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Trans free hard structural fat for margarine blend and spread

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Trans free Hard Structural fat for Margarine blend and Spreads

ABSTRACT

A Trans free hard structural fat suitable for the manufacture of low SAFA (Saturated Fatty Acid) poly/mono unsaturated margarine and spreads and fat blends for margarine/spreads. The structural fat is made from selectively fractionated non-hydrogenated high melting palm oil fraction which is interesterified with dry fractionated non hydrogenated palm kernel fraction with high yield ratios that can be economically and commercially used as structural fat for the aforesaid manufacture.

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COMPLETE SPECIFICATION

FOR A STANDARD PATENT

ORIGINAL

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Details of Associated Basic Applications:	Malaysian Patent Application No. PI 20002388 filed 29 May 2000

The following statement is a full description of this invention, including the best method of performing it known to us:

TRANS FREE HARD STRUCTURAL FAT FOR MARGARINE BLEND AND SPREADS

BACKGROUND OF THE INVENTION

Historically emulsified fat system in margarine/spreads has been designed to satisfy customer requirements such as significant cooling impact, a rapid sharp melt sensation, and not having a coated or waxy feel on the tongue. In addition, it should impart temperature cycling stability (heat stability) as well as spreadability when taken out frequently from the refrigerator as a prominent feature.

To achieve these objectives, margarine fat blend is being formulated using hard stocks derived by hydrogenation of liquid oils. However, with the adverse effect of Trans fatty acids being published, consumers are looking for margarine/spreads with practically no Trans fatty acids.

BRIEF DESCRIPTION OF THE INVENTION

This can be achieved by using fully hydrogenated fats as structural fat, which usually does not contain Trans fatty acid or very negligible amounts. Hydrogenation processes are generally viewed as the main reason for the development of Trans fatty acids in oils and fats. Hence, there is a strong consumer perception against usage of any hydrogenated oil/fat in the food products including margarine/spreads.

The present invention serves to develop margarine/spreads using no hydrogenated oils in their hard stock at the same time serving to reduce the saturated fatty acid levels (hereinafter referred to as SAFA) in the products.

According to an aspect of the invention there is provided A Margarine and spread fat blend including of 60 – 95% of a liquid oil selected from the group consisting of sunflower oil, Canola oil, soy oil, peanut oil, rice bran oil, olive oil, safflower oil, corn oil or marine oil or a blend of any of the above liquid oils with a trans free hard structural fat at 40 to 5 % level wherein the said trans free hard structural fat is made from selectively

fractionated non-hydrogenated hard palm oil fraction, which is interesterified with a lauric fat such as dry fractionated non-hydrogenated palm kernel oil fraction wherein:

said hard palm oil fraction is provided by a single or two stage melt crystallization of palm oil or stearin fraction thereof and filtering the crystallized slurry in a high pressure membrane filter wherein a pressure of about 10 to 35 bar is provided to inflate the membranes of said high pressure membrane filter to remove a liquid fraction occluded in a hard palm oil fraction (stearin fraction) collected in said high pressure membrane filter so as to enrich the C-16 carbon chain fatty acid in the separated hard palm oil fraction; and

said hard palm oil fraction having a C-16 carbon chain fatty acid residue level of 75% or above, said interesterification process not involving an enzymatic interesterification process, said interesterified fat without further fractionation being used as such in the fat blend along with said liquid oil or said group of liquid oils, and said processes not using any solvent or detergent for fractionation and also does not involve any hydrogenation process.

According to an aspect of the invention there is provided a Margarine and fat spread fat blend including 60 – 95% of a liquid oil selected from the group consisting of sunflower oil, Canola oil, soy oil, peanut oil, rice bran oil, olive oil, safflower oil, corn oil or marine oil or a blend of any of the above liquid oils with a trans free hard structural fat at 40 to 5% level wherein the said trans free hard structural fat is made from selectively

fractionated non-hydrogenated hard palm oil fraction, which is interesterified with a lauric fat such as dry fractionated non-hydrogenated palm kernel oil fraction wherein:

said hard palm oil fraction is provided by a single or two stage melt crystallization of palm oil or stearin fraction thereof and filtering the crystallized slurry in a high pressure membrane filter wherein a pressure of about 10 to 35 bar is provided to inflate the membranes of said high pressure membrane filter to remove a liquid fraction occluded in a hard palm oil fraction (stearin fraction) collected in said high pressure membrane filter so as to enrich the C-16 carbon chain fatty acid in the separated hard palm oil fraction; and

said hard palm oil fraction having a C-16 carbon chain fatty acid residue level of 75% or above, said interesterification process not involving an enzymatic interesterification process, said interesterified fat without further fractionation being used as such in the fat blend along with said liquid oil or said group of liquid oils, and said processes not using any solvent or detergent for fractionation and also does not involve any hydrogenation process.

According to another aspect of the invention there is provided a hard palm oil fraction being produced using a two-step melt crystallization process wherein a first step of said two-step melt crystallization process includes crystallizing said palm oil at a temperature between about 20 and 25°C and filtering a crystallized slurry of said palm oil through a membrane filter, and said step producing a medium hard palm oil fraction and a second step of said two-step melt crystallization process includes crystallizing said medium hard palm oil fraction at a temperature between about 45 to 55°C and filtering a crystallized slurry of said medium hard palm oil fraction through a high pressure membrane filter, and using a pressure of about 10 to 35 bar to inflate membranes of the said high pressure membrane filter to remove a liquid fraction occluded in a hard palm oil fraction collected in said high pressure membrane filter; wherein

said filtration step producing a very hard palm oil fraction with a C-16 carbon chain fatty acid residue level of 75% and above, the level of C-16 fatty acid residue in the hard palm oil fraction being dependent upon the inflation pressure so being applied and said processes not using any solvent or detergent for fractionation and also not involving any hydrogenation process.

DETAILED DESCRIPTION OF THE INVENTION

The present invention is concerned with a Trans free hard structural fat suitable for the manufacture of low SAFA (Saturated Fatty Acid) and high poly/mono unsaturated margarine and spreads and fat blends suitable for the manufacture of low SAFA (Saturated Fatty Acid) and high poly/mono unsaturated margarine/spreads using the above mentioned trans free structural fat. This structural fat is made from selectively fractionated non-hydrogenated palm oil fraction, which is interesterified with dry fractionated non-hydrogenated palm kernal oil fraction to obtain hard structural fat with high yield ratios that can be economically and commercially used as structural fat for the manufacture of Trans free low SAFA, high poly unsaturated/mono unsaturated margarine as well as spreads.

Theoretical Considerations

The hard stock contributes triglycerides especially of the trisaturated type. A certain minimum quantity of these is essential to provide the "structural fat" and to prevent oiling out of the liquid oil. From the patent literature and general experience, this minimum quantity is around 6%. More is acceptable and desirable if the amount of H_3 tri-glycerides, and especially tristearin, is not greater than 2% otherwise poor consumer mouth feel will result. Hence content of H_2M triglycerides is valuable, to give the structuring effect. Hence the need for a lauric oil.

The interesterification process is a well-known art and a more recent review of the same is published by Rozendaal & Macrae (1997). When the interesterification process is carried out using alkali metal catalyst (0.1-0.2% sodium methoxide catalyst (sodium methylate) ($NaOCH_3$)-UN No.143 also known as Natrium Methylate is used as catalyst), it leads to a random distribution of triglycerides in which the fatty acids are distributed randomly over the 1-2-and 3-position of the glycerol moiety. The number of tri-glycerides produced by interesterifying a fatty mixture containing ***n*** fatty acids is: $\frac{1}{2}(n^2+n^3)$. This interesterification process is generally termed as random chemical interesterification.

When the hard stock components are interesterified, the amounts of trisaturated triglycerides in the interesterified product are determined entirely by the content of

saturated fatty acids in the blend as described in the above review. This relationship is very critical as shown by the results:

% Saturated Fatty Acid in the Oil blend	% Trisaturated Triglycerides After Interesterification
50	13
60	22
70	34
80	51
90	73
92	77.87
94	83.60
95	85.74

Taking sunflower oil as the PUFA oil to be used in the blend, at a level of 80% (SAFA 10.3%) then the hard stock should not contribute more than 11.76% SAFA to the final blend considering that the SAFA content of polyunsaturated margarine should not exceed 20%. If 20% of the hard stock were used for the margarine blend along with Sunflower oil as above (a high usage level) - and if we also want a minimum of 6% trisaturated Tgs in the final blend, it can be seen from the above table that the SAFA content of the hard stock must be about 67% so that interesterified hard stock has 30% trisaturated triglyceride. Assuming only 15% hard stock is used then the SAFA content of the hard stock must be about 74%, so that it has 40% trisaturated triglyceride after interesterification. These are minimum requirements and a higher amount of trisaturated Tgs would be desirable.

The usage of hard structural fat in the blend can be 5 to 40% and the liquid oil or its blends can be 95 – 60 %.

By way of summary, a margarine and spread fat blend consisting of 60 - 95% of a liquid oil such as sunflower oil, Canola oil, soy oil, peanut oil, rice bran oil, olive oil, safflower oil, corn oil or marine oil or a blend of any of the above liquid oils is blended with a Trans

free hard structural fat at 5 - 40% level. Said trans free hard structural fat is made from selectively franctionated non-hydrogenated palm oil fraction, which is interesterified with lauric fat such as dry fractionated non-hydrogenated palm kernel oil fraction without using a hydrogenation process nor using an organic solvent or detergent for fractionation.

The margarine/spread fat blend has a liquid oil in its blend which preferably has a high poly/mono unsaturated level such that in the total fat blend the poly/mono unsaturation level exceeds 40% to better support health claims (high poly/mono unsaturated, low saturated fatty acid (SAFA) margarine/spreads) that can be made

The hard palm oil fraction has a C-16 carbon chain fatty acid residue greater than 70% preferably greater than 80% and most preferably greater than 84%. The hard palm fraction has a melting point higher than 57°C, preferably greater than 60°C and can be flaked for easy handling because of its high melting point in spite of not being required to undergo hydrogenation and has a solid fat content of >75% at 40°C preferably >80% solids at 40°C. The palm fat/palm oil or its stearin fraction is selectively dry fractionated by melt crystallization process to harvest the hard palm oil fraction with C-16 carbon chain fatty acid residue level of >75%, preferably >83% with a total unsaturation level of <15% preferably less than 10%.

A hard palm oil fraction for use in the margarine spread and fat blend is also provided, wherein said hard palm oil fraction is produced using a two-step melt crystallization process wherein a first step of said two-step melt crystallization process includes crystallizing said palm oil at a temperature between about 20 and 25°C and filtering a crystallized slurry of said palm oil through a membrane filter, said step producing a medium hard palm oil fraction, and a second step of said two-step melt crystallization process includes crystallizing said medium hard palm oil fraction at a temperature between about 45 to 55°C and filtering a crystallized slurry of said medium hard palm oil fraction through a high pressure membrane filter, and

using a pressure of about 10 to 35 bar to inflate membranes of the said high pressure membrane filter to remove a liquid fraction occluded in a hard palm oil fraction collected in said high pressure membrane filter wherein said filtration step producing a very hard palm oil fraction with a C-16 carbon chain fatty acid residue level of 75%.and

above and said processes not using any solvent or detergent for fractionation and also does not involve any hydrogenation process.

The trans free hard structural fat is produced by random chemical interesterification reaction of hard palm oil fraction with hard palm kernel oil fraction such that the hard structural fat has a trisaturated triglyceride of H_3 type of C-16 and above is less than 25%, preferably less than 20%, and where "H" denotes saturated fatty acid residue with carbon numbers greater than or equal to 16. The trans free hard structural fat produced by interesterification of a hard palm oil fraction with a C-16 carbon chain fatty acid residue level of 75 % or above with a hard palm kernel oil fraction wherein said trans free hard stock without further fractionation is used in the blend with the said liquid oils, said interesterification process is not an enzymatic interesterification process, and said hard palm oil fraction is produced using a two-step melt crystallization process.

It is noted that the abbreviations used above are as follows: FA = fatty acid, PUFA = poly-unsaturated acid(s), SAFA = saturated fatty acid(s), MUFA= Mono unsaturated Fatty Acids, H = saturated FAs with carbon numbers greater than or equal to 16, M = saturated FAs with carbon numbers less than or equal to or les than14. Furthermore, "C" refers to carbon chain residue. The term "carbon chain residue", "fatty acid residue" as well as "carbon chain", "carbon chain fatty acid residue" used in the invention are synonyms.

Also the term H_3 refers to triglycerides with 3-carbon chains of length C-16 carbon chain residue and above that are saturated.

H_2M refers to triglycerides (Tg's) which have 2 carbon chain lengths that are C-16 and above and saturated and one chain of carbon length C-14 and below.

The solid fat content (SFC) as used herein is expressed, as an N-value using nuclear magnetic resonance method. The method used is IUPAC method 2.323. The fat is heated to a temperature of 80°C and filtered, and filled in SFC tubes and maintained at 60°C for at least 5 minutes whilst keeping the sample for 1 hour at 0°C and then 30 minutes at the measuring temperature. The SFC values are measured using Bruker Minispec™-120 instrument.

For manufacturing of margarine and spreads please refer to various text books, e.g. The Chemistry and Technology of Edible Oils and Fats and their High Fat Products by G. Hoffmann; Academic Press London 1989, page 319 ff and in particular page 320-321. Furthermore, it is noted that carbon chain number analysis is a well-known technique in the art. A suitable description for example is given in EP 78,568.

The terms "fat" and "oil" as used herein are synonyms. The term "liquid oil" as used herein refers to glyceride mixtures that are pourable at 5°C. Preferably the solid fat content of the liquid oil is 0 at 20°C

"Fractionation" is a process used for separation of high melting component from a feed stock. The higher melting solid fraction obtained is denoted as the "stearin" fraction or a "hard" fraction and the lower melting liquid fraction is called the "olein" fraction. As used herein, the term stearin fraction as well as the term olein fraction means higher melting fraction and lower melting fraction respectively.

In this specification all parts, proportions and percentages are by weight; the amount of fatty acids in an oil or fat is based on the total amount of fatty acids in said oil or fat and the amount of hard fraction or hard fat in the fat composition is based on the total weight of said fat composition, unless otherwise stated.

The foregoing describes only a preferred embodiment of the present invention and modifications, obvious to those skilled in the art, can be made thereto without departing from the scope of the present invention.

The term "comprising" and its grammatical variations as used herein are used in the sense of "including" or "having" and not in the exclusive sense of "consisting only of".

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A Margarine and spread fat blend including of 60 – 95% of a liquid oil selected from the group consisting of sunflower oil, Canola oil, soy oil, peanut oil, rice bran oil, olive oil, safflower oil, corn oil or marine oil or a blend of any of the above liquid oils with a trans free hard structural fat at 40 to 5 % level wherein the said trans free hard structural fat is made from selectively fractionated non-hydrogenated hard palm oil fraction, which is interesterified with a lauric fat such as dry fractionated non-hydrogenated palm kernel oil fraction wherein:

said hard palm oil fraction is provided by a single or two stage melt crystallization of palm oil or stearin fraction thereof and filtering the crystallized slurry in a high pressure membrane filter wherein a pressure of about 10 to 35 bar is provided to inflate the membranes of said high pressure membrane filter to remove a liquid fraction occluded in a hard palm oil fraction (stearin fraction) collected in said high pressure membrane filter so as to enrich the C-16 carbon chain fatty acid in the separated hard palm oil fraction; and

said hard palm oil fraction having a C-16 carbon chain fatty acid residue level of 75% or above, said interesterification process not involving an enzymatic interesterification process, said interesterified fat without further fractionation being used as such in the fat blend along with said liquid oil or said group of liquid oils, and said processes not using any solvent or detergent for fractionation and also does not involve any hydrogenation process.

2. A margarine and spread fat blend according to claim 1 wherein the said fat blend has high poly/mono unsaturated level such that in the total fat blend the poly/mono unsaturation level exceeds 40%.

3. A trans free hard structural fat when used in margarine and spread fat blend according to claim 1 wherein:

said trans free hard structural fat without further fractionation being used in said fat blend along with said liquid oil or said group of liquid oils;

said hard structural fat being free from trans fatty acid residues that may develop where a hydrogenation process is used for producing similar hard structural fats;

said trans free hard structural fat having trisaturated triglyceride of H_3 type less than 25% wherein "H" denotes saturated fatty acid of carbon chain 16 and above; and

said trans free hard structural fat is free from any traces of organic solvents or detergents.

4. A hard palm oil fraction when used in the margarine and spread fat blend according to claim 1, the hard palm oil fraction having a C-16 carbon chain fatty acid residue level of 75% or above.

5. A hard palm oil fraction according to claim 4 having a melting point higher than 57°C and being flakable for easy handling because of its high melting point in spite of not being required to undergo hydrogenation, and having a solid fat content greater than 75% at 40°C.

6. A method of producing a hard palm oil fraction according to claim 4 or 5 including the step of selectively dry fractionating palm oil or its stearin fraction by a melt crystallization process to harvest the hard palm oil fraction having C-16 carbon chain fatty acid level of 75% and above with a total unsaturation level of less than 15%.

7. A method of producing a hard palm oil fraction according to claim 6 wherein dry fractionation of palm fat/ oil includes a two step melt crystallization process, the first step being performed between 20-25°C, to obtain a medium hard palm oil fraction (stearin fraction) which is then once again dry fractionated between 45-55°C to harvest very hard palm oil fraction rich in C-16 fatty acid residue to a level of 75% or above.

8. A method of producing a hard palm oil fraction according to claim 7 including separating the crystallized slurry of the medium hard palm oil fraction (stearin fraction) in the second fractionation step in a high pressure membrane type filter wherein a pressure of 10-35 bar is used to inflate the membrane so as to remove the liquid fraction (olein fraction) occluded in the separated hard palm oil fraction so as to enrich the C-16 carbon chain fatty acid fatty acid residue in said hard palm oil fraction recovered to a level of 75% or above.

9. A method of producing a trans free hard structural fat according to claim 3 by an interesterification reaction of hard palm oil fraction with hard palm kernel oil fraction, the resultant hard fat not being further fractionated but used as a hard trans free structural fat to eliminate a further processing which in turn results in high yield of the structural fat at a lower cost.

10. A trans free hard structural fat according to claim 3 and being produced by an interesterification reaction of hard palm oil fraction with hard palm kernel oil fraction, the produced hard structural fat having has a trisaturated triglyceride of H_3 type of C-16 and above is less than 25% where "H" denotes saturated fatty acid residue with carbon numbers greater than or equal to 16.

11. A trans free hard structural fat according to claim 3 and being produced by interesterification reaction of hard palm oil fraction with hard palm kernel oil fraction the

produced hard structural fat has a trisaturated triglyceride of H_3 type of C-16 and above is less than 20% where "H" denotes saturated fatty acid residue with carbon numbers greater than or equal to 16.

12. A method of producing a hard palm oil fraction with a C-16 carbon chain fatty acid residue level of 75% and above according to claim 4 or 5 including a labour intensive process of high pressure hydraulic pressing of a cooled slab of palm oil or its stearin fraction.

13. A margarine and spread fat blend according to claim 1 wherein the trans free hard structural fat is produced by an interesterification reaction of a hard palm oil fraction with hard palm kernel oil fraction and wherein the resultant hard fat is not further fractionated and used as a hard structural fat so as to eliminate further processing resulting in the high yield of the trans free hard structural fat at a lower cost.

14. A margarine and spread fat blend according to claim 1 wherein the trans free hard structural fat is produced by an interesterification reaction of hard palm oil fraction with hard palm kernel oil fraction without having to further undergo fractionation process so as to eliminate the disposal problems of by-product fractions associated with such processing to obtain trans free hard structural fat.

15. A margarine and spread fat blend according to claim 1 wherein the hard structural fat is produced by an interesterification reaction of hard palm oil fraction with a hard palm kernel oil fraction, the produced hard structural fat having a trisaturated triglyceride of H3 type less than 25% wherein "H" denotes saturated fatty acid of carbon chain 16 and above.

16. A margarine blend and spread according to claim 1 wherein the said trans free hard structural fat has a trisaturated triglyceride of H3 type less than 25% wherein "H" denotes saturated fatty acid of carbon chain 16 and above.

17. A margarine and spread fat blend according to claim 1 wherein said hard palm oil fraction is produced using a two-step melt crystallization process wherein:

a first step of said two-step melt crystallization process including of crystallizing said palm oil at a temperature between about 20 and 25°C and filtering a crystallized slurry of said palm oil through a membrane filter, said step producing a medium hard palm oil fraction; and

a second step of said two-step melt crystallization process including crystallizing said medium hard palm oil fraction at a temperature between about 45 to 55° and filtering a crystallized slurry of said medium hard palm oil fraction through a high pressure membrane filter; and

using a pressure of about 10 to 35 bar to inflate membranes of the said high pressure membrane filter to remove a liquid fraction occluded in a hard palm oil fraction collected in said high pressure membrane filter;

wherein said filtration step produces a very hard palm oil fraction with a C-16 carbon chain fatty acid residue level of 75% and above, the level of C-16 fatty acid residue in the hard palm oil fraction dependent up on the inflation pressure so being applied, and said processes not using any solvent or detergent for fractionation and also does not involve any hydrogenation process.

18. A hard palm oil fraction when used in the margarine and spread fat blend according to claim 1, wherein said hard palm oil fraction is produced using a two-step melt crystallization process wherein a first step of said two-step melt crystallization process includes crystallizing said palm oil at a temperature between about 20 and 25°C and filtering a crystallized slurry of said palm oil through a membrane filter, said step producing a medium hard palm oil fraction, and a second step of said two-step melt crystallization process includes crystallizing said medium hard palm oil fraction at a temperature between about 45 to 55°C and filtering a crystallized slurry of said medium hard palm oil fraction through a high pressure membrane filter, and

using a pressure of about 10 to 35 bar to inflate membranes of the said high pressure membrane filter to remove a liquid fraction occluded in a hard palm oil fraction collected in said high pressure membrane filter wherein said filtration step producing a very hard palm oil fraction with a C-16 carbon chain fatty acid residue level of 75% and above, the level of C-16 fatty acid residue in the hard palm oil fraction, being dependent upon the inflation pressure so being applied, and said processes not using any solvent or detergent for fractionation and also does not involve any hydrogenation process.

19. A trans free hard structural fat for use in a margarine blend and fat spread according to claim 1, the trans free hard structural fat, including interesterification of a hard palm oil fraction with a C-16 carbon chain fatty acid residue level of 75 % or above with a hard palm kernel oil fraction, wherein said trans free hard stock without further fractionation is used in the blend with the said liquid oils, said interesterification process is not an enzymatic interesterification process, and said hard palm oil fraction is produced using a two-step melt crystallization process;

a first step of said two-step melt crystallization process including crystallizing said palm oil at a temperature between about 20 and 25°C and filtering a crystallized slurry of said palm oil through a membrane filter, said step producing a medium hard palm oil fraction; and

a second step of said two-step melt crystallization process including crystallizing said medium hard palm oil fraction at a temperature between about 45 to 55°C and filtering a crystallized slurry of said medium hard palm oil fraction through a high pressure membrane filter, and using a pressure of about 10 to 35 bar to inflate membranes of the said high pressure membrane filter to remove a liquid fraction occluded in a hard palm oil fraction collected in said high pressure membrane filter;

wherein said filtration step producing a very hard palm oil fraction with a C-16 carbon chain fatty acid residue level of 75% and above, the level of C-16 fatty acid residue level in the hard palm oil fraction, being dependent upon the inflation pressure so being applied said processes does not use any solvent or detergent for fractionation, and also does not involve any hydrogenation process, and wherein said trans free hard structural fat having a trisaturated triglyceride of H_3 type less than 25% wherein "H" denotes saturated fatty acid of carbon chain 16 and above.

20. A hard palm oil fraction when used in a margarine spread and fat blend according to claim 1, the hard palm oil fraction being produced using a two-step melt crystallization process wherein a first step of said two-step melt crystallization process includes crystallizing said palm oil at a temperature between about 20 and 25°C and filtering a crystallized slurry of said palm oil through a membrane filter; and

said step producing a medium hard palm oil fraction and a second step of said two-step melt crystallization process includes crystallizing said medium hard palm oil fraction at a temperature between about 45 to 55°C and filtering a crystallized slurry of said medium hard palm oil fraction through a high pressure membrane filter, and

using a pressure of about 10 to 35 bar to inflate membranes of the said high pressure membrane filter to remove a liquid fraction occluded in a hard palm oil fraction collected in said high pressure membrane filter; wherein

said filtration step producing a very hard palm oil fraction with a C-16 carbon chain fatty acid residue level of 75%.and above , the level of C-16 fatty acid residue in the hard palm oil fraction , dependent upon the inflation pressure so being applied and said processes not using any solvent or detergent for fractionation and also does not involve any hydrogenation process.

21. A margarine and spread fat blend being substantially as herein described.

22. A trans free hard structural fat being substantially as herein described.

23. A method of producing a trans free hard structural fat, said method being substantially as herein described.

24. A hard palm oil fraction when used in a margarine and spread fat blend being substantially as herein described.

25. A method of producing a hard palm oil fraction when used in a margarine and spread fat blend, said method being substantially as herein described.

Dated this 16th day of December 2003

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