

Specification

Title of Invention:

CARBONATED BEVERAGE, METHOD FOR PREPARING FLAVOR
COMPOSITION, AND METHOD FOR SUPPRESSING EFFERVESCENCE OF
5 CARBONATED BEVERAGE

Technical Field

[0001] The present invention relates to a carbonated beverage, a method for preparing
a flavor composition, and a method for suppressing effervescence of carbonated
10 beverages.

Background Art

[0002] Carbonated beverages are popular in the market because they are often drunk for
the unique stimulation felt in the oral cavity due to the carbon dioxide gas in the beverage,
and can be enjoyed with stimulating and refreshing sensations. In addition, due to the
15 recent diversification of consumer tastes, not only plain carbonated beverages but also
carbonated beverages containing flavors and fruit juices are offered, and it is known that
carbonated beverages have a stronger aroma than non-carbonated beverages.

Meanwhile, carbonated beverages have carbon dioxide gas dissolved in a
supersaturated state, which may cause problems such as spurting of the carbonated
20 beverages when filling containers such as PET bottles or when consumers open the caps.
In view of this, for example, Patent Literature 1 discloses a technique that can effectively
and stably suppress the spurting of carbonated beverages by classifying aroma
components by LogP and controlling their content ratios. In addition, Patent Literature
2 discloses a technique that suppresses spurting and spillage during filling by blending
25 tri- or higher polysaccharides.

Citation List

Patent Literatures

[0003] Patent Literature 1: Japanese Patent Application Publication No. 2019-165668

30 Patent Literature 2: Japanese Patent Application Publication No. 2014-226073

Summary of Invention

Problems to be solved by the invention

[0004] However, the technique disclosed in Patent Literature 1 is expressed by the
5 content ratio of the hydrophobic aroma component and the hydrophilic aroma component,
and still has a problem in that it is necessary to consider both the flavor tone and the
effervescence. Moreover, the technique disclosed in Patent Literature 2 does not focus
on the effervescence of the flavor component itself.

Means for solution of the problems

10 [0005] Therefore, with the aim of providing a carbonated beverage capable of
suppressing the spurting and spillage of the carbonated beverage during production and
opening, the present inventors paid attention to the action of flavor components on foam
during intensive studies, and also paid attention to the physical property values of flavor
components related to this action. Thus, the present invention has been completed.

15 Specifically, the present invention provides a carbonated beverage containing 1
ppm to 160 ppm of a flavor component having a LogP of 2.8 to 8 and a flavor composition
containing a flavor component having a LogP of 2.8 to 8, and also provides a method for
suppressing effervescence of carbonated beverages, including the step of adjusting the
content of a flavor component having a LogP of 2.8 to 8 in the carbonated beverage to 1
20 ppm to 160 ppm.

Advantageous Effects of Invention

[0006] The present invention provides a carbonated beverage whose spurting and
spillage are suppressed during production and opening, a flavor composition for
carbonated beverages that suppresses spurting and spillage, and a technique capable of
25 suppressing spurting and spillage.

Description of Embodiments

[0007] The present invention is described below.

The LogP of the flavor component used in the present invention can be calculated
30 based on, for example, "United States Environmental Protection Agency ver. 4.11".

Note that larger values of LogP indicate higher hydrophobicity.

The flavor component used in the present invention has a LogP of 2.8 to 8, preferably a LogP of 2.8 to 6 in terms of solubility, calculated according to the above "United States Environmental Protection Agency ver. 4.11". Specific examples include
5 benzyl benzoate, isoamyl benzoate, benzyl phenyl acetate, benzyl salicylate, octanol, nonanol, decanol, and menthyl 3-hydroxybutyrate. Benzyl benzoate, menthyl 3-hydroxybutyrate, ethyl myristate, methyl myristate, and ethyl palmitate are preferable because they have a small impact on the flavor tone. Moreover, these flavor components may be used singly or in combination of two or more.

10 [0008] The content of the flavor component is 1 ppm to 160 ppm, preferably 2 ppm to 100 ppm, more preferably 3 ppm to 50 ppm, and further preferably 4 ppm to 20 ppm, based on the carbonated beverage. When the content of the flavor component is within the above ranges, the effervescence suppressing action on the carbonated beverage can be effectively obtained, and the impact on the flavor tone is small.

15 [0009] Carbonated beverages in the present invention can be, for example, various beverages containing carbon dioxide gas such as carbonated beverages containing only water, flavor, and carbon dioxide gas, cider beverages containing sweeteners and acidulants, and colored carbonated beverages. Also, the carbonated beverage in the present invention may be an alcohol-containing carbonated beverage. Examples of
20 alcohol-containing carbonated beverages include low-malt beer, beer-flavored alcoholic beverages, chuhai, and cocktails.

[0010] In the carbonated beverage of the present invention, flavors other than the flavor component may be general flavors such as natural flavors, synthetic flavors, and mixtures of natural flavors and synthetic flavors. For example, fruit flavors, yogurt flavors,
25 ramune flavors, or mixtures thereof can be used. Examples of fruit flavors include citrus fruits (such as orange, lemon, grapefruit, mandarin orange, pomelo, natsumikan, hassaku, lime, citron, yuzu, oroblanco, sudachi, kabosu, and kumquat), berries (raspberries such as raspberry, blackberry, loganberry, youngberry, boysenberry, tayberry, cloudberry, salmonberry, arctic raspberry, and mayberry, bilberries such as blueberry, cranberry, and
30 cowberry, currants such as gooseberry, red currant, and black currant, and gummies,

mulberry, strawberry, wolfberry, and elderberry), pears (such as European pear, Japanese pear, and Chinese pear), apple, grape, pineapple, fig, melon, mango, pomegranate, passion fruit, lychee, banana, peach, watermelon, tomato, papaya, guava, and loquat.

These flavors may be used singly or in combination of two or more. From the viewpoint of efficiently obtaining the effervescence suppressing effect on carbonated beverages, it is preferable to use natural flavors of citrus fruits or flavors abundantly contained in citrus fruits.

[0011] Solvents contained in the flavor composition of the present invention include ethanol, propylene glycol, triacetin, triethyl citrate, glycerin and the like. These solvents may be used singly or in combination of two or more.

[0012] Examples of sweeteners contained in carbonated beverages include fructose glucose corn syrup, sugar (including sucrose and granulated sugar), fructose, high-fructose corn syrup, glucose, oligosaccharides, lactose, honey, starch syrup, sugar alcohols, and high-intensity sweeteners.

Examples of high-intensity sweeteners include aspartame, acesulfame potassium, xylitol, glycyrrhizin, disodium glycyrrhizinate, saccharin, calcium saccharin, sodium saccharin, sucralose, alitame, neotame, arabinose, licorice extract, xylose, stevia, thaumatin, swingle extract, rhamnose, and ribose.

These sweeteners may be used singly or in combination of two or more.

[0013] Examples of acidulants contained in carbonated beverages include citric acid, lactic acid, malic acid, tartaric acid, adipic acid, glucono delta-lactone, gluconic acid, succinic acid, glacial acetic acid, fumaric acid, phytic acid, phosphoric acid, and salts thereof.

These acidulants may be used singly or in combination of two or more.

Preferably, the carbonated beverage is substantially free of fruit juice. This makes it possible to efficiently obtain the effervescence suppressing effect on carbonated beverages.

[0014] The gas volume of the carbonated beverage (pressure of the carbon dioxide gas) may be appropriately adjusted according to the purpose. According to the present invention, effervescence can be suppressed at a high gas volume of 3.0 to 5.0. However,

it is not particularly limited to this, and for example, the gas volume of carbonated beverages may be set to a low gas volume of 0.1 to 3.0.

A known method can be used as a method for injecting carbon dioxide gas. Also, the gas volume in carbonated beverages can be measured by known methods. For example, it can be measured using a commercially available measuring instrument (such as Gas Volume Analyzer GVA-500 manufactured by Kyoto Electronics Manufacturing Co., Ltd.).

Note that the gas volume represents the volume of carbon dioxide gas dissolved in the carbonated beverage based on the volume of the entire carbonated beverage under standard conditions (1 atmospheric pressure, 0°C).

[0015] The carbonated beverage of the present invention may contain additional components in addition to flavors, sweeteners, and acidulants to the extent that the effects of the present invention are not impaired. The additional components can be blended as additives. Examples of such additives include colorants, antioxidants, seasonings, reinforcing agents such as vitamins and minerals, pH adjusters, emulsifiers, stabilizers, dietary fibers, and dextrin.

These components may be used singly or in combination of two or more.

It is expected that the present invention can effectively suppress the spurting of carbonated beverages when filling with the carbonated beverages.

Examples

[0016] The present invention is described in more detail below with reference to Examples and Comparative Examples, but the present invention is not limited to these.

(Evaluation Method)

A funnel (diameter: 150 mm) was placed so that the tip thereof was positioned 5 mm above the mouth of a 2 L graduated cylinder (height: 490 mm, outer diameter: 9 cm). A 500 mL sample was poured into the funnel, and after 10 seconds, the liquid was carefully poured into the center of the graduated cylinder at a rate of 10 L/min, and the maximum height (maximum total height) reached until effervescence disappeared was measured. From the obtained results, the effervescence rate was calculated based on the following formula.

Effervescence rate (%)=(maximum total height with addition of a single item expected to have effervescence suppressing effect)×100/(maximum total height without addition)

Note that as a criterion for the effervescence suppressing effect, an effervescence rate of 90% or less was determined as having an effervescence suppressing effect.

The following lemon flavor composition (reference product 1) was prepared. Table 1 shows the formulation of reference product 1.

[0018] Table 1

Compound Name	Weight Ratio
Ethyl Alcohol	58.36
Water	40.00
Citral	1.00
α -Terpineol	0.20
Linalool	0.15
Geraniol	0.15
Neryl Acetate	0.05
Geranyl Acetate	0.05
4-Terpineol	0.02
Citronellyl Acetate	0.01
Nonanal	0.01
Total	100.00

[0019] To commercially available plain strong carbonated water (gas volume 5.0) cooled to 5°C or less, reference product 1 and various flavor components expected to have an effervescence suppressing effect were added so that the total thereof was 0.1% based on the total amount of the carbonated beverage, thereby preparing a sample. Table 2 below shows the mass ratio of reference product 1 and each flavor component.

The results in Table 2 below show that the flavor components added to carbonated beverages in Examples 1 to 9 have an effervescence suppressing action.

[0020]

Table 2

LogP	-	2.41	2.81	3.30	3.30	3.54	3.54	3.72	3.79	3.79	4.31	Foaming
Flavor Added	Reference Product 1	Heptanol	Octanol	Nonanol	Nonanol	Benzyl Benzoate	Menthyl 3- Hydroxybutyrate	Isoamyl Benzoate	Benzyl Phenyl Acetate	Decanol	Benzyl Salicylate	Rate (%)
Comparative Example 1	100											100
Comparative Example 2	99	1										99
Example 1	99		1									90
Example 2	99.9			0.1								90
Example 3	99				1							70
Example 4	99					1						73
Example 5	99						1					73
Example 6	99							1				73
Example 7	99								1			73
Example 8	99									1		73
Example 9	99										1	71

[0021] Next, a water-free flavor composition (reference product 2) was prepared.

Table 3 shows the formulation of Reference product 2.

[0022] Table 3

Flavor Compound Name	Weight Ratio
Ethyl Alcohol	98.36
Citral	1.00
α -Terpineol	0.20
Linalool	0.15
Geraniol	0.15
Neryl Acetate	0.05
Geranyl Acetate	0.05
4-Terpineol	0.02
Citronellyl Acetate	0.01
Nonanal	0.01
Total	100.00

[0023] To commercially available plain strong carbonated water (gas volume 5.0)

5 cooled to 5°C or less, reference product 2 and various flavor components expected to have an effervescence suppressing effect were added so that the total thereof was 0.1% based on the total amount of the carbonated beverage, thereby preparing a sample. Table 4 below shows the mass ratio of reference product 2 and each flavor component. Note that the effervescence rate was calculated with Comparative Example 1 as 100%.

[0024] Table 4

LogP	-	3.54	6.27	6.76	7.74	Foaming Rate (%)
Flavor Added	Reference Product 2	Benzyl Benzoate	Ethyl Myristate	Methyl Myristate	Ethyl Palmitate	
Comparative Example 3	100					97
Example 10	99	1				78
Example 11	99		1			71
Example 12	99			1		75
Example 13	99				1	70

[0025] A comparison between Comparative Example 3 and Example 10 in Table 4 showed that the flavor component having an effervescence suppressing effect had the effervescence suppressing effect regardless of the content of ethanol. Moreover, it was shown that the flavor components added in Examples 11 to 13 also had the effervescence suppressing action.

[0026] Next, to commercially available sweetener- and acidifier-containing carbonated beverage (gas volume 2.8) cooled to 5°C or less, reference product 1 and various flavor components expected to have an effervescence suppressing effect were added so that the total thereof was 0.1% based on the total amount of the carbonated beverage, thereby preparing a sample. Table 5 below shows the mass ratio of reference product 1 and each flavor component.

The results in Table 5 below show that the flavor components added to carbonated beverages in Examples 14 to 21 have an effervescence suppressing action.

[0027]

Table 5

LogP	-	2.41	2.81	3.30	3.54	3.54	3.72	3.79	3.79	4.31	Foaming
Flavor Added	Reference Product 1	Heptanol	Octanol	Nonanol	Benzyl Benzoate	Menthyl 3- Hydroxybutyrate	Isoamyl Benzoate	Benzyl Phenyl Acetate	Decanol	Benzyl Salicylate	Rate (%)
Comparative Example 4	100										100
Comparative Example 5	99	1									106
Example 14	99		1								83
Example 15	99			1							75
Example 16	99				1						77
Example 17	99					1					73
Example 18	99						1				88
Example 19	99							1			77
Example 20	99								1		84
Example 21	99									1	81

[0028] It has been confirmed from these results that no effervescence suppressing effect is observed for flavor compounds having a LogP of less than 2.8, but when adding flavor compounds having a LogP of 2.8 or more and a LogP of 8 or less within the range of 1 ppm to 160 ppm, an effervescence suppression effect is observed.

What is claimed is:

1. A carbonated beverage comprising 1 ppm to 160 ppm of a flavor component having a LogP of 2.8 to 8.
- 5 2. The carbonated beverage according to claim 1, wherein the flavor component is at least one selected from benzyl benzoate, isoamyl benzoate, benzyl phenyl acetate, benzyl salicylate, octanol, nonanol, decanol, menthyl 3-hydroxybutyrate, ethyl myristate, methyl myristate, and ethyl palmitate.
- 10 3. A flavor composition comprising a flavor component having a LogP of 2.8 to 8 for use in a carbonated beverage, wherein the flavor composition is added to the carbonated beverage so that 1 ppm to 160 ppm of the flavor component having a LogP of 2.8 to 8 is contained in the carbonated beverage.
- 15 4. The flavor composition according to claim 3, wherein the flavor component is at least one selected from benzyl benzoate, isoamyl benzoate, benzyl phenyl acetate, benzyl salicylate, octanol, nonanol, decanol, menthyl 3-hydroxybutyrate, ethyl myristate, methyl myristate, and ethyl palmitate.
- 20 5. A method for suppressing effervescence of a carbonated beverage, comprising the step of adjusting a content of a flavor component having a LogP of 2.8 to 8 in the carbonated beverage to 1 ppm to 160 ppm.
- 25 6. The method according to claim 5, wherein the flavor component is at least one selected from benzyl benzoate, isoamyl benzoate, benzyl phenyl acetate, benzyl salicylate, octanol, nonanol, decanol, menthyl 3-hydroxybutyrate, ethyl myristate, methyl myristate, and ethyl palmitate.