

PROCESS FOR PREPARING LIQUID CREAM

Technical Field

The present invention relates to a process for
5 preparing liquid cream.

Background Art

Cream includes that in the form of a liquid and in the
form of powder. As cream in the form of liquid, i.e.,
10 liquid cream, in general, there are natural cream and so-
called synthetic cream utilizing a vegetable fat. Since
natural cream is expensive and it is difficult to maintain
constant quality, synthetic cream utilizing a vegetable fat
is currently prevailing in liquid cream. Further, as
15 liquid cream, there are so-called "portion cream" filled in
a portion pack, and so-called "bottle cream" filled in a
bottle. In particular, portion cream is widely distributed
as cream for domestic use for coffee.

Since portion cream and bottle cream are exposed to
20 various temperatures (about 1°C to 40°C) such as
temperatures during transport from manufactures, storage in
retailers, storage in homes, and a distribution stage to
consumption by consumers, portion cream and bottle cream
are demanded to have stable flavor and emulsion state in a
25 wide temperature range from a low temperature to a high

temperature for a long term.

Currently, as a fat generally used for portion cream, hydrogenated rapeseed oil having a melting point of about 17°C to 30°C and, partially, a lauric type fat such as palm oil or palm kernel oil is used. Since an amount of crystallization of portion cream using hydrogenated rapeseed oil is small at a low temperature, emulsion stability at the time of refrigeration is excellent. However, a flavor of the portion cream is inferior as compared with portion cream using a lauric type fat. In addition, there is a tendency that use of a hydrogenated oil is avoided at markets. On the other hand, while a lauric type fat has a more excellent flavor as portion cream than that of hydrogenated rapeseed oil, there is a problem that emulsion stability at the time of refrigeration is low, because an amount of crystallization in a low temperature range is large. As portion cream excellent in emulsion stability in a low temperature range, there is portion cream using a fat prepared from triglycerides containing short or intermediate chain fatty acids as a main component or a major component and triglycerides containing long chain fatty acids as a main component using a 1,3-specific lipase (JP 07-079698 A), but this portion cream does not use palm kernel oil.

Meanwhile, an organic acid is generally recognized to

be excellent in antioxidant properties as a synergist, but to be difficult to incorporate it with a fat, and it is known that an organic acid is used by emulsifying it with a fat in the form of an oil-in-water type emulsion, or is used by melting in a monoglyceride. Although ascorbic acid itself is added to a fry oil for improving a heat-deteriorated smell of a fried product (WO 01/096506), this is not used in portion cream.

10 Disclosure of the Invention

Objects of the Invention

One object of the present invention is to develop a process for preparing liquid cream which has high emulsion stability and high flavor stability even when stored in a wide temperature range.

This object as well as other objects and advantages of the present invention will be apparent to those skilled in the art from the following description.

20 Summary of the Invention

In order to achieve the above objects, the present inventors intensively studied and, as a result, found that portion cream whose amount of crystallization in a low temperature range is smaller than that of a conventional portion cream using a lauric type fat and whose emulsion

stability is high even at the time of refrigeration can be prepared by using a low melting point fraction of palm kernel oil, and that a fat composition excellent in flavor stability can be prepared by adding at least one kind of an organic acid or an organic acid salt selected from the group consisting of ascorbic acid, erythorbic acid, malic acid and salts thereof to the above fraction. Thus, the present invention has been completed.

That is, according to the present invention, there is provided:

(1) A process for preparing liquid cream, which comprises adding a low melting point fraction of palm kernel oil;

(2) The process according to the above (1), wherein SFC (solid fat content) at 5°C of the low melting point fraction of palm kernel oil is 30% to 50%;

(3) The process according to the above (1) or (2), wherein the low melting point fraction of palm kernel oil contains an organic acid and/or an organic acid salt;

(4) The process according to the above (3), wherein a content of the organic acid and/or organic acid salt in the low melting point fraction of palm kernel oil is 2 to 28 ppm;

(5) The process according to the above (3), wherein the organic acid or the organic acid of the organic acid

salt is ascorbic acid, erythorbic acid or malic acid; and

(6) A fat composition for liquid cream, which comprises a low melting point fraction of palm kernel oil containing an organic acid and/or an organic acid salt.

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Detailed Description of the Invention

The liquid cream of the present invention is cream in the form of liquid such as portion cream and bottle cream and a representative use of the cream is that for coffee.

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In the present invention, as the low melting point fraction (e.g., melting point of the fraction: 10 to 20°C) of palm kernel oil, a liquid fraction obtained by subjecting palm kernel olein to further fractionation is preferably used, and the fractionation method includes a solvent fractionation method and a dry fractionation method.

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Preferably, SFC at 5°C of the low melting point fraction of palm kernel oil obtained by fractionation is 30 to 50%. The SFC value is measured according to IUPAC.

2.150 Solid Content Determination in Fats by NMR.

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If the SFC value at 5°C is higher than 50%, the emulsion of liquid cream is apt to be broken due to precipitation of fat crystals, when the liquid cream is stored under refrigeration or freezing. On the other hand, if the SFC value at 5°C is lower than 30%, a yield of the desired fraction by fractionation from palm kernel olein is

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remarkably decreased, while quality is not influenced, when using the liquid cream as coffee cream.

Usually, the amount of the low melting point fraction of palm kernel oil to be added is 10 to 30 % by weight
5 based on the total weight of the liquid cream.

As a method for adding the organic acid and/or organic acid salt to the fraction, since the organic acid and/or organic acid salt are hydrophilic and scarcely soluble in a fat, a preferred method is to add an aqueous solution of
10 the organic acid and/or organic acid salt to the fraction, followed by distillation or drying under reduced pressure. When a concentration of the organic acid and/or organic acid salt in the aqueous solution is low, a larger amount of the aqueous solution relative to the fraction is
15 required, thereby deteriorating production efficiency such as drying efficacy. On the other hand, when the concentration of the organic acid and/or organic acid salt is high, crystals of the organic acid and/or organic acid salt is precipitated and it is difficult to add the organic
20 acid and/or organic acid salt to the fraction. Then, the preferred concentration of the organic acid and/or organic acid salt in the aqueous solution is usually 1 to 10%. Distillation is carried out at the temperature of fraction of 50 to 180°C for 15 minutes to 1 hour at a vacuum degree
25 of 0.5 to 100 Torr. Preferably, the vacuum degree is as

low as possible.

The organic acid and/or organic acid salt improve flavor stability of the portion cream. As the amount of the organic acid and/or organic acid salt is larger, flavor stability is more improved. However, as mentioned above, the organic acid and/or organic acid salt are hydrophilic, and there is a tendency that a largest content in the fraction is 28 ppm. It is difficult to incorporate the organic acid and/or organic acid salt with the fraction in an amount exceeding this upper limit. And, when attempts are made to incorporate the organic acid and/or organic acid salt with the fraction in an amount exceeding the upper limit, an amount of water in the fraction is increased. This is problematic because the fraction is apt to deteriorated and, therefore, 28 ppm or smaller is preferred. On the other hand, when a content of the organic acid and/or organic acid salt is smaller than 2 ppm, the improvement effect of flavor stability of the portion cream tends to be lost.

Preferably, the organic acid or the organic acid of organic acid salt is a member selected from the group consisting of ascorbic acid, erythorbic acid and malic acid. These three acids have high capability for preventing deterioration of a flavor of the fraction and, when it is used in the fat composition for liquid cream, the

capability for preventing deterioration of a flavor are enhanced. Then, the liquid cream having high flavor stability can be obtained. As a salt of the organic acid salt, a sodium salt, a potassium salt and the like are used, with a sodium salt being preferred. The organic acid and organic acid salt can be used alone or in a combination of two or more thereof.

The present invention also includes the fat composition for liquid cream obtained by incorporating the organic acid and/or organic acid salt with the low melting point fraction of palm kernel oil.

The liquid cream, particularly, coffee cream can be prepared by a conventional method and other ingredients are not specifically limited. For example, first, a lipophilic emulsifying agent to be used is added to a part or all of a raw material fat, and dissolved or dispersed therein to prepare an oily phase part. Examples of the emulsifying agent include those having low HLB among conventional known emulsifying agents such as lecithin, glycerin fatty acid ester, polyglycerin fatty acid ester, propylene glycol fatty acid ester, sorbitan fatty acid ester, and the like, and any of them may be used in the present invention. Then, for example, sodium caseinate, skim milk powder, sugars and, if necessary, sucrose fatty acid ester, sodium citrate, sodium tripolyphosphate, dibasic sodium phosphate, sodium

bicarbonate, and sodium hexametaphosphate are added to an aqueous phase part.

Pre-emulsification is carried out by heating these oily phase part and aqueous phase part to 60°C and 80°C and
5 mixing them. After pre-emulsification, the resultant mixture is homogenized with a homogenizer, sterilized by a batch sterilizing method or UHT sterilizing treatment by an indirect or direct heating system, homogenized again with a homogenizer, and then cooled.

10 The raw material fat used in the oily phase part of the liquid cream include the fat composition for liquid cream of the present invention which comprises the low melting point fraction of palm kernel oil containing the organic acid and/or organic acid salt. This fat
15 composition contains both of the low melting point fraction of palm kernel oil and the organic acid and/or organic acid salt. Even when the low melting point fraction of palm kernel oil, and the organic acid and/or organic acid salt are separately added at the time of preparing liquid cream,
20 desired effects of the organic acid and/or organic acid salt of stabilizing a flavor are not exerted.

The following Examples and Comparative Examples further illustrate the present invention in detail but are not to be construed to limit the scope thereof. In
25 examples, all the "parts" are by weigh unless otherwise

stated.

Example 1

Palm kernel olein having IV (iodine value) of 25.1 was fractionated into a liquid fraction (IV 35.1, yield 41.7%) and a crystalline fraction (IV 15.1, yield 58.3%) by dry fractionation to obtain a liquid fraction as a low melting point fraction of palm kernel oil. This low melting point fraction of palm kernel oil had SFC at 5°C of 34.7. To 100 parts of this low melting point fraction heated to 70°C was added 0.4 part of a 1% aqueous solution of ascorbic acid (manufactured by Wako Pure Chemical Industries, Ltd., trade name: L Ascorbic acid, purity 99.5%), followed by dehydration with stirring for 20 minutes at a vacuum degree of 40 Torr. The mixture was filtered with a TOYO No.5 filter to obtain a low melting point fraction of palm kernel oil containing ascorbic acid. Ascorbic acid concentration was 20.3 ppm as measured by an ascorbic acid determination method.

Example 2

Fifty parts of the low melting point fraction of palm kernel oil containing ascorbic acid prepared as described above was mixed with 50 parts of low melting point fraction of palm kernel oil prepared as described above with no addition of ascorbic acid to obtain a low melting point fraction of palm kernel oil having an ascorbic acid content

of 10.2 ppm.

Example 3

Ten parts of the low melting point fraction of palm kernel oil containing ascorbic acid prepared as described above was mixed with 60 parts of the low melting point fraction of palm kernel oil prepared as described above with no addition of ascorbic acid to obtain a low melting point fraction of palm kernel oil having an ascorbic acid content of 2.8 ppm.

10 Comparative Example 1

Five parts of the low melting point fraction of palm kernel oil containing ascorbic acid prepared as described above was mixed with 95 parts of the low melting point fraction of palm kernel oil prepared as described above with no addition of ascorbic acid to obtain a low melting point fraction of palm kernel oil having an ascorbic acid content of 1.1 ppm.

Comparative Example 2

According to the same manner as that described in Example 1, ascorbic acid was added to hydrogenated rapeseed oil having a softening point of 22°C. Ascorbic acid concentration was 20.1 ppm as measured by an ascorbic acid determination method.

Comparative Example 3

25 According to the same manner as that described in

Example 1, ascorbic acid was added to palm oil. Ascorbic acid concentration was 20.2 ppm as measured by an ascorbic acid determination method.

Comparative Example 4

5 According to the same manner as that described in Example 1, ascorbic acid was added to palm kernel olein. Ascorbic acid concentration was 19.8 ppm as measured by an ascorbic acid determination method.

Comparative Example 5

10 A low melting point fraction of palm kernel oil having SFC at 5°C of 52.0% was obtained by dry fractionation of palm kernel olein having IV of 25.1. As in Example 1, ascorbic acid was added to obtain a low melting point fraction of palm kernel oil having ascorbic acid
15 concentration of 20.3 ppm.

Comparative Example 6

 According to the same manner as that described in Example 1, ascorbic acid was added to MCT (middle chain triglycerides: manufactured by Uniqema (Malaysia) Sdn. Bhd.,
20 saturated fatty acid having 8 carbon atoms (60%), saturated fatty acid having 10 carbon atoms (40%)) to obtain a low melting point fraction of palm kernel oil having ascorbic acid concentration of 20.3 ppm.

Preparation of portion cream

25 According to the formulation as shown in Table 1,

coffee cream was prepared. The values in Table 1 are % by weight in the entire composition.

Table 1

Oily phase part	Fat composition	25.0
	Lecithin	0.1
	Sucrose fatty acid ester (HLB=1)	0.15
	Sorbitan fatty acid ester	0.1
	Sucrose fatty acid ester (HLB=5)	0.1
Aqueous phase part	Sodium caseinate	5.2
	Sucrose fatty acid ester (HLB=15)	0.5
	Stabilizer	0.15
	Salts	0.6
	Water	Balance

5 The oily phase part and the aqueous phase part having the above formulation were pre-emulsified at 65°C for 15 minutes, homogenized at a homogenization pressure (primary homo pressure) of 150 kg/cm² using a homogenizer (manufactured by Fukao Kikai), and sterilized by VTIS
10 sterilization treatment according to a conventional method. The resultant mixture was homogenized again at homogenizing pressure (secondary homo pressure) of 250 kg/cm² using a homogenizer (manufactured by Manton Gorin), and cooled to prepare the desired portion cream.

15 Table 2 shows each low melting point fraction used in each portion cream, SFC at 5°C of the fraction and ascorbic acid concentration, as well as the results of a portion cream test.

Table 2

	Fat	SFC 5°C (%)	Ascorbic acid (ppm)	Flavor	1°C storage	Freezing test
Example 1	Low melting point fraction of palm kernel oil	34.7	20.3	◎	○	○
Example 2	Low melting point fraction of palm kernel oil	34.7	10.2	◎	○	○
Example 3	Low melting point fraction of palm kernel oil	34.7	2.8	○	○	○
Comparative Example 1	Low melting point fraction of palm kernel oil	34.7	1.1	×	○	○
Comparative Example 2	Hardened rapeseed oil	30.6	20.1	×	○	○
Comparative Example 3	Palm oil	90.0	20.2	◎	×	×
Comparative Example 4	Palm kernel olein	63.8	19.8	◎	×	×
Comparative Example 5	Low melting point fraction of palm kernel oil	52.0	20.3	◎	×	×
Comparative Example 6	MCT	0	20.3	×	○	○

For evaluating a flavor, a cream sample was placed into a 5 ml portion pack, stored at ordinary temperature (20°C), and a flavor was confirmed after 120 days.

5 Criteria of Flavor Evaluation

◎: Flavor better, ○: Slight change in flavor, ×: Deterioration in flavor (unsuitable for drinking and

eating), XX: Serious deterioration in flavor

For carrying out the 1°C storage test, 200 ml of a sample was placed into a 220 ml mayonnaise bottle, stored at 1°C, and whey separation was observed after 3 days.

5 Criteria of Test Results

○: No whey separation, X: Whey separation was observed.

For carrying out the freezing test, 5 ml of a sample was placed into a portion pack, allowed to stand at -20°C
10 for 72 hours, thawed at 25°C for 3 hours, and whey separation was observed.

Criteria of Test Results

○: No. whey separation, X: Whey separation was observed.

15 As seen from Comparative Example 1, when a content of ascorbic acid is smaller than 2 ppm, whey separation is not observed in 1°C storage and freezing tests, and emulsion stability is excellent. However, a flavor is deteriorated.

As seen from Comparative Example 2, regarding the
20 portion cream prepared by using hydrogenated rapeseed oil having a melting point of 22°C, whey separation is not observed in 1°C storage and freezing tests, and emulsion stability is excellent. However, a flavor is deteriorated.

As seen from Comparative Examples 3, 4 and 5, the
25 portion creams prepared by using lauric type palm oil, palm

kernel olein, and the low melting point fraction of palm kernel oil having a high SFC value at 5°C have better flavors. However, whey separation is caused in 1°C storage and freezing tests. Therefore, commercial value is lost.

5 When MCT which does not cause crystal precipitation at 5°C is used, whey separation is not observed in 1°C storage and freezing tests, and emulsion stability is excellent. However, a good flavor was not obtained because it is not a lauric type fat.

10 As seen from Examples 1, 2 and 3, the portion cream using the low melting point fraction of palm kernel oil containing ascorbic acid has flavor stability equivalent or superior to that of a portion cream using the lauric type fat and, in 1°C storage and freezing test, whey separation
15 is not observed, and emulsification is maintained even in a low temperature range. Thus, they are portion creams having high emulsion stability equivalent to that of a portion cream using hydrogenated rapeseed oil.

In addition, palm kernel olein having IV of 25.1 was
20 fractionated into a liquid fraction (IV35.1, yield 47.1%) and a crystalline fraction (IV15.1, yield 58.3%) by dry fractionation. Portion cream was prepared by using the resultant liquid fraction as a low melting point fraction of palm kernel oil and separately an organic acid so that
25 the amount thereof was 20.3 ppm. When flavor stability was

assessed, a flavor immediately after preparation was better, but a flavor was seriously deteriorated after 120 days.

As described herein above, according to the present invention, there can be provided liquid cream maintaining
5 high emulsion stability and high flavor stability even when stored in a wide temperature range.

CLAIMS

1. A process for preparing liquid cream, which comprises adding a low melting point fraction of palm
5 kernel oil.

2. The process according to claim 1, wherein SFC (solid fat content) at 5°C of the low melting point fraction of palm kernel oil is 30% to 50%.

3. The process according to claim 1 or 2, wherein
10 the low melting point fraction of palm kernel oil contains an organic acid and/or an organic acid salt.

4. The process according to claim 3, wherein a content of the organic acid and/or organic acid salt in the low melting point fraction of palm kernel oil is 2 to 28
15 ppm.

5. The process according to claim 3, wherein the organic acid or the organic acid of the organic acid salt is ascorbic acid, erythorbic acid or malic acid.

6. A fat composition for liquid cream, which
20 comprises a low melting point fraction of palm kernel oil containing an organic acid and/or an organic acid salt.