DESCRIPTION

Title of Invention: METHOD FOR MASKING DETERIORATION ODOR OF FOOD AND BEVERAGE, FLAVORING COMPOSITION FOR FOOD AND BEVERAGE, FOOD AND BEVERAGE, AND METHOD FOR PRODUCING FOOD AND BEVERAGE

Technical Field

[0001] The present invention relates to a method for masking a deterioration odor of a food or beverage, a flavoring composition for masking a deterioration odor of a food or beverage, a food or beverage, and a method for producing a food or beverage. More specifically, the present invention relates to a method for masking a deterioration odor (off-flavor) that occurs in a wide variety of foods and beverages, such as alcoholic beverages, foods and beverages containing fruit juice, and foods and beverages containing vitamin C, and to foods and beverages, such as alcoholic beverages, foods and beverages containing fruit juice, and foods and beverages containing vitamin C, in which the deterioration odor has been masked.

Background Art

[0002] Sotolon is an aroma component having a sweet and spicy aroma and is also used as a food flavoring. On the other hand, when produced in foods and beverages, it may disrupt the flavor balance and be perceived as a deterioration odor (off-flavor).

In Non Patent Literature 1, sotolon is cited as one of the causative substances of a deterioration odor resulting from oxidation of white wine. In addition, in Non Patent Literature 2, sotolon is cited as an off-flavor occurring in citrus-flavored soft drinks, and vitamin C in the soft drinks is cited as a cause of the formation of sotolon.

As a method for masking an off-flavor caused by sotolon, Patent Literature 1 describes a method involving adding one or more selected from the group consisting

of acetaldehyde, β-damascenone, acetal, 1,8-cineole, γ-valerolactone, p-menthan-3-one, γ-hexalactone, dihydroactinidiolide, ethyl crotonate, 1,4-cineole, hexanal, anethole, rose oxide, sclareolide, and ethyl isovalerate. Patent Literature 2 describes a method involving using 1,8-cineole, rose oxide, menthone, dihydroactinidiolide, and 1,4-cineole as masking agents for sotolon, which is one of the major aroma substances of a wort- and/or malt extract-derived odor. Patent Literature 3 discloses an agent for suppressing an odor caused by sotolon, comprising, as an active ingredient, one or more selected from the group consisting of 1-(2,3,4,7,8,8a-hexahydro-3,6,8,8-tetramethyl-1H-3a,7-methanoazulen-5-yl)ethanone, oxacyclohexadecen-2-one, citral, ω-6-hexadecenlactone, 2-benzylideneheptanal, 3-(4-tert-butylphenyl)propanal, (5E)-3-methylcyclopentadec-5-en-1-one, 1-(5,6,7,8-tetrahydro-3,5,5,6,8,8-hexamethyl-2-naphthalenyl)ethanone, 7-acetyl-1,2,3,4,5,6,7,8-octahydro-1,1,6,7-tetramethylnaphthalene, and muscone.

[0003] Meanwhile, β-caryophyllene oxide, eugenol, ethyl acetoacetate, methyl isovalerate, ethyl valerate, γ-methyl ionone, and triethyl citrate are known to be used in masking compositions for hair cosmetics for masking unpleasant odors such as base material odors, amine odors, ammonia odors, sulfur odors, acid odors, rust odors, tobacco odors, animal odors, and halogen odors (Patent Literature 4). Hexyl octanoate is known to be used as an aroma and flavor imparting or modifying agent in flavoring compositions for oral use (Patent Literature 5). Triethyl citrate is known to be used as an aroma and flavor imparting or modifying agent in citrus-type flavoring compositions (Patent Literature 6). γ-Methyl ionone is known to be used in deodorant compositions for solvent odors (Patent Literature 7).

Citation List

Patent Literature

[0004]

Patent Literature 1: Japanese Patent Laid-Open No. 2019-170375

Patent Literature 2: Japanese Patent Laid-Open No. 2020-178664

Patent Literature 3: Japanese Patent Laid-Open No. 2015-81237

Patent Literature 4: Japanese Patent Laid-Open No. 2003-137758

Patent Literature 5: Japanese Patent Laid-Open No. 2004-18431

Patent Literature 6: Japanese Patent Laid-Open No. 2004-168936

Patent Literature 7: Japanese Patent Laid-Open No. 2021-126449

Non Patent Literature

[0005]

Non Patent Literature 1: J. Agric. Food Chem., 51, 1377-1381 (2003)

Non Patent Literature 2: J. Agric. Food Chem., 47, 3288-3291 (1999)

Summary of Invention

Technical Problem

[0006] The present invention relates to providing a method for making a sotolon odor less perceptible (masking) without affecting the flavor of a food or beverage.

Solution to Problem

[0007] The present inventor has found that β-caryophyllene oxide, ethyl acetoacetate, methyl isovalerate, ethyl valerate, triethyl citrate, eugenol, hexyl octanoate, bornyl acetate, γ-methyl ionone, 1,4-cineole, 3,7-dimethyl-2-methylene-6-octen-1-ol, 8-decenal, N-(2-hydroxy-2-phenylethyl)-2-isopropyl-5,5-dimethylcyclohexane-1-carboxamide, mustakone, and (2E)-4-methyl-2,4-tridecadienal suppress a sotolon odor in foods and beverages at specific concentrations without impairing the flavor of the product.

[0008] Accordingly, the present invention includes the following.

Item 1. A method for masking a deterioration odor of a food or beverage, comprising adding one or more selected from the group consisting of β-caryophyllene oxide, ethyl acetoacetate, methyl isovalerate, ethyl valerate, triethyl citrate, eugenol, hexyl

octanoate, bornyl acetate, γ-methyl ionone, 1,4-cineole, 3,7-dimethyl-2-methylene-6-octen-1-ol, 8-decenal, N-(2-hydroxy-2-phenylethyl)-2-isopropyl-5,5-dimethylcyclohexane-1-carboxamide, mustakone, and (2E)-4-methyl-2,4-tridecadienal.

Item 2. The masking method according to item 1, wherein a causative substance of the deterioration odor comprises sotolon.

Item 3. The masking method according to claim 1 or 2, wherein the food or beverage is a fruit juice beverage, a confectionery product, a seasoning, or an alcoholic beverage.

Item 4. A flavoring composition for masking a deterioration odor of a food or beverage, comprising one or more selected from the group consisting of β-caryophyllene oxide, ethyl acetoacetate, methyl isovalerate, ethyl valerate, triethyl citrate, eugenol, hexyl octanoate, bornyl acetate, γ-methyl ionone, 1,4-cineole, 3,7-dimethyl-2-methylene-6-octen-1-ol, 8-decenal, N-(2-hydroxy-2-phenylethyl)-2-isopropyl-5,5-dimethylcyclohexane-1-carboxamide, mustakone, and (2E)-4-methyl-2,4-tridecadienal.

Item 5. The flavoring composition according to item 4, for imparting a fruity or alcoholic aroma to a food or beverage.

Item 6. The flavoring composition according to item 4 or 5, wherein a causative substance of the deterioration odor comprises sotolon.

Item 7. The flavoring composition according to any one of items 4 to 6, wherein the food or beverage is a fruit juice beverage, a confectionery product, a seasoning, or an alcoholic beverage.

Item 8. A food or beverage comprising 0.1 ppt to 100 ppm of one or more selected from the group consisting of β-caryophyllene oxide, ethyl acetoacetate, methyl isovalerate, ethyl valerate, triethyl citrate, eugenol, hexyl octanoate, bornyl acetate, γ-methyl ionone, 1,4-cineole, 3,7-dimethyl-2-methylene-6-octen-1-ol, 8-decenal, N-(2-hydroxy-2-phenylethyl)-2-isopropyl-5,5-dimethylcyclohexane-1-carboxamide, mustakone, and (2E)-4-methyl-2,4-tridecadienal.

Item 9. The food or beverage according to item 8, wherein the food or beverage is a fruit juice beverage, a confectionery product, a seasoning, or an alcoholic beverage.

Item 10. The food or beverage according to item 8 or 9, comprising 10 ppt to 1 ppm of sotolon.

Item 11. A method for producing a food or beverage, comprising incorporating into a food or beverage 0.1 ppt to 100 ppm of one or more selected from the group consisting of β-caryophyllene oxide, ethyl acetoacetate, methyl isovalerate, ethyl valerate, triethyl citrate, eugenol, hexyl octanoate, bornyl acetate, γ-methyl ionone, 1,4-cineole, 3,7-dimethyl-2-methylene-6-octen-1-ol, 8-decenal, N-(2-hydroxy-2-phenylethyl)-2-isopropyl-5,5-dimethylcyclohexane-1-carboxamide, mustakone, and (2E)-4-methyl-2,4-tridecadienal.

Advantageous Effects of Invention

[0009] According to the present invention, by adding to a food or beverage one or more selected from the group consisting of β-caryophyllene oxide, ethyl acetoacetate, methyl isovalerate, ethyl valerate, triethyl citrate, eugenol, hexyl octanoate, bornyl acetate, γ-methyl ionone, 1,4-cineole, 3,7-dimethyl-2-methylene-6-octen-1-ol, 8-decenal, N-(2-hydroxy-2-phenylethyl)-2-isopropyl-5,5-dimethylcyclohexane-1-carboxamide, mustakone, and (2E)-4-methyl-2,4-tridecadienal at specific concentrations, a deterioration odor occurring due to deterioration of the food or beverage can be masked. Thus, even when deterioration components are formed, for example, as a result of long-term storage in foods and beverages that are prone to deterioration, foods and beverages can be provided in which a flavor closer to that designed immediately after production can be perceived.

Description of Embodiments

[0010] β-Caryophyllene oxide, ethyl acetoacetate, methyl isovalerate, ethyl valerate, triethyl citrate, eugenol, hexyl octanoate, bornyl acetate, γ-methyl ionone, 1,4-cineole,

3,7-dimethyl-2-methylene-6-octen-1-ol, 8-decenal, N-(2-hydroxy-2-phenylethyl)-2-isopropyl-5,5-dimethylcyclohexane-1-carboxamide, mustakone, and (2E)-4-methyl-2,4-tridecadienal (hereinafter, these 15 compounds may be collectively referred to as "the masking agents of the present invention") used in the present invention are all known aroma components, and commercially available products can be used. The masking agents of the present invention may be used alone or in combination of two or more.

In the method for masking a deterioration odor of a food or beverage according to the present invention, the masking agents of the present invention can be added at any stage, such as a raw material preparation stage, a raw material mixing stage, a processing stage, a final finishing stage, and a stage immediately before container filling or packaging of a food or beverage. By adding the masking agents of the present invention, a deterioration odor of a food or beverage can be masked. The amount of the masking agents of the present invention to be added is adjusted according to the type and form of the food or beverage so as to achieve an appropriate content based on the mass of the food or beverage.

In the present specification, examples of causative substances of a deterioration odor of a food or beverage include sotolon. For example, a food or beverage may contain 10 ppt to 1 ppm of sotolon based on the mass of the food or beverage. Since the masking agents of the present invention have a high effect of masking a deterioration odor derived from sotolon, by adding the masking agents to a food or beverage containing sotolon or to a food or beverage in which sotolon can be generated, a deterioration odor occurring in the food or beverage can be effectively masked.

[0011] The flavoring composition for masking a deterioration odor according to the present invention comprises one or more of the masking agents of the present invention. In the above flavoring composition, in addition to the masking agents of the present invention, other components can be incorporated to the extent that the effects of the present invention are not impaired.

Examples of other components that can be incorporated into the flavoring composition for masking a deterioration odor of the present invention include various synthetic flavors, natural flavors, natural essential oils, and plant extracts, and include the natural essential oils, natural flavors, and synthetic flavors described in "Patent Gazette, Customary Technology Set (Flavors and Fragrances), Part 2: Food Flavoring," pp. 88-131, published on January 14, 2000.

The flavoring composition for masking a deterioration odor of the present invention can contain, as necessary, commonly used solvents, such as water and ethanol; and fixatives, such as ethylene glycol, propylene glycol, dipropylene glycol, hexylene glycol, glycerin, triethyl citrate, medium-chain fatty acid triglycerides, and medium-chain fatty acid diglycerides.

[0012] The flavoring composition for masking a deterioration odor of the present invention can be incorporated as such into foods and beverages.

Specific examples of foods and beverages include beverages such as carbonated beverages, soft drinks, fruit juice beverages, milk beverages, lactic acid bacteria beverages, energy drinks, soy milk, and tea beverages; alcoholic beverages such as chuhai, cocktail drinks, happoshu, fruit wines, and herbal liqueurs; desserts such as ice cream, ice milk, lacto ice, ice confections, yogurt, pudding, jelly, and dairy desserts; confectionery products such as caramel, candy, tablet confectionery, crackers, biscuits, cookies, pies, chocolate, snacks, and chewing gum; soups such as Japanese-style soups and Western-style soups; jams; flavored seasonings such as dressings; various instant beverages; and various instant foods.

[0013] The content of the masking agents of the present invention in the flavoring composition for masking a deterioration odor of the present invention varies depending on other components to be blended and cannot be generally specified, but can usually be set, for example, within a concentration range of 0.01 ppm or more and 10,000 ppm or less, preferably 0.1 ppm or more and 1,000 ppm or less, based on the mass of the flavoring composition for masking a deterioration odor. If the content of the masking

agents of the present invention in the flavoring composition for masking a deterioration odor is less than 0.01 ppm, a deterioration odor masking effect in a food or beverage cannot be obtained. When two or more masking agents of the present invention are used in combination, it is sufficient that the total amount thereof satisfies the above range.

[0014] In addition, the content of the masking agents of the present invention to be contained in a food or beverage can be set within a concentration range of 0.1 ppt or more and 100 ppm or less, preferably 0.1 ppt or more and 10 ppm or less, and more preferably 1 ppt or more and 100 ppb or less, based on the mass of the food or beverage. If the content of the masking agents of the present invention in a food or beverage is less than 0.01 ppt, a deterioration odor masking effect in the food or beverage cannot be obtained, and if the content exceeds 100 ppm, the change in flavor of the food or beverage is large and undesirable.

Examples

[0015] Hereinafter, the present invention will be described more specifically by Examples, but the present invention is not limited to these Examples. Unless otherwise specified in each Example, concentrations are on a mass basis.

The sensory evaluation in the present Examples was conducted by eight trained panelists, with the intensity of the sotolon odor of a sotolon-containing product or sample to which no masking component had been added defined as "rating: 4," and the intensity of the sotolon odor of a product or sample containing no sotolon defined as "rating: 0," and the intensity of the sotolon odor (masking effect) of each product or sample was relatively evaluated in accordance with the following evaluation criteria.

<Evaluation criteria>

Sotolon odor is strongly perceived:	4 points
Sotolon odor is perceived:	3 points
Sotolon odor is slightly perceived:	2 points

Almost no sotolon odor is perceived: 1 point

Sotolon odor is not perceived at all: 0 points

In addition, the effect on the flavor of the product or sample was absolutely evaluated in accordance with the following evaluation criteria, based on the presence or absence of a sotolon odor and off-flavors other than those of the product or sample itself.

<Evaluation criteria>

Off-flavor is strongly perceived: 4 points

Off-flavor is perceived: 3 points

Off-flavor is slightly perceived: 2 points

Almost no off-flavor is perceived: 1 point

Off-flavor is not perceived at all: 0 points

[0016] [Example 1] Sotolon odor masking effect of β-caryophyllene oxide in a beverage

Purified water was added to 2 g of a lemon flavor prepared by converting lemon oil into an essence, and the total volume was adjusted to 1,000 mL. To this citrus-flavored beverage, sotolon adjusted to a concentration of 1 mass% with 95% ethanol was added so as to be 5 ppb in the citrus-flavored beverage. β-Caryophyllene oxide was added to this sotolon-containing citrus-flavored beverage at the concentrations shown in Table 1, and the intensity of the sotolon odor (masking effect) and the effect on the citrus flavor of each sample were evaluated.

The results are as shown in Table 1, which shows the average scores of the evaluation results from each panelist.

[0017] [Table 1]

β-Caryophyllene oxide Added concentration	Intensity of sotolon odor	Intensity of off-flavor
1ppm	0.7	3.5
100ppb	0.9	2.9
10ppb	1.3	2.4
1ppb	1.7	2.0
100ppt	2.0	1.4
10ppt	2.4	1.0
1ppt	3.0	0.7
0.1ppt	3.7	0.4

[0018] From the results in Table 1, it is clear that β-caryophyllene oxide masks a sotolon odor at a concentration of 10 ppt or more and 100 ppb or less, without affecting the citrus flavor.

[0019] [Example 2] Sotolon odor masking effect of ethyl acetoacetate in a beverage

Using samples prepared in the same manner as in Example 1, the intensity of the sotolon odor (masking effect) and the effect on the citrus flavor of ethyl acetoacetate were evaluated. The evaluation was carried out in the same manner as in Example 1. The results are as shown in Table 2, which shows the average scores of the panelists.

[0020] [Table 2]

Ethyl acetoacetate Added concentration	Intensity of sotolon odor	Intensity of off-flavor
1000ppm	0.4	3.1
100ppm	0.7	2.8
10ppm	1.1	2.4
1ppm	1.4	2.2
100ppb	1.9	1.6
10ppb	2.6	0.9
1ppb	3.3	0.7
100ppt	3.6	0.3

[0021] From the results in Table 2, it is clear that ethyl acetoacetate masks a sotolon odor at a concentration of 10 ppb or more and 100 ppm or less, without affecting the citrus flavor.

[0022] [Example 3] Sotolon odor masking effect of methyl isovalerate in a beverage

Using samples prepared in the same manner as in Example 1, the intensity of the sotolon odor (masking effect) and the effect on the citrus flavor of methyl isovalerate were evaluated. The evaluation was carried out in the same manner as in Example 1. The results are as shown in Table 3, which shows the average scores of the panelists.

[0023] [Table 3]

Methyl isovalerate Added concentration	Intensity of sotolon odor	Intensity of off-flavor
100ppm	0.9	3.6
10ppm	1.3	3.3
1ppm	1.3	2.9
100ppb	1.6	2.6
10ppb	2.1	2.0
1ppb	2.4	1.6
100ppt	2.7	1.3
10ppt	3.7	0.6

[0024] From the results in Table 3, it is clear that methyl isovalerate masks a sotolon odor at a concentration of 100 ppt or more and 1 ppm or less, without affecting the citrus flavor.

[0025] [Example 4] Sotolon odor masking effect of ethyl valerate in a beverage

Using samples prepared in the same manner as in Example 1, the intensity of the sotolon odor (masking effect) and the effect on the citrus flavor of ethyl valerate were evaluated. The evaluation was carried out in the same manner as in Example 1. The results are as shown in Table 4, which shows the average scores of the panelists.

[0026] [Table 4]

Ethyl valerate Added concentration	Intensity of sotolon odor	Intensity of off-flavor
100ppm	0.6	3.7
10ppm	1.0	3.3
1ppm	1.4	2.7
100ppb	1.9	2.3
10ppb	2.0	1.7
1ppb	2.6	1.4
100ppt	2.9	0.9
10ppt	3.6	0.4

[0027] From the results in Table 4, it is clear that ethyl valerate masks a sotolon odor at a concentration of 100 ppt or more and 1 ppm or less, without affecting the citrus flavor.

[0028] [Example 5] Sotolon odor masking effect of triethyl citrate in a beverage

Using samples prepared in the same manner as in Example 1, the intensity of the sotolon odor (masking effect) and the effect on the citrus flavor of triethyl citrate were evaluated. The evaluation was carried out in the same manner as in Example 1. The results are as shown in Table 5, which shows the average scores of the panelists.

[0029] [Table 5]

Triethyl citrate Added concentration	Intensity of sotolon odor	Intensity of off-flavor
1000ppm	0.4	3.6
100ppm	0.7	2.8
10ppm	1.1	2.4
1ppm	1.4	2.0
100ppb	1.9	1.6
10ppb	2.6	0.9
1ppb	3.3	0.7
100ppt	3.6	0.3

[0030] From the results in Table 5, it is clear that triethyl citrate masks a sotolon odor at a concentration of 10 ppb or more and 100 ppm or less, without affecting the citrus flavor.

[0031] [Example 6] Sotolon odor masking effect of eugenol in a beverage

Using samples prepared in the same manner as in Example 1, the intensity of the sotolon odor (masking effect) and the effect on the citrus flavor of eugenol were evaluated. The evaluation was carried out in the same manner as in Example 1. The results are as shown in Table 6, which shows the average scores of the panelists.

[0032] [Table 6]

Eugenol Added concentration	Intensity of sotolon odor	Intensity of off-flavor
10ppm	0.9	3.7
1ppm	1.0	3.2
100ppb	1.1	2.7
10ppb	1.6	2.1
1ppb	1.9	2.0
100ppt	2.3	1.6
10ppt	2.7	0.9
1ppt	3.7	0.7

[0033] From the results in Table 6, it is clear that eugenol masks a sotolon odor at a concentration of 10 ppt or more and 100 ppb or less, without affecting the citrus flavor.

[0034] [Example 7] Sotolon odor masking effect of hexyl octanoate in a beverage

Using samples prepared in the same manner as in Example 1, the intensity of the sotolon odor (masking effect) and the effect on the citrus flavor of hexyl octanoate were evaluated. The evaluation was carried out in the same manner as in Example 1. The results are as shown in Table 7, which shows the average scores of the panelists.

[0035] [Table 7]

Hexyl octanoate Added concentration	Intensity of sotolon odor	Intensity of off-flavor
10ppm	0.7	3.6
1ppm	1.3	2.8
100ppb	1.6	2.0
10ppb	2.0	1.7
1ppb	2.3	1.0
100ppt	2.7	0.6
10ppt	3.9	0.1

[0036] From the results in Table 7, it is clear that hexyl octanoate masks a sotolon odor at a concentration of 100 ppt or more and 1 ppm or less, without affecting the citrus flavor.

[0037] [Example 8] Sotolon odor masking effect of bornyl acetate in a beverage

Using samples prepared in the same manner as in Example 1, the intensity of the sotolon odor (masking effect) and the effect on the citrus flavor of bornyl acetate

were evaluated. The evaluation was carried out in the same manner as in Example 1. The results are as shown in Table 8, which shows the average scores of the panelists.

[0038] [Table 8]

Bornyl acetate Added concentration	Intensity of sotolon odor	Intensity of off-flavor
10ppm	0.6	3.7
1ppm	0.9	3.1
100ppb	1.7	2.1
10ppb	2.0	1.9
1ppb	2.0	1.1
100ppt	2.3	0.9
10ppt	2.7	0.4
1ppt	3.9	0.3

[0039] From the results in Table 8, it is clear that bornyl acetate masks a sotolon odor at a concentration of 10 ppt or more and 100 ppb or less, without affecting the citrus flavor.

[0040] [Example 9] Sotolon odor masking effect of γ-methyl ionone in a beverage

Using samples prepared in the same manner as in Example 1, the intensity of the sotolon odor (masking effect) and the effect on the citrus flavor of γ-methyl ionone were evaluated. The evaluation was carried out in the same manner as in Example 1. The results are as shown in Table 9, which shows the average scores of the panelists.

[0041] [Table 9]

γ-Methyl ionone Added concentration	Intensity of sotolon odor	Intensity of off-flavor
100ppb	0.4	3.7
10ppb	1.0	2.9
1ppb	1.0	2.4
100ppt	1.6	2.0
10ppt	1.7	1.6
1ppt	2.1	1.3
0.1ppt	2.6	1.0
0.01ppt	3.9	0.6

[0042] From the results in Table 9, it is clear that γ-methyl ionone masks a sotolon odor at a concentration of 0.1 ppt or more and 10 ppb or less, without affecting the citrus flavor.

[0043] [Example 10] Sotolon odor masking effect of 1,4-cineole in a beverage

Using samples prepared in the same manner as in Example 1, the intensity of the sotolon odor (masking effect) and the effect on the citrus flavor of 1,4-cineole were evaluated. The evaluation was carried out in the same manner as in Example 1. The results are as shown in Table 10, which shows the average scores of the panelists.

[0044] [Table 10]

1,4-Cineole Added concentration	Intensity of sotolon odor	Intensity of off-flavor
100ppm	0.4	3.4
10ppm	1.0	2.6
1ppm	1.1	2.0
100ppb	1.9	1.3
10ppb	2.1	0.9
1ppb	2.6	0.3
100ppt	3.6	0.1

[0045] From the results in Table 10, it is clear that 1,4-cineole masks a sotolon odor at a concentration of 1 ppb or more and 10 ppm or less, without affecting the citrus flavor.

[0046] [Example 11] Sotolon odor masking effect of 3,7-dimethyl-2-methylene-6-octen-1-ol in a beverage

Using samples prepared in the same manner as in Example 1, the intensity of the sotolon odor (masking effect) and the effect on the citrus flavor of 3,7-dimethyl-2-methylene-6-octen-1-ol were evaluated. The evaluation was carried out in the same manner as in Example 1. The results are as shown in Table 11, which shows the average scores of the panelists.

[0047] [Table 11]

3,7-Dimethyl-2-methylene-6-octen-1-ol Added concentration	Intensity of sotolon odor	Intensity of off-flavor
100ppm	1.0	3.2
10ppm	1.1	2.5
1ppm	1.9	1.3
100ppb	2.1	0.9
10ppb	2.6	0.3
100ppt	3.6	0.1

[0048] From the results in Table 11, it is clear that 3,7-dimethyl-2-methylene-6-octen-1-ol masks a sotolon odor at a concentration of 10 ppb or more and 10 ppm or less, without affecting the citrus flavor.

[0049] [Example 12] Sotolon odor masking effect of 8-decenal in a beverage

Using samples prepared in the same manner as in Example 1, the intensity of the sotolon odor (masking effect) and the effect on the citrus flavor of 8-decenal were evaluated. The evaluation was carried out in the same manner as in Example 1. The results are as shown in Table 12, which shows the average scores of the panelists.

[0050] [Table 12]

8-Decenal Added concentration	Intensity of sotolon odor	Intensity of off-flavor
100ppb	0.4	3.4
10ppb	1.0	2.6
1ppb	1.1	2.0
100ppt	1.9	1.3
10ppt	2.1	1.0
1ppt	2.6	0.9
0.1ppt	2.9	0.3
0.01ppt	3.9	0.1

[0051] From the results in Table 12, it is clear that 8-decenal masks a sotolon odor at a concentration of 0.1 ppb or more and 10 ppb or less, without affecting the citrus flavor.

[0052] [Example 13] Sotolon odor masking effect of N-(2-hydroxy-2-phenylethyl)-2-isopropyl-5,5-dimethylcyclohexane-1-carboxamide in a beverage

Using samples prepared in the same manner as in Example 1, the intensity of the sotolon odor (masking effect) and the effect on the citrus flavor of N-(2-hydroxy-2-phenylethyl)-2-isopropyl-5,5-dimethylcyclohexane-1-carboxamide were evaluated. The evaluation was carried out in the same manner as in Example 1. The results are as shown in Table 13, which shows the average scores of the panelists.

[0053] [Table 13]

N-(2-Hydroxy-2-phenylethyl)-2-isopropyl-5,5-dimethylcyclohexane-1-carboxamide Added concentration	Intensity of sotolon odor	Intensity of off-flavor
100ppm	0.7	3.0
10ppm	0.9	2.7
1ppm	1.0	2.3
100ppb	1.4	2.1
10ppb	1.9	2.0
1ppb	2.1	1.9
100ppt	2.5	1.7
10ppt	2.9	1.3
1ppt	3.2	0.9
0.1ppt	3.8	0.3

[0054] From the results in Table 13, it is clear that N-(2-hydroxy-2-phenylethyl)-2-isopropyl-5,5-dimethylcyclohexane-1-carboxamide masks a sotolon odor at a concentration of 10 ppt or more and 10 ppm or less, without affecting the citrus flavor.

[0055] [Example 14] Sotolon odor masking effect of mustakone in a beverage

Using samples prepared in the same manner as in Example 1, the intensity of the sotolon odor (masking effect) and the effect on the citrus flavor of mustakone were evaluated. The evaluation was carried out in the same manner as in Example 1. The results are as shown in Table 14, which shows the average scores of the panelists.

[0056] [Table 14]

Mustakone Added concentration	Intensity of sotolon odor	Intensity of off-flavor
10ppm	0.9	3.7
1ppm	1.0	3.1
100ppb	1.4	2.8
10ppb	1.9	2.0
1ppb	2.1	1.9
100ppt	2.5	1.7
10ppt	2.9	1.3
1ppt	3.2	0.9
0.1ppt	3.8	0.3

[0057] From the results in Table 14, it is clear that mustakone masks a sotolon odor at a concentration of 10 ppt or more and 100 ppb or less, without affecting the citrus flavor.

[0058] [Example 15] Sotolon odor masking effect of (2E)-4-methyl-2,4-tridecadienal in a beverage

Using samples prepared in the same manner as in Example 1, the intensity of the sotolon odor (masking effect) and the effect on the citrus flavor of (2E)-4-methyl-2,4-tridecadienal were evaluated. The evaluation was carried out in the same manner as in Example 1. The results are as shown in Table 15, which shows the average scores of the panelists.

[0059] [Table 15]

(2E)-4-Methyl-2,4-tridecadienal Added concentration	Intensity of sotolon odor	Intensity of off-flavor
10ppb	0.9	3.7
1ppb	1.5	2.9
100ppt	2.1	2.5
10ppt	2.4	1.8
1ppt	2.8	1.4
0.1ppt	3.4	0.9

[0060] From the results in Table 15, it is clear that (2E)-4-methyl-2,4-tridecadienal masks a sotolon odor at a concentration of 1 ppt or more and 1 ppb or less, without affecting the citrus flavor.

[0061] [Example 16] Sotolon odor masking effect of a flavoring composition in a beverage

Grape juice concentrate was diluted with water to adjust the juice content to 20%. To this fruit juice beverage, sotolon adjusted to a concentration of 1 mass% with 95% ethanol was added so as to be 5 ppb in the fruit juice beverage. Flavoring composition 1, flavoring composition 2, and flavoring composition 3, prepared according to the formulations of Table 16, were each added at 0.1 mass% to this sotolon-containing fruit juice beverage, and the intensity of the sotolon odor (masking effect) and the effect on the grape flavor of each sample were evaluated.

The results are as shown in Table 17, which shows the average scores of the evaluation results from each panelist.

[0062] [Table 16]

(Component)	Flavoring composition 1 (pts. by mass)	Flavoring composition 2 (pts. by mass)	Flavoring composition 3 (pts. by mass)
Ethyl propionate	50	50	50
Methyl anthranilate	10	10	10
β-Caryophyllene oxide	-	0.01	0.01
Ethyl acetoacetate	-	1.0	1.0
Methyl isovalerate	-	0.05	0.05
Ethyl valerate	-	0.05	0.05
Triethyl citrate	-	1.0	1.0
Eugenol	-	0.001	0.001
Hexyl octanoate	-	0.01	0.01
Bornyl acetate	-	0.001	0.001
γ-Methyl ionone	-	0.001	0.001
1,4-Cineole	-	0.01	0.01
3,7-Dimethyl-2-methylene-6-octen-1-ol	-	-	0.1
8-Decenal	-	-	0.0001
N-(2-Hydroxy-2-phenylethyl)-2-isopropyl-5,5-dimethylcyclohexane-1-carboxamide	-	-	0.01
Mustakone	-	-	0.01
(2E)-4-Methyl-2,4-tridecadienal	-	-	0.0001
Ethanol	Balance	Balance	Balance
Total	1000.0	1000.0	1000.0

[0063] [Table 17]

	Intensity of sotolon odor	Intensity of off-flavor
Not added	3.9	0.0
Flavoring composition 1	3.6	0.2
Flavoring composition 2	1.3	0.3
Flavoring composition 3	0.9	0.5

[0064] From the results in Table 17, it is clear that flavoring composition 2 and flavoring composition 3, which contain the aroma components found in the present invention, mask a sotolon odor without affecting the grape flavor.

[0065] [Example 17] Sotolon odor masking effect of β-caryophyllene oxide in a confectionery product

Apple-flavored gummy candy to which 0.3% of a general apple flavor, 5 ppb of sotolon, and β-caryophyllene oxide at concentrations shown in Table 18 had been

added was prepared, and the intensity of the sotolon odor (masking effect) and the effect on the apple flavor of each sample were evaluated.

The test was conducted by 11 trained panelists.

The results are as shown in Table 18, which shows the average scores of the evaluation results from each panelist.

[0066] [Table 18]

β-Caryophyllene oxide Added concentration	Intensity of sotolon odor	Intensity of off-flavor
100ppm	0.5	3.8
10ppm	0.8	2.9
1ppm	1.2	2.5
100ppb	1.5	1.6
10ppb	2.0	1.1
1ppb	2.4	0.5
100ppt	3.1	0.4

[0067] From the results in Table 18, it is clear that β-caryophyllene oxide masks a sotolon odor at a concentration of 1 ppb or more and 10 ppm or less, without affecting the apple flavor.

[0068] [Example 18] Sotolon odor masking effect of 1,4-cineole in a confectionery product

Using samples prepared in the same manner as in Example 17, the intensity of the sotolon odor (masking effect) and the effect on the apple flavor of 1,4-cineole were evaluated. The evaluation was carried out in the same manner as in Example 17. The results are as shown in Table 19, which shows the average scores of the panelists.

[0069] [Table 19]

1,4-Cineole Added concentration	Intensity of sotolon odor	Intensity of off-flavor
10ppm	0.8	3.6
1ppm	1.1	2.8
100ppb	1.3	1.8
10ppb	1.6	1.1
1ppb	2.1	0.7
100ppt	2.5	0.5
10ppt	3.2	0.5

[0070] From the results in Table 19, it is clear that 1,4-cineole masks a sotolon odor at a concentration of 100 ppt or more and 1 ppm or less, without affecting the apple flavor.

[0071] [Example 19] Sotolon odor masking effect of ethyl acetoacetate in a seasoning

To a commercially available lemon dressing, sotolon adjusted to a concentration of 1 mass% with 95% ethanol was added so as to be 50 ppb in the lemon dressing. Ethyl acetoacetate was added to this sotolon-containing lemon dressing at the concentrations shown in Table 20, and the intensity of the sotolon odor (masking effect) and the effect on the lemon dressing of each sample were evaluated.

The test was conducted by 10 trained panelists.

The results are as shown in Table 20, which shows the average scores of the evaluation results from each panelist.

[0072] [Table 20]

Ethyl acetoacetate Added concentration	Intensity of sotolon odor	Intensity of off-flavor
1000ppm	0.7	3.8
100ppm	0.7	2.8
10ppm	0.8	2.0
1ppm	1.3	1.4
100ppb	1.8	0.9
10ppb	2.4	0.7
1ppb	2.9	0.3
100ppt	3.3	0.2

[0073] From the results in Table 20, it is clear that ethyl acetoacetate masks a sotolon odor at a concentration of 1 ppb or more and 100 ppm or less, without affecting the lemon dressing.

[0074] [Example 20] Sotolon odor masking effect of ethyl valerate in a seasoning

Using samples prepared in the same manner as in Example 19, the intensity of the sotolon odor (masking effect) and the effect on the lemon dressing of ethyl valerate were evaluated. The evaluation was carried out in the same manner as in Example 19. The results are as shown in Table 21, which shows the average scores of the panelists.

[0075] [Table 21]

Ethyl valerate Added concentration	Intensity of sotolon odor	Intensity of off-flavor
100ppm	0.7	3.8
10ppm	0.7	3.2
1ppm	0.8	2.8
100ppb	1.4	1.7
10ppb	2.2	1.2
1ppb	2.7	0.6
100ppt	3.0	0.2
10ppt	3.4	0.1

[0076] From the results in Table 21, it is clear that ethyl valerate masks a sotolon odor at a concentration of 100 ppt or more and 1 ppm or less, without affecting the lemon dressing.

[0077] [Example 21] Sotolon odor masking effect of γ-methyl ionone in a seasoning

Using samples prepared in the same manner as in Example 19, the intensity of the sotolon odor (masking effect) and the effect on the lemon dressing of γ-methyl ionone were evaluated. The evaluation was carried out in the same manner as in Example 19. The results are as shown in Table 22, which shows the average scores of the panelists.

[0078] [Table 22]

γ-Methyl ionone Added concentration	Intensity of sotolon odor	Intensity of off-flavor
100ppb	0.7	3.2
10ppb	0.6	2.3
1ppb	0.7	1.9
100ppt	1.1	1.2
10ppt	1.4	0.9
1ppt	1.9	0.6
0.1ppt	2.7	0.2

[0079] From the results in Table 22, it is clear that γ-methyl ionone masks a sotolon odor at a concentration of 0.1 ppt or more and 10 ppb or less, without affecting the lemon dressing.

[0080] [Example 21] Sotolon odor masking effect of 1,4-cineole in a dressing

Using samples prepared in the same manner as in Example 19, the intensity of the sotolon odor (masking effect) and the effect on the lemon dressing of 1,4-cineole were evaluated. The evaluation was carried out in the same manner as in Example 19. The results are as shown in Table 23, which shows the average scores of the panelists.

[0081] [Table 23]

1,4-Cineole Added concentration	Intensity of sotolon odor	Intensity of off-flavor
100ppm	0.6	3.8
10ppm	0.9	3.0
1ppm	1.1	2.0
100ppb	1.1	1.4
10ppb	1.7	0.9
1ppb	2.4	0.6
100ppt	2.9	0.3

[0082] From the results in Table 23, it is clear that 1,4-cineole masks a sotolon odor at a concentration of 100 ppt or more and 10 ppm or less, without affecting the lemon dressing.

CLAIMS

[Claim 1]

A method for masking a deterioration odor of a food or beverage, comprising adding one or more selected from the group consisting of β-caryophyllene oxide, ethyl acetoacetate, methyl isovalerate, ethyl valerate, triethyl citrate, eugenol, hexyl octanoate, bornyl acetate, γ-methyl ionone, 1,4-cineole, 3,7-dimethyl-2-methylene-6-octen-1-ol, 8-decenal, N-(2-hydroxy-2-phenylethyl)-2-isopropyl-5,5-dimethylcyclohexane-1-carboxamide, mustakone, and (2E)-4-methyl-2,4-tridecadienal.

[Claim 2]

The masking method according to claim 1, wherein a causative substance of the deterioration odor comprises sotolon.

[Claim 3]

The masking method according to claim 1 or 2, wherein the food or beverage is a fruit juice beverage, a confectionery product, a seasoning, or an alcoholic beverage.

[Claim 4]

A flavoring composition for masking a deterioration odor of a food or beverage, comprising one or more selected from the group consisting of β-caryophyllene oxide, ethyl acetoacetate, methyl isovalerate, ethyl valerate, triethyl citrate, eugenol, hexyl octanoate, bornyl acetate, γ-methyl ionone, 1,4-cineole, 3,7-dimethyl-2-methylene-6-octen-1-ol, 8-decenal, N-(2-hydroxy-2-phenylethyl)-2-isopropyl-5,5-dimethylcyclohexane-1-carboxamide, mustakone, and (2E)-4-methyl-2,4-tridecadienal.

[Claim 5]

The flavoring composition according to claim 4, for imparting a fruity or alcoholic aroma to a food or beverage.

[Claim 6]

The flavoring composition according to claim 4 or 5, wherein a causative substance of the deterioration odor comprises sotolon.

[Claim 7]

The flavoring composition according to any one of claims 4 to 6, wherein the food or beverage is a fruit juice beverage, a confectionery product, a seasoning, or an alcoholic beverage.

[Claim 8]

A food or beverage comprising 0.1 ppt to 100 ppm of one or more selected from the group consisting of β-caryophyllene oxide, ethyl acetoacetate, methyl isovalerate, ethyl valerate, triethyl citrate, eugenol, hexyl octanoate, bornyl acetate, γ-methyl ionone, 1,4-cineole, 3,7-dimethyl-2-methylene-6-octen-1-ol, 8-decenal, N-(2-hydroxy-2-phenylethyl)-2-isopropyl-5,5-dimethylcyclohexane-1-carboxamide, mustakone, and (2E)-4-methyl-2,4-tridecadienal.

[Claim 9]

The food or beverage according to claim 8, wherein the food or beverage is a fruit juice beverage, a confectionery product, a seasoning, or an alcoholic beverage.

[Claim 10]

The food or beverage according to claim 8 or 9, comprising 10 ppt to 1 ppm of sotolon.

[Claim 11]

A method for producing a food or beverage, comprising incorporating into a food or beverage 0.1 ppt to 100 ppm of one or more selected from the group consisting of β-caryophyllene oxide, ethyl acetoacetate, methyl isovalerate, ethyl valerate, triethyl citrate, eugenol, hexyl octanoate, bornyl acetate, γ-methyl ionone, 1,4-cineole, 3,7-dimethyl-2-methylene-6-octen-1-ol, 8-decenal, N-(2-hydroxy-2-phenylethyl)-2-isopropyl-5,5-dimethylcyclohexane-1-carboxamide, mustakone, and (2E)-4-methyl-2,4-tridecadienal.