mm, 3000 RPM, TS 55%). The particle size distribution after pre-grinding is given in Fig. 2 A. After two passages through the bead mill the size distribution of the micronized particles is
- 15 characterized by a $d_{90,3}$ of 34 μ m, i.e 90% of the mass belongs to particles with a diameter smaller than 34 micrometers, as shown in Fig 2 B.

The oil containing micronized tea particles was then mixed with monoglycerides DimodanTM and PanodanTM (Dupont).

- In parallel typical filled-dairy creamer ingredients (skim milk powder, milk fat, sodium
- 20 phosphate, sodium tripolyphosphate and sodium chloride) were mixed in water and stirred in a vessel at 50°C.

- The oily and the aqueous component were then mixed and stirred at 50°C with the addition of glucose syrup. The final mix was homogenized (APV-HTST) and pasteurized (APV-HTST at 85°C during 5 sec). The pasteurized mix was then spray-dried (NIRO SD-6.3-N)
- 25 at 160°C. Additional sugar was added to the dry product.

The above process was performed to produce the compositions presented in table 4.

Table 4: Creamer compositions (contents per portion of 6 g)

Variant no.	1	2	3	4
	REF (0% MT*)	4% MT	9% MT	15% MT
Micronized tea	0 g	0.25 g	0.53 g	0.88 g
Sugar	1 g	1 g	1 g	1 g
Oil	1.7 g	1.5 g	1.2 g	0.9 g

*MT=Micronized tea

Example 2

5 Use of creamer as tea enhancer

Methods

This filled-dairy creamer containing micronized tea particles produced according to example 1 or 1A can be added to a cup of tea (prepared separately).

10 Example 3

Use of creamer as part of beverage powders

Methods

The filled-dairy creamer composition containing micronized tea particles (according to Example 2, as given in Table 3) was dry mixed with sugar, soluble tea extract and chai

15 spices to produce a beverage powder (tea mix powders) containing micronized tea.

A typical beverage powder composition comprises 45% creamer according to variant 4 in table 3, 15% soluble tea, 30% sugar and 10% milk powder. The obtained powder is filled in sachets and provides an instant tea beverage upon reconstitution with hot water. In another use the described powdered beverage preparation is filled into capsules and

20 provides a tea beverage upon reconstitution with the help of a beverage system such as Nescafé Dolce Gusto.

Sedimentation test

150 ml of the beverage sample was poured into in a cup at T=60°C. The beverage was

25 allowed a settling time of 5 minutes and the sedimentation test was done by measuring the mass of sediments in the cup on a submersed plate using a sedimentation balance: Mettler

Toledo XP404S Excellence Plus with Density Determination Kit. Balance Link Software V 4.02.

Results

- 5 Based on continuous and quantitative measurement of particle sedimentation in the cup with the help of the sedimentation balance, the stability of the dispersion of the micronized particles in the beverage preparation can be evaluated. The result is presented in Fig. 2. A steep increase of the sedimented tea particle mass for the reference sample (dispersion of dry micronized tea particles into the beverage preparation) is observed, whereas tea
- 10 micronized in oil almost does not settle within 5 min time. No sediments are found for the micronized tea in oil sample.

Conclusion

- The novel process for introducing micronized tea to the oil of a creamer composition
- 15 provides tea beverages with enhanced stability.

Example 4

Use of creamer as part of Ready-to-Drink (RTD) beverages

- 20 Black tea (Finlay Gokal, origin India) was ground using a Frewitt hammer mill (screen size: 2 mm) and then mixed with pre-heated palm kernel oil and micronized using a wet bead mill (Alpine Hydro-Mill 90 AHM) (T=65°C, zirconium oxide beads 1.7/1.9 mm, 3000 RPM, TS 55%). The particle size distribution after pre-grinding is given in Fig. 2 A. After two passages through the bead mill the size distribution of the micronized particles is
- 25 characterized by a $d_{90,3}$ of 34 μm , i.e 90% of the mass belongs to particles with a diameter smaller than 34 micrometers, as shown in Fig 2 B.
- In parallel skim milk (95%) and sugar (5%) were mixed and stirred in a vessel at 50°C. Both the oily and the aqueous preparation were then mixed and stirred at 50°C. The final mix was pre-heated (80°C), subjected to UHT treatment by direct steam injection (APV-
- 30 HTST at 145°C during 5 sec), flash-cooled to 80°C and homogenized (APV-HTST). The final liquid beverage contains 93.5% skim milk, 4% sugar, 2% fat and 0.5% micronized tea.

A reference tea RTD beverage at equal composition was prepared, where the tea was not added via the oil phase as described in the current invention, but dry milled and mixed into the skim milk together with the sugar. The particle size distribution of the reference dry milled tea powder is shown in Figure 2A. It is characterized by a $d_{90,3}$ of 34 μm , as shown in Figure 2B.

Example 5

Process for providing a creamer containing micronized green tea particles

Methods

Green tea (Sencha Zhejiang, origin China) was ground using a Frewitt hammer mill (screen size: 2 mm) and then mixed with pre-heated palm kernel oil and micronized using a wet bead mill (Alpine Hydro-Mill 90 AHM) ($T=65^{\circ}\text{C}$, zirconium oxide beads 1.7/1.9 mm, 3000 RPM, TS 55%).

The oil containing micronized tea particles was then mixed with monoglycerides

DimodanTM and PanodanTM (Dupont).

In parallel typical filled-dairy creamer ingredients (skim milk powder, milk fat, sodium phosphate, sodium tripolyphosphate and sodium chloride) were mixed in water and stirred in a vessel at 50°C .

The oily and the aqueous component were then mixed and stirred at 50°C with the addition of glucose syrup. The final mix was homogenized (APV-HTST) and pasteurized (APV-HTST at 85°C during 5 sec). The pasteurized mix was then spray-dried (NIRO SD-6.3-N) at 160°C . Additional sugar was added to the dry product.

The above process was performed to produce the compositions presented in table 4.

Table 4: Creamer compositions (contents per portion of 6 g)

Variant no.	1	2	3
	REF (0% MT*)	4% MT	9% MT
Micronized tea	0 g	0.25 g	0.53 g
Sugar	1 g	1 g	1 g
Oil	1.7 g	1.5 g	1.2 g

*MT=Micronized tea

Example 6

Use of creamer as part of green tea beverage powders

Methods

- 5 The filled-dairy creamer composition according to example 5, containing micronized tea particles (as given in Table 3) was dry mixed with sugar, soluble green tea extract to produce a beverage powder (green tea mix powder) containing micronized green tea. A typical beverage powder composition comprises 45% creamer according to variant 3 in table 4, 15% soluble tea, 30% sugar and 10% milk powder. The obtained powder is filled
- 10 in sachets and provides an instant green tea beverage upon reconstitution with hot water. In another use the described powdered beverage preparation is filled into capsules and provides a tea beverage upon reconstitution with the help of a beverage system such as Nescafé Dolce Gusto.

Claims

1. A process for providing a tea creamer composition, the process comprising
 - a) mixing in a first mixing step an oil component with dried cut leaves of a tea bush, thereby providing a first composition comprising micronized tea incorporated in the oil component wherein the micronized tea has a mean diameter value Dv_{50} of less than 20 μm as measured by laser diffraction;
 - b) providing a aqueous creamer component, e.g. comprising sodium caseinate;
 - c) mixing in a second mixing step the first composition with the aqueous creamer component;
 - d) homogenising the composition of step c), thereby providing an oil-in-water emulsion;
 - e) optionally, adding a sweetener source to the oil-in-water emulsion;
 - f) optionally, pasteurizing the oil-in-water emulsion;
 - g) optionally, drying the oil-in-water emulsion; and
 - h) providing a creamer composition.
2. The process according to claim 1, wherein one or more emulsifiers are added
 - to the first composition in step a); and/or
 - to the aqueous creamer component in step b); and/or
 - during the mixing step c); and/or
 - during the homogenisation step d).
3. The process according to claim 1, wherein the first mixing step a) is done by milling.
4. The process according to claim 3, wherein the one or more spices are added to the step a), wherein the species comprises ginger, cardamom, cinnamon, pepper or combinations thereof.
5. The process according to any of the preceding claims, wherein the creamer component of step b) comprises a protein, e.g. milk protein such as skim milk solids, caseinate, e.g. sodium caseinate, and/or whey protein.

6. A tea creamer creamer composition obtainable by a process of any one of the claims 1 to 5.
- 5 7. The tea creamer composition according to claim 6, wherein the weight/weight ratio between the amount of micronized tea incorporated in the oil and the amount of oil is in the range 0.01:1 – 2:1, such as 0.05:1 – 2:1, such as 0.1:1 – 2:1, such as 0.1:1 – 1:1, such as 0.4:1 – 1:1, such as 0.6:1 – 1:1, such as 0.8:1 – 1, or such as 1:1.
- 10 8. The tea creamer composition according to claim 6 or 7, comprising at least 5% (w/w) of the oil component comprising micronized tea therein, such as in the range 5-50%, such as 5-30%, such as 5-30%, such as in the range 5-20%, or such as in the range 5-10%.
9. The tea creamer composition according to any of claims 6-8 comprising
- 15 - 5-50% (w/w) of the oil component comprising micronized tea incorporated therein, wherein the micronized tea constitutes 2.5-60% of the total weight of the oil component comprising micronized tea incorporated therein; and
- one or more protein components, e.g. including sodium caseinate.
- 20 10. The tea creamer composition according to any of claims 6-9 comprising
- 5-50% (w/w) of the oil component comprising micronized tea incorporated therein, wherein the micronized tea constitutes 2.5-60% of the total weight of the oil component comprising micronized tea incorporated therein;
- 1-50% (w/w) of one or more protein components, e.g. including sodium caseinate;
- 25 and
- 5-70% (w/w) of a sugar source.
11. The tea creamer of claim 6, wherein the amount of the oil component ranges from 5-40% (w/w) and wherein the micronized tea constitutes 2.5-60% of the total weight of the
- 30 oil component comprising micronized tea incorporated therein.

12. Use of a creamer composition according to any of claims 6-11 in a tea beverages containing a milk component, desserts and cakes.