

COOKING OIL OR FAT, AND METHOD FOR PRODUCING THE SAME

Technical Field

[0001]

5 The present invention relates to a cooking oil or fat whose increase in an acid value due to heating is suppressed, and a method for producing the same.

Background Art

10 [0002]

 Since an oil or fat is excellent in properties as a heating medium, a cooking oil or fat such as a frying oil or a spray oil is utilized in cooking with heat such as "roasting", "frying" and "deep-frying" in food cooking.

15 [0003]

 In a cooking oil or fat, an acid value often increases with time by exposure of the oil or fat to a high temperature during a heating step in food cooking.

[0004]

20 Then, in a cooking oil or fat such as a frying oil, many users control the deterioration of the oil or fat by means of an acid value as an index thereof. For example, in case of cooked frozen food manufacturers, an acid value of a frying oil is provided to be 2.5 or lower.

25 [0005]

Therefore, if increase in an acid value of an oil or fat due to heating can be suppressed, a frying oil can be used for a longer period of time, thereby making it possible to decrease exchange frequency of a frying oil.

5 [0006]

So far, as a method for improving quality of a cooking oil or fat, for example, Patent Document 1 has proposed a frying oil composition comprising a polyglycerin fatty acid ester having HLB of 9.0 or more in order to suppress
10 increase in an acid value or coloration of the oil upon frying dough containing a yolk ingredient. This is a method for suppressing deterioration of a frying oil upon frying dough containing a yolk ingredient.

[0007]

15 In addition, Patent Document 2 has proposed a fry oil composition whose deterioration after heating is suppressed, wherein the frying oil composition comprises a polyglycerin fatty acid ester having a specific esterification rate and fatty acid composition. This is the use of a polyglycerin
20 fatty acid ester having a high polymerization degree of 6 to 10 in an oil or fat having specific physical properties.

[0008]

Further, Patent Document 3 has proposed an oil or fat composition comprising a polyglycerin fatty acid ester
25 having an average polymerization degree of 6 to 30 and an

average substitution degree of 4 to 32. This is a method for prolonging a life of an oil or fat at the time of fry-cooking by suppressing foaming.

[0009]

5 Furthermore, non-Patent Document 1 describes the prevention of deterioration of safflower oil by means of a variety of surfactants such as soap. The document also describes that a considerable amount of a surfactant is required, and an oil containing such a surfactant is
10 colored by heating.

[0010]

As mentioned above, so far some studies have been carried out. However, the effect of suppression of the increase in an acid value of an oil or fat due to heating
15 is insufficient in any methods. In addition, the costs of various food raw materials have been soared. Then, a solution for the reduction of exchange frequency of a frying oil have been desired by users.

Further, from the viewpoint of reducing the burden on
20 the environment, there has been a demand for an environmentally friendly technique which enables reduction of the amount of waste used oil by using a frying oil for a longer period of time.

25 Prior Art Documents

Patent Documents

[0011]

Patent Document 1: JP 2001-149010 A

Patent Document 2: JP 9-299027 A

5 Patent Document 3 3: JP 2003-313583 A

Non-Patent Documents

[0012]

Non-Patent Document 1: Sizuyuki Ohta, Etsuji Yugi,
"Theory and Practice of Fried Foods", Saiwai Shobo, April,
10 1989, p.112

Disclosure of Invention

Problems to be Solved by the Invention

[0013]

15 An object of the present invention is to provide a
cooking oil or fat such as a frying oil or the like whose
increase in an acid value due to heating is suppressed by a
simple method.

20 Means for Solving the Problems

[0014]

Then, the present inventors have studied intensively
and, as a result, found that, by blending one or more
components selected from the group consisting of sodium,
25 potassium, magnesium and calcium in an oil or fat in an

amount of 0.1 to 1 $\mu\text{mol/g}$, the increase in an acid value of the oil or fat due to heating can be suppressed, resulting in the completion of the present invention.

[0015]

5 That is, the present invention is:

 (1) A cooking oil or fat whose increase in an acid value due to heating is suppressed characterized in that one or more components selected from the group consisting of sodium, potassium, magnesium and calcium is contained in
10 an amount of 0.1 to 1 $\mu\text{mol/g}$ of the oil or fat;

 (2) A method for suppressing increase in an acid value of a cooking oil or fat due to heating characterized in that one or more components selected from the group consisting of sodium, potassium, magnesium and calcium is
15 blended in an amount of 0.1 to 1 $\mu\text{mol/g}$ of the oil or fat;

 (3) A method for producing a cooking oil or fat whose increase in an acid value due to heating is suppressed characterized in that an aqueous solution of one or more salts of metals selected from the group consisting of
20 sodium, potassium, magnesium and calcium is mixed with an oil or fat, followed by dehydrating the mixture to obtain the cooking oil or fat containing one or more components selected from the group consisting of sodium, potassium, magnesium and calcium in a total amount of 0.1 to 1 $\mu\text{mol/g}$
25 of the oil or fat;

(4) An agent for suppressing increase in an acid value of a cooking oil or fat characterized in that the agent comprises one or more salts of metals selected from the group consisting of sodium, potassium, magnesium and calcium;

(5) An agent for suppressing increase in an acid value of a cooking oil or fat characterized in that the agent is a water-in-oil type emulsion composition comprising an aqueous solution of one or more salts of metals selected from the group consisting of sodium, potassium, magnesium and calcium; a substrate; and an emulsifier;

(6) A powdery preparation for suppressing increase in an acid value of a cooking oil or fat characterized in that the preparation comprises one or more salts of metals selected from the group consisting of sodium, potassium, magnesium and calcium; and

(7) A powdery oil or fat preparation for suppressing increase in an acid value of a cooking oil or fat, wherein the preparation comprises one or more salts of metals selected from the group consisting of sodium, potassium, magnesium and calcium.

Effects of the Invention

[0016]

Since increase in an acid value of an oil or fat due to heating is suppressed by using the cooking oil or fat as well as the agent for suppressing increase in an acid value of a cooking oil or fat of the present invention, exchange
5 frequency of a frying oil can be reduced, which enables a user to use a frying oil for a longer period of time. Further, this reduction leads to reduction of costs for using a frying oil, and also reduction of the amount of waste used oil, thereby making it possible to reduce the
10 burden on the environment.

Mode for Carrying Out the Invention

[0017]

Hereinafter, the present invention will be explained
15 in detail.

[0018]

The cooking oil or fat of the present invention is characterized in that it contains one or more components selected from the group consisting of sodium, potassium, magnesium and calcium in the oil or fat. Specifically, the
20 cooking oil or fat can be obtained by adding a carbonate salt, a chloride salt, an organic acid salt and the like of the above mentioned components to the oil or fat.

[0019]

25 Examples of the metal salts to be used include the

following metal salts regardless of whether they are water-soluble or oil-soluble.

calcium L-ascorbate, sodium L-ascorbate, sodium erythorbate, sodium caseinate, monopotassium citrate and tripotassium
5 citrate, calcium citrate, trisodium citrate, potassium L-glutamate, calcium L-glutamate, sodium L-glutamate, magnesium L-glutamate, monosodium succinate, disodium succinate, potassium hydrogen DL-tartrate, potassium hydrogen L-tartrate, sodium DL-tartrate, sodium L-tartrate,
10 potassium carbonate, calcium carbonate, sodium bicarbonate, sodium carbonate, magnesium carbonate, sodium DL-malate, tripotassium phosphate, tricalcium phosphate, trimagnesium phosphate, dipotassium hydrogen phosphate, potassium dihydrogen phosphate, calcium monohydrogen phosphate,
15 calcium dihydrogen phosphate, disodium hydrogen phosphate, sodium dihydrogen phosphate, trisodium phosphate, calcium stearyl lactate, and sodium stearyl lactate.

[0020]

It is preferred to use, among these salts, calcium L-
20 ascorbate, sodium L-ascorbate, sodium erythorbate, trisodium citrate, sodium L-glutamate, monosodium succinate, disodium succinate, potassium sorbate, calcium carbonate, sodium bicarbonate, sodium carbonate, or magnesium carbonate.

[0021]

For example, in the case where an oil or fat containing sodium is obtained, a given amount of a 1% aqueous sodium carbonate solution is added to an oil or fat heated to 70°C, and the resulting mixture is stirred for 15 minutes to 1 hour under the conditions of a temperature of 50 to 180°C and a vacuum degree of 0.5 to 100 Torr to sufficiently dehydrate the mixture, thereby obtaining the oil or fat containing sodium. At this time, a concentration of an aqueous sodium carbonate solution is 0.1 to 30%, preferably 1 to 10%. When the concentration is less than the lower limit, the amount of water relative to the oil or fat becomes too much, which causes inefficiency. On the other hand, when the concentration is more than the upper limit, crystals of sodium carbonate are deposited, which results in difficulty in compounding the component(s) into the oil or fat. Further, the dehydration can be carried out under the conditions at a temperature of 50 to 180°C, and at a vacuum degree of 0.5 to 100 Torr, preferably, at a temperature and vacuum degree of as low as possible.

[0022]

The cooking oil or fat of the present invention is characterized in that the oil or fat contains one or more components selected from the group consisting of sodium, potassium, magnesium and calcium therein. Among them,

sodium is preferred because of its higher effect of suppression of increase in an acid value of the oil or fat due to heating.

[0023]

5 The cooking oil or fat of the present invention is characterized in that a total of one or more components selected from the group consisting of sodium, potassium, magnesium and calcium is 0.1 to 1 $\mu\text{mol/g}$. The increase in an acid value of an oil or fat due to heating can be
10 suppressed by blending a very small amount of them in the oil or fat. When a total amount of these components is too small, sometimes, the effect of suppression of increase in an acid value due to heating is hardly obtainable. On the other hand, when a total amount of these metals is too
15 large, the effect of suppression of increase in an acid value is also hardly obtainable.

[0024]

 In addition, according to the present invention, the increase in an acid value due to heating of a frying oil
20 can also be suppressed by producing an agent for suppressing increase in an acid value of a cooking oil or fat, wherein a content of one or more salts of metals selected from the group consisting of sodium, potassium, magnesium and calcium is enhanced, and adding this agent
25 for suppressing increase in an acid value to the frying oil

in a small amount.

[0025]

Further, according to the present invention, an agent for suppressing increase in an acid value of a cooking oil or fat which is a water-in-oil type emulsion composition can be obtained by mixing an aqueous solution of one or more salts of metals selected from the group consisting of sodium, potassium, magnesium and calcium, a substrate (e.g. an oil or fat such as palm olein), and an emulsifier. The increase in an acid value due to heating of a frying oil can be suppressed by adding this agent for suppressing increase in an acid value to the frying oil in a small amount.

[0026]

For example, after addition of 5 parts by weight of polyglycerin-condensed ricinoleic acid ester (PGPR) as a dispersing medium (emulsifier) to 65 parts by weight of palm olein warmed at 70°C, a 30 wt% aqueous sodium carbonate solution is added thereto in an amount of 30 parts by weight, and the resulting mixture is thoroughly stirred, thereby obtaining an agent for suppressing increase in an acid value of a cooking oil or fat containing 9 wt% of sodium carbonate. Polyglycerin-condensed ricinoleic acid ester to be used is not particularly limited, and a commercially available

emulsifier such as Poem PR-100, Poem PR-300 and the like manufactured by Riken Vitamin Co., Ltd. can be used.

[0027]

Furthermore, the powdery preparation for suppressing
5 increase in an acid value of a cooking oil or fat of the present invention is characterized in that the preparation contains one or more salts of metals selected from the group consisting of sodium, potassium, magnesium and calcium. Examples of a method of making this powdery
10 preparation are not limited to, but include mixing of an aqueous solution of one or more salts of metals selected from the group consisting of sodium, potassium, magnesium and calcium, a substrate and an emulsifier, and drying the resulting mixed solution by a per se known method, followed
15 by pulverization. By adding this powdery preparation to an oil or fat, the effect of suppressing increase in an acid value can be obtained.

[0028]

Furthermore, the powdery oil or fat preparation for
20 suppressing increase in an acid value of a cooking oil or fat according to the present invention can be obtained by mixing one or more salts of metals selected from the group consisting of sodium, potassium, magnesium and calcium, an oil or fat and, if necessary, an emulsifier, and
25 pulverizing the resulting mixed oil or fat composition by a

per se known method. The oil or fat used in the powdery oil or fat preparation of the present invention is not particularly limited as far as it is an edible oil.

Examples thereof include a palm oil, a rapeseed oil, a soybean oil, a sunflower oil, a corn oil, a cottonseed oil, a safflower oil, a rice bran oil, a coconut oil, a palm kernel oil, and the like, as well as hydrogenated oil, interesterification oil, and fractionated oil thereof, and the like.

Among these oils or fats, an oil or fat having a melting point of 45 to 75°C, preferably a melting point of 50 to 65°C is desirable.

[0029]

Examples of the method of making the powdery oil or fat preparation for suppressing increase in an acid value of a cooking oil or fat are not limited to, but include a spray cooling method comprising mixing one or more salts of metals selected from the group consisting of sodium, potassium magnesium and calcium, a fat and oil and, if necessary, an emulsifier, and spraying the resulting mixed oil or fat composition into a cooling tower (chiller) to obtain the powdery oil or fat preparation; a drum flaking method comprising running a mixed oil or fat composition on a cooled drum to solidify and scraping off the composition; and a spray drying method. By adding this powdery oil or

fat preparation for suppressing increase in an acid value to a frying oil in a small amount, increase in an acid value due to heating of a frying oil can be suppressed.

[0030]

5 The powdery oil or fat preparation for suppressing increase in an acid value of a cooking oil or fat containing 9 wt% of sodium carbonate can be obtained, for example, by adding 5 parts by weight of polyglycerin-condensed ricinoleic acid ester (PGPR) as a dispersing
10 medium (emulsifier) to 65 parts by weight of an extremely hydrogenated oil of a purified palm oil which has been warmed to 70°C and completely melted, and then, adding 30 parts by weight of a 30 wt% aqueous sodium carbonate solution, thoroughly stirring the mixture, running the
15 mixture on a cooled drum, scraping off a solidified oil or fat, pulverizing the oil or fat, and passing it through a 10 mesh sieve. The polyglycerin-condensed ricinoleic acid ester to be used is not particularly limited, but a commercially available emulsifier such as Poem PR-100, Poem
20 PR-300 and the like manufactured by Riken Vitamin Co., Ltd. can be used.

[0031]

 The oil or fat which can be used as the cooking oil or fat of the present invention is not particularly limited,
25 but include edible oils or fats such as a soybean oil, a

rapeseed oil, a safflower oil, a corn oil, a sunflower oil, a cottonseed oil, a rice oil, an olive oil, a palm oil, a coconut oil, a palm kernel oil, a sesame oil, a beef tallow, a lard and a fish oil, as well as processed oils or fats
5 obtained by subjecting them to fractionation, hydrogenation or interesterification. They can be used alone, or in a combination of two or more kinds of them.

[0032]

The present invention can be preferably applied to,
10 inter alia, palm group oils or fats among the above-mentioned oils or fats, and examples of the palm group oils or fats include a purified palm oil having an iodine value of 50 or more and less than 60, obtained by purifying a natural palm oil, a palm medium melting point fraction
15 having an iodine value of 40 or more and less than 50, obtained by fractionation by a solvent or non-solvent fractionation method, palm olein which is a low melting point fraction, and an edible palm olein having an iodine value of 55 or more, obtained by further one stage-
20 fractionating, or two stage-fractionating palm olein.

[0033]

The present invention can be preferably applied to an edible palm olein having an iodine value of 55 or more, which is liquid at room temperature, has good workability,
25 and is used as a general frying oil or fat, among the

above-mentioned palm group oils or fats.

[0034]

Since increase in an acid value of an oil or fat due to heating is considerably suppressed as compared with a conventional cooking oil or fat, the cooking oil or fat of the present invention can be widely utilized in cooking with heating, for example, as a frying oil, or a spray oil upon oven roasting or broiling.

[0035]

Further, an edible emulsifier such as sucrose fatty acid ester, polyglycerin fatty acid ester, sorbitan fatty acid ester, glycerin fatty acid ester or the like, a flavor, a dye, an antioxidant, silicone and the like can be added to the cooking oil or fat, if necessary.

As the antioxidant to be used together, natural and synthesized antioxidants can be used. Examples thereof include a variety of tocopherols, and tocopherol preparations and mix tocopherols in which α , β , γ , δ and the like are concentrated, or tocotrienols having the same as that of tocopherol can be also used. Although vitamin C as a water-soluble antioxidant can also be used, it is difficult to disperse it into an oil or fat because of water-soluble. Then, it is desirable to use an ascorbic acid palmitic acid ester whose oil-solubility has been improved as a palmitic acid ester. In addition, any other

antioxidants usable as an antioxidant of an oil or fat such as a tea extract and the like can also be used without limitation to the above-mentioned examples.

5 Examples

[0036]

Hereinafter, the present invention will be explained in more detail by way of Examples.

Hereinafter, a determination method of sodium,
10 potassium, magnesium and calcium contents, and a fry test method were carried out as follows.

Determination method of sodium, potassium, magnesium and calcium contents

Sodium, potassium, magnesium and calcium contents were
15 determined by atomic absorption spectrophotometry.

Fry test method

Two (2) kg of an cooking oil or fat was weighed on a frying pan. Oil temperature was retained at $180\pm 5^{\circ}\text{C}$, and two frozen croquettes were fried for 5 minutes and 30
20 second at once every 20 minutes. This procedure was continuously repeated for 12 hours, and an acid value of a frying oil after 12 hours was analyzed.

The acid value of the oil was determined according to Standard Methods for the Analysis of Oils and Fats (2.3.1-
25 Acid Value, Standard Methods for the Analysis of Oils and

Fats (I), established by Japan Oil Chemists' Society, 1996 edition, Japan Oil Chemists' Society).

Effect of suppressing increase in acid value

Assuming that an acid value of an oil or fat without
5 containing sodium, potassium, magnesium or calcium in a fry
test was A, and that of the same oil or fat containing
sodium, potassium, magnesium or calcium in a fry test was B,
(A-B)/A was adopted as the effect of suppressing increase
in an acid value (%).

10 [0037]

Comparative Example 1

To palm olein (iodine value: 67) was added mix
tocopherol as an antioxidant at a concentration of 100 ppm
to obtain a cooking oil or fat.

15 An analysis value of an acid value of this cooking oil
or fat after a fry test was 1.85.

[0038]

Comparative Example 2

To 100 parts by weight of palm olein (iodine value:
20 67) warmed at 70°C was added 0.3 part by weight of a 1 wt%
aqueous sodium carbonate solution, and the resulting
mixture was dehydrated for 20 minutes with stirring under
the conditions of a temperature of 70°C and a vacuum degree
of 40 Torr to obtain an oil or fat containing the sodium
25 salt at a concentration of 13 ppm in terms of sodium.

After the oil or fat was diluted with palm olein (iodine value: 67) to adjust the concentration, the sodium content was analyzed to be 1.2 ppm (0.05 $\mu\text{mol/g}$). One hundred (100) ppm of mix tocopherol as an antioxidant was added thereto to obtain a cooking oil or fat.

The analysis value of an acid value of the cooking oil or fat in a fry test was 1.82, and the effect of suppressing increase in an acid value as compared with the cooking oil or fat of Comparative Example 1 was 1.6%.

[0039]

Example 1

To 100 parts by weight of palm olein (iodine value: 67) warmed to 70°C was added 0.3 part by weight of a 1 wt% aqueous sodium carbonate solution, and the resulting mixture was dehydrated for 20 minutes with stirring under the conditions of temperature of a 70°C and a vacuum degree of 40 Torr to obtain an oil or fat containing the sodium salt at a concentration of 13 ppm in terms of sodium.

After the oil or fat was diluted with palm olein (iodine value: 67) to adjust the concentration, the sodium content was analyzed and found to be 3.2 ppm (0.14 $\mu\text{mol/g}$). One hundred (100) ppm of mix tocopherol as an antioxidant was added to obtain a cooking oil or fat.

An analysis value of an acid value of the cooking oil or fat in a fry test was 1.68, and the effect of

suppressing increase in an acid value as compared with the cooking oil or fat of Comparative Example 1 was 9.2%.

[0040]

Example 2

5 To 100 parts by weight of palm olein (iodine value: 67) warmed to 70°C was added 0.3 part by weight of a 1 wt% aqueous sodium carbonate solution, and the resulting mixture was dehydrated for 20 minutes with stirring under the conditions of a temperature of 70°C and a vacuum degree
10 of 40 Torr to obtain an oil or fat containing the sodium salt at a concentration of 13 ppm in terms of sodium. The sodium content was analyzed and found to be 8.3 ppm (0.36 $\mu\text{mol/g}$). One hundred (100) ppm of mix tocopherol as an antioxidant was added to obtain a cooking oil or fat.

15 An analysis value of an acid value of the cooking oil or fat after a fry test was 1.56, and the effect of suppressing increase in an acid value as compared with the cooking oil or fat of Comparative Example 1 was 15.7%.

[0041]

20 Example 3

 To 100 parts of weight of palm olein (iodine value: 67) warmed to 70°C was added 0.75 part by weight of a 1 wt% aqueous sodium carbonate solution, and the resulting mixture was dehydrated for 20 minutes with stirring under
25 the conditions of a temperature of 70°C and a vacuum degree

of 40 Torr to obtain an oil or fat containing the sodium salt at a concentration of 32.3 ppm in terms of sodium. The sodium content was analyzed and found to be 18.6 ppm (0.81 $\mu\text{mol/g}$). One hundred (100) ppm of mix tocopherol as an antioxidant was added to obtain a cooking oil or fat.

An analysis value of an acid value of the cooking oil or fat after a fry test was 1.64, and the effect of suppressing increase in an acid value as compared with the cooking oil or fat of Comparative Example 1 was 11.4%.

[0042]

Comparative Example 3

To 100 parts by weight of palm olein (iodine value: 67) warmed to 70°C was added 1.5 parts by weight of a 1 wt% aqueous sodium carbonate solution, and the resulting mixture was dehydrated for 20 minutes with stirring under the conditions of a temperature of 70°C and a vacuum degree of 40 Torr to obtain an oil or fat containing the sodium salt at a concentration of 64.5 ppm in terms of sodium. The sodium content was analyzed and found to be 37.2 ppm (1.62 $\mu\text{mol/g}$). One hundred (100) ppm of mix tocopherol as an antioxidant was added to obtain a cooking oil or fat.

An analysis value of an acid value of the cooking oil or fat after a fry test was 1.94, and the effect of suppressing increase in an acid value as compared with the cooking oil or fat of Comparative Example 1 was -4.9%.

[0043]

The results of Comparative Examples 1 to 3 and
Examples 1 to 3 are shown in Table 1

[0044]

Table 1	Comparative Example 1	Comparative Example 2	Example 1	Example 2	Example 3	Comparative Example 3
Added salts	-	Na carbonate	Na carbonate	Na carbonate	Na carbonate	Na carbonate
Na, K, Mg and Ca content (ppm)	-	1.2	3.2	8.3	18.6	37.2
Na, K, Mg, Ca content (μmol/g)	-	0.05	0.14	0.36	0.81	1.62
Oil or fat	Palm olein	Palm olein	Palm olein	Palm olein	Palm olein	Palm olein
Iodine value	67	67	67	67	67	67
Antioxidant	100 ppm	100 ppm	100 ppm	100 ppm	100 ppm	100 ppm
acid value	1.85	1.82	1.68	1.56	1.64	1.94
Acid Value suppressing effect		1.6%	9.2%	15.7%	11.4%	-4.9%

[0045]

Comparative Example 4

To a refined soybean oil (iodine value: 131) was added
5 100 ppm of mix tocopherol to obtain a cooking oil or fat.

An analysis value of an acid value of the cooking oil
or fat after a fry test was 1.40.

[0046]

Example 4

10 To 100 parts by weight of a refined soybean oil
(iodine value: 131) warmed to 70°C was added 0.3 part by
weight of a 1 wt% aqueous sodium carbonate solution, and
the resulting mixture was dehydrated for 20 minutes with
stirring under the conditions of a temperature of 70°C and
15 a vacuum degree of 40 Torr to obtain an oil or fat
containing the sodium salt at a concentration of 13 ppm in
terms of sodium. The sodium content was analyzed and found
to be 9.6 ppm (0.42 $\mu\text{mol/g}$). One hundred (100) ppm of mix
tocopherol as an antioxidant was added to obtain a cooking
20 oil or fat.

An analysis value of an acid value of the cooking oil
or fat after a fry test was 1.02, and the effect of
suppressing increase in an acid value as compared with the
cooking oil or fat of Comparative Example 4 was 27.1%.

25 [0047]

Comparative Example 5

To a blended oil of 50 parts by weight of palm olein (iodine value: 67), and 50 parts by weight of a refined soybean oil (iodine value: 131) were added 100 ppm of mix
5 tocopherol as an antioxidant and 500 ppm of an emulsifier (polyglycerin fatty acid ester) to obtain a cooking oil or fat.

An analysis value of an acid value of the cooking oil or fat after a fry test was 1.41.

10 [0048]

Example 5

To a blended oil of 50 parts by weight of palm olein (iodine value: 67) and 50 parts by weight of a refined soybean oil (iodine value: 131) warmed to 70°C was added
15 0.3 part by weight of a 1 wt% aqueous sodium carbonate solution, and the resulting mixture was dehydrated for 20 minutes with stirring under the conditions of a temperature 70°C and a vacuum degree of 40 Torr to obtain an oil or fat containing the sodium salt at a concentration of 13 ppm in
20 terms of sodium. The sodium content was analyzed and found to be 9.1 ppm (0.4 $\mu\text{mol/g}$). One hundred (100) ppm of mix tocopherol as an antioxidant and 500 ppm of an emulsifier (polyglycerin fatty acid ester) were added to obtain a cooking oil or fat.

25 An analysis value of an acid value of the cooking oil

or fat after a fry test was 1.11, and the effect of suppressing increase in an acid value as compared with the cooking oil or fat of Comparative Example 5 was 21.3%.

[0049]

5 Comparative Example 6

To a purified palm oil (iodine value: 52) was added 100 ppm of mix tocopherol as an antioxidant to obtain a cooking oil or fat.

10 An analysis value of an acid value of the cooking oil or fat after a fry test was 1.87.

[0050]

Example 6

To 100 parts by weight of palm olein (iodine value: 52) warmed to 70°C was added 0.3 part by weight of a 1 wt% aqueous sodium carbonate solution, and the resulting mixture was dehydrated for 20 minutes with stirring under the conditions of a temperature 70°C and a vacuum degree of 40 Torr to obtain an oil or fat containing the sodium salt at a concentration of 13 ppm in terms of sodium. The sodium content was analyzed and found to be 7.8 ppm (0.34 $\mu\text{mol/g}$). One hundred (100) ppm of mix tocopherol as an antioxidant was added to obtain a cooking oil or fat.

15

20

An analysis value of an acid value of the cooking oil or fat after a fry test was 1.53, and the effect of suppressing increase in an acid value as compared with the

25

cooking oil or fat of Comparative Example 6 was 18.2%.

[0051]

The results of Comparative Examples 4 to 6 and Examples 4 to 6 are shown in Table 2.

[0052]

Table 2	Comparative Example 4	Example 4	Comparative Example 5	Example 5	Comparative Example 6	Example 6
Added salts		Na carbonate	-	Na carbonate		Na carbonate
Na, K, Mg and Ca content (ppm)	-	9.6	-	9.1	-	7.8
Na, K, Mg, Ca content (μmol/g)	-	0.42	-	0.4	-	0.34
Oil or fat	Soybean oil	Soybean oil	Palm blended oil	Palm blended oil	Palm oil	Palm oil
Iodine value	131	131	99	99	52	52
Antioxidant	100 ppm	100 ppm	100 ppm	100 ppm	100 ppm	100 ppm
Emulsifier	-	-	500 ppm	500 ppm	-	-
	1.40	1.02	1.41	1.11	1.87	1.53
Acid Value suppressing effect	-	27.1%	-	21.3%	-	18.2%

[0053]

Example 7

To 100 parts by weight of palm olein (Iodine value:
67) warmed to 70°C was added 0.5 part by weight of a 1 wt%
5 aqueous potassium carbonate solution, and the resulting
mixture was dehydrated for 20 minutes with stirring under
the conditions of a temperature of 70°C and a vacuum degree
of 40 Torr to obtain a cooking oil or fat containing the
potassium salt at a concentration of 29 ppm in terms of
10 potassium. The potassium content was analyzed and found to
be 19.2 ppm (0.49 $\mu\text{mol/g}$).

An analysis value of an acid value of the cooking oil
or fat after a fry test was 1.6, and the effect of
suppressing increase in an acid value as compared with the
15 cooking oil or fat Comparative Example 1 was 13.51%.

[0054]

Example 8

To 100 parts by weight of palm olein (Iodine value:
67) warmed to 70°C was added 0.5 part by weight of a 1 wt%
20 aqueous calcium chloride solution, and the resulting
mixture was dehydrated for 20 minutes with stirring under
the conditions of a temperature of 70°C and a vacuum degree
of 40 Torr to obtain a cooking oil or fat containing the
calcium salt at a concentration of 14 ppm in terms of
25 calcium. The calcium content was analyzed and found to be

8.4 ppm (0.21 $\mu\text{mol/g}$).

An analysis value of an acid value of the cooking oil or fat after a fry test was 1.75, and the effect of suppressing increase in an acid value as compared with the cooking oil or fat of Comparative Example 1 was 5.41%.

[0055]

Example 9

To 100 parts by weight of palm olein (Iodine value: 67) warmed to 70°C was added 1 part by weight of a 1 wt% aqueous magnesium chloride solution, and the resulting mixture was dehydrated for 20 minutes with stirring under the conditions of a temperature of 70°C and a vacuum degree of 40 Torr to obtain a cooking oil or fat containing the magnesium salt at a concentration of 24 ppm in terms of magnesium. The magnesium content was analyzed and found to be 16.3 ppm (0.67 $\mu\text{mol/g}$).

An analysis value of an acid value of the cooking oil or fat after a fry test was 1.61, and the effect of suppressing increase in an acid value as compared with the cooking oil or fat of Comparative Example 1 was 12.97%.

[0056]

Example 10

To 100 parts by weight of palm olein (Iodine value: 67) warmed to 70°C was added 1.1 parts by weight of a 1 wt% aqueous sodium ascorbate solution, and the resulting

mixture was dehydrated for 20 minutes with stirring under the conditions of a temperature of 70°C and a vacuum degree of 40 Torr to obtain an oil or fat containing the sodium salt at a concentration of 13 ppm in terms of sodium. The sodium content was analyzed and found to be 8.0 ppm (0.35 $\mu\text{mol/g}$). One hundred (100) ppm of mix tocopherol as an antioxidant was added to obtain a cooking oil or fat.

An analysis value of an acid value of the cooking oil or fat after a fry test was 1.65, and the effect of suppressing increase in an acid value as compared with the cooking oil or fat of Comparative Example 1 was 10.81%.

[0057]

Example 11

To 100 parts by weight of palm olein (Iodine value: 67) warmed to 70°C was added 0.6 part by weight of a 1 wt% aqueous trisodium citrate solution, and the resulting mixture was dehydrated for 20 minutes while stirring under the conditions of a temperature of 70°C and a vacuum degree of 40 Torr to obtain an oil or fat containing the sodium salt at a concentration of 14 ppm in terms of sodium. The sodium content was analyzed and found to be 8.5 ppm (0.37 $\mu\text{mol/g}$). One hundred (100) ppm of mix tocopherol as an antioxidant was added to obtain a cooking oil or fat.

An analysis value of an acid value of the cooking oil or fat after a fry test was 1.52, and the effect of

suppressing increase in an acid value as compared with the cooking oil or fat of Comparative Example 1 was 17.84%.

[0058]

The results of Examples 7 to 11 are shown in Table 3.

Table 3	Example 7	Example 8	Example 9	Example 10	Example 11
Added salts	K carbonate	Ca chloride	Mg chloride	Na ascorbate	triNa citrate
Na, K, Mg and Ca content (ppm)	19.2	8.4	16.3	8.0	8.5
Na, K, Mg, and Ca content ($\mu\text{mol/g}$)	0.49	0.21	0.67	0.35	0.37
Oil or fat	Palm olein	Palm olein	Palm olein	Palm olein	Palm olein
Iodine value	67	67	67	67	67
Antioxidant	-	-	-	100 ppm	100 ppm
Acid Value	1.60	1.75	1.61	1.65	1.52
Acid Value suppressing effect	13.51%	5.41%	12.97%	10.81%	17.84

[0060]

Example 12

To 100 parts by weight of palm olein (iodine value:
67) warmed to 70°C was added 0.9 part by weight of a 1 wt%
5 aqueous sodium L-glutamate solution, and the resulting
mixture was dehydrated for 20 minutes with stirring under
the conditions of a temperature of 70°C and a vacuum degree
of 40 Torr to obtain an oil or fat containing the sodium
salt at a concentration of 13 ppm in terms of sodium. The
10 sodium content was analyzed and found to be 8.2 ppm (0.36
μmol/g). One hundred (100) ppm of mix tocopherol as an
antioxidant was added to obtain a cooking oil or fat.

An analysis value of an acid value of the cooking oil
or fat after a fry test was 1.71, and the effect of
15 suppressing increase in an acid value as compared with the
cooking oil or fat of Comparative Example 1 was 7.57%.

[0061]

Example 13

To 100 parts by weight of palm olein (iodine value:
20 67) warmed to 70°C was added 7.5 parts by weight of a 1 wt%
aqueous disodium succinate solution, and the resulting
mixture was dehydrated for 20 minutes with stirring under
the conditions of a temperature of 70°C and a vacuum degree
of 40 Torr to obtain an oil or fat containing the sodium
25 salt at a concentration of 13 ppm in terms of sodium. The

sodium content was analyzed and found to be 8.4 ppm (0.37 $\mu\text{mol/g}$). One hundred (100) ppm of mix tocopherol as an antioxidant was added to obtain a cooking oil or fat.

An analysis value of an acid value of the cooking oil or fat after a fry test was 1.58, and the effect of suppressing increase in an acid value as compared with the cooking oil or fat of Comparative Example 1 was 14.59%.

[0062]

Example 14

To 65 parts by weight of palm olein warmed to 70°C was added 5 parts by weight of polyglycerin-condensed ricinoleic acid ester (PGPR), and then, 30 parts by weight of a 30 wt% aqueous sodium carbonate solution was added, and the resulting mixture was thoroughly stirred to obtain an agent for suppressing increase in an acid value for a cooking oil or fat containing 9 wt% sodium carbonate. As polyglycerin-condensed ricinoleic acid ester, Poem PR-100 manufactured by Riken Vitamin Co., Ltd. was used.

To 100 parts by weight of palm olein (iodine value: 67) warmed to 70°C was added 220 ppm of the agent for suppressing increase in an acid value for a cooking oil or fat containing 9 wt% of the made sodium carbonate to obtain an oil or fat containing the sodium salt at a concentration of 8.5 ppm in terms of sodium. The sodium content was analyzed and found to be 8.6 ppm (0.37 $\mu\text{mol/g}$).

An analysis value of an acid value of the cooking oil or fat after a fry test was 1.50, and the effect of suppressing increase in an acid value as compared with the cooking oil or fat of Comparative Example 1 was 18.92%.

5 [0063]

Example 15

To 65 parts by weight of an extremely hydrogenated oil of a purified palm oil which had been warmed to 70°C and completely melted was added 5 parts by weight of
10 polyglycerin-condensed ricinoleic acid ester (PGPR), and then, 30 parts by weight of a 30 wt% aqueous sodium carbonate solution was added. The resulting mixture was thoroughly stirred, and run on a cooled drum. A solidified oil or fat was scraped and ground, and passed through a 10
15 mesh sieve to obtain a powdery preparation for suppressing increase in an acid value for a cooking oil or fat 9 wt% sodium carbonate. As the polyglycerin-condensed ricinoleic acid ester, Poem PR-100 manufactured by Riken Vitamin Co., Ltd. was used.

20 To 100 parts by weight of palm olein (iodine value: 67) warmed to a frying temperature of 180°C in a frying pan was added 220 ppm of the above-prepared powdery preparation for suppressing increase in an acid value for a cooking oil or containing 9 wt% of sodium carbonate to obtain an oil or
25 fat containing the sodium salt at a concentration of 8.5

ppm in terms of sodium. After dispersion, a sample was obtained, and the sodium content was analyzed and found to be 8.3 ppm (0.36 $\mu\text{mol/g}$).

An analysis value of an acid value of this cooking oil or fat after a fry test was 1.57, and the effect of suppressing increase in an acid value as compared with the cooking oil or fat of Comparative Example 1 was 15.14%.

[0064]

Example 16

To 100 parts by weight of palm olein (iodine value: 67) which had been weighed in a frying pan and warmed to a frying temperature of 180°C was added 200 ppm of sodium stearoyl lactate. After dispersion, a sample was obtained, and the sodium content was analyzed and found to be 8.3 ppm $\div$ 23 (0.36 $\mu\text{mol/g}$). An analysis value of an acid value of this cooking oil or fat after a fry test was 1.55, and the effect of suppressing increase in an acid value as compared with the cooking oil or fat of Comparative Example 1 was 16.21%.

[0065]

Comparative Example 7

To 100 parts by weight of palm olein (iodine value: 67) which had been weighed in a frying pan and warmed to a frying temperature of 180°C was added 25.5 ppm of sodium carbonate. After dispersion, a sample was obtained, and

the sodium content was analyzed and found to be 0.0 ppm (0 $\mu\text{mol/g}$).

An analysis value of an acid value of the cooking oil or fat after a frying test was 1.81, and the effect of
5 suppressing increase in an acid value as compared with the cooking oil or fat of Comparative Example 1 was 2.16%.

[0066]

The results of Examples 12 to 16 and Comparative Example 7 are shown in Table 4.

10 [0067]

[0067]

Table 4

	Example 12	Example 13	Example 14	Example 15	Example 16	Comparative Example 7
Added salts	Na L- glutamate	Na succinate	Na carbonate	Na carbonate	Na stearoyl lactate	Na carbonate
Na, K, Mg and Ca content (ppm)	8.2	8.4	8.6	8.3	8.3	0.0
Na, K, Mg, Ca content ($\mu\text{mol/g}$)	0.36	0.37	0.37	0.36	0.36	0
Oil or fat	Palm olein	Palm olein	Palm olein	Palm olein	Palm olein	Palm olein
Iodine value	67	67	67	67	67	67
Antioxidant	100 ppm	100 ppm	-	-	-	-
Acid Value	1.71	1.58	1.50	1.57	1.55	1.81
Acid Value suppressing effect	7.57%	14.59%	18.92%	15.14%	16.21%	2.16%

CLAIMS

1. A cooking oil or fat whose increase in an acid value due to heating is suppressed characterized in that
5 one or more components selected from the group consisting of sodium, potassium, magnesium and calcium is contained in an amount of 0.1 to 1 $\mu\text{mol/g}$ of the oil or fat.

2. A method for suppressing increase in an acid
10 value of a cooking oil or fat due to heating characterized in that one or more components selected from the group consisting of sodium, potassium, magnesium and calcium is blended in an amount of 0.1 to 1 $\mu\text{mol/g}$ of the oil or fat.

15 3. A method for producing a cooking oil or fat whose increase in an acid value due to heating is suppressed characterized in that an aqueous solution of one or more salts of metals selected from the group consisting of sodium, potassium, magnesium and calcium is mixed with an
20 oil or fat, followed by dehydrating the mixture to obtain the cooking oil or fat containing one or more components selected from the group consisting of sodium, potassium, magnesium and calcium in a total amount of 0.1 to 1 $\mu\text{mol/g}$ of the oil or fat.

4. An agent for suppressing increase in an acid value of a cooking oil or fat characterized in that the agent comprises one or more salts of metals selected from the group consisting of sodium, potassium, magnesium and calcium.

5. An agent for suppressing increase in an acid value of a cooking oil or fat characterized in that the agent is a water-in-oil type emulsion composition comprising an aqueous solution of one or more salts of metals selected from the group consisting of sodium, potassium, magnesium and calcium; a substrate; and an emulsifier.

6. A powdery preparation for suppressing increase in an acid value of a cooking oil or fat characterized in that the preparation comprises one or more salts of metals selected from the group consisting of sodium, potassium, magnesium and calcium.

7. A powdery oil or fat preparation for suppressing increase in an acid value of a cooking oil or fat, wherein the preparation comprises one or more salts of metals selected from the group consisting of sodium, potassium, magnesium and calcium.