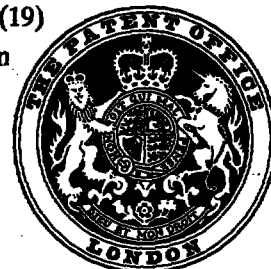


PATENT SPECIFICATION

(11) 1 603 002

- 1 603 002
- (21) Application No. 10111/78 (22) Filed 14 Mar. 1978 (19)
(31) Convention Application No. 777738 (32) Filed 15 Mar. 1977 in
(33) United States of America (US)
(44) Complete Specification Published 18 Nov. 1981
(51) INT. CL.³ A23L 1/38
(52) Index at Acceptance
A2B 313 401 615 BCX
C5C 9B9CX 9C3 9EX



(54) PEANUT BUTTER STABILIZER

(71) We, CPC INTERNATIONAL INC., a Corporation organized under the laws of the State of Delaware, United States of America, of International Plaza, Englewood Cliffs, New Jersey 07632, United States of America, do hereby declare the invention, for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:-

This invention relates to a peanut butter composition having improved mouth feel and low temperature spreadability.

BACKGROUND OF THE INVENTION

Peanut butter of the prior art consists essentially of ground roasted peanuts, sugar (dextrose and/or sucrose), and salt. Because this product exhibits gravitational instability (oil separation on top of the product), it has become regular practice to add a relatively high melting fat component as a stabilizer to the hot (about 140°-170°F.) peanut butter prior to the filling of the product into jars. This high melting fat component usually has a melting point in excess of 110°F. but less than 160°F. and may be partially hydrogenated fat, a completely hydrogenated fat, and diglyceride esters of saturated fatty acids, or mixtures of these stabilizing agents.

These high melting fat components, when added in small amounts (viz. 1-3% of the peanut butter) may be introduced as a supplement to the ground roasted peanuts or when added in larger amounts (viz. 5-8% of the peanut butter) may be introduced after an equivalent amount of the liquid peanut oil in the ground roasted peanuts has been removed in order that the total oil does not exceed 55% by weight of the end product. The added hard fat sets up as a continuous or semi-continuous structure within the final peanut butter during the cooling of the product and in so doing prevents oil from separating. The sugars and salt flavorings are added in the peanut butter manufactured in total amounts usually less than 5% and this addition may be balanced if desired, with an equivalent addition by weight of liquid non-hydrogenated vegetable oil or the stabilizing agent previously mentioned. During the roasting of the peanuts, the moisture content is reduced so that the final product will contain less than 2% moisture.

Oil separation can easily be prevented by the use of a sufficient amount of a completely saturated fat or other stabilizer. Frequently this leads to a sacrifice of low temperature spreadability and the development of waxy mouthing properties. The delicate balance required to prevent oil separation without sacrificing too much low temperature spreadability and incurring poor (waxy) mouthing properties is difficult to attain and almost impossible to maintain in the day-to-day manufacture of the peanut butter.

The well-known determination of solids content index (SCI) applied to the extracted fat from heated peanut butters provides a good method for correlating the spreadability and stability of peanut butters with the amounts and kinds of stabilizers used in the peanut butters. The SCI of the fat may be determined by the dilatometric method described by Fulton et al. (J.A.O.C.S. 31: 98, 1954). The less solids a fat contains at 50°F., the more spreadable is the peanut butter containing the fat. On the other hand, there must still be a sufficient solid fat content at 102°F. if oil separation is to be avoided when the product is exposed to high temperatures. Thus the higher the SCI value is at about 102°F., the better is the tendency of the peanut butter containing the oil to resist oil separation at elevated temperatures.

The typical peanut butters of industry include as stabilizers, either: (1), fat hydrogenated

to near saturation; (2), small amounts of mono- and diglycerides; or (3), partially hydrogenated fats, generally partially hydrogenated vegetable oils. Table I shows typical SCT's of oil separated from peanut butters using the three stabilizers.

TABLE I

Stabilizer	Melting point of oil-stabilizer combination	Solids Content Index				
		50°F.	70°F.	80°F.	92°F.	102°F.
Fat hydro- genated to near satura- tion	118	5.6	5.5	5.4	5.4	4.7
Small amount of mono- and di-glycerides	112	4.0	3.7	3.7	3.6	*
Partially hydrogenated peanut oil	95	8.3	5.4	3.4	2.1	0.3

*Not determined.

Examination of the table indicates that peanut butter stabilized with a saturated fat stabilizer has high resistance to oil separation. The disadvantage of many saturated fat stabilized peanut butters is that the high melting point of the fat and the high solids content at 102°F. detracts from the mouthing characteristics of the peanut butter product or prevents good spreadability at refrigerated temperature (45°-50°F.).

The peanut butter stabilized by the addition of small amounts of mono- and diglycerides is somewhat better in that it has acceptable spreadability and resistance to oil separation. However, the fat phase is still of relatively high melting point and thus does not impart optimum (non-waxy) mouthing properties.

The peanut butter stabilized and partially hydrogenated peanut oil has adequate resistance to oil separation at moderate temperatures and good mouthing properties but exhibits greatly decreased spreadability at 50°F. Also, it tends to separate oil at temperatures near the melting point of the fat phase. Furthermore, when these peanut butters are exposed to temperatures above the melting point of the fat phase, they resolidify upon cooling to an objectionably firm product which has undesirable spreadability characteristics.

An object of the invention is to improve the spreadability of peanut butter at temperatures in the ranges from 45°-75°F.

Another object of the invention is to achieve a stabilized peanut butter with superior resistance to oil separation at elevated temperature.

Still another object of the invention is to provide a peanut butter containing a stabilizer which requires fewer processing steps in its preparation thereby providing a more economical process and reducing the chances of contamination by foreign oils during industrial refining and hydrogenation.

Yet another object of the invention is to provide a finished peanut butter with less hydrogenated oil as the stabilizer.

A still further object of the invention is to provide a peanut butter manufacturing process with greater flexibility in product formulation due to the fact that less stabilizer is required and with improved control over product stability.

SUMMARY OF THE INVENTION

I have discovered that a stabilizer for peanut butter may be prepared from a hydrogenated mixture of peanut oil and palm oil.

The present invention provides a peanut butter composition having improved spreadability, improved melt down in mouth and resistance to oil bleeding and gravitational separation comprising peanut butter and a stabilizer containing from 70% to 90% hydrogenated palm oil and from 30% to 10% hydrogenated peanut oil, the stabilizer being provided in an amount of from 1.25% to 1.6% by weight of the composition.

Preferably, the stabilizer, which preferably comprises 80% palm oil and 20% peanut oil is prepared by thoroughly blending together the two components which have each been refined and bleached. Thereafter the oil blend is hydrogenated to almost complete

saturation to have a preferred iodine value of less than 4 using standard hydrogenation techniques with oil temperatures up to 350°F. Subsequent to the hydrogenation process, the hydrogenated oil blend is deodorized at a temperature of 475°-495°F., preferably at the higher range of temperature, until the free fatty acids are below 0.05%.

Preferably, the stabilizer contains about 35% palmitic acid.

Specifications for the refined, bleached, hydrogenated and deodorized oil are given in Table II which follows:

TABLE II
SPECIFICATIONS FOR PALM/PEANUT STABILIZER
(80:20 BLEND) SATURATED BY SINGLE HYDROGENATION

Text	Minimum	Maximum
Wiley Melting Point (°F.)	139	143
Iodine Value (W ₁ JS)	0.5	4.0
Color (Lovibond Scale)	---	4.5
Free Fatty Acids (%)	---	0.05

U.S. Patent 3,766,266 to Gooding *et al.* discloses a stabilizer prepared from a blend of cottonseed oil and peanut oil wherein a crude cottonseed oil is refined and bleached and thereafter winterized to produce a liquid oil fraction and cottonseed stearine. The cottonseed stearine is then hydrogenated to an iodine value (IV) of about 34.0 ± 2.0 . The peanut oil portion is prepared by refining and bleaching a crude peanut oil followed by hydrogenation to an iodine value (IV) of less than about 4.5. A blend is then prepared using 72.7% of the cottonseed stearine and 27.3% of the peanut oil. The blend is deodorized and yields a stabilizer with an iodine value (IV) of about 25.5 ± 2.0 .

DETAILED DESCRIPTION OF INVENTION

Hydrogenated oils made from three different oil compositions (i.e. 100% Palm Oil; 90% Palm Oil + 10% Peanut Oil; and 80% Palm Oil + 20% Peanut Oil) were prepared and evaluated as stabilizers for peanut butter. Iodine Values on the finished stabilizers follows:

	IV
100% Palm Oil	2.2
90% Palm Oil + 10% Peanut Oil	2.3
80% Palm Oil + 20% Peanut Oil	2.4

Different quantities of the three stabilizers were blended with liquid peanut oil and SCI values obtained on the total solids of the blended oils as a possible indicator of the performance characteristics of the individual stabilizers and the approximate use level (see Table III which follows).

(12)

4

1,603,002

4

TABLE III

**SCI'S OF HYDROGENATED VEGETABLE OIL STABILIZERS USED AT
DIFFERENT USE LEVELS IN LIQUID PEANUT OIL TO DETERMINE
POTENTIAL USE AS STABILIZERS FOR PEANUT BUTTER**

Stabilizer Composition						
% Saturated Palm Oil	100	80	90			
% Saturated Peanut Oil	0	20	10			
Use Level						
% Peanut Oil	97.5	97.0	96.5	97.5	96.5	97.0
% Stabilizer	2.5	3.0	3.5	2.5	3.5	3.0
SCI at						
50°F.	3.7	3.8	4.5	3.8	4.8	4.0
70°F.	2.6	2.8	3.5	2.6	3.6	3.0
80°F.	2.3	2.5	3.1	2.3	3.3	2.8
92°F.	1.8	2.2	2.8	1.9	2.9	2.3
102°F.	0.6	0.8	1.2	1.1	1.7	1.2
Peanut butters were prepared using the above stabilizers at formula levels of 1.25%, 1.50% and 1.75% (by weight) of the total product to test for stability against oil separation at 95°F. and spreadability characteristics at 70°F. using a Standard ASTM Penetrometer with a standard grease cone. Results of this testing found two of the peanut butters (prepared with 100% Palm Oil at 1.25 and 1.5%) to be too soft and separated oil at 95°F. Two other peanut butters (100% Palm Oil at 1.75% and 80% Palm Oil + 20% Peanut Oil at 1.75%) were found to be too firm when tested at 70°F. The other two samples (90% Palm Oil + 10% Peanut Oil at 1.5% and 80% Palm Oil + 20% Peanut Oil at 1.25%) compared favorably to a control product made according to the teaching revealed by Gooding <i>et al.</i> in U.S. Patent No. 3,766,226. Utilizing palm oil and peanut oil mixed at an 80:20 blend which was hydrogenated to an iodine value of 1.4, melting point of 143.6 and a 0.04% FFA in the deodorized oil, tests were conducted employing a test design wherein stabilizer use levels and the scrapped wall heat exchanger (cooler) discharge temperatures were studied, after establishing the SCI values at three different use levels. The results from the SCI tests follow:						
Stabilizer/Peanut Oil Blend(%)						
	50	70	80	92	102	
2.5/97.5						
3.0/97.0	3.4	2.4	2.0	1.9	1.1	
3.5/96.5	3.6	2.7	2.3	2.2	1.4	
Control Stabilizer	4.4	3.5	3.1	2.9	1.9	
5.0/95.0	4.3	2.9	2.4	2.3	1.3	

Samples produced from three different use levels with varying heat exchanger discharge temperatures were obtained and evaluated for spreadability using the standard penetrometer test. Penetration results from these tests are reported on the attached Table IV which follows:

TABLE IV
PENETRATIONS AT 30 DAYS AGE ON CREAMY STYLE
PEANUT BUTTER PRODUCED WITH PALM/PEANUT STABILIZER

Test Identity (Level of stab. and exit temperature of heat exchanger)	Penetration (mm) at 70°F.			Mean	SD
Control	24.2,	24.2,	23.7,	24.14	.26
T ₁ (1.25% at 77°F.)	25.9,	26.0,	25.9,	25.84	.15
T ₂ (1.25% at 80°F.)	24.4,	25.1,	25.3,	25.02	.35
T ₃ (1.25% at 80°F.)	25.3,	24.5,	25.2,	25.02	.32
T ₄ (1.00% at 77°F.)	26.8,	26.2,	26.8,	26.58	.26
T ₅ (1.00% at 83°F.)	27.3,	27.1,	27.0,	27.14	.20
T ₆ (1.50% at 77°F.)	25.0,	25.0,	24.9,	24.86	.20
T ₇ (1.50% at 83°F.)	23.5,	23.3,	23.5,	23.32	.30

Results from the stability tests at 95°F., on the finished product, indicate marginal stability for product produced with 1% stabilizer but satisfactory for all products produced with 1.5% and 1.25% stabilizer.

Results from the penetration tests indicate good correlation between the stabilizer use levels and mean penetration values. In addition, a good response was also noted from the different cooler temperatures and effect on product penetrations, for the higher stabilizer levels, with the lower cooler temperatures producing the highest penetration values in each instance. The lack of this type of penetration response for the stabilizer level at the 1% use level, indicates the product and process at this level of stabilizer was marginal with respect to proper control. This observation was further confirmed by the lack of stability at 95°F.

Furthermore penetration tests at 45°F. on test products made with 1.48% stabilizer, show unexpectedly high penetrations for this temperature with test values around 19-20 mm; the control product at this temperature showed test values of 16-17 mm, indicating the test product to be noticeably more spreadable at this temperature.

Fatty acids composition of various samples of the stabilizer of the invention (A, B, C) against samples of the control stabilizer (D, E) obtained from industrial refining where several different types of vegetable oils are processed are shown in Table V.

TABLE V
FATTY ACIDS CONTENT OF STABILIZERS

Fatty Acid Composition (%)	A	B	C	D	E
C-8	T	0.1	0.2	0.4	0.4
C-10	0.1	0.3	0.2	0.3	0.2
C-12	1.9	2.6	1.9	1.2	1.8
C-14	1.4	1.8	1.5	0.9	1.1
C-16	35.8	35.6	35.3	27.6	27.6
C-16:1	--	--	0.1	--	0.2
C-18	59.3	58.2	58.2	41.4	40.3
C-18:1	T	0.8	0.7	26.1	25.6
C-18:2	--	--	0.1	0.6	0.1
C-18:3	--	--	--	0.6	0.9
C-20	0.8	T	0.9	--	0.3
C-22	0.7	0.5	0.6	0.9	1.0
C-24	--	--	0.3	T	0.5

The higher percent of palmitic acid is believed to be a factor in the higher penetration values at 45°F. and indicates an increased plasticity which results in an improved spreadability of the final peanut butter at low temperature.

Use of such stabilizers permits the manufacture of peanut butter which is spreadable even when stored in the refrigerator.

WHAT WE CLAIM IS:

1. A peanut butter composition having improved spreadability, improved melt down in the mouth and resistance to oil bleeding and gravitational separation comprising peanut butter and a stabilizer containing from 70% to 90% hydrogenated palm oil and from 30% to 10% hydrogenated peanut oil, the stabilizer being provided in an amount of from 1.25% to 1.60% by weight of the composition.

2. The composition as claimed in claim 1 wherein the stabilizer contains about 80% hydrogenated palm oil and about 20% hydrogenated peanut oil.

3. The composition as claimed in either claim 1 or 2 wherein the stabilizer has an iodine value of less than 4.0.

4. The composition as claimed in any one of claims 1 to 3 wherein the stabilizer contains about 35% palmitic acid.

5. The composition as claimed in claim 4 which exhibits improved low temperature spreadability.

6. The composition as claimed in claim 1 and substantially as hereinbefore described.

STEVENS, HEWLETT & PERKINS,

Chartered Patent Agents,

5 Quality Court,

Chancery Lane,

London WC2,

Tel. 01-405 8393.

Results from the stability tests at 95°F., on the finished product, indicate marginal stability for product produced with 1% stabilizer but satisfactory for all products produced with 1.5% and 1.25% stabilizer.

Results from the penetration tests indicate good correlation between the stabilizer use levels and mean penetration values. In addition, a good response was also noted from the different cooler temperatures and effect on product penetrations, for the higher stabilizer levels, with the lower cooler temperatures producing the highest penetration values in each instance. The lack of this type of penetration response for the stabilizer level at the 1% use level, indicates the product and process at this level of stabilizer was marginal with respect to proper control. This observation was further confirmed by the lack of stability at 95°F.

Furthermore penetration tests at 45°F. on test products made with 1.48% stabilizer, show unexpectedly high penetrations for this temperature with test values around 19-20 mm; the control product at this temperature showed test values of 16-17 mm, indicating the test product to be noticeably more spreadable at this temperature.

Fatty acids composition of various samples of the stabilizer of the invention (A, B, C) against samples of the control stabilizer (D, E) obtained from industrial refining where several different types of vegetable oils are processed are shown in Table V.

TABLE V

FATTY ACIDS CONTENT OF STABILIZERS

Fatty Acid Composition (%)	A	B	C	D	E
C-8	T	0.1	0.2	0.4	0.4
C-10	0.1	0.3	0.2	0.3	0.2
C-12	1.9	2.6	1.9	1.2	1.8
C-14	1.4	1.8	1.5	0.9	1.1
C-16	35.8	35.6	35.3	27.6	27.6
C-16:1	--	--	0.1	--	0.2
C-18	59.3	58.2	58.2	41.4	40.3
C-18:1	T	0.8	0.7	26.1	25.6
C-18:2	--	--	0.1	0.6	0.1
C-18:3	--	--	--	0.6	0.9
C-20	0.8	T	0.9	--	0.3
C-22	0.7	0.5	0.6	0.9	1.0
C-24	--	--	0.3	T	0.5

The higher percent of palmitic acid is believed to be a factor in the higher penetration values at 45°F. and indicates an increased plasticity which results in an improved spreadability of the final peanut butter at low temperature.

Use of such stabilizers permits the manufacture of peanut butter which is spreadable even when stored in the refrigerator.

WHAT WE CLAIM IS:

1. A peanut butter composition having improved spreadability, improved melt down in the mouth and resistance to oil bleeding and gravitational separation comprising peanut butter and a stabilizer containing from 70% to 90% hydrogenated palm oil and from 30% to 10% hydrogenated peanut oil, the stabilizer being provided in an amount of from 1.25% to 1.60% by weight of the composition.

2. The composition as claimed in claim 1 wherein the stabilizer contains about 80% hydrogenated palm oil and about 20% hydrogenated peanut oil.

3. The composition as claimed in either claim 1 or 2 wherein the stabilizer has an iodine value of less than 4.0.

4. The composition as claimed in any one of claims 1 to 3 wherein the stabilizer contains about 35% palmitic acid.

5. The composition as claimed in claim 4 which exhibits improved low temperature spreadability.

6. The composition as claimed in claim 1 and substantially as hereinbefore described.

STEVENS, HEWLETT & PERKINS,

Chartered Patent Agents,

5 Quality Court,

Chancery Lane,

London WC2,

Tel. 01-405 8393.

