

BEVERAGES CONTAINING DEFOAMING AGENT

2254771

The present invention relates to a beverage containing an anti-foaming agent.

Various kinds of milky and soft drinks are marketed in closed containers, for example for sale in cold or hot states by an automatic vending machine.

Steel or aluminum is commonly used as a material for the containers ("cans"), but bottles and plastic containers are also used for some beverages. Some steel cans are composed of three parts, i.e. upper and lower lid portions and a trunk, such that the plate thickness of the trunk is thick enough to provide adequate strength for the trunk so that it does not become dented even when the internal pressure of the can is reduced. On the other hand, an aluminum can may be composed of two parts, i.e. a trunk and a lid portion, and in order to prevent denting of the can trunk, which is made of a thick plate, it is customary to increase the pressure within the can with carbon dioxide gas as is customary in canned beer and cola drinks. Accordingly, when such an aluminum can filled with highly pressurized beverage is opened after being shaken, bubbles foam in the headspace and the contents of the can may spurt out, sometimes spraying the user or his clothes.

Recently, other beverages have also been put on sale, such as coffee with milk, tea with milk, Wulong tea, chocolate drink or a sports drink, having been filled into a two-piece aluminum or steel can together with liquid nitrogen at high pressure. When such a highly pressurized beverage in a can is shaken by a consumer before the can is opened or when such a can is taken from a vending machine and is shaken during transport in a car, a considerable amount of bubbles foam in the head space of the can, and these bubbles are sprayed out when the lid is opened and are scattered around from the opened can, giving an unpleasant feeling to the consumer. With a can containing a mixture such as milky coffee, the consumer is instructed to shake the can before drinking so as to mix the contents

well, and in such a case the aforesaid problem is frequently encountered.

To solve this problem, it has been suggested that it is necessary to redesign the opening portion of the can so that the contents do not spurt out when the can is opened; however, this is so technically difficult that so far no sufficiently satisfactory result has been obtained.

The manufacture has also been proposed of a low foaming beverage composition which has a low foaming property even if the can is shaken before opening. However, since a beverage component such as coffee, tea or powdered milk, is, in itself, liable to foam, this is also difficult to achieve.

The object of the present invention is, therefore, to provide a beverage containing an anti-foaming agent for solving the aforesaid problem of the spurting out and scattering of the contents upon opening the can, even if the can has been shaken.

We have now discovered that this object can be met by adding an anti-foaming agent comprising a specific sucrose fatty acid ester as the effective component to a beverage to be contained in a can.

According to the present invention, there is provided a beverage contained in a positively pressurized canister, said beverage containing an anti-foaming agent comprising, as an effective component, a sucrose fatty acid ester composition wherein the constituent fatty acids are at least one of a saturated fatty acid having from 12 to 22 carbon atoms and an unsaturated fatty acid having from 12 to 22 carbon atoms, and the average substitution degree is from 4 to 7, said sucrose fatty acid ester composition being a mixture of a sucrose fatty acid ester having a melting point of not higher than 30°C and a sucrose fatty acid ester having a melting point of not lower than 50°C.

The beverages to which the present invention is applicable are low-acidic beverages such as coffee (e.g. sugar-containing coffee, no-sugar coffee and milk coffee), Wulong tea, green tea, cocoa, black tea, milk cocoa or milk

tea contained in cans, bottles or other tightly sealed containers.

The anti-foaming agent used in the beverage of the present invention comprises the above specific sucrose fatty acid ester composition as the effective component.

The term "average degree of substitution" means the average number of esterifying fatty acid groups bonded to one molecule of sucrose in the sucrose fatty acid ester.

Examples of the bonded fatty acid are saturated fatty acids such as lauric acid, myristic acid, palmitic acid and stearic acid; and unsaturated fatty acids such as oleic acid and ricinoleic acid, singly or as a mixture thereof.

These sucrose fatty acid esters have an average degree of substitution of from 4 to 7, that is, each contains many tri-, tetra-, penta-, hexa- or hepta-esters. In the case of sucrose fatty acid esters each containing many monoesters or diesters, that is having an average degree of substitution of 3 or less, the solubility thereof in water is greatly increased and hence an anti-foaming effect cannot be achieved. Also, if the average degree of substitution is over 7, the dispersibility thereof in water is lowered and thus an effective advantage cannot be expected.

The term "constituent fatty acid" in the sucrose fatty acid ester composition being used in the present invention and in the sorbitan fatty acid ester which will be described later, means a main constituent fatty acid, the content of which is usually at least 50% of the whole of the constituent fatty acids. That is, fatty acids in various fatty acid esters are obtained using a mixture of fatty acid derived from edible fats and oils as a raw material, and it is not always easy to separate a fatty acid as a single component having a purity of about 100%. Therefore, the purity of a single constituent fatty acid in a sucrose fatty acid ester, which is commercially available is usually from about 70% to 95%.

The sucrose fatty acid esters, in which the constituent fatty acid is at least one of a saturated fatty

acid having from 12 to 22 carbon atoms and an unsaturated fatty acid having from 12 to 22 carbon atoms, and the average degree of substitution is from 4 to 7 may be used singly or as a combination of two or more kinds thereof. Also, since, in general, an anti-foaming agent of a low melting point has a tendency of being excellent in effecting anti-foaming at a low temperature, whereas an anti-foaming agent of a high melting point has a tendency of being excellent at a high temperature, a combination of sucrose fatty acid ester having a melting point of not higher than 30°C and sucrose fatty acid ester having a melting point of not lower than 50°C is particularly preferred so that anti-foaming may be stably maintained in the wide temperature range of from usually 5° to 60°C at which canned beverages are on sale. The ratio of the sucrose fatty acid ester having a melting point of not higher than 30°C to the sucrose fatty acid ester having a melting point of not lower than 50°C is usually from 1/5 to 5/1, and preferably 5/1 by weight ratio.

The anti-foaming agent being used for the beverage of the present invention may be an individual specific sucrose fatty acid ester or may be combined with various additives for maintaining the anti-foaming effect throughout a wide temperature range.

Preferred embodiments of the anti-foaming agent composed of such a combination include the following two embodiments:

1. An anti-foaming agent comprising (1) sucrose fatty acid ester wherein the constituent fatty acid is a saturated fatty acid having from 12 to 22 carbon atoms and the average degree of substitution is from 4 to 7 and (2) at least one kind selected from a sucrose fatty acid ester wherein the constituent fatty acid is a saturated fatty acid having from 6 to 10 carbon atoms or an unsaturated fatty acid having 12 to 22 carbon atoms, and the HLB value thereof is 7 or lower, a sorbitan fatty acid ester, a glycerol fatty acid ester and a polyglycerol fatty acid ester.

2. An anti-foaming agent comprising (3) sucrose fatty acid ester wherein the constituent fatty acid is an unsaturated fatty acid having from 12 to 22 carbon atoms and the average degree of substitution is from 4 to 7 and (4) at least one kind selected from a sucrose fatty acid ester wherein the constituent fatty acid is a saturated fatty acid having from 12 to 18 carbon atoms and the HLB value thereof is 7 or lower, a sorbitan fatty acid ester, a glycerol fatty acid ester and a polyglycerol fatty acid ester.

In the foregoing embodiments, component (1) or (4) generally has a melting point of at least 50°C and shows a large anti-foaming effect in the temperature range of mainly from 20°C to 60 °C. On the other hand, component (2) or (3) generally has a melting point of not higher than 30°C and is excellent in effecting anti-foaming in the temperature range of mainly from 5°C to 20°C. Accordingly, by using these components in combination, the anti-foaming effect throughout a wide temperature range of from 5°C to 60°C can be attained. Also, in this case, the weight ratio of component (1) component (2) or the ratio of component (3) to component (4) is usually from 1/5 to 5/1, and preferably from 1/3 to 3/1.

The amount of the anti-foaming agent being used for the beverage of the present invention is usually from 0.001 to 0.1% by weight, and preferably from 0.005 to 0.05% by weight of the beverage. When the amount of the anti-foaming agent is more than 0.1% by weight, the cost of the beverage is increased and as the case may be, the taste of the beverage deteriorates. On the other hand, if the amount of the anti-foaming agent is less than 0.001% by weight, the anti-foaming effect of this invention cannot be ensured.

In the foregoing embodiments, component (1) or (4) generally has a melting point of at least 50°C and shows a large anti-foaming effect in the temperature range of mainly from 20°C to 60°C. On the other hand, component (2) or (3) generally has a melting point of not higher than 30°C

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The amount of the anti-foaming agent being used for the beverage of the present invention is usually from 0.001 to 0.1% by weight, and preferably from 0.005 to 0.05% by weight based on the weight of the beverage. When the amount of the anti-foaming agent is more than 0.1% by weight, the cost of the beverage is increased and as the case may be, the taste of the beverage is impaired. On the other hand, if the amount of the anti-foaming agent is less than 0.001% by weight, the anti-foaming effect of this invention cannot be ensured.

Furthermore, the beverage of the present invention may contain a hydrophilic emulsifying agent for further increasing the dispersibility of the anti-foaming agent in water at a low temperature.

Preferably the foregoing hydrophilic emulsifying agent is an emulsifying agent having the ability of emulsifying the sucrose fatty acid ester in water as the effective component of the anti-foaming agent, and having an HLB value of at least 10. Practical examples of the hydrophilic emulsifying agent include a polyglycerol fatty acid ester, a sorbitan fatty acid ester, a polyoxyethylenesorbitan fatty acid ester, and a sucrose fatty acid ester. They can be used singly or as a mixture thereof and a sucrose fatty acid ester is preferably used.

The sucrose fatty acid ester which is used as the hydrophilic emulsifying agent is preferably a sucrose fatty acid ester wherein the constituent fatty acid is at least one of a saturated fatty acid having from 12 to 22 carbon atoms and an unsaturated fatty acid ester having from 12 to 22 carbon atoms and the average degree of substitution is

from 1 to 1.6, that is, sucrose fatty acid ester containing many monoesters or diesters. A sucrose fatty acid ester containing at least 50% by weight monoesters, at least 60% by weight monoesters is particularly used. These sucrose fatty acid esters have an anti-foaming capability comparable with that of the aforesaid sucrose fatty acid ester composition of the present invention but also have excellent ability to form an aqueous emulsion of the main components. If the average substitution degree of the sucrose fatty acid ester as the emulsifying agent is 2 or higher, it becomes difficult to uniformly and stably emulsify the anti-foaming agent.

When used in combination, the anti-foaming agent and the hydrophilic emulsifying agent are usually added to water in a weight ratio of 1/50 to 50/1 followed by stirring at about 70°C to provide an emulsion. The amount of water in the emulsion is optionally determined in consideration of the stability, handling conditions, etc., of the emulsion. The concentrations of the anti-foaming agent and the hydrophilic emulsifying agent are usually from 2.5 to 60% by weight, and preferably from 5 to 40% by weight of the emulsion.

When a heated mixture is used in preparing the canned beverage, the anti-foaming agent for use in the present invention may be directly added to the mixture and also in the case of using beverage cooled to a temperature of 30°C or lower, anti-foaming agent is added to the mixture as an emulsion thereof, whereby the anti-foaming agent can be uniformly added to the mixture. Beverage containing anti-foaming agent in this way is filled into empty cans by a filling machine and simultaneously or subsequently, liquid nitrogen is added dropwise into the can, which is tightly sealed to provide a positively-pressurized can.

Depending on the demand and the purpose, the beverage of the present invention may suitably contain other additives, for example, lecithin, a glycerol fatty acid ester, a polyglycerol fatty acid ester, a sorbitan fatty acid ester, a propylene glycol fatty acid ester, an edible

oil or a dimethylsilicone oil.

The anti-foaming property of the beverage of the present invention is maintained over a wide temperature range and the amount of contents which foams after shaking such an easily foamable beverage is greatly reduced. In addition, deterioration in the taste of the beverage of the present invention is scarcely observed due to the addition of the anti-foaming agent.

Accordingly, the anti-foaming agent-containing beverage of the present invention is suitable as a canned drink and can greatly contribute to the production of positively-pressurized canned beverage the contents of which scarcely spurt out even after shaking.

The present invention is hereinafter described in more detail with reference to the following examples. Unless otherwise indicated, all parts, percentages and ratios are by weight.

The contents and properties of the sucrose fatty acid esters used in the examples are as shown in Table 1 below.

TABLE 1

Product Mark	Constituting Fatty Acid			Fatty Acid Purity (%)	Average Substitution Degree	HLB Value	Distributor
	Name	Carbon Atom No.					
L-095	Sucrose Lauric Acid Ester	12		95	6.4	<1	Mitsubishi Kasei Food Co., Ltd.
L-195	"	12		95	5.5	1	
P-170	Sucrose Palmitic Acid Ester	16		70	5.5	1	
P-1670	"	16		70	1.2	16	
S-170	Sucrose Stearic Acid Ester	18		70	5.3	1	
S-270	"	18		70	4.1	2	
S-370	"	18		70	2.3	3	
S-1170	"	18		70	1.6	11	
O-070	Sucrose Oleic Acid Ester	18		70	6.6	<1	
O-170	"	18		70	5.5	1	
OS-170	Sucrose Oleic Acid-Stearic Acid Ester	18		70	5.2	1	
ER-190	Sucrose Erucic Acid Ester	22		90	5.4	1	
ER-290	"	22		90	4.3	2	

TABLE 1 (continued)

Product Mark	Constituting Fatty Acid			Fatty Acid Purity (%)	Average Substitution Degree	HLB Value	Distributor
	Name	Carbon Atom No.					
O-30	Glycerol Oleic Acid Ester	18	-	-	4	Taiyo Kagaku Co., Ltd.	
G-H	Glycerol Capric Acid Ester	6	-	-	4	"	
G-D	Glycerol Capric Acid Ester	10	-	-	3	"	
G-P	Glycerol Palmitic Acid Ester	16	-	-	<1	"	
G-Li	Glycerol Linoleic Acid Ester	18	-	-	4	"	
PR-100	Polyglycerol Ricinoleic Acid Ester	18	-	-	3	Riken Vitamin Co., Ltd.	
PG-O-5	Polyglycerol Oleic Acid Ester	18	-	-	5	Taiyo Kagaku Co., Ltd.	
PG-O-7	"	18	-	-	7	"	
PG-O-8	"	18	-	-	8	"	
SPAN-65	Sorbitan Stearic Acid Ester	18	-	-	2	Kao Atlas Co., Ltd.	
So-L	Sorbitan Lauric Acid Ester	12	-	-	5	Taiyo Kagaku Co., Ltd.	
So-O	Sorbitan Oleic Acid Ester	18	-	-	5	"	

EXAMPLES 1 TO 7 AND COMPARISON EXAMPLES 1 TO 3

To milk coffee composed of 2% instant coffee, 0.8% skim milk powder, 0.16% whole milk powder, and 10% sugar, was added 0.02% of each of the anti-foaming agents (such as the sucrose fatty acid esters, etc.,) shown in Table 2 below, followed by heating the mixture to a temperature of at least 60°C to disperse the anti-foaming agent. The milk coffee thus formed was filled in a 250 ml aluminum can together with liquid nitrogen followed by sealing to provide a canned milk coffee. The inner pressure of the can was adjusted to 1.2 kg/cm². After sterilizing the can in a retort oven at 125°C for 20 minutes, the can was stored for one day at 55°C. Immediately after shaking the can 10 times by means of a shaker (made by Yoyoi Co., Ltd.), the can was opened and the amount of the content spurting out was measured as the difference of the weight of the can before and after shaking thereof.

The results are as shown in Table 2 below.

TABLE 2

	Sucrose Fatty Acid Ester* ¹	Average Substitu- tion Degree	Amount Spurred (g)	
			SOT* ²	RT* ³
Ex. 1	L-095	6.4	0.080	0.165
2	L-195	5.5	0.081	0.085
3	P-170	5.5	0.095	0.105
4	S-170	5.3	0.085	0.090
5	O-170	5.5	0.070	0.105
6	ER-290	4.3	0.080	0.095
7	OS-170	5.2	0.095	0.075
Comp. Ex. 1	-	-	0.67	1.19
2	S-370	2.3	0.415	0.490
3	O-30* ¹	-	0.390	0.317

(*1): Glycerol fatty acid ester

(*2): Reteind Lid Can

(*3): Ring Lid Can

EXAMPLES 8 TO 17 AND COMPARISON EXAMPLE 4

In a 2 liter stainless steel beaker was poured 1,000 g of a commercially available canned milk coffee mixture (milky beverage, non-fat milk solid components 3.7%) and the coffee mixture was heated to 70°C. While stirring the coffee mixture with a stirrer, each of the anti-foaming agents shown in Table 3 below was added thereto and the mixture was then homogenized for 5

minutes by means of a TK Homomixer (manufactured by Tokushu Kika Kogyo Co., Ltd.).

The homogenized coffee mixture was poured into a 100 ml graduated test tube and after allowing to stand for 40 minutes at 5°C, 25°C, and 55°C, the test tube was upset up and down 50 times. Then, the test tube was allowed to stand for 10 seconds and thereafter, the amount of foams thus formed was measured. Said foaming test was carried out twice and the foam-restraining ratio was evaluated by the mean value.

The foam-restraining ratio (%) was calculated by the following equation and the results are shown in Table 3 below.

$$\text{Foam-Restraining Ratio (\%)} = [(A - B)/A] \times 100$$

A: Foamed amount (ml) without the anti-foaming agent

B: Foamed amount (ml) with anti-foaming agent

The melting point was measured by means of DSC (differential scanning calorimeter, DSC200 Type, manufactured by Seiko Instruments Inc.) after cooling the molten sample to -50°C and then raising the temperature at a rate of 5°C/minute. The temperature was a molten endothermic peak top temperature.

TABLE 3

Example No.	Composition of Anti-foaming Agent				Anti-foaming Effect (Foam-Restraining Ratio)		
	Component (1)		Component (2)		Product Mark	M.P. (°C)	Amount (%)
	Product Mark	M.P. (°C)	Amount (%)	Product Mark			
Ex. 8	P-170	56	50	L-195	27	50	5°C (%) 91
9	P-170	56	25	O-070	<0	75	93
10	P-170	56	50	O-070	<0	50	86
11	P-170	56	75	O-070	<0	25	93
12	P-170	56	50	ER-190	1.3	50	40
13	S-170	66	50	O-30	<0	50	63
14	P-170	56	50	PR-100	<0	50	68
15	SPAN 65	57	50	O-070	<0	50	93
16	P-170	56	100	-	-	-	22
17	O-070	<0	100	-	-	-	47
Comp. Ex. 4	SPAN 65	57	100	-	-	-	4

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Example 18

Into a 2 liter stainless steel beaker was poured 1000 g of a commercially available canned milk coffee mixture (milky beverage, non-fat milk solid components 3.7%) and the coffee mixture was heated to 70°C. While stirring the coffee mixture with a stirrer, 0.05 g each of sucrose palmitic acid ester (Product name: P-170, an average substitution degree: 5.5, melting point : 55°C) and sucrose oleic acid ester (Product name: O-070, an average substitution degree: 6.6, melting point: 0°C or lower) were added thereto and the mixture was then homogenized for 5 minutes by means of a TK Homomixer. The coffee mixture was poured into a 250 ml aluminum can together with liquid nitrogen and the can was sealed. The can was subjected to a retort sterilizing treatment at 125°C for 20 minutes. One of the cans, thus sterilized, was stored for one day at 5°C, and another stored for one day at 55°C.

Separately, by following the same procedure as above, canned milk coffee not containing the emulsion of the anti-foaming agent was prepared as a control.

After vigorously shaking 10 times each of the can containing the emulsion-added sample mixture and the control can by hand, each can was opened and the amount of the contents spurting out was measured. As the results, in the control sample, more than 1 g of the contents spurting out, while no spurting out of the contents was observed in the sample containing the emulsion, regardless of the storing temperature conditions.

EXAMPLES 19 TO 33, REFERENCE EXAMPLE 1, AND
COMPARISON EXAMPLES 5 TO 7

To 100 parts of an anti-foaming agent composed of component (1) and component (2) shown in Table 4 below was added 12.5 parts of a sucrose palmitic acid ester having an HLB value of 16 as an emulsifying agent to provide an aqueous emulsion having a concentration of 20%.

By adding a definite amount of each aqueous emulsions prepared as described above to each of various easily foamable beverages, the samples each containing the anti-foaming agent as shown in Table 4 below were prepared.

TABLE 4

Sample No.	Component 1			Component 2			Kind of Drink
	Product Mark	HLB Value	Amount (wt%)	Product Mark	HLB Value	Amount (wt%)	
1	S-170	1	0.01	P-070	<1	0.01	Milk Coffee
2	G-P	<1	0.01	ER-190	1	0.03	Milk Coffee
3	So-L	5	0.001	P-170	1	0.001	Milk Tea
4	L-195	1	0.02	So-O/G-D	4/3	0.01/0.01	Milk Coffee
5	S-170	1	0.005	G-Li	4	0.02	Milk Coffee
6	S-170	1	0.03	PG-O	7	0.03	Milk Tea
7	P-170	1	0.01	G-H	4	0.02	Milk Coffee
8	S-170	1	0.01	P-170	1	0.01	Milk Coffee
9	S-170/L-195	1/1	0.01/0.01	G-D	3	0.02	Black Coffee
10	S-170/L-195	1/1	0.01/0.01	So-O	5	0.02	Milk Coffee
11	S-170	1	0.06	-	-	-	Milk Coffee
12	P-170	1	0.05	G-Li	4	0.005	Milk Coffee
13	L-195	1	0.005	PG-O	5	0.05	Milk Coffee
14	S-170	1	0.01	PG-O	8	0.01	Milk Coffee
15	S-170/L-195	1/1	0.02/0.02	So-O	5	0.03	Milk Coffee
16	So-O	5	0.06	-	-	-	Black Coffee

Each of the various beverages thus prepared was poured into a positively-pressurized can with dropwisely addition of liquid nitrogen. The inner pressure of the filled can was 2.0 kg/cm^2 (at 29°C). Said inner pressure is considered as being the severest condition in regard to spurting the contents out of the can. The cans used were of aluminum and contained 250 ml of beverage. The headspace of the can after filling was 15 mm in thickness.

After filling the can with each mixture, the can was subjected to a retort treatment at 125°C for 20 minutes. Thereafter, the test for spurting was carried out and the spurted amount was evaluated.

The spurting test was carried out as follows. That is, after shaking each can using a shaking machine at an acceleration of 7.8 G and a shaking width of 25 cm, the can was opened and the amount of the beverage spurted out of the can was measured.

The results obtained are as shown in Table 5 below.

In Reference Example 1, exclusively using a sorbitan fatty acid ester as an anti-foaming agent, it can be seen that the anti-foaming effect is obtained at 5°C but the anti-foaming effect is greatly reduced by increasing the temperature.

TABLE 5

<u>Example</u>	<u>Sample No.</u>	<u>Amount Spurted Out at Each Temperature (g)</u>			<u>Taste</u>
		<u>5°C</u>	<u>20°C</u>	<u>60°C *</u>	
19	1	0.16	0.12	0.14	○
20	2	0.09	0.08	0.09	○
21	3	0.19	0.17	0.20	○
22	4	0.07	0.09	0.08	○
23	5	0.13	0.15	0.16	○
24	6	0.08	0.08	0.07	○
25	7	0.10	0.10	0.11	○
26	8	0.14	0.11	0.13	○
27	9	0.16	0.09	0.10	○
28	10	0.13	0.11	0.10	○
29	11	0.49	0.17	0.05	○
30	12	0.35	0.14	0.11	○
31	13	0.38	0.19	0.12	○
32	14	0.41	0.20	0.16	○
33	15	0.08	0.08	0.06	×
Ref. Ex. 1	16	0.09	0.20	0.62	○

(*): The temperature of the mixture in the can

As comparison examples, each of the foregoing easily foamable mixtures not containing the anti-foaming agent, was filled into the positively-pressurized can under the same condition as in the aforesaid

examples and then the test for spurting was carried out on each can.

The results obtained are shown in Table 6 below.

TABLE 6

Comparison Example	Sample Beverage	Amount Spurted Out at Each Temperature (g)		
		5°C	20°C	60°C*
5	Milk Coffee	1.21	1.06	0.98
6	Black Coffee	0.70	0.88	0.82
7	Milk Tea	0.41	0.59	0.45

(*): The temperature of the mixture in the can

EXAMPLES 35 TO 40 AND COMPARISON EXAMPLES 8 AND 9

Into a 2 liter stainless steel beaker was poured 1,000 g of milk coffee having a composition of 1.8% instant coffee, 0.8% a skimmilk powder, 0.16% whole milk powder, and 8% sugar and the temperature of the milk coffee was controlled to at 25°C. Each of the emulsions of anti-foaming agents as shown in Table 7 below was prepared by stirring the mixture with a stirrer. After adding the emulsion thus prepared to a coffee liquid and the mixture was homogenized for 5 minutes by means of a TK Homomixer (manufactured by Tokushu Kika Kogyo Co., Ltd.).

Each coffee beverage was poured into a 100 ml graduated test tube. After subjecting the test tube to an autoclave treatment (under the same condition as

the foregoing retort sterilizing treatment) for 20 minutes at 125°C, the test tube was allowed to stand for one day at 55°C. The tube was upset up and down 50 times and then after allowing to stand the test time for 10 seconds, the amount of foams formed was measured. The foaming test was carried out twice and the anti-foaming effect was evaluated by the mean value.

The results are shown in Table 7 below.

TABLE 7

	Composition of Anti-foaming Agent (Emulsifying Agent)				Hydrophilic Emulsifying Agent	Average Substitution Degree	Amount		Amount of Water	Added Ratio of Emulsion to Coffee Liquid	Anti-foaming Effect (Foam-Resisting Ratio)	Stability of Emulsion*1
	Sucrose Fatty Acid Ester*2	Average Substitution Degree	Compounded Amount	(%)			Compounded Amount	(%)				
Ex. 35	S-170	5.3	20		S-1170	1.6	2.5		77.5	0.05	67	○
Ex. 36	S-170	5.3	10		P-1670	1.2	20		60	0.05	67	○
	L-195	5.5	10									
Ex. 37	S-170	5.3	2.5		S-1170	1.6	25		70	0.2	50	○
	L-195	5.5	2.5									
Ex. 38	P-170	5.5	10		P-1670	1.2	2.5		77.5	0.05	94	○
	ER-290	4.3	10									
Ex. 39	P-170	5.5	10		S-1170	1.6	2.5		77.5	0.05	82	○
	L-095	6.4	10									
Ex. 40	P-170	5.5	10		P-1670	1.2	2.5		77.5	0.05	76	○
	O-170	5.5	10									
Comp. Ex. 8	S-370	2.3	20		P-1670	1.2	2.5		77.5	0.05	20	○
Comp. Ex. 9	O-30*2	-	20		P-1670	1.2	2.5		77.5	0.05	20	×

*1: Emulsion Stability: ○: Stable X: Separated

*2: O-30 is glycerol fatty acid ester.

EXAMPLE 41

After dispersing 5 g of a sucrose palmitic acid ester (P-1670, trade name, made by Mitsubishi Kasei Shokuhin K.K., average substitution degree 1.2) in 155 g of water, 20 g of a sucrose stearic acid ester (S-170, trade name, made by Mitsubishi Kasei Food Co., Ltd., average substitution degree 5.3) and 20 g of a sucrose lauric acid ester (L-190, trade name, made by Mitsubishi Kasei Food Co., Ltd., average substitution degree 5.5) were added to the dispersion. After heating the mixture to about 70°C with stirring by a spatula to form a homogeneous emulsion, the emulsion was cooled to room temperature.

1,000 g of milk coffee having the composition of 1.8% instant coffee, 0.8% a skimmilk powder, 0.16% whole milk powder, and 8% sugar was placed in a 2 liter stainless steel beaker and the coffee mixture was heated to 25°C. 0.5 ml of the emulsion prepared as described above was added to the coffee mixture with stirring followed by mixing, and the mixture was homogenized for 5 minutes by means of a TK Homomixer. The milk coffee mixture was filled in a 250 ml aluminum can together with liquid nitrogen and the can was sealed. The can was subjected to a retort sterilizing treatment at 125°C for 20 minutes, and then stored for one day at 55°C.

By following the same procedure as above, a canned milk coffee not containing an emulsion of the anti-foaming agent was prepared as a control.

After vigorously shaking 10 times each of the can containing the emulsion-added sample mixture and the can of the control by hand, each can was opened and the spurted out amount of the content was measured. As the results, in the control sample, more than 1 g of the content was spurted out, while no spurting out of the content was observed in the sample containing the emulsion.



CLAIMS:

1. A beverage contained in a positively pressurized canister, said beverage containing an anti-foaming agent comprising, as an effective component, a sucrose fatty acid ester composition wherein the constituent fatty acids are at least one of a saturated fatty acid having from 12 to 22 carbon atoms and an unsaturated fatty acid having from 12 to 22 carbon atoms, and the average substitution degree is from 4 to 7, said sucrose fatty acid ester composition being a mixture of a sucrose fatty acid ester having a melting point of not higher than 30°C and a sucrose fatty acid ester having a melting point of not lower than 50°C.

2. A beverage as claimed in Claim 1, wherein the weight ratio of the sucrose fatty acid ester having a melting point of not higher than 30°C to the sucrose fatty acid ester having a melting point of not lower than 50°C is from 1:5 to 5:1.

3. A beverage contained in a positively pressurized canister, said beverage containing, as an effective component, an anti-foaming agent comprising (1) a sucrose fatty acid ester wherein the constituent fatty acid is a saturated fatty acid having from 12 to 22 carbon atoms and the average substitution degree is from 4 to 7, and (2) at least one of a sucrose fatty acid ester wherein the constituent fatty acid is a saturated fatty acid having from 6 to 10 carbon atoms or an unsaturated fatty acid having from 12 to 22 carbon atoms, and the HLB value thereof is not more than 7, a sorbitan fatty acid ester, a glycerol fatty acid ester and a polyglycerol fatty acid ester.

4. A beverage as claimed in Claim 3, wherein the melting point of the component (1) is not lower than 50°C and the melting point of the component (2) is not higher than 30°C.

5. A beverage contained in a positively pressurized canister, said beverage containing, as an effective component, an anti-foaming agent comprising (3) a sucrose fatty acid ester wherein the constituent fatty acid is an



unsaturated fatty acid having from 12 to 22 carbon atoms and the average substitution degree is from 4 to 7, and (4) at least one of a sucrose fatty acid ester wherein the constituent fatty acid is a saturated fatty acid having from 12 to 18 carbon atoms and the HLB value thereof is not more than 7, a sorbitan fatty acid ester, a glycerol fatty acid ester and a polyglycerol fatty acid ester.

6. A beverage as claimed in Claim 5, wherein the melting point of the component (3) is not higher than 30°C and the melting point of the component (4) is not lower than 50°C.

7. A beverage as claimed in any preceding claim, wherein the content of the anti-foaming agent is from 0.001 to 0.1% by weight based on the weight of the drink.

8. A beverage as claimed in any preceding claim, wherein a hydrophilic emulsifying agent is present and the anti-foaming agent is in the form of an emulsion in water.

9. A beverage as claimed in Claim 8, wherein the hydrophilic emulsifying agent is a sucrose fatty acid ester in which the constituent fatty acid is a saturated fatty acid having from 12 to 22 carbon atoms and/or an unsaturated fatty acid having from 12 to 22 carbon atoms, and the average substitution degree is from 1 to 1.6.

10. A beverage as claimed in Claim 8 or 9, wherein the weight ratio of the anti-foaming agent to the hydrophilic emulsifying agent is from 1/50 to 50/1.

11. A beverage as claimed in any preceding claim and which is pressurized with nitrogen gas.

12. A beverage substantially as hereinbefore described with reference to any of Examples 1 to 41.
