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The invention relates to a food product comprising a water in oil emulsion, a variegate composition and from 15 to 85 vol % of a gas. Products according to the invention have a pronounced, preferably sweet taste.





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- (54) Title: FOOD PRODUCT COMPRISING A VARIEGATE COMPOSITION
- (57) Abstract

The invention relates to a food product comprising a water in oil emulsion, a variegate composition and from 15 to 85 vol % of a gas. Products according to the invention have a pronounced, preferably sweet taste.

Food product comprising a variegate composition

The current invention relates to a spreadable food product comprising a water in oil emulsion and a variegate 5 composition and to a process for preparing this food product.

Background of the invention

10 Food products comprising a variegate composition are known.

Variegate compositions are compositions which form an inhomogeneously mixed material in another phase and which have a colour or texture which differs from the phase with which they are inhomogeneously mixed. Examples of variegate compositions are fruit puree, chocolate puree, vegetable puree.

US-A-4873104 discloses an ice cream confection comprising a 20 variegated composition which is made by rotationally feeding one stream of material into another which can lead to a nicely striped ice cream confection.

A non fat food product comprising a mixture of a fruit 25 puree, or whole fruit and water, sweetener, stabiliser, and a fat mimetic is disclosed in US-A-5503863.

EP 807 385 discloses water continuous creams comprising a fruit puree, which creams can be used as desserts.

The current invention aims at spreadable food products comprising a variegate composition.

All the above compositions are believed not to show the desired mouthfeel sensation and melting behaviour upon 5 consumption as they are either water continuous or do not contain any fat. The mouthfeel upon consumption of these compositions can be considered "thin" as the flavour

compounds in the aqueous phase easily dissolve in saliva

and are removed with the saliva very quickly.

10 Hence the water continuous products do not lead to a long lasting taste and flavour perception.

Another disadvantage of water continuous compositions comprising a variegate composition, is their permeation in 15 products like bread, bagels and muffins if they are applied to these. Due to this permeation the bread, muffin or bagel

becomes soggy.

Similar sogginess is encountered if jam, syrup, honey or like compositions are applied on bread or muffins.

20

Generally margarines, which are water in oil emulsion comprising from 40 to 80 wt% fat are used as a spread on products like bread, muffins or bagels. They cause less sogginess than water containing components. However the

25 taste of these products is usually bland or butter like, whereas groups of consumers prefer spreads with a more pronounced taste. In this respect children for example often prefer sweet spreads.

5 To come to the preferred non-sogginess in combination with the desired taste effect, many consumers have the habit of spreading an underlayer of margarine, a margarine like product or butter on bread, followed by a top layer of another composition like jam, honey, syrup, pesto and the 10 like. However this is considered an inconvenient solution.

Therefore there is a desire for a spreadable food product which shows the taste advantage of a spread with a pronounced taste, but at the same time shows a more fat, 15 more rich, longer lasting mouthfeel and flavour perception than water continuous compositions. This product desirably

does not lead to sogginess of for example bread if it is used as a spread directly on bread

20 GB 2 113 523 discloses a honey-containing water and oil emulsion. It is recommended to de-aerate the emulsion to prevent the formation of air bubbles.

It has surprisingly been found that a food product which 25 comprises a variegate composition and a water in oil emulsion which is characterized by an aqueous phase which comprises a puree and which food product comprises from 15 to 85 vol% gas on total product, shows the desired rich mouthfeel in combination with a pronounced taste.

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Statement of invention

Therefore the invention relates to a spreadable food product comprising a water in oil emulsion and a variegate 35 composition, and wherein the water in oil emulsion is

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characterized by an aqueous phase which comprises a puree and which emulsion comprises 10 to 80 wt% of a fat blend,

and wherein the food product comprises 15 - 85 vol% of a gas.

Furthermore the invention relates to a process for the 5 preparation of these food products.

Detailed description of the invention

Water activity is defined to mean the ratio of the vapour 10 pressure of water above a sample and the vapour pressure of pure water at the same temperature.

An example of pure water is distilled water.

A spreadable product can be applied on for example bread 15 with a knife without tearing the bread and forming a nice and homogeneous layer on the bread. Examples of spreadable products are margarine, peanut butter, chocolate paste, syrup, honey.

20 Products according to the invention are based on a water in oil emulsion and a variegate composition.

The fat continuous food products according to the invention comprise from 15 to 85 vol % of a gas, preferably an inert

25 gas such as nitrogen carbon dioxide, helium, or a combination thereof. The presence of such relatively high volumes of gas leads to stable, easily spreadable products with a surprisingly good mouthfeel and flavour perception.

Although it is possible to use air as the gas, this is not preferred because of the potentially oxidative action of oxygen in air towards other ingredients.

According to a preferred embodiment, the amount of gas is 5 from 20 to 65 vol%, more preferred from 20 to 50 vol%, most preferred from 25 to 40 vol%.

Despite the potentially high gas contents, the products according to the invention are basically fat continuous.

10 Products according to the invention comprise a variegate composition.

For the purpose of the invention, a variegate composition can be based on vegetable bases like vegetable concentrates, vegetable extracts, or fruit bases such as

15 fruit puree, concentrate or extract; and other compositions like chocolate. The variegate composition differs from the water in oil composition in texture, and/or colour.

In a highly preferred embodiment the variegate composition 20 is based on fruit, fruit extract or crushed fruit.

The variegate composition preferably comprises a fruit or vegetable based ingredient, sugar, salt, and thickener.

Optional further components are preservatives, gelling

25 agents, artificial or natural flavour compositions,

The fruit based ingredient is for example originating from strawberry, apple, or blueberries or a mixture of these.

30 The fruit based ingredient may be a fruit puree, and may

colouring agents, vitamins.

comprise pieces of fruit. The fruit based ingredient can also be a combination of a fruit puree and a fruit extract. Vegetable based ingredients include ingredients based on spinach, broccoli, lettuce, tomato and the like.

5

The preferred amount of fruit or vegetable based ingredient is from 20 to 90 wt%, more preferred from 40 to 80 wt% on the total weight of the variegate composition.

10 Preferred sugars are saccharose, sucrose, fructose and combinations thereof.

Thickeners are for example selected from the group comprising xanthan gum, locust bean gum, starches or 15 mixtures thereof. Starches may be modified or unmodified.

Suitable gelling agents are pectin, alginate, carrageenan, gelatine and combinations thereof.

20 The preferred amount of gelling agent and thickening agent in total is from 0.1 to 10 wt%.

The preferred salt is sodium chloride. The amount of salt is preferably from 0.1 to 10 wt%.

25 For sweet spreads, wherein the variegate composition and puree are based on fruit, the preferred amount of salt is from 0.1 to 0.5 wt% on total spread weight.

To increase the microbiological stability, the variegate 30 composition may comprise a preservative like potassium

sorbate. Alternatively or additionally the microbiological stability is improved by reducing the pH of the variegate composition to between 3 and 5. Such an acidic pH can be reached by addition of an acidifying agent like citric acid 5 or gluconodeltalactone.

A variegate composition is commercially available from suppliers like J.M. Smucker Company and Hero Industrial BV.

- 10 The aqueous phase of the food product according to the invention comprises a puree. The puree may be based on vegetables, fruit or crushed components like crushed or highly viscous chocolate. The composition of the puree may be the same or different from the variegate composition.
- 15 Vegetable or fruit based puree is preferred.

An even more preferred puree comprises flavour compounds, colouring agents, and a fruit or vegetable based ingredient.

20

The presence of a puree in the aqueous phase is essential to obtain the desired taste and flavour development. The sole presence of the variegate composition was found to lead to products which still show a more or less bland

- 25 taste. To the contrary, products with a puree in the aqueous phase showed a pronounced flavour and the desired development of flavour over time. This long lasting flavour and taste, may be due to inversion of the water in oil emulsion in the mouth, whereby flavour and taste components
- 30 from the puree in the aqueous phase are released.

The puree preferably comprises from 10 to 40 wt% of a fruit or vegetable based ingredient on total weight of the fruit puree.

5

Preferably, the amount of fruit or vegetable puree in the aqueous phase is from about 0.1 to 30 wt%, more preferably 0.1% to about 20%, and preferably, from about 1.0% to about 15%, and most preferably, from about 3.0% to about 8.0% by 10 weight of the spread.

In a highly preferred embodiment both the variegate composition and the puree are based on fruit.

- 15 According to another preferred embodiment, products according to the invention are stable in that the ingredients of the variegate composition and the water in oil emulsion show limited "exchange" between the two parts of the current products.
- 20 It has been found that this can be obtained if the difference between the water activity of the aqueous phase and the water activity of the variegate composition is at most 0.05 %, preferably less than 0.02 %.
- 25 Preferred products are those wherein the aqueous phase of the emulsion comprises from 0.1 to 40 wt% of a water soluble humectant selected from the group of sugar, salt such as NaCl, potassium sorbate; sorbitol, glycerol, or a combination thereof.

The amount of 0.1 to 40 wt% includes humectant, present in the aqueous phase, originating from any source. Therefore the humectant present in the puree is included in this amount.

5 The humectant may serve to tune water activity.

The most preferred humectant is sugar, which sugar can be selected from the sugars that are mentioned above for the variegate composition and puree.

10

Sugar may be added to the aqueous phase in the granular and/or raw form. Sugar is optionally added to the aqueous phase in the form of a syrup, like a commercially available syrup having about 30% by weight water, and about 70% by

- 15 weight solids based on total weight of the syrup. Most preferred the syrup which is employed in this invention is corn syrup having about 55% to about 65% of its total solid content in the form of a saccharide such as fructose.
- 20 The water activity of the variegate composition can as well be regulated by the addition of a suitable humectant in a suitable amount.

Preferably the variegate composition comprises from 0.1 to 40 wt% on the total weight of the variegate composition of 25 a sugar, preferably sucrose or saccharose.

The amount of fat should be such that the product does not taste primarily as a fat spread, but a fatty, rich taste impression is given, while the product does not leave only 30 a fatty impression. Therefore, the food product according

to the invention comprises from 10 to 80 wt%, preferably from 15 to 60 wt% of a fat blend, more preferred 20 to 50 wt% of a fat blend.

- 5 Fat blends with a solid fat content of between 0.1 and 10% at 30 °C were found to show the desired mouthfeel and taste in combination with the puree in the aqueous phase and the variegate composition.
- 10 Even more preferred, the fat blend shows a solid fat content of between 0.5 and 3% at 30 °C.

The fat blend may be composed of any triglyceride composition leading to the above solids fat content 15 specification.

The triglycerides which are employed in the fat phase that is used to make up the water-in-oil composition of this invention are preferably naturally occurring and can be

- 20 derived from vegetable sources, animal sources, or both. In addition to naturally occurring triglycerides, it is within the scope of this invention to use triglycerides that have been synthesized or modified either chemically, physically or genetically, or by any techniques which
- 25 include a combination thereof.

Examples of these techniques are hydrogenation, fractionation and interesterification.

The vegetable derived triglycerides which may be used in 30 this invention include those which may be selected from the

group consisting of soybean oil, sunflower oil, palm oil, palm kernel oil, high and low erucic rapeseed oil, coconut oil, olive oil, sesame oil, peanut oil, corn oil, linseed oil, cotton seed oil, shea and mixtures thereof.

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The animal derived triglycerides which may be used in this invention include those which may be selected from the group consisting of fish oil, tallow oil, sardine oil, dairy fat and mixtures thereof.

10

It is also within the scope of this invention to employ natural and synthetic triglyceride replacements in the fat phase used to prepare the water-in-oil composition of this invention. Triglyceride replacements include, for example, compounds which may be classified as waxes, like jojoba oil, fatty acid esters, and mono- or disaccharides.

Preferably the fat blend according to the invention is high in triglycerides comprising at least one (poly) unsaturated 20 fatty acid.

The aqueous phase of the products according to the invention preferably shows a pH of from 3 to 5. This ensures good microbiological stability and is believed to 25 contribute to a more fresh taste.

The water in oil emulsion according to the invention is preferably stabilized by an emulsifier system. Emulsifiers which may be used to prepare the products of this invention

may be added to the fat phase, aqueous phase or both phases of the emulsion.

Examples of suitable emulsifiers are mono- and

5 diglycerides, partial polyglycerol esters, lecithin,
polyoxyethylene sorbitan monoesters and polyglycerol
polyricinoleates or combinations thereof.

Embodiments wherein at least part of the emulsifiers are
partial polyglycerol esters are highly preferred in view of
10 product stability and mouthfeel.

Generally, the amount of emulsifier used to prepare the emulsion in the food product of this invention is less than about 1.5% by weight based on total weight of the emulsion.

15 This amount of emulsifier includes the emulsifier present in the puree which is in the aqueous phase, and emulsifier present in the variegate composition.

The water in oil emulsion may further comprise ingredients 20 which are common for such products like salts, protein, thickening agents, gelling agents, colouring agents, flavour compositions, and the like.

An example of a suitable salt is sodium chloride.

25

Salt is usually present in an amount from about 0.25% to about 10%, and preferably, from 0.25 to 4 wt% and more preferably from about 0.5% to about 3.0%, and most preferably, from about 0.75% to about 1.5% by weight of the 30 total weight of the food product. This amount includes the

amount of salt present in the puree and the variegate composition.

Thickening agents are preferably selected from those 5 already mentioned above for the puree.

Suitable gelling agents are preferably selected from the group comprising alginate, pectin, gelatin, carrageenan or combinations thereof. The amount may vary depending on the 10 viscosity and consistency of the product that is desired.

The total amount of gelling agent and thickening agent in the current spreads is preferably between 0.1 and 10 wt% on total weight of the spread.

15

The emulsion can also comprise a protein, for example selected from the group comprising dairy protein like whole milk, semi-skimmed milk, skimmed milk, cultured buttermilk, buttermilk powder, skimmed milk powder, yoghurt, yoghurt

- 20 powder, quark, cottage cheese, whey powder, butter, mixtures thereof and the like, with yoghurt powder being the most preferred. An illustrative list of the non-dairy proteins which may be used in this invention include soy protein, rice protein, mixtures thereof and the like.
- 25 The amount of protein is preferably from 0.25 to 5 wt%, more preferred from 0.5 to 3 wt%, even more preferred from 0.75 to 2 wt%.

These amounts include the protein present in the puree, and in the variegate composition.

For the purpose of the invention, gelatin is considered a gelling agent and is not included in the amount of protein present.

5 Optionally the aqueous phase of the emulsion comprises an anti-oxidant such as a metal complexing agent like a chelator. EDTA (ethylenediaminetetraacetic acid), citrates, phosphates, or acids like gluconic acid are examples of suitable chelators. The preferred chelator is EDTA.

10

The water in oil emulsion which is part of the food product according to the invention can be prepared by any well known process for the production of this type of food products. Such known processes for example comprise the steps of mixing the aqueous phase and fat phase ingredients at an elevated temperature of from 30 to 70 °C, subjecting the resulting mixture to a working treatment under shear, and cooling the emulsion before or after packaging to a temperature of from 0 to 20 °C.

20

The gas may be added at any moment in the process, however adding it in line at a point, dimensionally close to the packaging unit or even during packaging is highly preferred.

25

The amount of gas in a product is reduced by further treatments in high shear units such as votatortm units.

Therefore in a preferred embodiment high shear treatments are not applied to the product after gas has been added.

It has been found that a preferred method comprises the steps of separately mixing the aqueous phase ingredients in one step and the fat phase ingredients in another step.

These two phases are then mixed to form a pre-mix. The 5 temperature during mixing is at 40 to 60 °C.

Aqueous phase ingredients are ingredients such as water, water soluble emulsifier, protein, salt, gelling agents, acids, preservatives, chelator.

10

Examples of fat phase ingredients are vitamins, emulsifier, fat blend, chelator.

Subsequently the premix is subjected to shear conditions in 15 one or more shear units, for example a scrape surface heat exchanger or a series of these like a series of votatortm A units.

The temperature in the shear unit(s) is preferably from about 1 to about 30 °C, more preferred from about 2 to 20 about 20 °C.

The product, which is preferably a water in oil emulsion after the A units, is then optionally transferred to a pin stirrer (for example a C unit), wherein shear is applied, 25 preferably at 100-900 rpm. If the product is not yet in the form of a fat continuous emulsion it is converted to such an emulsion in the pin stirrer.

In a following step, the resulting mixture is treated in a pin stirrer which is equipped with gas injection inlet means, to add the gas.

5 The variegate composition is preferably introduced just before the product is filled into packaging. The variegate composition can be introduced by way of a common, well known mixer or it can be pumped into the water in oil emulsion.

10

This type of mixing ensures that the products are "interwoven" with one another. The mixing however should preferably carried out such that the products do not mix homogeneously and that both parts, i.e. the emulsion and 15 the variegate composition can be separately seen in a glass jar or other transparent packaging material.

Therefore preferably, the mixing is done such that the variegate composition is present in the form of zig zags, 20 streams, veins, swirls or ribbons.

Optionally at any moment in the process, the food product or the ingredients that are part of the final food product, are subjected to a pasteurization or sterilization

25 treatment at increased temperatures. For example the aqueous phase and the fat phase may be subjected to a heat treatment at 70 to 100 °C for at least 1 minute to pasteurize it. Heat labile ingredients such as a fruit or vegetable puree are preferably added after a heat treatment 30 at increased temperature.

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Preferably the temperature of the mixture constituting the food product of the invention is below 60 °C after the puree has been added.

Examples

Example 1

A vessel was charged with the following items listed in 5 table 1

Table 1; fat phase

	% Weight based on total
	weight of the food product
Partially hydrogenated	8.7
bean oil (m.p. 42°C)	
Liquid Bean Oil	30.7
Distilled monoglyceride	
(iodine value 60)	0.4
Polyglycerol esters of	
fatty acid (HLB 6.5)	0.1
Soy lecithin	0.1

10 The items constituting the fat phase were mixed in the vessel and heated to about 60°C. The resulting mixture was a homogeneous solution that was used as the fat phase to produce the water-in-oil composition comprising the water soluble humectant of this invention.

15

A second vessel was charged with the following items listed in table 2.

Table 2; aqueous phase

	% Weight based on total
	weight of the product
Water	24.6
Salt	1.0
Yogurt powder	1.035
Sodium alginate	0.3
EDTA	0.008
Potassium sorbate	0.112
High fructose corn	
syrup (71% solids/42%	26.5
fructose)	
Lactic acid	0.1
Seedless strawberry	6.3
puree	

The items were mixed in the second vessel and heated to about 35°C. The resulting mixture was a homogeneous 5 solution that was used as the aqueous phase to produce the water-in-oil composition comprising the water soluble humectant of this invention.

A run tank was charged with the fat phase to which the 10 aqueous phase was added. The contents were stirred and heated to about 55°C for about 1 hour to produce a water-in-oil emulsion.

Trace amounts of Vitamin A and butter strawberry flavoring 15 were added to the emulsion. Nitrogen (20%) was injected

5 into the emulsion and the resulting aerated emulsion was passed through an A-unit exiting at about 5°C. The resulting cooled emulsion was then passed through a C-unit (30 liters) having a shaft speed of about 400 RPM. The resulting crystallized emulsion was subsequently passed 10 through a second A-unit at about 5°C. The resulting water-in-oil spread had a fat content of about 39.5%.

A variegate composition with water soluble humectant (strawberry) was purchased as made commercial available

15 from J.M. Smuckers. The humectant concentration of the variegate composition was modified by blending in, with a commercially available blender, sugar (end product had a water activity of 0.9 and a viscosity that was substantially similar to the viscosity of the water-in-oil composition). The amount of sugar blended into the variegate composition was enough to give the variegate composition substantially the same water activity as the water-in-oil composition, whereby the difference was less than 0.05%.

Once the water soluble humectant concentration of the variegate composition was thus adjusted, streams of the water-in-oil composition (at about 5°C to about 10°C) were joined with streams of the variegate composition to produce 30 the heterogeneous edible spread having about 15% by weight variegate composition.

Approximately 50-8 oz.(1.4 - 0.2 kg) containers were filled with the product comprising about 15% variegate

35 composition. The

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containers were stored in a manner that mimicked consumer use. For example, the containers were stored at about 5°C. During periodic time frames, the temperature of the containers was raised to about 20°C for about 1 hour (about 5 the time the product would be on the consumers table). After about 10 days of observation (about the time it takes for the consumer to use the product, the appearance and texture of the spread remained substantially the same as when the product was first made (as determined by visual 10 inspection).

A trained tasting pannel determined that bread on which the obtained product was applied, did not get as soggy as bread on which a commercial jam had been applied.

15 The taste and mouthfeel of the obtained product were considered to be a combination of a rich fatty taste and a sweet taste. The product's sweet taste was even better than the taste which develops when on bread an underlayer of margarine and a top layer of jam is applied.

20

Example 2

A food product was prepared according to the method and composition of example 1 with the modification that 40% 25 nitrogen gas was added just before packaging.

The product had an even better appearance and the taste and mouthfeel were even more pleasant than the product of example 1.

Claims

- 1. Spreadable food product comprising a water in oil emulsion and a variegate composition, and wherein the water in oil emulsion is characterized by an aqueous phase which comprises a puree and which emulsion comprises 10 to 80 wta of a fat blend, said fat blend having a solid fat content of between 0.1 and 10% at 30°C, and wherein the food product comprises 15 - 85 vol% of a gas.
- 2. Spreadable food product according to claim 1, wherein the difference between the water activity of the aqueous phase and the water activity of the variegate composition is at most 0.05 %, preferably less than 0.02%.
- 3. Food product according to claim 1 or 2 wherein the puree is a fruit puree and the variegate composition is based on fruit.
- 4. Food product according to any of claims 1-3 wherein the amount of gas is from 20 to 65 vol%, more preferred from 20 to 50 vol%, most preferred from 25 to 40 vol%.
- 5. Food product according to any of claims 1-4, wherein the aqueous phase of the emulsion comprises from 0.1 to 40 wt% of a water soluble humectant selected from the group of sugar, salt, sorbitol, glycerol or a combination thereof.

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- 6. Food product according to any of claims 1-5, wherein the humectant is a sugar.
- 7. Food product according to any of the preceding claims wherein the pH of the aqueous phase is from 3 to 5.
- 8. Food product according to any of the preceding claims wherein the gas is an inert gas such as nitrogen gas, carbondioxide, helium or a combination thereof.
- 9. Process for the preparation of a food product according to any of claims 1-8, wherein the gas is introduced in line at a point dimensionally close to the packaging unit or even during packaging.
- Process for the preparation of a food product according to claim 9 wherein the variegate composition is introduced just before the product is filled into packaging.