

OIL AND FAT COMPOSITION FOR CHOCOLATE

Technical Field

The present invention relates to an oil and fat
5 composition for chocolate which comprises an oil and fat
obtained by ester exchange between an oil and fat
containing 30% or more of a fatty acid having 12 carbon
atoms or less and an oil and fat containing 30% or more of
a saturated fatty acid having 20 carbon atoms or more, and
10 further comprises an acetylated sucrose fatty acid ester,
and which can produce a chocolate excellent in flavor
containing cocoa butter without resort to a tempering
operation.

15 Background Art

Chocolate is roughly classified into one requiring a
tempering operation and one not requiring a tempering
operation, depending on an oil and fat ingredient used in
production of the chocolate. The former chocolate consists
20 of an oil and fat containing, as the main component, SUS-
type triglyceride (S: saturated fatty acid, U: unsaturated
fatty acid) a representative of which is cocoa butter. On
the other hand, the latter chocolate often consists of an
oil and fat containing a trans-unsaturated fatty acid or a
25 lauric acid-type oil and fat such as a palm oil and a palm

kernel oil.

In recent years, combination products of chocolate and baked confectionery have been increased due to diversification of taste of consumers. In production of combination products of chocolate and baked confectionery, if chocolate can be subjected to a tempering operation, good products can be made without using triglyceride containing as the main component an oil and fat containing a trans-unsaturated fatty acid. However, there are cases where a tempering operation can not be performed. For example, when chocolate is combined with baked confectionery in a hot state or when chocolate is filled into hollow baked confectionery, a tempering operation can not be performed. In the former case, a tempering operation of chocolate may be performed after baked confectionery is cooled once. In this case, however, productivity is reduced, which is not economical. In the latter case, a tempering operation can not be substantially performed in many cases because once chocolate is subjected to a tempering operation, the chocolate generally has a high viscosity and as a result, a filling operation can not be performed. Therefore, it is necessary to fill chocolate in a low viscous state into hollow baked confectionery.

If an oil and fat containing 5% or less of cocoa butter is used in production of chocolate, a chocolate with

stable quality can be produced without using an oil and fat consisting of a trans-unsaturated fatty acid, such as a palm oil or a palm kernel oil or a fractionated oil thereof. The chocolate thus produced, however, can not have the intrinsic good flavor of chocolate because cocoa butter or cacao mass can not be used. In this case, cocoa powder is used in production of chocolate and as a result, the produced chocolate has a strong cocoa flavor rather than the intrinsic good flavor of chocolate.

In many cases, cocoa butter or cacao mass is used for the purpose of producing a chocolate having an excellent flavor, and an oil and fat containing a trans-unsaturated fatty acid is used for the purpose of obtaining a good quality chocolate without resort to a tempering operation. The content of a trans-unsaturated fatty acid in the oil and fat containing a trans-unsaturated fatty acid is generally around 40 to 50%. For example, JP-A 2000-041579 discloses an example of a non-tempering chocolate having a high cacao butter content produced from a combination of a high trans-unsaturated fatty acid-containing oil and fat and an acetylated sucrose fatty acid ester.

There is also a hardened oil having a low content of a trans-unsaturated fatty acid. However, when the content of a trans-unsaturated fatty acid in an oil and fat to be used in production of a chocolate is lower, the amount of cocoa

butter that can be contained in the oil and fat is also lower.

An oil and fat containing a trans-unsaturated fatty acid is generally produced by hydrogenation (also called hardening). The hydrogenation is a step of producing a saturated fatty acid by adding hydrogen to the double bonds of an unsaturated fatty acid. Although an unsaturated fatty acid generally has a cis configuration in terms of the attached positions of hydrogen, the configuration is changed to a trans-type during a step of hydrogenation. Trans-unsaturated fatty acids are naturally produced by microorganisms of ruminants, and therefore are contained in milk fat or meat.

In recent years, it has been found that excess intake of trans-unsaturated fatty acids increases a risk of heart disease such as arterial sclerosis, and therefore Western countries have cautioned consumers. For example, the United States has obligated producers to put labels showing the content of trans-unsaturated fatty acids on products since January 2006. In Denmark, the sale of a processed oil and fat containing 2% or more of trans-unsaturated fatty acids has been prohibited.

In Japan, intake of trans-unsaturated fatty acids is conventionally lower than Western countries. Thus, at present, a health problem caused by trans-unsaturated fatty

acids is not particularly recognized. Nevertheless, there is demand for an oil and fat having a lower content of trans-unsaturated fatty acids.

A modification method of an oil and fat is generally known, which comprises performing ester exchange between a fatty acid having a small number of carbon atoms or an oil and fat containing the fatty acid, and a fatty acid having a large number of carbon atoms or an oil and fat containing the fatty acid to modify the characteristics of each oil and fat. For example, US Patent No. 3353964 describes an oil and fat obtained by random ester exchange between 50 parts of a palm oil and 50 parts of a high erucic acid rapeseed extremely hardened oil. JP-A 4-066045 describes an oil and fat obtained by ester exchange between 50 parts of a palm oil and 50 parts of a high erucic acid rapeseed extremely hardened oil with an alkali catalyst. JP-A 9-165595 describes an oil and fat obtained by a random ester exchange of an oil and fat containing 2 to 50% by weight of a saturated fatty acid of 14 carbon atoms or less and 1 to 50% by weight of a saturated fatty acid of 20 carbon atoms or more and, as an example, an oil and fat produced by random ester exchange between 40% of a palm oil, 30% of a high erucic acid rapeseed extremely hardened oil and 30% of a soybean oil using sodium methyllate. However, these oil and fat compositions are intended to be kneaded into baked

confectionery, for example, used in producing margarine or shortening, and therefore they are rapidly cooled and plasticized in order to obtain plasticity of an oil and fat.

5 Disclosure of Invention

Problems to be Solved by the Invention

An object of the present invention is to provide a chocolate excellent in flavor and melting in mouth, which contains cocoa butter and is produced without a tempering
10 operation and which is prevented from quality deterioration with time, and an oil and fat composition used in production of the chocolate.

Means for Solving the Problems

15 The present inventors intensively studied and as a result, found that selection of an oil and fat derived from specific kinds of fatty acids and a method of processing an oil and fat by ester exchange is effective for resolving the above-described problems and, further, that a
20 combination of the oil and fat processing method and a specific emulsifying agent is effective for resolving the above-described problems. Then, the present invention was completed based on the findings.

In the first aspect, the present invention provides an
25 oil and fat composition for chocolate obtained by ester

exchange between an oil and fat containing 30% or more of a fatty acid having 12 carbon atoms or less and an oil and fat containing 30% or more of a saturated fatty acid having 20 carbon atoms or more. In the second aspect, the present invention provides the oil and fat composition for chocolate according to the first aspect, which has an iodine value of 28 or less. In the third aspect, the present invention provides the oil and fat composition for chocolate according to the first or second aspect, which further comprises an oil and fat containing 30% or more of behenic acid. In the forth aspect, the present invention provides the oil and fat composition for chocolate according to the first or second aspect, wherein the ester exchange is random ester exchange. In the fifth aspect, the present invention provides the oil and fat composition for chocolate according to any one of the first to fourth aspects, wherein the content of a trans-unsaturated fatty acid is 10% or less. In the sixth aspect, the present invention provides a chocolate obtained by using the oil and fat composition according to any one of the first to fifth aspects. In the seventh aspect, the present invention provides a process for producing a chocolate which comprises using the oil and fat composition according to the first or second aspect in an amount of 20 to 68% by weight based on the whole chocolate. In the eighth aspect,

the present invention provides an oil and fat composition for chocolate comprising the ester-exchanged oil and fat according to the first aspect and an acetylated sucrose fatty acid ester. In the ninth aspect, the present

5 invention provides the oil and fat composition for chocolate according to the eighth aspect, which has an iodine value of 5 to 30. In the tenth aspect, the present invention provides a chocolate obtained by using the oil and fat composition according to the eighth or ninth aspect.

10 In the eleventh aspect, the present invention provides a process for producing a chocolate which comprises using the oil and fat composition according to the eighth or ninth aspect in an amount of 20 to 68% by weight based on the whole chocolate.

15

Effect of the invention

The oil and fat composition for chocolate of the present invention can produce a chocolate excellent in flavor and melting in mouth which is prevented from quality
20 deterioration with time such as blooming, graining and luster deterioration, wherein said chocolate can be produced without a tempering operation in spite of containing only 10% or less of a trans-unsaturated fatty acid, even if the chocolate contains cocoa butter in an
25 amount of 5% or more of the whole oil and fat.

Best Mode for Carrying out the Invention

The oil and fat composition for chocolate of the present invention can be obtained by ester exchange between
5 an oil and fat containing 30% or more of a fatty acid having 12 carbon atoms or less and an oil and fat containing 30% or more of a saturated fatty acid having 20 carbon atoms or more. The oil and fat composition for chocolate thus obtained has an iodine value of 28 or less,
10 preferably 0 to 27, further preferably 0 to 26. It is further preferable that the ester-exchanged oil and fat is blended with an acetylated sucrose fatty acid ester. The amount of the acetylated sucrose fatty acid ester to be blended is preferably 0.4 to 7.5% by weight of the whole
15 oil and fat composition. The oil and fat composition for chocolate thus obtained has an iodine value of is 5 to 30, preferably 7 to 25.

From a viewpoint of luster of chocolate, it is preferable that the oil and fat composition for chocolate
20 further comprises an oil and fat containing 30% or more of behenic acid.

Examples of the oil and fat containing 30% or more of a fatty acid having 12 carbon atoms or less include a palm oil, and a palm kernel oil, and a fractionated oil, a
25 hardened oil and an ester exchanged oil thereof. These

oils and fats can be used alone or in combination.

Examples of the oil and fat containing 30% or more of a saturated fatty acid having 20 carbon atoms or more include extremely hardened oils and fats (normally, oils
5 hydrogenated to an iodine value of 1 or less) of a high erucic acid rapeseed oil, a mustard oil, a crambe oil and a fish oil. Examples of the oil and fat containing 30% or more of behenic acid also include an extremely hardened oil and fat of a rapeseed oil having a high erucic acid content
10 (when unsaturated erucic acid is hardened, saturated behenic acid can be obtained), and extremely hardened oils and fats of a mustard oil, a crambe oil, and a fish oil, and preferred is an extremely hardened oil and fat of a high erucic acid rapeseed oil which is easily available.

15 Examples of an oil and fat contained in the oil and fat composition for chocolate, other than the oil and fat containing 30% or more of a fatty acid having 12 carbon atoms or less, the oil and fat containing 30% or more of a saturated fatty acid having 20 carbon atoms or more and the
20 oil and fat containing 30% or more of behenic acid, include vegetable oils and fats such as a soybean oil, a sunflower seed oil, a cottonseed oil, a peanut oil, a rice bran oil, a corn oil, a safflower, an olive oil, a kapok oil, a sesame oil, an evening primrose oil and a palm oil, and
25 animal oils and fats such as a milk fat, a beef tallow and

a lard. The above-described oils and fats can be used alone or a mixture thereof. Hardened oils, fractionated oils, hardened fractionated oils, fractionated hardened oils and processed oils and fats by ester exchange or the like of the above-described oils and fats can be also used.

The oil and fat composition thus obtained contains 10% or less, preferably 5% or less of a trans-unsaturated fatty acid. When the content of a trans-unsaturated fatty acid is high, it is difficult to attain the object of the present invention.

As ester exchange, there are specific ester exchange (1,3-position specific ester exchange) which specifically exchanges only fatty acids bound to the 1- and 3-positions of triglyceride using an enzyme (lipase), and random ester exchange which randomly exchanges fatty acids irrespectively of binding positions using an enzyme or a metal catalyst (e.g. sodium methylate). As ester exchange in the present invention, the latter random ester exchange is preferable. This is because random ester exchange produces more kinds of triglycerides, which allows stabilization of quality of non-tempering chocolate over a long period.

The acetylated sucrose fatty acid ester used in the present invention is a sucrose fatty acid ester in which hydroxy groups remaining in a sucrose fatty acid ester are

substituted with acetyl groups. Examples of the fatty acid of the acetylated sucrose fatty acid ester preferably include long chain saturated fatty acids having 16 carbon atoms or more such as stearic acid and palmitic acid. The acetylated sucrose fatty acid ester has preferably an esterification degree of 3 or more. The blending amount of the acetylated sucrose fatty acid ester is in the range of 0.4 to 7.5% by weight of the oil and fat composition of the present invention. It is preferable that the blending amount of the acetylated sucrose fatty acid ester is an amount corresponding to 0.4 to 2.0% by weight of the obtained chocolate. When the content of the acetylated sucrose fatty acid ester in a chocolate is small, there is a risk of causing quality deterioration (coarsening) of the chocolate with time. When the content of the acetylated sucrose fatty acid ester in a chocolate is too large, the effect of the acetylated sucrose fatty acid ester is not much increased considering the high cost of production. Therefore, the content of the acetylated sucrose fatty acid ester in a chocolate is preferably 2.0% by weight.

The oil and fat composition obtained as above described is used in production of chocolate. Chocolate is generally classified into dark chocolate made from ingredients including cacao mass, cocoa butter, saccharides such as sugar, an oil and fat such as cocoa butter, an

emulsifying agent and a flavor, milk chocolate made from ingredients including cacao mass, cocoa butter, saccharides such as sugar, an oil and fat such as cocoa butter, milk products such as powdered whole milk, an emulsifying agent and a flavor, and white chocolate made from ingredients including saccharides such as sugar, an oil and fat such as cocoa butter, milk products such as powdered whole milk, an emulsifying agent and a flavor. Chocolate is also classified into chocolate (cacao content: 35% or more) and quasi chocolate (cacao content: 15% or more) depending on a cacao content. The chocolate of the present invention is not limited to the above-described chocolates, and the oil and fat composition of the present invention can be used in production of any chocolate. Chocolate is generally has an oil and fat content of 30 to 60% by weight.

The chocolate of the present invention is produced by using the above-described oil and fat composition. The oil and fat composition according to the first, second, eighth or ninth aspect of the present invention is used in an amount of preferably 20 to 68% by weight, more preferably 24 to 60% by weight, further preferably 28 to 51% by weight of the whole chocolate. When a smaller amount of the oil and fat composition is used, it is difficult to maintain the quality of the obtained chocolate over a long period of time (quality deterioration of chocolate such as blooming

and graining). Conversely, when a larger amount of the oil and fat composition is used, the proportion of components other than the oil and fat composition of the present invention in the obtained chocolate is too lowered and therefore, it is difficult to produce a chocolate having a good flavor.

The content of cocoa butter in an oil and fat used in production of a chocolate is preferably 25% by weight or less, further preferably 20% by weight or less. When the content of cocoa butter in the oil and fat is more than 25% by weight, it is difficult to produce a chocolate excellent in flavor and quality without tempering even if the oil and fat composition of the present invention is used.

Examples

The following Examples demonstrate the effect of the present invention. However, the spirit of the present invention is not limited to the following Examples. In Examples, "%" and "part(s)" are shown on a weight basis.

Test Example 1 (Preparation of oil and fat)

To an oil and fat mixture of 50 parts of a palm oil (iodine value: 8), 40 parts of a palm fractionated stearin (iodine value: 31) and 10 parts of a high erucic acid rapeseed extremely hardened oil (iodine value: 1 or less)

was added 0.3 part of a metal catalyst (sodium methoxide). The mixture was subjected to random ester exchange at 60°C for 60 minutes under vacuum. The resulting oil and fat was purified according to a conventional method to obtain an oil and fat A. The oil and fat A had an iodine value of 17, and a slip melting point of 35°C.

Test Example 2 (Preparation of oil and fat)

Into 99.6 parts of the ester-exchanged fat prepared in Test Example 1 was mixed 0.4 part of a high erucic acid rapeseed extremely hardened oil (iodine value: 1 or less) to obtain an oil and fat B. The oil and fat B had an iodine value of 17 and a slip melting point of 35°C.

Test Example 3 (Preparation of oil and fat)

Into 98 parts of the ester-exchanged fat prepared in Test Example 1 was mixed 2 parts of a high erucic acid rapeseed extremely hardened oil (iodine value: 1 or less) to obtain an oil and fat C. The oil and fat C had an iodine value of 17 and a slip melting point of 36°C.

Test Example 4 (Preparation of oil and fat)

To an oil and fat mixture of 40 parts of a palm oil (iodine value: 8), 55 parts of a palm fractionated stearin (iodine value: 31) and 5 parts of a high erucic acid

rapeseed extremely hardened oil (iodine value: 1 or less) was added 0.3 part of a metal catalyst (sodium methoxide). The mixture was subjected to random ester exchange at 80°C for 60 minutes under vacuum. Into 99.5 parts of the resulting ester-exchanged fat was mixed 0.5 part of a high erucic acid rapeseed extremely hardened oil (iodine value: 1 or less) to obtain an oil and fat D. The oil and fat D had an iodine value of 20 and a slip melting point of 38°C.

10 Test Example 5 (Preparation of oil and fat)

To an oil and fat mixture of 50 parts of a palm oil (iodine value: 8), 20 parts of a palm fractionated stearin (iodine value: 31), 20 parts of a hardened palm olein (iodine value: 55) and 10 parts of a high erucic acid rapeseed extremely hardened oil (iodine value: 1 or less) was added 0.3 part of a metal catalyst. The mixture was subjected to random ester exchange at 80°C for 60 minutes under vacuum. The resulting oil and fat was purified according to a conventional method. 99 parts of the resulting ester-exchanged fat and 1 part of a high erucic acid rapeseed extremely hardened oil (iodine value: 1 or less) were mixed to obtain an oil and fat E. The oil and fat E had an iodine value of 21 and a slip melting point of 32°C.

Test Example 6 (Preparation of oil and fat)

A mixture of 95 parts of a palm kernel oil (iodine value: 17) and 5 parts of a palm oil (iodine value 52) was extremely hardened. To a mixture of 70 parts of the
5 resulting extremely hardened oil and fat (iodine value: 1 or less), 15 parts of a palm fractionated stearin (iodine value: 31), 5 parts of a high oleic sunflower oil (iodine value: 84) and 10 parts of a high erucic acid rapeseed extremely hardened oil (iodine value: 1 or less) was added
10 0.3 part of a metal catalyst (sodium methoxide). The mixture was subjected to random ester exchange at 80°C for 60 minutes under vacuum. The resulting oil and fat was purified according to a conventional method to obtain an oil and fat F. The oil and fat F had an iodine value of 9
15 and a slip melting point of 36°C.

Test Example 7 (Preparation of oil and fat)

A mixture of 95 parts of a palm kernel oil (iodine value: 17) and 5 parts of a palm oil (iodine value: 52) was
20 extremely hardened. To a mixture of 70 parts of the resulting extremely hardened oil and fat (iodine value: 1 or less), 25 parts of a palm fractionated stearin (iodine value: 31) and 5 parts of a high erucic acid rapeseed extremely hardened oil (iodine value: 1 or less) was added
25 0.3 part of a metal catalyst (sodium methoxide). The

mixture was subjected to random ester exchange at 80°C for 60 minutes under vacuum. The resulting oil and fat was purified according to a conventional method to obtain an oil and fat G. The oil and fat G had an iodine value of 7
5 and a slip melting point of 38°C.

Table 1 shows the fatty acid compositions of the oil and fat A, the oil and fat B, the oil and fat C, the oil and fat D, the oil and fat E, the oil and fat F, and the
10 oil and fat G.

A fatty acid was measured as follows. First, a fatty acid was prepared according to "Standard Methods for the Analysis of Fats, Oils and Related Materials 2.4.1.2-1996". The resulting fatty acid prepared solution was analyzed by
15 a gas chromatography method.

[Table 1]

	Satur ated fatty acid	Satur ated fatty acid	Satur ated fatty acid	Satur ated fatty acid	Satur ated fatty acid	Satur ated fatty acid	Satur ated fatty acid	Unsaturated fatty acid	Unsaturated fatty acid	Unsaturated fatty acid	Unsaturated fatty acid	Satur ated fatty acid	Satur ated fatty acid		
	C6	C8	C10	C12	C14	C16	C18	C18:1		C18:2		C18:3		C20	C22
								t	c	t	c	t	c		
Oil and fat A	0.2	3.1	2.7	24.4	10.0	31.5	7.3	0.1	12.9	0.1	2.5	0.0	0.1	0.7	4.4
Oil and fat B	0.2	3.1	2.7	24.3	10.0	31.4	7.5	0.1	12.9	0.1	2.5	0.0	0.1	0.8	4.6
Oil and fat C	0.2	3.0	2.6	23.9	9.8	31.0	8.1	0.1	12.7	0.1	2.4	0.0	0.1	0.9	5.2
Oil and fat D	0.1	2.5	2.1	19.4	8.3	40.0	5.8	0.1	15.7	0.1	2.9	0.0	0.1	0.4	2.4
Oil and fat E	0.2	3.1	2.7	24.2	9.8	24.9	8.0	8.0	11.5	0.2	1.7	0.0	0.1	0.8	4.8
Oil and fat F	0.0	2.2	2.0	31.0	10.5	17.9	21.1	0.0	8.6	0.0	1.1	0.0	0.0	0.9	4.7
Oil and fat G	0.1	2.1	2.2	34.8	10.9	23.6	16.1	0.3	6.1	0.0	1.1	0.0	0.1	0.4	2.2

*In Table, t denotes a trans-unsaturated fatty acid, and c denotes a cis-unsaturated fatty acid.

Comparative Test Example 1 (Preparation of oil and fat)

An oil and fat mixture of 50 parts of a palm oil (iodine value: 8), 40 parts of a palm fractionated stearin (iodine value: 31) and 10 parts of a high erucic acid rapeseed extremely hardened oil (iodine value: 1 or less) was prepared to obtain an oil and fat H. The oil and fat H had an iodine value of 17 and a slip melting point of 54°C.

Comparative Test Example 2 (Preparation of oil and fat)

To an oil and fat mixture of 31 parts of a palm oil (iodine value: 52), 66 parts of a palm fractionated stearin (iodine value: 31) and 3 parts of a high erucic acid rapeseed extremely hardened oil (iodine value: 1 or less) was added 0.3 part of a metal catalyst (sodium methoxide). The mixture was subjected to random ester exchange at 80°C for 60 minutes under vacuum. The resulting oil and fat was purified according to a conventional method to obtain an oil and fat I. The oil and fat I had an iodine value of 37 and a slip melting point of 46°C.

20

Comparative Test Example 3 (Preparation of oil and fat)

To an oil and fat mixture of 65 parts of a palm kernel oil (iodine value: 17) and 35 parts of a palm fractionated olein (iodine value: 62) was added 0.3 part of a metal catalyst (sodium methoxide). The mixture was subjected to

random ester exchange at 80°C for 60 minutes under vacuum,
and then hardened until the iodine value of the oil and fat
became 1 or less. The resulting oil and fat was purified
according to a conventional method to obtain an oil and fat
5 J. The oil and fat J had an iodine value of 1 and a slip
melting point of 42°C.

Comparative Test Example 4 (Preparation of oil and fat)

A palm olein having an iodine value of 69 was
10 isomerized and hardened until the iodine value became 55,
and then discolored and deodorized according to a
conventional method. The resulting hardened oil and fat
was designated an oil and fat K. The oil and fat K had a
trans fatty acid content of 42.7%, an iodine value of 55,
15 and a slip melting point of 39°C.

Comparative Test Example 5 (Preparation of oil and fat)

A palm medium melting point fraction (PMF) having an
iodine value of 45 was hardened until the iodine value
20 became 40, and then discolored and deodorized according to
a conventional method. The resulting hardened oil and fat
was designated an oil and fat L. The oil and fat L had a
trans fatty acid content of 6.7%, an iodine value of 40,
and a slip melting point of 36°C.

Table 2 shows the fatty acid compositions of the oil and fat H, the oil and fat I, the oil and fat J, the oil and fat K, and the oil and fat L.

[Table 2]

	Satur ated fatty acid	Satur aled fatty acid	Satur ated fatty acid	Satur ated fatty acid	Satur ated fatty acid	Satur ated fatty acid	Satur ated fatty acid	Unsatur ated fatty acid	Unsatur ated fatty acid	Unsatur ated fatty acid	Unsatur ated fatty acid	Unsatur ated fatty acid	Unsatur ated fatty acid	Unsatur ated fatty acid	Unsatur ated fatty acid	Unsatur ated fatty acid	Unsatur ated fatty acid	Unsatur ated fatty acid	Satur ated fatty acid	Satur ated fatty acid
	C6	C8	C10	C12	C14	C16	C18	C18:1		C18:2		C18:3		C20	C22					
								t	c	t	c	t	c							
Oil and fat H	0.2	3.1	2.7	24.4	10.0	31.5	7.3	0.1	12.9	0.1	2.5	0.0	0.1	0.7	4.4					
Oil and fat I	0.0	0.0	0.0	0.2	1.2	59.5	5.8	0.6	30.4	0.3	0.1	0.0	0.1	0.5	1.3					
Oil and fat J	0.1	2.2	2.3	34.4	11.4	17.4	31.3	0.4	0.2	0.0	0.0	0.0	0.0	0.3	0.0					
Oil and fat K	0.0	0.0	0.0	0.4	1.1	33.5	5.9	40.2	17.6	0.8	0.3	0.0	0.3	0.0	0.0					
Oil and fat L	0.0	0.0	0.0	0.2	1.0	51.4	4.7	6.5	34.3	0.3	1.3	0.0	0.3	0.0	0.0					

* In Table, t denotes a trans-unsaturated fatty acid, and c denotes a cis-unsaturated fatty acid.

Regarding the oils and fats A to L prepared in Test Examples 1 to 7 and Comparative Test Examples 1 to 5, the total amount of fatty acids having 12 carbon atoms or less, the total amount of saturated fatty acids having 20 carbon atoms or more, the total amount of all saturated fatty acids, an iodine value, and a slip melting point are shown in Table 3.

[Table 3]

	Test Example 1	Test Example 2	Test Example 3	Test Example 4	Test Example 5	Test Example 6	Test Example 7
Storage condition	Oil and fat A	Oil and fat B	Oil and fat C	Oil and fat D	Oil and fat E	Oil and fat F	Oil and fat G
Total of C12 or less	30.3	30.2	29.7	24.2	30.1	35.2	39.2
Total of C20 or more	5.2	5.3	6.1	2.8	5.6	5.6	2.6
Total of all saturated fatty acids	84.4	84.4	84.7	81	78.5	90.3	92.4
Iodine value	17	17	17	20	21	9	7
Slip melting point	35	35	36	38	32	36	38

	Comparative Test Example 1	Comparative Test Example 2	Comparative Test Example 3	Comparative Test Example 4	Comparative Test Example 5
Storage condition	Oil and fat H	Oil and fat I	Oil and fat J	Oil and fat K	Oil and fat L
Total of C12 or less	30.3	0.2	39	0.5	0.2
Total of C20 or more	5.2	1.7	0.3	0	0
Total of all saturated fatty acids	84.4	68.5	82.4	40.9	57.3
Iodine value	17	37	1	55	40
Slip melting point	54	46	42	39	36

Example 1

8 parts of cacao mass, 15 parts of a cocoa powder, 43 parts of sugar, and 20 parts of the oil and fat A obtained in Test Example 1 were mixed with a mixer to prepare dough (mixing). The dough was passed through a refiner to be adjusted to a particle size of about 20 micrometers (refining). The resulting flakes were subjected to conching. At a final stage of conching, 14 parts of the remaining oil and fat A and 0.4 part of lecithin were added to produce a chocolate. The final composition of the chocolate is shown in Table 4.

[Table 4]

Composition of cocoa butter content 15% (in oil and fat)

Cacao mass	8
Cocoa powder	15
Sugar	43
Oil and fat	34
Lecithin	0.4

Example 2 to Example 7 and Comparative Example 1 to Comparative Example 5

A chocolate of Example 2 was obtained by using the same composition and the same method as those of Example 1 except that the oil and fat B was substituted for the oil and fat A.

Similarly, the oil and fat C was substituted for the

oil and fat A to obtain a chocolate of Example 3. Similarly, chocolates of Example 4 to Example 7 and Comparative Example 1 to Comparative Example 5 were obtained.

5

Confirmation test for storage stability of chocolate

The chocolate prepared as described above was poured into a mold at a temperature at which the oil and fat was melted (50°C), and then cooled at 15 to 20°C to be solidified. The solidified chocolate was tested for storage stability by the following method and evaluation.

Items to be confirmed by the test were a melting feel in mouth, the degree of blooming or graining, and luster.

15

Confirmation test for melting feel in mouth of chocolate

A melting feel in mouth of the chocolate prepared using each oil and fat was evaluated by panelists (6 people). For evaluation, a chocolate which panelists felt good melting in mouth was shown as "O", and a chocolate which panelists felt bad melting in mouth was shown as "X".

20

Results are shown in Table 5.

[Table 5]

Melting feel in mouth of chocolate

	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7
Storage condition	Oil and fat A	Oil and fat B	Oil and fat C	Oil and fat D	Oil and fat E	Oil and fat F	Oil and fat G
20°C	O	O	O	O	O	O	O

	Comparative Example 1	Comparative Example 2	Comparative Example 3	Comparative Example 4	Comparative Example 5
Storage condition	Oil and fat H	Oil and fat I	Oil and fat J	Oil and fat K	Oil and fat L
20°C	X	X	O	O	O

Evaluation O: Good
 X: Bad

5 Results show that chocolates prepared using the oils and fats A to G and J to L had a good melting feel in mouth, while chocolates prepared using the oils and fats H and I had a bad melting feel in mouth. Particularly, a chocolate prepared using the oil and fat H had the worst melting feel

10 in mouth, and it was recognized that the oil and fat H had no commercial value.

Confirmation test for degree of blooming or graining in chocolate

15 The chocolate prepared as described above was poured into a mold at a temperature at which the oil and fat was melted (50°C), and then cooled at 15 to 20°C to be solidified. The solidified chocolate was aged at 20°C for

one week (aging). Then, the chocolate was subjected to a cycle test (90 cycles) comprising alternately keeping the chocolate at 17°C for 10 hours and at 28°C for 10 hours in one day (2 hours for changing from 17°C to 28°C and, similarly, 2 hours for changing from 28°C to 17°C) in a temperature-controlled chamber. In addition, the chocolate was stored in a temperature-controlled chamber at 20°C (storage for 90 days), and a change in quality with time (occurrence of blooming or graining) of the chocolate was confirmed visually.

Results are shown in Table 6.

[Table 6]

Blooming or braining in chocolate

	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7
Storage condition	Oil and fat A	Oil and fat B	Oil and fat C	Oil and fat D	Oil and fat E	Oil and fat F	Oil and fat G
17°C to 28°C cycle	O	O	O	O	O	O	O
20°C constant	O	O	O	O	O	O	O

	Comparative Example 1	Comparative Example 2	Comparative Example 3	Comparative Example 4	Comparative Example 5
Storage condition	Oil and fat H	Oil and fat I	Oil and fat J	Oil and fat K	Oil and fat L
17°C to 28°C cycle	X	X	X	O	X
20°C constant	X	X	X	O	X

Evaluation O: Nonoccurrence of blooming or graining
X: Occurrence of blooming or graining

The results show that occurrence of blooming or graining in chocolates prepared using the oils and fats A to G was not observed during storage. In chocolates prepared using the oils and fats H, I, J and H, occurrence of blooming or graining was observed during storage. In the case of the oil and fat H, not only occurrence of blooming or graining was observed during storage, but also melting in mouth of the chocolate was poor. Thus it was recognized that the oil and fat H had no commercial value. In the case of the oil and fat K, although occurrence of blooming or graining was not observed during storage, the oil and fat K contained 10% or more of a trans fatty acid and therefore was outside the scope of the present invention. In the case of the oil and fat L, although the oil and fat L contained 10% or less of a trans fatty acid, blooming or graining occurred during storage.

Confirmation test for luster of chocolate

The chocolate prepared as described above was poured into a mold at a temperature at which the oil and fat was melted (50°C), and then cooled at 15°C, 20°C or 25°C to be solidified. The solidified chocolate was aged at 20°C for one week (aging), and the degree of luster thereof was confirmed visually.

Results are shown in Table 7.

[Table 7]

Confirmation of luster of chocolate

	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7
15°C	○	○	◎	○	○	○	○
20°C	○	○/◎	◎	○/◎	○/◎	○	○
25°C	○	○/◎	◎	○/◎	◎	○	○

	Comparative Example 1	Comparative Example 2	Comparative Example 3	Comparative Example 4	Comparative Example 5
15°C	×	×	×	○	○
20°C	×	×	×	△	△
25°C	×	×	×	×	×

Evaluation: × Very poor △ Poor ○ Good ◎ Very good

5 The chocolates of Examples 1, 6 and 7 were prepared
 using only a random ester-exchanged fat, and the luster of
 these chocolates was good. The chocolates of Examples 2 to
 5 were prepared using an oil and fat consisting of a random
 ester-exchanged fat and 0.4 to 2.0% by weight of an oil and
 10 fat containing 30% or more of behenic acid. In the cases
 of Examples 2 to 5, the luster of the chocolate was better
 when the chocolate contained a larger amount of the oil and
 fat or the chocolate was solidified at a higher temperature.
 Such function was more effective under a condition in which
 15 a chocolate could not be rapidly cooled and solidified. To
 the contrary, the chocolates of Comparative Examples 1 to 3

had poor luster irrespective of a cooling temperature. In addition, in Comparative Examples 4 and 5, the chocolates solidified at a relatively lower temperature (15°C) had good luster, and the chocolates solidified at 20°C or higher had poor luster.

Test Example 8 (Preparation of oil and fat)

To an oil and fat mixture of 50 parts of a palm oil (iodine value: 8), 40 parts of a palm fractionated stearin (iodine value: 31) and 10 parts of a high erucic acid rapeseed extremely hardened oil (iodine value: 1 or less) was added 0.3 part of a metal catalyst (sodium methoxide). The mixture was subjected to random ester exchange at 80°C for 60 minutes under vacuum. The resulting oil and fat was purified according to a conventional method. Into 99.6 parts of the resulting ester-exchanged fat was mixed 0.4 part of a high erucic acid rapeseed extremely hardened oil (iodine value: 1 or less). Further, 100 parts of the resulting oil and fat mixture was blended with 1.5 parts of an acetylated sucrose fatty acid ester (DK Ester FA10-E/manufactured by DAI-ICHI KOGYO SEIYAKU CO., LTD.; esterification degree: 4.9) to obtain an oil and fat M. The oil and fat M had an iodine value of 17, and a slip melting point of 35°C.

Test Example 9 (Preparation of oil and fat)

To an oil and fat mixture of 50 parts of a palm oil (iodine value: 8), 40 parts of a palm fractionated stearin (iodine value: 31) and 10 parts of a high erucic acid rapeseed extremely hardened oil (iodine value: 1 or less) was added 0.3 part of a metal catalyst (sodium methoxide). The mixture was subjected to random ester exchange at 80°C for 60 minutes under vacuum. The resulting oil and fat was purified according to a conventional method. Into 99.6 parts of the resulting ester-exchanged fat was mixed 0.4 part of a high erucic acid rapeseed extremely hardened oil (iodine value: 1 or less). Further, 100 parts of the resulting oil and fat mixture was blended with 6.3 parts of an acetylated sucrose fatty acid ester (DK Ester FA10-E/manufactured by AI-ICHI KOGYO SEIYAKU CO., LTD.; esterification degree: 4.9) to obtain an oil and fat N. The oil and fat N had an iodine value of 16, and a slip melting point of 35°C.

Test Example 10 (Preparation of oil and fat)

Into 99.6 parts of the ester-exchanged fat prepared in Test Example 8, 0.4 part of a high erucic acid rapeseed extremely hardened oil (iodine value: 1 or less) was mixed. Into 95 parts of the resulting oil and fat mixture, 5 parts of a behenic acid-containing ester-exchanged fat

(manufactured by Fuji Oil CO., Ltd.: trade name "EBFW":
melting point 58°C/iodine value 26). Further, to 100 parts
of the resulting oil and fat mixture was blended 1.5 parts
of an acetylated sucrose fatty acid ester to obtain an oil
5 and fat O. The oil and fat O had an iodine value of 18,
and a slip melting point of 38°C.

Test Example 11 (Preparation of oil and fat)

To an oil and fat mixture of 85 parts of a palm kernel
10 oil (iodine value: 17), 5 parts of a palm oil (iodine
value: 52) and 10 parts of a high erucic acid rapeseed
extremely hardened oil (iodine value: 1 or less) was added
0.3 part of a metal catalyst (sodium methoxide). The
mixture was subjected to random ester exchange at 80°C for
15 60 minutes under reduced pressure. The resulting oil and
fat was hardened until the iodine value became 0, and then
purified according to a conventional method. Into 78 parts
of the resulting oil and fat were mixed 10 parts of another
ester-exchanged fat ("Perkid Y: melting point 33°C/iodine
20 value 39" manufactured by Fuji Oil Co.,Ltd.) and 12 parts
of a hardened oil and fat ("Melano F-11: melting point
36°C/iodine value 60" manufactured by Fuji Oil Co.,Ltd.).
Further, 100 parts of the oil and fat mixture was blended
with 1.5 parts of an acetylated sucrose fatty acid ester to
25 obtain an oil and fat P. The oil and fat P had an iodine

value of 12, and a slip melting point of 38°C.

Regarding the oils and fats M to P prepared in Test Examples 8 to 11, the total amount of fatty acids having 12 carbon atoms or less, the total amount of saturated fatty acids having 20 carbon atoms or more, an iodine value, a slip melting point, the amount of an acetylated sucrose fatty acid ester, and a trans fatty acid content are shown in Table 8.

10 [Table 8]

	Test Example 8	Test Example 9	Test Example 10	Test Example 11
Storage condition	Oil and fat M	Oil and fat N	Oil and fat O	Oil and fat P
Total of C12 or less	28.5	27.2	27.4	37.3
Total of C20 or more	5.5	5.2	8.3	3.8
Iodine value	17	16	18	12
Slip melting point	35	35	38	38
Acetylated sucrose fatty acid ester	1.5	6.3	1.5	1.5
Trans fatty acid content	0.2	0.2	0.2	5.5

Example 8

8 parts of a cacao mass, 15 parts of a cocoa powder, 2 parts of cocoa butter, 43 parts of sugar, and 18 parts of the oil and fat M obtained in Test Example 8 were mixed

with a mixer to prepare dough (mixing). The dough was passed through a refiner to be adjusted to a particle size of about 20 micrometers (refining). The resulting flakes were subjected to conching. At a final stage of conching, 14 parts of the remaining oil and fat M and 0.4 part of lecithin were added to produce a chocolate. The final composition of the chocolate is shown in Table 9.

[Table 9]

Composition of cocoa butter content 20% (in oil and fat)

Cacao mass	8
Cocoa powder	15
Sugar	43
Cocoa butter	2
Oil and fat	32
Lecithin	0.4

Examples 9 to 11

A chocolate of Example 9 was obtained by using the same composition and the same method as those of Example 8 except that the oil and fat N was substituted for the oil and fat M.

Similarly, the oil and fat O was substituted for the oil and fat M to obtain a chocolate of Example 10. Similarly, a chocolate of Example 11 was obtained.

Confirmation test for storage stability of chocolate

The chocolate prepared as described above was poured

into a mold at a temperature at which the oil and fat was melted (50°C), and then cooled at 15 to 20°C to be solidified. The solidified chocolate was tested for storage stability by the following method and evaluation.

- 5 Items to be confirmed by the test were a melting feel in mouth, and the degree of blooming or graining.

Confirmation test for melting feel in mouth of chocolate

- 10 A melting feel in mouth of the chocolate prepared using each oil and fat was evaluated by panelists (6 people). For evaluation, a chocolate which panelists felt good melting in mouth was shown as "O", and a chocolate which panelists felt bad melting in mouth was shown as "X".

Results are shown in Table 10.

- 15 [Table 10]

Melting feel in mouth of chocolate

	Example 8	Example 9	Example 10	Example 11
Storage condition	Oil and fat M	Oil and fat N	Oil and fat O	Oil and fat P
20°C	O	O	O	O

Evaluation O: Good

 X: Bad

Results show that melting feel in mouth of the chocolates prepared using the oil and fat M to the oil and fat P was good.

- 20

Confirmation test for degree of blooming or graining in

chocolate

The chocolate prepared as described above was poured into a mold at a temperature at which the oil and fat was melted (50°C), and then cooled at 15 to 20°C to be solidified. The solidified chocolate was aged at 20°C for one week (aging). Then, the chocolate was subjected to a cycle test (90 cycles) comprising alternately keeping the chocolate at 17°C for 10 hours and at 28°C for 10 hours in one day (2 hours for changing from 17°C to 28°C and, similarly, 2 hours for changing from 28°C to 17°C) in a temperature-controlled chamber. In addition, the chocolate was stored in a temperature-controlled chamber at 20°C (storage for 90 days), and a change in quality with time (occurrence of blooming or graining) of the chocolate was confirmed visually.

Results are shown in Table 11.

[Table 11]

Blooming or graining in chocolate

	Example 8	Example 9	Example 10	Example 11
Storage condition	Oil and fat M	Oil and fat N	Oil and fat O	Oil and fat P
17°C to 28°C cycle	O	O	O	O
20°C constant	O	O	O	O

Evaluation O: Nonoccurrence of blooming or graining
X: Occurrence of blooming or graining

Results show that, in the chocolates prepared using the oils and fats M to P, occurrence of blooming or

graining was not observed during storage.

Example 12

8 parts of a cacao mass, 15 parts of a cocoa powder, 1
5 part of cocoa butter, 38 parts of sugar, and 15 parts of
the oil and fat A obtained in Test Example 1 were mixed
with a mixer to prepare dough (mixing). The dough was
passed through a refiner to be adjusted to a particle size
of about 20 micrometers (refining). The resulting flakes
10 were subjected to conching. At a final stage of conching,
23 parts of the remaining oil and fat A and 0.4 part of
lecithin were added to produce a chocolate. The final
composition of the chocolate is shown in Table 12.

15 Example 13

8 parts of a cacao mass, 15 parts of a cocoa powder, 3
parts of cocoa butter, 23 parts of sugar, and 7 parts of
the oil and fat A obtained in Test Example 1 were mixed
with a mixer to prepare dough (mixing). The dough was
20 passed through a refiner to be adjusted to a particle size
of about 20 micrometers (refining). The resulting flakes
were subjected to conching. At a final stage of conching,
44 parts of the remaining oil and fat A and 0.4 part of
lecithin were added to produce a chocolate. The final
25 composition of the chocolate is shown in Table 12.

Example 14

8 parts of a cacao mass, 15 parts of a cocoa powder, 1 part of cocoa butter, 48 parts of sugar, and 18 parts of the oil and fat M obtained in Test Example 8 were mixed with a mixer to prepare dough (mixing). The dough was passed through a refiner to be adjusted to a particle size of about 20 micrometers (refining). The resulting flakes were subjected to conching. At a final stage of conching, 10 parts of the remaining oil and fat M and 0.4 part of lecithin were added to produce a chocolate. The final composition of the chocolate is shown in Table 12.

Comparative Example 11

15 9 parts of a cacao mass, 17 parts of a cocoa powder, 45 parts of sugar, and 24 parts of the oil and fat A obtained in Test Example 1 were mixed with a mixer to prepare dough (mixing). The dough was passed through a refiner to be adjusted to a particle size of about 20 micrometers (refining). The resulting flakes were subjected to conching. At a final stage of conching, 11 parts of the remaining oil and fat A and 0.4 part of lecithin were added to produce a chocolate. The final composition of the chocolate is shown in Table 12.

Comparative Example 12

13 parts of a cocoa powder, 52 parts of sugar, and 19 parts of the oil and fat M obtained in Test Example 8 were mixed with a mixer to prepare dough (mixing). The dough was passed through a refiner to be adjusted to a particle size of about 20 micrometers (refining). The resulting flakes were subjected to conching. At a final stage of conching, 6 parts of the remaining oil and fat M and 0.4 part of lecithin were added to produce a chocolate. The final composition of the chocolate is shown in Table 12.

Table 12 shows the compositions of Example 12 to Example 14 and Comparative Examples 11 and 12, the total oil content, the content of the oil and fat composition of the present invention in a chocolate, and the content of cocoa butter in an oil and fat used in production of a chocolate.

[Table 12]

	Example 12	Example 13	Example 14	Example 11	Example 12
Cacao mass	8	8	8	0	9
Cocoa powder	15	15	15	13	17
Sugar	38	23	48	52	45
Cocoa butter	1	3	1	0	4
Oil and fat A	38	51	—	35	—
Oil and fat M	—	—	28	—	25
Lecithin	0.4	0.4	0.4	0.4	0.4
Total oil content	44.8	60.0	35.1	36.4	35.8
Oil and fat composition (in chocolate)	38	51	28	35	25
Cocoa butter (in oil phase)	15.1	15.0	20.1	3.9	30.2

Confirmation test for degree of blooming or graining in chocolate

- 5 The chocolate prepared as described above was poured into a mold at a temperature at which the oil and fat was melted (50°C), and then cooled at 15 to 20°C to be solidified. The solidified chocolate was aged at 20°C for one week (aging). Then, the chocolate was subjected to a
- 10 cycle test (90 cycles) comprising alternately keeping the chocolate at 17°C for 10 hours and at 28°C for 10 hours in one day (2 hours for changing from 17°C to 28°C and, similarly, 2 hours for changing from 28°C to 17°C) in a temperature-controlled chamber. In addition, the chocolate

was stored in a temperature-controlled chamber at 20°C (storage for 90 days), and a change in quality with time (occurrence of blooming or graining) of the chocolate was confirmed visually.

5 Results are shown in Table 13.

[Table 13]

Blooming or graining in chocolate

	Example 12	Example 13	Example 14	Comparative Example 11	Comparative Example 12
Storage condition	Oil and fat A	Oil and fat A	Oil and fat M	Oil and fat A	Oil and fat M
17°C to 28°C cycle	O	O	O	O	X
20°C constant	O	O	O	O	X

Evaluation O: Nonoccurrence of blooming or graining
 X: Occurrence of blooming or graining

Results show that occurrence of blooming or graining was not observed in the chocolates of Examples 12 to 14 and Comparative Example 11. However, the chocolate of Comparative Example 11 did not contain cacao mass and therefore had a poor flavor. Thus the chocolate of Comparative Example 11 was contrary to the object to be solved by the present invention. On the other hand, the chocolate of Comparative Example 12 contained a large amount of cocoa butter and therefore was excellent in flavor. However, when the chocolate of Comparative Example 12 was subjected to the cycle storage test, blooming or graining occurred remarkably in the chocolate. Thus the

chocolate of Comparative Example 12 had remarkably lowered commercial value.

Industrial applicability

5 The present invention relates to an oil and fat composition for chocolate which comprises an oil and fat obtained by ester exchange between an oil and fat containing 30% or more of a fatty acid having 12 carbon atoms or less and an oil and fat containing 30% or more of
10 a saturated fatty acid having 20 carbon atoms or more, and further comprises an acetylated sucrose fatty acid ester, and which can produce a chocolate excellent in flavor containing cocoa butter without resort to a tempering operation.

CLAIMS

1. An oil and fat composition for chocolate obtained by ester exchange between an oil and fat containing 30% or
5 more of a fatty acid having 12 carbon atoms or less and an oil and fat containing 30% or more of a saturated fatty acid having 20 carbon atoms or more.
2. The oil and fat composition for chocolate according to
10 claim 1, which has an iodine value of 28 or less.
3. The oil and fat composition for chocolate according to claim 1 or 2, which further comprises an oil and fat containing 30% or more of behenic acid.
15
4. The oil and fat composition for chocolate according to claim 1 or 2, wherein the ester exchange is random ester exchange.
- 20 5. The oil and fat composition for chocolate according to any one of claims 1 to 4, wherein the content of a trans-unsaturated fatty acid is 10% or less.
6. A chocolate obtained by using the oil and fat
25 composition according to any one of claims 1 to 5.

7. A process for producing a chocolate which comprises using the oil and fat composition according to claim 1 or 2 in an amount of 20 to 68% by weight based on the whole
5 chocolate.

8. An oil and fat composition for chocolate comprising the ester-exchanged oil and fat according to claim 1 and an acetylated sucrose fatty acid ester.
10

9. The oil and fat composition for chocolate according to claim 8, which has an iodine value of 5 to 30.

10. A chocolate obtained by using the oil and fat
15 composition according to claim 8 or 9.

11. A process for producing a chocolate which comprises using the oil and fat composition according to claim 8 or 9 in an amount of 20 to 68% by weight based on the whole
20 chocolate.