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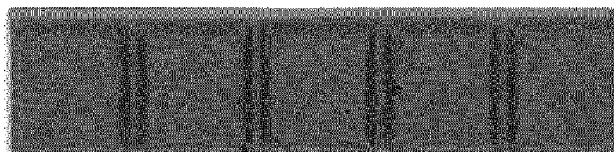
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(54) **Title:** TRIGLYCERIDE MIXTURE AND CONFECTIONERY COMPOSITION COMPRISING IT

FIGURE 1



(57) **Abstract:** The invention relates to a triglyceride blend of i) one or more S-U-S triglyceride(s) from 15 to 30 wt%; and ii) one or more S-S-U triglycerides(s) from 0.1 to 10.0 wt% and iii) optionally one or more triglycerides other than (i) or (ii) up to 5.0 wt%; where S is a C₁₆₋₂₀ saturated fatty acid moiety; and U is a C₁₆₋₂₀ unsaturated fatty acid moiety. The invention also relates to a chocolate confectionery composition comprising the triglyceride blend and use of the triglyceride blend to retard defects due to heat exposure of chocolate (e.g. resist the bloom effect); and to a process for using the triglyceride blend to manufacture a chocolate confectionery composition.



TRIGLYCERIDE MIXTURE AND CONFECTIONERY COMPOSITION COMPRISING IT

The present invention relates to a fat based composition such as a chocolate confectionery composition containing a triglyceride mixture with a reduced amount of saturated fat. The invention also relates to a triglyceride mixture having a reduced amount of saturated fat, to the use thereof for retarding visual defects due to heat exposure in a chocolate product, in particular the bloom effect, and to a process for manufacturing said chocolate confectionery composition.

Sensory aspects, such as textural properties and mouth feel are of major importance in the improvements sought for in chocolate manufacture processes, in order to fulfil consumers' expectations. Visual aspect of a chocolate product also plays an important role, as it may be related, in the consumer's opinion, to the quality of the product.

One appearance defect that the chocolate manufacture faces is the appearance of the bloom effect, namely a less glossy and whitish appearance, resulting from the re-crystallisation of cocoa butter on the surface. Bloom may occur through the polymorphic transformation of cocoa butter from a less stable form (form IV or V) to the most stable form (form VI). Elevated and/or fluctuating temperatures promote the transformation rate and thus also promote the rate of bloom formation.

When chocolate is exposed to a temperature above 34°C, the beta-polymorphic crystals of cocoa butter are transformed into less stable polymorphs upon melting. This process is commonly referred to as "loss of chocolate temper". If the chocolate is subsequently cooled down, it will set up into a dull, soft and brittle texture with different sensorial attributes, and with time it will develop the whitish crystal stains on the surface, known as "fat bloom". In order to regain the beta-polymorphic crystal form, the chocolate must go through a tempering process. Thus loss of temper is also another important cause of poor chocolate quality.

These problems, are particularly acute in tropical countries. Several solutions were proposed in the prior art to improve chocolate bloom resistance and/or chocolate temper resistance, which includes the use of higher temperature melting fats. However, such products have a negative impact on the chocolate in-mouth texture, which is felt waxy and slow-melting.

Other solutions, such as using cocoa butter replacers (CBR) or cocoa butter substitutes (CBS) with lower saturate fat contents are commercially available, but they demand additional cooling during processing and do not provide optimal sensorial attributes. Also their heat resistance with regards to bloom formation is compromised due to the lower saturated fat contents.

Bailey's industrial oil & fat products, vol. 3 – Edible oil and fat products: products and application technology (editor Hui, Y.H.), 1 Jan 1996 (ISBN 978-0-471-59427-7) (hereinafter referred to as Bailey) describes on p 382 (see table 9. 12) certain cocoa butter equivalents (CBE) comprising saturated-unsaturated-saturated type triglycerides from fatty acids having from 16 to 20 carbon atoms (namely palmitic acid (C16), stearic acid, oleic acid, linoleic acids (C18) and arachidic acid (C20)). The amounts of such saturated-unsaturated-saturated triglycerides in the CBEs disclosed in table 9.21 vary over a wide range (92.6%, 53.3%, 96.8%, 54.0%, 74.4% or 80.9%) based on the total amount of triglycerides present being 100%. None of the CBEs described in table 9.21 comprise saturated-saturated-unsaturated type triglycerides.

GB1431781 (Unilever) describes a process for preparing chocolate using a hard fat replacer. Unilever describes (see table on page 9) a cocoa butter with saturated fatty acid and unsaturated fatty acid components, although other mono, di and tri-glycerides are also present and it is not clear whether the fatty acids are present as discrete elements and/or part of a triglyceride. Page 9 of Unilever refers to a method of acetone fractionation described in GB 827172 being used to prepare the palm mid-fraction also described in the same table.

US5925399 (Nestec) describes a method for reducing chocolate bloom by incorporating from 0.01 to 0.5 % by weight of silicon dioxide.

US2010/323067 (Hershey) describes a method for preparing a chocolate composition having enhanced temperature resistance by incorporating solid particles (such of a carbohydrate sweetener) having a particle size from 50 to 1000 nanometres.

US5424090 discloses an anti-bloom compositions containing at least 20 wt%, or, alternatively, at least 40 wt% of triglycerides of the form Sat'Sat'Unsat', where Sat' denotes a saturated fatty acid and Unsat' denotes an unsaturated fatty acid, and wherein at least 75wt% of all Sat' are selected from stearic acid and palmitic acid. The anti-bloom composition is added to

a cocoa butter chocolate product, in an amount that increases the content of Sat'Sat'Unsat' in the product by 2 to 25%. The anti-bloom composition was used in the manufacture of a chocolate composition which was subjected to a thermal tempering process.

WO2012/139574 discloses a bloom retarding fat composition containing a component A and a component B, where component A and component B are present in respective amounts of from 40 to 95 wt% and of 5 to 60 wt% of the bloom retarding composition, wherein component A comprises a fat composition having a content of SatUnsatSat triglycerides of 60 wt% or higher, and component B comprises a fat composition having a content of saturated fatty acids of 30 wt% or less and a total content of (Sat)₂Unsat triglycerides of 18 wt% or less and a content of (Sat)₃ triglycerides of 8 wt% or less, with the proviso that, if the content of SatSatUnsat triglycerides in B is 1wt% or more, then the molar ratio of SatSatUnsat to SatUnsatSat triglycerides is 1 or higher, where Sat denotes a C₁₆-C₂₀ saturated fatty acid, Unsat denotes unsaturated fatty acids (including oleic acid) and (Sat)₂Unsat stands for SatSatUnsat or SatUnsatSat. This bloom retarding composition is used in the manufacture of a chocolate product where the bloom retarding fat composition is mixed with traditional chocolate ingredients to provide a chocolate composition, subjecting the composition thus obtained to a thermal tempering process and subsequently cooling the composition.

However none of the prior art compositions are entirely satisfactory in terms of the properties desired herein. Thus for example there remains a need for chocolate confectionery compositions which satisfy in one object of the invention by retarding the creation of visual defects when a chocolate product is exposed to temperatures up to 40°C (preferably up to 37°C).

It is an object of the invention to overcome one or more disadvantages of the prior art described above.

It would be advantageous in one embodiment of the invention to provide a chocolate confectionery composition which exhibits delayed appearance of visual defects due to heat exposure in a chocolate product, notably up to 40°C.

It would be advantageous in another embodiment of the invention to provide chocolate confectionery compositions containing a triglyceride fat blend, having auto-tempering properties, enabling visual defects due to heat exposure in a chocolate product, notably up to 40°C to be retarded.

It would be advantageous in a further embodiment of the invention to provide chocolate confectionery compositions containing a triglyceride fat blend composition having a reduced saturated fat content (SFA), and which has auto-tempering properties, enabling visual defects due to heat exposure in a chocolate product, notably up to 40°C to be retarded.

Broadly in accordance with one aspect of the invention there is provided a fat based confectionery composition comprising:

- i) one or more S-U-S triglyceride(s) in an amount of from 15% to 30 % by weight; and
- ii) one or more S-S-U triglycerides(s) in an amount of from 0.1% to 10.0% by weight;
- iii) optionally one or more triglycerides other than (i) or (ii) in a total amount up to 5.0 % by weight;

where all percentages by weight are based on the total weight of the confectionery composition being 100%;

S represents a C₁₆₋₂₀ saturated fatty acid moiety; and

U represents a C₁₆₋₂₀ unsaturated fatty acid moiety.

It is particularly preferred that the fat based confectionery composition of the invention is a chocolate confectionery composition and more preferably that the chocolate confectionery composition has a reduced saturated fat (SFA) content (which term is used herein to denote that less than 65% by weight of the total weight of fat content in given a composition comprises SFA).

Usefully the confectionery compositions of invention comprise a total amount of fat of from 25 to 40% by weight, more usefully from 27 to 35% by weight based on the total weight of the confectionery composition.

Conveniently the one or more S-U-S triglyceride(s) (i) are present in a total amount of from 15% to 25%, more conveniently from 16% to 23%, most conveniently from 18% to 23% by total weight of the confectionery composition.

Preferably the one or more S-S-U triglycerides(s) (ii) are present in a total amount of from 0.5% to 8.0%, more preferably from 0.6% to 6.5%, most preferably from 0.7% to 4.0% by total weight of the confectionery composition.

In another embodiment of the invention advantageously the one or more S-U-S triglyceride(s) (i) are present in a total amount of from 15% to 25% by weight; and the one or more S-S-U triglycerides(s) (i) are present in a total amount of from 0.50% to 8.0% by total weight of the confectionery composition.

5 In yet other embodiment conveniently the one or more S-U-S triglyceride(s) (i) are present in a total amount of from 16 to 23% by weight; and the one or more S-S-U triglycerides(s) (i) are present in a total amount of from 0.6% to 6.5% by total weight of the confectionery composition.

10 In still other embodiment conveniently the one or more S-U-S triglyceride(s) (i) are present in a total amount of from 18 to 23% by weight; and the one or more S-S-U triglycerides(s) (i) are present in a total amount of from 0.7% to 4.0% by total weight of the confectionery composition.

Another aspect of the invention broadly provides a triglyceride mixture comprising:

i) one or more S-U-S triglyceride(s) in an amount of from 75 to 99, preferably from 80 to 98, more preferably from 82 to 97 parts by weight;

15 ii) one or more S-S-U triglycerides(s) in an amount of from 1 to 25, preferably 2 to 20, more preferably 3 to 17 parts by weight;

iii) optionally the remaining parts of the mixture comprising (preferably consisting of) one or more triglyceride(s) other than (i) or (ii), where all weight parts are based total weight of the mixture of (i), (ii) (and optionally (iii) where present) being 100 parts, and

20 where S represents a C₁₆₋₂₀ saturated fatty acid moiety; and U represents a C₁₆₋₂₀ unsaturated fatty acid moiety.

In preferred triglyceride mixtures ingredient iii) is absent and the triglyceride mixture of the invention consists only of ingredient (i) and ingredient (ii).

25 As used herein, unless the context indicates otherwise, the term 'Triglyceride Blend' denotes the triglyceride mixture of the invention described herein.

It will be appreciated that in the triglycerides of and/or used in the present invention that comprise fatty acid moieties denoted by S or U as used herein, the S and/or U may represent mono and/or polyvalent moieties dependent on their position within the triglyceride. For example monovalent S and/or U moieties may be located in the triglyceride at a terminal position, bivalent S and/or U moieties (e.g. to which other S or U moieties are attached) may comprise part of a linear chain and tri or greater multivalent S and/or U moieties may comprise branched units (e.g. three or more other moieties may attached thereto which may be S, U and/or other moieties). Although triglycerides used in the present invention may also comprise moieties other than those represented by S or U, in a preferred embodiment of the invention the triglyceride(s) consist of S and/or U moieties only. In yet other more preferred embodiment S-U-S triglyceride(s), denote any triglyceride(s) having two monovalent S moieties both attached to a bivalent U moiety. In another more preferred embodiment S-S-U triglyceride(s), denote any triglyceride(s) having a monovalent S moiety and a monovalent U moiety both attached to a bivalent S moiety. The S and/or U fatty acid moieties may independently be linear or branched.

40 Within the same triglyceride each S and/or U may independently represent fatty acid moieties having the same or different numbers of carbon atoms from 16 to 20. Conveniently in one embodiment of the invention within the same triglyceride(s) molecule(s) each independently represented by S-U-S and/or by S-S-U the fatty acid moiety denoted by each of the two S has the same number of carbon atoms, more conveniently within the same triglyceride the fatty acids denoted by both the U and the two S have the same number of carbon atoms.

45 Usefully in compositions of the invention the S represents saturated fatty acid moieties in which each S for both S-U-S and S-S-U have the same number of carbon atoms from 16 to 20.

50 Conveniently in compositions of the invention the U represents unsaturated fatty acid moieties in which each U for both S-U-S and S-S-U have the same number of carbon atoms from 16 to 20.

Advantageously in compositions of the invention the S and U represent fatty acid moieties in which each S and each U for both S-U-S and S-S-U have the same number of carbon atoms from 16 to 20.

55 The triglyceride(s) denoted by S-U-S and S-S-U may each independently represent the same triglyceride molecule or a mixture of different triglyceride molecules that having S and U fatty acid moieties with 16 to 20 carbon atoms as described herein.

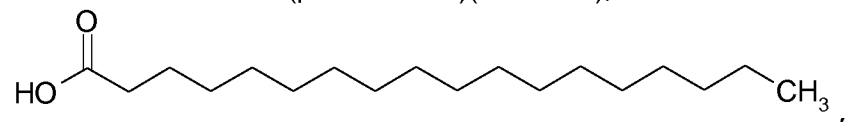
The unsaturated C₁₆₋₂₀ fatty acid moieties denoted by U herein may comprise one or a plurality of C=C double bonds. If two C=C double bonds are present these may be isolated or conjugated. If more than three C=C double bonds are present they may be isolated and/or conjugated.

The degree of unsaturation can be determined by measurement of iodine number. The iodine number is defined according to DIN 53 241-1 as the quotient of that mass m_I of iodine which is added on to the olefinic double bonds, with decolourisation, of a sample to be analysed and the mass m_B of this sample (mass of the solid in the sample in the case of solutions or dispersions); its conventional unit is "g/(100g)" or "cg/g". Preferred U moieties may be derived from corresponding fatty acids have a iodine number of at least 100 cg / g, preferably from 120 to 200 cg / g.

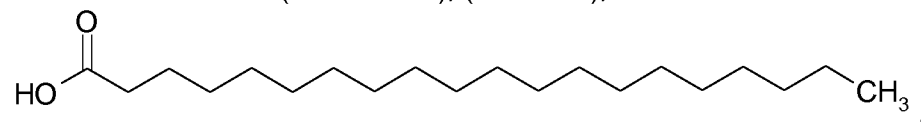
Suitable fatty acids that may be used to obtain U moieties may be fatty acids obtained and/or obtainable, for example, from plant sources, such as soy oil, fish oil, sunflower oil, linseed oil, safflower oil and cottonseed oil or originate from tall oil distillation. Fatty acids having conjugated double bonds may be obtained by catalytic isomerisation of natural fatty acids or from dehydrated castor oil. Conjugated oil is preferably obtained by dehydration of castor oil.

Suitable saturated C₁₆₋₂₀ fatty acids from which S moiety(ies) may be derived comprise:

n-hexadecanoic acid (palmitic acid)(C₁₆H₃₂O₂); and/or

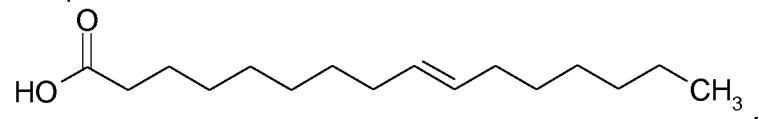


n-octadecanoic acid (stearic acid), (C₁₈H₃₆O₂); and/or

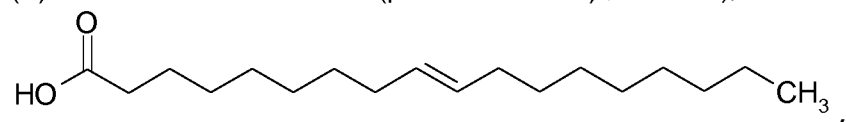


n-eicosanoic acid (arachidic acid) (C₂₀H₄₀O₂).

Suitable mono unsaturated C₁₆₋₂₀ fatty acids from which U moiety(ies) may be derived comprise:



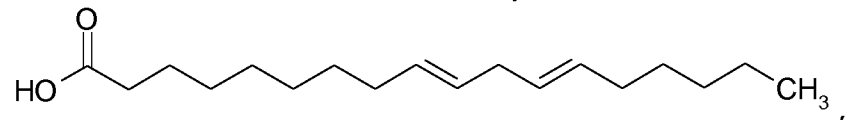
(Z)-hexadecan-9-enoic acid (palmitoleic acid) (C₁₆H₃₀O₂); and/or



(Z)-octadecan-9-enoic acid (oleic acid) (C₁₈H₃₄O₂) and/or

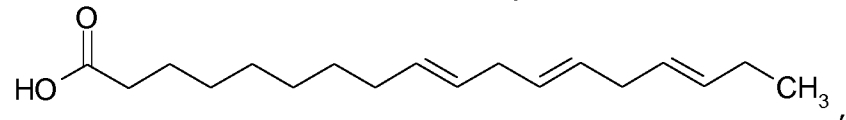
(Z)-eicosan-9-enoic acid (gadoleic acid) (C₂₀H₃₈O₂)

Suitable di-unsaturated C₁₆₋₂₀ fatty acids from which U moiety(ies) may be derived comprise:



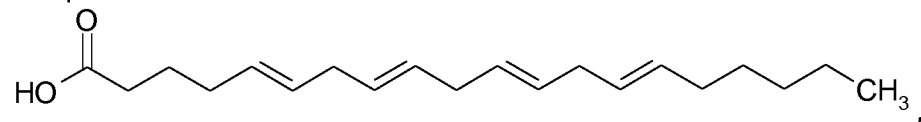
n-octadecan-9,12-dienoic acid (linoleic acid, inc Z-linoleic acid) (C₁₈H₃₂O₂).

Suitable tri-unsaturated C₁₆₋₂₀ fatty acids from which U moiety(ies) may be derived comprise:



n-octadecan-9,12,15-trienoic acid (linolenic acid) inc α-Linolenic acid (C₁₈H₃₀O₂).

Suitable tetra-unsaturated C₁₆₋₂₀ fatty acids from which U moiety(ies) may be derived comprise:



n-eicosan-5,8,11,14-tetraenoic acid (arachidonic acid) ($C_{20}H_{32}O_2$).

Suitable penta-unsaturated C_{16-20} fatty acids from which U moeit(ies) may be derived comprise:

$CH_3CH_2CH=CHCH_2CH=CHCH_2CH=CHCH_2CH=CHCH_2CH=CH(CH_2)_3COOH$,

eicosapentaenoic acid (EPA).

Advantageously the Triglyceride Blend displays auto-tempering properties. Auto-tempering properties as used herein refers to the ability of a fat composition (such as a chocolate confectionery composition and/or chocolate confectionery product) to crystallize chocolate as Form V polymorphic crystals without the need of a thermal tempering process.

Broadly in other aspect of the invention, there is provided the use of the Triglyceride Blend for the purpose of retarding visual defects due to heat exposure of a chocolate confectionery product, in particular the bloom effect. It is particularly preferred that, heat exposure denotes exposure that occurs at a temperature from $34^{\circ}C$ to $40^{\circ}C$, more preferably from $36^{\circ}C$ to $40^{\circ}C$, optionally for a duration of at least 30 minutes

A further aspect of the invention relates to a process for manufacturing a fat based (preferably chocolate) confectionery composition comprising the step of combining with a confectionery composition the Triglyceride Blend preferably in an amount of from 0.5 to 20% by weight of the Triglyceride Blend based of the total weight of the fat based confectionery composition being 100%.

A still other aspect of the invention relates to the use of the Triglyceride Blend for the preparation of a chocolate confectionery with reduced saturated fat (SFA) content (i.e. less than 65% by weight of the total fat content comprising SFA).

The applicants have found that, in one embodiment of the invention by combining S-U-S triglycerides and S-S-U triglycerides together in a specific level and adding this mixture to a chocolate confectionery composition, it was possible to produce a chocolate with reduced saturated fat, and/or with the desired resistance to visual defects due to heat exposure, in particular those associated with the bloom effect, notably up to $40^{\circ}C$.

By "resistance to visual defects due to heat exposure", it is understood that these defects are delayed for a significant time in comparison to their appearance in chocolate products that do not comprise the Triglyceride Blend.

As used herein the term 'chocolate' comprises any ingredient with cocoa or cocoa-derived fatty solids, whether or not they meet any legal or other formal definition of chocolate used in other contexts. Thus as used herein the term 'chocolate' encompasses ingredients having no cocoa butter (also referred to as 'compound') and/or also white chocolate or white compound. A chocolate coating is also referred to herein as a chocolate shell. Optionally the fat based compositions (such as fat based confectionery) of the invention may also comprises chocolate and/or similar ingredients (e.g. with similar taste). The terms 'chocolate compound' or 'compound' as used herein (unless the context clearly indicates otherwise) denotes a chocolate analogue in which all or part of the cocoa butter is replaced by cocoa butter equivalents (CBE) or cocoa butter replacers (CBR). The terms "chocolate confectionery composition" as used herein denotes a chocolate composition which is processed for manufacturing a final chocolate confectionery product which term also includes chocolate compound products.

Advantageously, a chocolate confectionery product of the invention and/or comprising the Triglyceride Blend was found to show good stability against heat damage. The stability is evaluated, in particular, in relation to the ability to resist heat challenge up to $40^{\circ}C$ with reduced visual deviation.

Usefully the onset of undesirable deviations in visual appearance of the surface of chocolate, in particular loss of sheen and/or the appearance of whitish crystal spots associated with fat bloom on the surface may be delayed or prevented by use of the Triglyceride Blend.

Conveniently the Triglyceride Blend can be used to produce chocolate compound products with a reduced saturated fatty acid (SFA) content (i.e. less than 65% SFA by weight based on total fat content), compared to conventional chocolate compound products prepared with conventional cocoa butter replacers (CBR). More conveniently the Triglyceride Blend can be used to provide chocolate compound products with reduced SFA content and also having improved resistance to appearance of visual degradation associated with bloom (improved bloom resistance).

A chocolate confectionery product of the invention as well as the ingredients described herein may also comprise one or more of the following ingredients, cocoa butter, cocoa powder, milk fat, milk powder and at least one ingredient selected from emulsifiers, sugars, natural or artificial sweeteners, flavouring agents, nuts and/or fruits.

5 A further embodiment of the invention provides a process for manufacturing a chocolate confectionery composition, comprising a step of adding the Triglyceride Blend to a chocolate mass containing cocoa butter.

10 The chocolate mass used in the present invention may comprise cocoa butter, cocoa powder, milk fat, milk powder and, optionally, at least one ingredient selected from emulsifiers, sugars, natural or artificial sweeteners, flavouring agents, nuts and/or fruits

A still other embodiment of the invention comprises a method for manufacturing a chocolate confectionery composition that comprises the Triglyceride Blend comprises the steps of blending the fat components in molten state (for example including the Triglyceride Blend) and mixing together with other chocolate ingredients to form the pre-refining mass. The procedures followed
15 can be any procedures that a person skilled in the art would know as being suitable for preparing a chocolate mass.

The preferred features described herein as suitable for a chocolate confectionery composition of the invention may also apply equally (as the context dictates) to the Triglyceride Blend itself, to using the Triglyceride Blend for retarding visual defects due to heat exposure in a chocolate confectionery product and to the process for manufacturing said chocolate
20 confectionery composition with the Triglyceride Blend.

A still yet further aspect of the invention provides chocolate compositions comprising the Triglyceride Blend and also having at least one, usefully at least two improved properties 1 to 5 as defined herein with respect to a reference composition. In a preferred embodiment of this
25 aspect of invention, two, more preferably three, mostly preferably the remaining of the desired properties 1 to 5 that are not improved are at least comparable as defined herein with respect to a reference composition. Conveniently the reference composition is an analogous composition to that the invention where the Triglyceride Blend is replaced by the same amount by weight of a triglyceride consisting of one of the SUS triglycerides described herein as suitable for Ingredient
30 (i) herein.

A still other aspect of the invention provides for use of the Triglyceride Blend for retarding visual defects due to heat exposure in a chocolate confectionery product (for example after being subject to any of the temperature regimes described herein), preferably in such a use, the Triglyceride Blend being present in the chocolate composition in a total amount of at least 20%,
35 more preferably from 25% to 40%, by weight of the chocolate composition.

A yet further aspect of the invention provides a method for reducing the susceptibility of a chocolate composition to bloom due to heat damage the method comprising the steps of
a) preparing a chocolate composition of the invention as described herein using the Triglyceride Blend;

40 b) tempering the composition from step a) by heating to a temperature from 26 to 32°C to produce form V crystals of cocoa butter; and

c) cooling the chocolate from the temperature of step b) to a temperature from 12 to 15°C over a period of from 10 to 60 minutes, preferably from 20 to 40 minutes, more preferably from 25 to 35 minutes, for example for 30 minutes.

45 A yet other further aspect of the invention provides a process for manufacturing a chocolate confectionery composition of the invention as described herein, comprising a step of adding the Triglyceride Blend to a chocolate mass that comprises cocoa butter.

Further aspects and preferred features of the present invention are described in the claims.

50 TEST METHODS AND DEFINITIONS

Unless defined otherwise, all technical and scientific terms have and should be given the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs.

RANGES

55 In the discussion of the invention herein, unless stated to the contrary, the disclosure of alternative values for the upper and lower limit of the permitted range of a parameter coupled with an indicated that one of said values is more preferred than the other, is to be construed as an implied

statement that each intermediate value of said parameter, lying between the more preferred and less preferred of said alternatives is itself preferred to said less preferred value and also to each less preferred value and said intermediate value.

For all upper and/or lower boundaries of any parameters given herein, the boundary value is included in the value for each parameter. It will also be understood that all combinations of preferred and/or intermediate minimum and maximum boundary values of the parameters described herein in various embodiments of the invention may also be used to define alternative ranges for each parameter for various other embodiments and/or preferences of the invention whether or not the combination of such values has been specifically disclosed herein.

PERCENTAGES

It will be understood that the total sum of any quantities expressed herein as percentages cannot (allowing for rounding errors) exceed 100%. For example the sum of all components of which the composition of the invention (or part(s) thereof) comprises may, when expressed as a weight (or other) percentage of the composition (or the same part(s) thereof), total 100% allowing for rounding errors. However where a list of components is non exhaustive the sum of the percentage for each of such components may be less than 100% to allow a certain percentage for additional amount(s) of any additional component(s) that may not be explicitly described herein.

All percentages for amounts are given in percent by weight, if not otherwise indicated and applicable.

IMPROVEMENTS / COMPARABLE PROPERTIES

Compositions of and/or used in the present invention may also exhibit improved properties with respect to known compositions that are used in a similar manner. Such improved properties may be (preferably as defined below) in at least one, preferably a plurality, more preferably three or more of those property(ies) labeled 1 to 5 below. Preferred compositions of and/or used in the present invention, may exhibit comparable properties (compared to known compositions and/or components thereof) in at least one, more preferably at least two, even more preferably at least three, most preferably at least four, for example all of those properties labeled 1 to 5 below.

- 1) Reduced SFA content being defined as less than 65% total fat content being SFA;
- 2) Resistance to visual defects due to heat exposure (bloom resistance) being defined as having a visual rating of at least 4 after being subject to temperature Regime 2;
- 3) Stability against heat damage being defined as having at least 80% of the sample surface free of damage after being subject to temperature Regime 1;
- 4) Sheen (gloss retention) after heat exposure under Regime 1 being rated as G or M, preferably G.
- 5) Auto-tempering as defined herein.

Improved properties as used herein means the value of the property of the component and/or the composition of and/or used in the present invention, where it can be measured quantitatively, is $> +8\%$ of the value of the known reference component and/or composition described herein, more preferably $> +10\%$, even more preferably $> +12\%$, most preferably $> +15\%$.

Comparable properties as used herein means the value of the property of the component and/or composition of and/or used in the present invention, where it can be measured quantitatively, is within $\pm 6\%$ of the value of the known reference component and/or composition described herein, more preferably $\pm 5\%$, most preferably $\pm 4\%$.

The percentage differences for improved and comparable properties herein refer to fractional differences between the component and/or composition of and/or used in the invention and the known reference component and/or composition described herein where the property is measured in the same units in the same way (i.e. if the value to be compared is also measured as a percentage it does not denote an absolute difference).

The reference composition used to measure improvement or comparability is preferably a composition analogous to those of the present invention that comprise a Triglyceride Blend, where the Triglyceride Blend is replaced by the same total amount by weight of one SUS triglyceride selected from any as described for Ingredient (i) herein all other ingredients remaining unchanged.

BLOOM RESISTANCE

Immediately prior to being tested for bloom resistance, the samples to be tested were pre-stored at 20°C in temperature-controlled cabinets and their appearance assessed to provide a comparison to the appearance after the test.

5 To assess bloom resistance the test sample was then subjected to a specific temperature storage regime (where the samples were also stored in temperature-controlled cabinets during these tests) which unless otherwise specified is one or more of those temperature regimes described below.

10 Regime 1 (also referred to herein as Isothermal Storage) denotes that the samples were heated to 60°C to fully melt the fat and subsequently stored at 20°C. The appearance of bloom was monitored visually after three days of storage at 20°C.

Regime 2 (also referred to herein as Cycling Temperature Storage) denotes the sample was stored for seven hours at a temperature of 45°C followed by three days at 20°C and then this temperature cycle was repeated (for a total of two times). At the end of the second cycle the sample was stored for a further eight days at 20°C.

15 Regime 3 denotes the sample was stored for eight hours at 37°C followed by sixteen hours at 20°C.

Regime 4 denotes the sample was stored in a cabinet, programmed with a temperature cycle for eight hours at 37°C followed by sixteen hours at 20°C. This cycle was repeated for a total of five times and the appearance of bloom was observed at the end of the fifth cycle.

20 After the specified storage regime the formation of bloom on the surface of the test sample was observed and bloom resistance of the sample was then rated according to one or more of the assessment criteria as described herein. As a control comparison a reference sample (such as Comp A as described herein) may also be assessed for bloom formation after a suitable storage regime such as isothermal storage (Regime 1).

25 The formation of bloom on the test samples was observed and manually rated as described herein and/or by taking pictures of the samples (for example using DigiEye image system).

VISUAL ASSESSMENT OF SAMPLES

30 Where indicated in some of the tests described herein (e.g. bloom test), the visual appearance of a sample can be assessed before and after the tests as described herein. The appearance can be determined by inspecting the sample surface either manually or for example by taking pictures of the samples using a DigiEye image system (some of the pictures from which are shown in the Figures herein).

In one assessment method the sample appearance may be assessed by measuring what percentage of the sample surface area is unblemished (e.g. by damage, discoloration, haze and/or blooming, as appropriate). In one embodiment of the invention a sample that is deemed acceptable (i.e. passes the test) - assuming before the test the sample is 100% unblemished -, may have a percentage surface area post-test which is substantially unblemished, preferably at least 85%, more preferably at least 90%, even more preferably at least 95%, most preferably at least 99%, for example 100% unblemished

40 Alternatively or as well the samples herein can also be evaluated visually before and after the test using one or both of the visual rating and/or gloss rating as described below.

The visual rating is used to rate a sample from 5 (best) to 1 (worse) where:

5 is very good, denoting there are no visible signs of blemishes;

4 denotes that blemishes are only slightly visible;

45 3 denotes there are clearly apparent blemishes;

2 denotes the surface is partially blemished;

1 is very poor, denoting that surface is completely blemished.

Unless otherwise indicated herein a visual rating of 4 or 5 is considered to be a pass and 1, 2 or 3 a fail.

50 The gloss rating the surface is placed in one of three categories (B, M or G) to assess bloom resistance where: B denotes a bloomed surface appearance (fail, an unacceptable level of bloom); M denotes a matt surface appearance and G denotes that a glossy surface appearance (M or G showing an acceptable bloom resistance, G being preferred).

PARTICLE SIZE

55 The particle size values given herein are measured by laser diffractometry (for example as described in Industrial Chocolate Manufacture and Use, editor Steve Beckett, fourth edition, 2009, Section 22.3.4. 'Particle size measurement', pages 522 to 524, the contents of which are

incorporated herein by reference.). A suitable instrument to measure particle size from laser diffraction is a 'Coulter LS230 Particle Size Analyser'. Particle size is determined by measuring the volume distribution of the sample by plotting volume (%) versus size (microns) (e.g. see Figure 22.24 of Beckett). Particle size is then quoted as the linear dimension which corresponds to the diameter of an approximate spherical particle having the same volume as the mean volume calculated from the measured volume distribution. A normal particle size distribution (PSD) with single maximum peak (mono modal) is assumed in most cases for the particles used in the present invention. However other PSDs (e.g. multimodal such as bimodal) are not excluded from this invention. As an alternative measure of particle size, the measure d_n may be used (also expressed in linear dimensions) which denotes the size of particle below which $n\%$ (by number) of the particles in a given particle sample lie. In this alternative a useful measure of particle size is where n is 50 (i.e. size is measured as d_{50}), more usefully n is 70 (i.e. size is measured as d_{70}), most usefully n is 90 (i.e. size is measured as d_{90}).

STANDARD CONDITIONS

As used herein, unless the context indicates otherwise, standard conditions (e.g. for defining a solid fat or liquid oil) means, atmospheric pressure, a relative humidity of $50\% \pm 5\%$, ambient temperature ($22^\circ\text{C} \pm 2^\circ$) and an air flow of less than or equal to 0.1m/s . Unless otherwise indicated all the tests herein are carried out under standard conditions as defined herein.

SUBSTANTIALLY

The term "substantially" as used herein may refer to a quantity or entity to imply a large amount or proportion thereof. Where it is relevant in the context in which it is used "substantially" can be understood to mean quantitatively (in relation to whatever quantity or entity to which it refers in the context of the description) there comprises an proportion of at least 80%, preferably at least 85%, more preferably at least 90%, most preferably at least 95%, especially at least 98%, for example about 100% of the relevant whole. By analogy the term "substantially-free" may similarly denote that quantity or entity to which it refers comprises no more than 20%, preferably no more than 15%, more preferably no more than 10%, most preferably no more than 5%, especially no more than 2%, for example about 0% of the relevant whole. Preferably where appropriate (for example in amounts of ingredient) such percentages are by weight.

IODINE NUMBER

The iodine value (also referred to herein as iodine number) is a measure of the amount of ethylenic unsaturated double bonds in a sample and increases with a greater degree of unsaturation. Iodine value may be defined according to DIN 53241 1 as the quotient of that mass ml of iodine which is added on to the olefinic double bonds, with decolourisation, of a sample to be analysed and the mass m_B of this sample (mass of the solid in the sample in the case of solutions or dispersions). Iodine values may be quoted either in units of centigrams of iodine per gram of sample ($\text{cg I}_2 / \text{g}$) or in units of grams of iodine per 100 gram of sample ($\text{g I}_2 / 100\text{g}$). Standard methods for analysis may be used such as for example ASTM D5768-02(2006) and DIN 53241. One common method (and that used to measure the iodine values given herein) is the Wjjs method in which iodine absorption is determined by titrating unreact reagent with sodium thiosulfate and the iodine value is then calculated as follows:

$$\text{Iodine value} = \frac{(12.69) \times (\text{ml of thiosulfate}) \times (\text{normality})}{\text{mass of sample (g)}}$$

FIGURES

The invention is illustrated by the following non-limiting Figures 1 to 6 herein, where: Figure 1 is an image of the surface of sample (taken using a DigiEye image system) of a sample of a reference chocolate Comp A (prepared as described herein) before bloom testing. Figure 2 is an image of Comp A taken in the same manner as for Figure 1 after being exposed to the temperature regime denoted by Regime 3 as described herein. Figures 3 and 4 represent respectively images (taken as described in Figure 1) of Example 2 (a chocolate of the present invention) before (Fig 3) and after (Fig 4) exposure to Regime 3. Figures 5 and 6 represent respective images (taken as described in Figure 1) of a reference sample Comp B before (Fig 5) and after (Fig 6) exposure to Regime 4. Figures 7 and 8 represent respective images (taken as described in Figure 1) of Example 3 before (Fig 7) and after (Fig 8) exposure to Regime 4.

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

Although embodiments have been disclosed in the description with reference to specific examples, it will be recognized that the invention is not limited to those embodiments. Various modifications may become apparent to those of ordinary skill in the art and may be acquired from practice of the invention and such variations are contemplated within the broad scope of the present invention. It will be understood that the materials used and the chemical details may be slightly different or modified from the descriptions without departing from the methods and compositions disclosed and taught by the present invention.

Further aspects of the invention and preferred features thereof are given in the claims herein.

As used in this specification, the words “comprises”, “comprising”, and similar words, are not to be interpreted in an exclusive or exhaustive sense. In other words, they are intended to mean “including”, but not limited to.

Any reference to prior art documents in this specification is not to be considered an admission that such prior art is widely known or forms part of the common general knowledge in the field.

The invention is further described with reference to the following examples. It will be appreciated that the invention as claimed is not intended to be limited in any way by these examples.

Examples

The present invention will now be described in detail with reference to the following non limiting examples which are by way of illustration only.

Example 1

The following chocolate composition of the invention was prepared from the ingredients listed in Tables 1.1 and 1.2 below.

Table 1.1 (Ex 1 Flake Composition)

Ingredient	Parts by weight
Sucrose	45.48
Cocoa butter	6.28
Cocoa liquor	7.20
Alkalized cocoa powder	1.59
Skimmed milk powder	16.30
Milk fat	3.60
Whey permeate	2.52
Akopol LT03	11.94
Chocolate aroma	0.05
Vanilla flavour	0.04
Total weight flake for refining	95.00

Table 1.2 (Ex 1 Ingredients for conching)

Ingredient	Parts by weight
Flake from table 1.1	95.0
Cocoa Butter	1.85
CBE Vegetable Fat	2.70
Lecithin Emulsifier	0.42
PGPR Emulsifier	0.03
Total weight conched mass (Ex1)	100.00

Total amount of fat present in Example 1 was 31.04 % by weight based on total weight of Ex1 being 100 percent. The amount of fat in Ex1 that was saturated fatty acid (SFA) was 60.7

parts by weight (based on the total weight of fat in Ex1 being 100 parts by weight). Thus Example 1 can be denoted as being reduced in SFA as defined herein (i.e. having less than 65% of its total fat content as SFA). The amount of triglycerides in Ex1 are given in Table 1.3 below.

5

Table 1.3 (Triglyceride content of Ex1)

Triglyceride	% by weight of Ex1
SUS (i)	18.31 %
SSU (ii)	3.58 %
Other triglyceride(s) (iii)	-
Total triglycerides (i.e. SUS + SSU)	21.89 %

Method to prepare Example 1

10 Ex1 was prepared from the ingredients in Tables 1.1 and 1.2 herein. Chocolate flakes were prepared by mixing together the ingredients in Table 1.1 in a suitable vessel. The flake mixture was then refined with Buhler 3 roll refiner such that the particle size of refined flake composition (d_{90} measured as described herein) was 30 microns. The refined flake was then conched in a Lipp conche at 60°C for 2 hours during which time the remaining fat and emulsifier ingredients in
 15 Table 1.2 were added to the composition to produce as Ex1 a conched chocolate mass which was used in the following tests.

The results showed that while the control sample (Comp A see below) showed evidence of bloom (visual rating 1) after isothermal storage (3 days) the test samples of Example 1 did not show any evidence of bloom (visual rating 5) either after isothermal storage (3 days) or after
 20 cycling temperature storage (8 days).

Example 2 and Comp A (Milk Chocolate)

25 Further compositions of chocolate masses of the invention (and a comparison) are given in Table 2.1 below which were used to prepare milk chocolate of the invention (Example 2) and as a comparison a reference milk chocolate (Comp A).

Table 2.1 (Example 2 and Comp A)

Ingredients	Comp A	Ex2
Mixing	Parts by weight	
Sucrose	48.35	48.35
Whey Permeate powder	1.38	1.38
Whole Milk Powder	10.79	10.79
Anhydrous Milk Fat	1.48	1.48
Cocoa Liquor	14.34	14.34
Cocoa Butter	11.70	11.70
Natural vanilla	0.01	0.01
Total for Refining	88.05	88.05
Cocoa Butter	9.40	0.10
Cocoa Butter Seed	2.00	2.00
Lecithin Emulsifier	0.50	0.50
PGPR Emulsifier	0.05	0.05
Akopol LT03	0	9.3
Total Conched Mass	100.00	100.00

Comp A and Example 2 were independently prepared using the analogous methods with reference to Table 2.1. First the flake ingredients were blended using a Crypto Peerless EC30 mixer; the resultant mass was subsequently refined to 30 microns using a Bühler 3 roll refiner; and then conched with a Hobart A120N mixer during which period the remaining ingredients (fats and emulsifiers) specified in Table 2 were added.

The triglyceride content of the samples is given in Table 2.2 below.

Table 2.2 (Triglyceride content of Comp A and Ex 2)

Triglyceride content by total weight % of composition		
Triglyceride	Comp A	Ex 2
SUS	26.34	22.90
SSU	0.00	2.79
Total SUS + SSU	26.34	25.69

Tempering of the chocolate masses of Comp A and Ex 2 was carried out by heating the chocolate to 42.2°C in a ChocoVision Rev2 tempering machine and once this temperature is reached, it was held at this temperature and mixed for a further 15 minutes. The chocolate mass was then cooled down to 31.7°C and held at this temperature for 5 minutes whilst being mixed. Cocoa butter seeds were then added and the mixture mixed with a spatula for a further 2 minutes to ensure that the seeds had fully dispersed. The tempering Index was measured on a Sollich tempermeter after 15 minutes. The samples were then moulded and cooled in a cooling tunnel at 14°C for 60 minutes. After de-moulding the samples were stored at ambient temperature for 2 weeks to allow maturation.

The bloom resistance of Comp A and Example 2 after Regime 3 were tested and the results are given below Table 2.3.

Table 2.3 (Bloom resistance of Comp A and Ex 2)

Example	Gloss rating	Image
Comp A - before bloom test	G	Fig 1
Comp A - after bloom test under Regime 3	B	Fig 2
Ex 2 - before bloom test	G	Fig 3
Ex 2 - after bloom test under Regime 3	M	Fig 4

It can be seen that the milk chocolate reference Comp A showed significant fat bloom after the bloom test, while the milk chocolate Example 2 of the invention had a matt appearance and showed no sign of bloom.

Example 3 and Comp B (Milk chocolate)

Two further milk chocolate samples were prepared according to the compositions given in Table 3.1, one comparison (comp B) and one of the invention (Ex 3):

Table 3.1 (Example 3 and Comp B)

Ingredients	Comp B	Ex3
Mixing	Parts by weight	
Sucrose	51.30	51.30
Lactose	14.42	14.42
Cocoa Liquor	17.47	17.47
Cocoa Butter	8.03	8.03
Total for Refining	91.22	91.22
Cocoa Butter	6.25	3.86
Lecithin Emulsifier	0.50	0.50
PGPR Emulsifier	0.07	0.07
Anhydrous milk fat	1.96	1.96
Akopol LT03	0	2.39
Total Conched Mass	100.00	100.00

Table 3.2 (Triglyceride content of Comp B and Ex 3)

Triglyceride content by total weight % of composition		
Triglyceride	Comp B	Ex 3
SUS	20.31	19.42
SSU	0.00	0.72
Total SUS + SSU	20.31	20.14

Chocolate flakes were prepared from the compositions described in Table 3.1 and refined through Buhler 3 and 5 roll refiners to a particle size of 37 microns. The refined flake was then conched in a Buhler 60Kg Frisse conche at 60°C for 4 hours with further addition of fat and emulsifier in the amounts described in Table 3.1. The chocolate masses were then tempered on a Aasted Mini 3 stage temperer to a tempering index of 5 to 6.5 (CTU index) and slope of 0 ± 0.2 on a Tricor 505 tempering meter. The samples were then molded into 6g pieces and cooled in a cooling tunnel ranging from 13° to 16°C for 20 minutes. After de-molding the samples were stored at 18°C temperature for 2 weeks to allow maturation.

The bloom resistance of Comp B and Example 3 after Regime 4 were tested and the results are given below Table 3.3.

Table 3.3 (Bloom resistance of Comp B and Ex 3)

Example	Gloss rating	Image
Comp B - before bloom test	G	Fig 5
Comp B - after bloom test under Regime 4	B	Fig 6
Ex 3 - before bloom test	G	Fig 7
Ex 3 - after bloom test under Regime 4	M	Fig 8

It can be seen that the milk chocolate reference Comp B showed significant fat bloom after the bloom test, while the milk chocolate Example 3 of the invention had a matt appearance and showed no sign of bloom.

For convenience the absolute and relative amounts of the triglyceride content present in the examples prepared as described herein are given in Table 4 below.

Table 4 (Summary of triglyceride content of examples)

Triglyceride (TG) wt parts by tot wt =100 (and % of total TG)	Ex1	Ex 2	Ex 3	Comp A	Comp B
SUS (i)	18.31 (83.6%)	22.90 (89.1%)	19.42 (96.4%)	26.34 (100%)	20.31 (100%)
SSU (ii)	3.58 (16.4%)	2.79 (10.9%)	0.72 (3.6%)	0.00	0.00
Total SUS + SSU	21.89	25.69	20.14	26.34	20.31

CLAIMS

1. A fat based confectionery composition comprising:
i) one or more S-U-S triglyceride(s) in an amount of from 15% to 30 % by weight; and
5 ii) one or more S-S-U triglycerides(s) in an amount of from 0.1% to 10.0% by weight;
iii) optionally one or more triglycerides other than (i) or (ii) in a total amount up to 5.0 % by weight;
where all percentages by weight are based on the total weight of the confectionery composition being 100%;
- 10 S represents a C₁₆₋₂₀ saturated fatty acid moiety; and
U represents a C₁₆₋₂₀ unsaturated fatty acid moiety.
2. A fat based confectionery composition as claimed in claim 1, which is a chocolate confectionery composition.
- 15 3. A fat based confectionery composition as claimed in either claim 1 or 2, which comprises a total amount of fat of from 25% to 40% by total weight of the confectionery composition.
4. A fat based confectionery composition as claimed in claim 3, which comprises a total
20 amount of fat of from 27% to 35% by total weight of the confectionery composition.
5. A fat based confectionery composition as claimed in any preceding claim, where less than 65 parts by weight comprise saturated fatty acids (SFA), based on the total weight of fat in the confectionery composition being 100 parts by weight.
- 25 6. A fat based confectionery composition as claimed in any preceding claim, where the one or more S-U-S triglyceride(s) (i) are present in a total amount of from 15% to 25% by total weight of the confectionery composition.
- 30 7. A fat based confectionery composition as claimed in claim 6, where the one or more S-U-S triglyceride(s) (i) are present in a total amount of from 16% to 23% by total weight of the confectionery composition.
8. A fat based confectionery composition as claimed in claim 7, where the one or more S-U-S
35 triglyceride(s) (i) are present in a total amount of from 18% to 23% by total weight of the confectionery composition.
9. A fat based confectionery composition as claimed in any preceding claim, where the one or more S-S-U triglycerides(s) (ii) are present in a total amount of from 0.5% to 8.0% by total weight of the confectionery composition.
- 40 10. A fat based confectionery composition as claimed in claim 9, where the one or more S-S-U triglycerides(s) (ii) are present in a total amount of from 0.6% to 6.5 by total weight of the confectionery composition.
- 45 11. A fat based confectionery composition as claimed in claim 10, where the one or more S-S-U triglycerides(s) (ii) are present in a total amount of from 0.7% to 4.0% by total weight of the confectionery composition.
- 50 12. A fat based confectionery composition according to any preceding claim, which is a chocolate confectionery composition and further comprises cocoa butter, cocoa powder, milk fat, milk powder and, optionally, at least one ingredient selected from emulsifiers, sugars, natural or artificial sweeteners, flavouring agents, nuts and fruits.
- 55 13. A triglyceride mixture suitable for use in a fat based confectionery composition as claimed in any preceding claim, the triglyceride mixture comprising:
i) S-U-S triglycerides in a total amount of from 60 to 90 parts by weight; and

- ii) S-S-U triglycerides in a total amount of from 1 to 15 parts by weight;
iii) optionally the remaining parts of the mixture comprising (preferably consisting of) one or more triglyceride(s) other than (i) or (ii);
where all weight parts are based total weight of the mixture being 100 parts, and
5 where S represents a C₁₆₋₂₀ saturated fatty acid; and
U represents a C₁₆₋₂₀ unsaturated fatty acid.
14. A triglyceride mixture as claimed in claim 13, comprising:
i) one or more S-U-S triglyceride(s) in a total amount of from 75 to 99 parts by weight and;
10 ii) one or more S-S-U triglycerides(s) in a total amount of from 1 to 25 parts by weight;
and where there are no triglyceride(s) present in the mixture other than (i) or (ii),
where all weight parts are based total weight of the mixture of (i) and (ii) being 100 parts.
15. A triglyceride mixture as claimed in claim 14, comprising:
15 i) one or more S-U-S triglyceride(s) in an amount of from 80 to 98 parts by weight and;
ii) one or more S-S-U triglycerides(s) in an amount of from 2 to 20 parts by weight.
16. A triglyceride mixture as claimed in claim 15, consisting of:
i) one or more S-U-S triglyceride(s) in an amount of from 82 to 97 parts by weight and;
20 ii) one or more S-S-U triglycerides(s) in an amount of from 3 to 17 parts by weight.
17. Use of a triglyceride mixture according to any of claims 13 to 16, for retarding visual defects due to heat exposure in a chocolate confectionery product.
- 25 18. Use according to claim 17, where the triglyceride mixture is present in a chocolate composition of any of claims 2 to 12 in a total amount of at least 20% by weight of the chocolate composition.
- 30 19. Use according to claim 18, where the triglyceride mixture is present in a total amount of from 25% to 40% by weight of the chocolate composition.
20. A method for reducing the susceptibility of a chocolate composition to bloom due to heat damage the method comprising the steps of
a) preparing a chocolate composition as claimed in any of claims 2 to 12 by using a triglyceride
35 blend as claimed in any of claim 13 to 16;
b) tempering the composition by heating to a temperature from 26 to 32°C to produce form V crystals of cocoa butter; and
c) cooling the chocolate from the temperature of step b) to a temperature from 12 to 15°C over
40 a period of from 10 to 60 minutes.
21. Process for manufacturing a chocolate confectionery composition according to any one of claims 2 to 12, comprising a step of adding a triglyceride mixture according to any of claims 13 to 16 to chocolate mass that comprises cocoa butter.

FIGURE 1

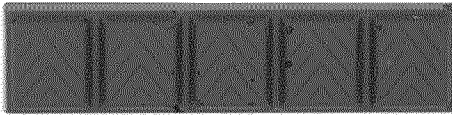


FIGURE 2

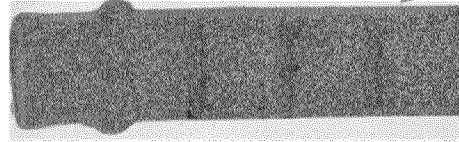


FIGURE 3

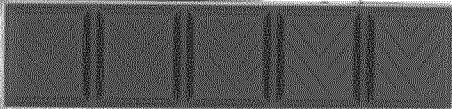


FIGURE 4

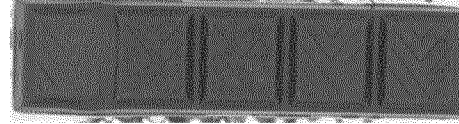


FIGURE 5

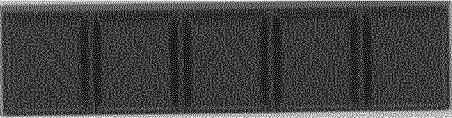


FIGURE 6



FIGURE 7

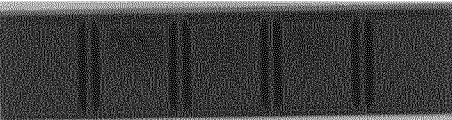


FIGURE 8



INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2016/052109

A. CLASSIFICATION OF SUBJECT MATTER
 INV. A23D9/00 A23G1/36
 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, BIOSIS, FSTA, 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	US 4 199 611 A (ITO TADASU [JP] ET AL) 22 April 1980 (1980-04-22) column 3, lines 60-68 column 4, lines 20-26 tables 1,2 (Compositions I, III, V-VII) table 3	1-13, 17-21
X	----- US 2012/128859 A1 (OHARA ATSUSHI [JP]) 24 May 2012 (2012-05-24) paragraphs [0019] - [0022], [0079] - [0083], [0113] examples A,C,F	1-19,21
X	----- EP 1 676 484 A1 (LODERS CROKLAAN BV [NL]) 5 July 2006 (2006-07-05) paragraph [0004]	13
A	----- -/-	1-12, 14-21



Further documents are listed in the continuation of Box C.



See patent family annex.

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

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Date of the actual completion of the international search

30 March 2016

Date of mailing of the international search report

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Name and mailing address of the ISA/

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Couzy, François

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2016/052109

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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