

Description

Title of Invention: COFFEE BEVERAGE AND METHOD FOR MANUFACTURING SAME

Technical Field

[0001]

The present invention relates to a coffee beverage and a method for manufacturing the coffee beverage.

Background Art

[0002]

Coffee beverages are popular as beverages of preference in various parts of the world. Coffee beverages include regular coffee, which is made by extracting coffee components immediately before drinking, and coffee industrially manufactured from regular coffee. Among these, coffee industrially manufactured from regular coffee is preferred from the viewpoint that it can be easily consumed. In particular, packaged coffee beverages called ready-to-drinks (RTDs), which are provided in the form, such as cans, paper packs, or PET bottles, are excellent in that they can be drunk immediately after purchase.

[0003]

However, packaged coffee beverages contain not only coffee extract components but also various components in the products, and thus the quality needs to be maintained during the storage period.

[0004]

For example, Patent Document 1 (JP 2021-501564 T) describes an invention related to a ready-to-drink (RTD) beverage product. Patent Document 1 describes that the RTD beverage product can have, for example, improved physicochemical stability during storage.

Citation List

Patent Document

[0005]

Patent Document 1: JP 2021-501564 T

Summary of Invention

Technical Problem

[0006]

In such circumstances, there is a demand for a method for manufacturing a coffee beverage with high stability and the like.

Solution to Problem

[0007]

The present invention provides, for example, a method for manufacturing a coffee beverage and the like of the following aspects.

[0008]

[1] A method for manufacturing a coffee beverage, comprising mixing at least one of a milk component or a plant-based cream, gellan gum, and sodium caseinate to obtain a beverage base, wherein

sodium caseinate is added to the beverage base in an amount of 0.1 to 2.0 g per liter of the coffee beverage.

[2] The method according to [1] above, wherein the at least one of the milk component or the plant-based cream is added in the form of powder.

[3] The method according to [1] or [2] above, wherein the beverage base has a pH of 7.0 or lower.

[4] The method according to any one of [1] to [3] above, wherein the gellan gum contains high acyl gellan gum.

[5] The method according to any one of [1] to [4] above, wherein the beverage base further contains an emulsifier.

[6] The method according to [5] above, wherein the emulsifier has a HLB of 10 or more.

[7] The method according to any one of [1] to [6] above, wherein the coffee beverage is a packaged beverage.

[8] A coffee beverage containing:

at least one of a milk component or a plant-based cream;

from 0.2 to 0.4 g/L of gellan gum; and

from 0.48 to 1.0 mass% of casein;

wherein at least part of the casein is derived from sodium caseinate.

[9] A coffee beverage containing:

at least one of a milk component or a plant-based cream;

from 0.2 to 0.4 g/L of gellan gum;

from 0.48 to 1.0 mass% of casein; and

from 0.065 to 0.3 g/100 g of β -lactoglobulin.

[10] The coffee beverage according to [8] or [9] above, wherein the coffee beverage has a volume-based mean diameter D [4,3] of 0.3 μ m or less.

[11] A coffee beverage containing:

at least one of a milk component or a plant-based cream;

from 0.2 to 0.4 g/L of gellan gum; and

from 0.48 to 1.0 mass% of casein;

wherein the coffee beverage has a particle size distribution having a volume-based mean diameter D [4,3] of 0.3 μ m or less.

[12] The coffee beverage according to any one of [8] to [11] above, wherein the milk component and/or the plant-based cream is a component derived from a powder raw material.

[13] The coffee beverage according to any one of [8] to [12] above, wherein the gellan gum contains high acyl gellan gum.

[14] The coffee beverage according to any one of [8] to [13] above, further containing an emulsifier.

[15] The coffee beverage according to [14] above, wherein the emulsifier has a HLB of 10 or more.

[16] The coffee beverage according to any one of [8] to [15] above, wherein the coffee beverage is a packaged beverage.

[17] A coffee beverage containing:

at least one of a milk component or a plant-based cream;

from 0.2 to 0.4 g/L of gellan gum; and

from 0.91 to 1.0 mass% of casein.

Advantageous Effects of Invention

[0009]

According to the present invention, there are provided a method for manufacturing a coffee beverage with high stability and the like. According to a preferred aspect of the present invention, there is provided a coffee beverage that can be stored for a long period of time. In addition, according to a preferred aspect of the present invention, there is provided a coffee beverage of which quality is not reduced by vibration and shock during transportation. Furthermore, according to a preferred aspect of the present invention, there is provided a coffee beverage that can maintain high quality even under high temperature and high humidity.

Description of Embodiments

[0010]

The present invention will be described in detail below. The following embodiments are examples for explaining the present invention and are not intended to limit the present invention to these embodiments only. The present invention can be implemented in various embodiments as long as the gist of the present invention is not deviated. All literatures, patent application publications, patent publications, and other patent documents cited in the present specification are incorporated herein by reference.

[0011]

First embodiment: method for manufacturing coffee beverage

According to a first embodiment of the present invention, a method for manufacturing a coffee beverage is provided. The manufacturing method includes mixing at least one of a milk component or a plant-based cream, gellan gum, and sodium caseinate to obtain a beverage base. Here, sodium caseinate is added to the beverage base in an amount of 0.1 to 2.0 g per liter of the coffee beverage. In the present specification, “Y is added in an amount of X g per liter of the coffee beverage” means that Y is added so that its amount contained in 1 L of the coffee

beverage as a final product is X g, and the amount of Y to be added can be calculated in view of increase or decrease of water and the other factors in a manufacturing process. Thus, the content of Y in 1 L of the coffee beverage as a final product is X g. In addition, in the present specification, the amount of a component added per liter of the coffee beverage may be described using “g/L” as a unit.

[0012]

According to the manufacturing method, a coffee beverage with high stability can be manufactured. Specifically, in a coffee beverage containing a milk component and/or a plant-based cream, creaming based on aggregation or floating of oil and/or precipitation based on aggregation or sedimentation of protein may occur. The occurrence of such creaming and/or precipitation may reduce the quality of the coffee beverage. In contrast, according to the manufacturing method of the first embodiment, addition of gellan gum and a given amount of sodium caseinate can prevent or suppress the occurrence of the creaming and/or precipitation. Consequently, the resulting coffee beverage has high stability. As a result, the coffee beverage has various effects. For example, it can be stored for a long period of time, its quality is not reduced by vibration and shock during transportation, and high quality can be maintained even under high temperature and high humidity.

[0013]

In the present specification, the “coffee beverage” means a beverage made from coffee beans as a raw material. The “coffee beverage” includes the “coffee”, the “coffee beverage”, the “soft drink containing coffee”, the “carbonated drink containing coffee”, and the “caffeine-less coffee” defined in “the Fair Competition Code regarding Labeling of Coffee Beverages and the Like”. In addition, among beverages subject to “the Fair Competition Code regarding Labeling of Milk for Drinking” or “the Fair Competition Code regarding Labeling of Soy Milks” and alcoholic beverages defined in the Liquor Tax Law, beverages made from coffee beans as a raw material are also included in the “coffee beverages”.

[0014]

As described above, the manufacturing method according to the first embodiment includes mixing. In addition, the method may further include sterilization, filling, and the like.

[0015]

Mixing

The mixing is a process of mixing at least one of a milk component or a plant-based cream, gellan gum, and sodium caseinate to obtain a beverage base. In the beverage base obtained through the mixing, usually no or almost no creaming and no or almost no precipitation occur. Here, “no creaming occurs” and “almost no creaming occurs” mean that the evaluation results of creaming described in Examples are “◎” and “○”, respectively. In addition, “no precipitation occurs” and “almost no precipitation occurs” mean that the evaluation results of precipitation described in Examples are “◎” and “○”, respectively.

[0016]

The mixing is not particularly limited and preferably includes adding raw materials for the coffee beverage and homogenizing the added raw materials.

[0017]

Addition

In the addition, raw materials for the coffee beverage are added. Examples of the raw materials for the coffee beverage include a coffee extract, water, at least one of a milk component and a plant-based cream, gellan gum, and sodium caseinate. In addition, saccharose, an additional sweetener, an emulsifier, an additional thickener, a pH adjuster, a perfume, an additive, and/or the like may be further added as a raw material for the coffee beverage.

[0018]

The order of adding the raw materials for the coffee beverage in the addition is not particularly limited, and the raw materials can be added in any order. In an embodiment, examples of the addition include a method of adding various raw materials to a solution containing a coffee extract and water.

[0019]

Coffee extract

The coffee extract is not particularly limited, and examples include those extracted from green coffee beans or roasted coffee beans, and instant coffee made from a liquid coffee extract as a raw material.

[0020]

The coffee beans used here are not particularly limited, and examples include Blue Mountain, Kona, Kilimanjaro, Mocha, Guatemala, Brazil, Colombia, Toraja, Java coffee, Kenya, Salvador, Costa Rica, Papua New Guinea, and Cuba coffee beans. One type of these coffee beans may be used alone, or two or more types of these may be used in combination.

[0021]

A method of purifying coffee beans, a method of roasting coffee beans, a method of extracting coffee from coffee beans, and the like are not particularly limited either and can be appropriately set.

[0022]

Green coffee beans, roasted coffee beans, instant coffee, and/or the like used for the coffee extract can be appropriately blended.

[0023]

The amount of the coffee extract added is preferably such an amount that coffee components extracted or dissolved from coffee beans are in an amount, in terms of green coffee beans, of 1 g or more, 2 g or more, 2.5 g or more, 3 g or more, 4 g or more, 5 g or more, 7.5 g or more, or 10 g or more in 100 g of the coffee beverage. In addition, the amount of the coffee extract added is preferably such an amount that coffee components extracted or dissolved from coffee beans are in an amount, in terms of green coffee beans, of 30 g or less, 20 g or less, 15 g or less, 10 g or less, 7.5 g or less, 5 g or less, less than 5 g, 3 g or less, 2.5 g or less, less than 2.5

g, or 2 g or less in 100 g of the coffee beverage. In an embodiment, the amount of the coffee extract added is preferably such an amount that coffee components extracted or dissolved from coffee beans are in an amount, in terms of green coffee beans, of 1 g or more and less than 2.5 g, from 1 g to 2 g, from 1 to 1.5 g, 1.5 g or more and less than 2.5 g, 2 g or more and less than 2.5 g; 2.5 g or more and less than 5 g, from 2.5 to 4.5 g, from 2.5 to 4 g, from 2.5 to 3 g, 3 g or more and less than 5 g, 3.5 or more and less than 5 g, 4 g or more and less than 5 g, 4.5 or more and less than 5 g; from 5 to 30 g, from 5 to 20 g, from 5 to 15 g, from 5 to 10 g, or from 5 to 7.5 g in 100 g of the coffee beverage. When roasted coffee beans are used, the amount added is calculated from 1.3-fold amount of the above amount in terms of green coffee beans, and when instant coffee is used, the amount added is calculated from 3.0-fold amount of the above amount in terms of green coffee beans. In the present specification, the upper limit and the lower limit can be appropriately combined, and numerical ranges of these combinations are regarded as being disclosed.

[0024]

Water

Water is not particularly limited, and water commonly used for beverages is used.

[0025]

The amount of water added is usually preferably an amount calculated from given values of the amounts of the components to be added to the beverage base.

[0026]

Milk component

The milk component can adjust the flavor, taste, and the like of the coffee beverage. The milk component usually contains at least one of oil or protein. Thus, adding the milk component can cause creaming and/or precipitation.

[0027]

The milk component is a component originating from milk (e.g., cow milk, sheep milk, or goat milk). Specific examples of the milk component include milk, whole milk powder, skimmed milk powder, semi-skimmed milk powder, concentrated milk, skimmed concentrated milk, condensed milk, full-fat sugar-free condensed milk, sweetened milk powder, full-fat sweetened condensed milk, skimmed sweetened condensed milk, butter, fresh cream, casein, and whey. One of these milk components may be used alone, or two or more thereof may be used in combination.

[0028]

The form of the milk component is not particularly limited, and examples include the form of powder and the form of liquid. Among these, the milk component is added preferably in the form of powder. The milk component in the form of powder increases the storage stability of the milk component in the manufacturing process, and is lightweight and reduces transportation cost. Thus, the milk component in the form of powder is preferable in that it is excellent in manufacturing cost. The milk component in the form of powder may be likely to cause creaming

and/or precipitation in the manufacturing process of the coffee beverage and in the resulting coffee beverage, compared with the milk component in the form of liquid. However, the manufacturing method according to the present embodiment can prevent or suppress the occurrence of creaming and/or precipitation.

[0029]

The milk component is preferably added in an amount of 1 g or more, 3 g or more, 5 g or more, 10 g or more, 15 g or more, 20 g or more, 25 g or more, or 30 g or more per liter of the coffee beverage. In addition, the milk component is preferably added in an amount of 60 g or less, 50 g or less, 40 g or less, 30 g or less, 20 g or less, or 10 g or less per liter of the coffee beverage. In an embodiment, the amount of the milk component added is preferably from 1 to 60 g/L, more preferably from 10 to 50 g/L, even more preferably from 15 to 30 g/L, and particularly preferably from 20 to 30 g/L.

[0030]

Plant-based cream

The plant-based cream can adjust the flavor, taste, and the like of the coffee beverage. The plant-based cream contains at least one of oil or protein. Thus, adding the plant-based cream can cause creaming and/or precipitation.

[0031]

The plant-based cream is a component originating from a plant. Specific examples of the plant-based cream include palm oil, coconut butter, coconut oil, soybean oil, almond oil, rice oil, safflower oil, sunflower oil, and creamers made using these oils. One of these plant-based creams may be used alone, or two or more thereof may be used in combination.

[0032]

The form of the plant-based cream is not particularly limited, and examples include the form of powder and the form of liquid. Among these, the plant-based cream is added preferably in the form of powder. The plant-based cream in the form of powder increases the storage stability of the plant-based cream in the manufacturing process, and is lightweight and reduces transportation cost as in the case of the milk component. Thus, the plant-based cream in the form of powder is preferable in that it is excellent in manufacturing cost. The plant-based cream in the form of powder may be likely to cause creaming and/or precipitation in the manufacturing process and in the resulting coffee beverage. However, the manufacturing method according to the present embodiment can prevent or suppress the occurrence of creaming and/or precipitation.

[0033]

The plant-based cream is preferably added in an amount of 1 g or more, 3 g or more, 5 g or more, 10 g or more, 15 g or more, 20 g or more, 25 g or more, or 30 g or more per liter of the coffee beverage. In addition, the plant-based cream is preferably added in an amount of 60 g or less, 50 g or less, 40 g or less, 30 g or less, 20 g or less, or 10 g or less per liter of the coffee beverage. In an embodiment, the amount of the plant-based cream added is preferably from 1 to 60 g/L, more preferably from 5 to 40 g/L, and even more preferably from 10 to 20 g/L.

[0034]

Gellan gum

Gellan gum is a high molecular weight polysaccharide containing glucose, glucuronic acid, and rhamnose as constituent sugars and obtained from *Pseudomonas elodea*. Gellan gum has, among others, a function of preventing creaming and/or precipitation, by adjusting the viscosity of the coffee beverage, for example.

[0035]

Examples of the gellan gum include high acyl gellan gum and low acyl gellan gum (see, e.g., Handbook of Molecular Gastronomy: Scientific Foundations, Educational Practices, and Culinary Applications). The high acyl gellan gum is also called native gellan gum and has a structure in which an acyl group is attached to a constituent sugar (mainly glucose). The low acyl gellan gum is also called deacylated gellan gum and is obtained by deacylating high acyl gellan gum. Among these, the gellan gum preferably contains high acyl gellan gum.

[0036]

The gellan gum is preferably added in an amount of 0.01 g or more, 0.05 g or more, 0.1 g or more, 0.2 g or more, 0.3 g or more, 0.5 g or more, 0.7 g or more, 1 g or more, 1.2 g or more, 1.5 g or more, 1.7 g or more, 2 g or more, 2.5 g or more, or 3 g or more per liter of the coffee beverage. In addition, the gellan gum is preferably added in an amount of 10 g or less, 7.5 g or less, 5 g or less, 3 g or less, 2 g or less, 1.7 g or less, 1.5 g or less, 1.2 g or less, 1 g or less, 0.8 g or less, or 0.5 g or less per liter of the coffee beverage. In an embodiment, the amount of the gellan gum added is preferably from 0.05 to 3 g/L, more preferably from 0.1 to 1 g/L, and even more preferably from 0.2 to 0.4 g/L.

[0037]

Sodium caseinate

Sodium caseinate is a compound in which sodium binds to casein, a type of protein contained in milk and the like. Sodium caseinate has, among others, a function of preventing creaming and/or precipitation by being dissolved in a beverage base or beverage coffee to form micelles and improve dispersion stability of oil, protein, and/or the like.

[0038]

Sodium caseinate is preferably added in an amount of 0.1 g or more, 0.2 g or more, 0.3 g or more, 0.4 g or more, 0.5 g or more, 0.6 g or more, 0.7 g or more, 1 g or more, 1.2 g or more, 1.5 g or more, 2 g or more, or 3 g or more per liter of the coffee beverage. In addition, sodium caseinate is preferably added in an amount of 2 g or less, 1.8 g or less, 1.6 g or less, 1.4 g or less, 1.2 g or less, 1 g or less, or 0.8 g or less per liter of the coffee beverage. In an embodiment, the amount of sodium caseinate added is preferably from 0.1 to 2.0 g/L, more preferably from 0.3 to 1.8 g/L, and even more preferably from 0.6 to 1.2 g/L.

[0039]

Saccharose

Saccharose can be used as a raw material for the coffee beverage. Saccharose is also called sucrose and has a structure in which glucose (grape sugar) and fructose (fruit sugar) are linked via an α -1,2-glycosidic bond. Saccharose has, among others, a function of adjusting the sweetness of the coffee beverage.

[0040]

Saccharose is preferably added in an amount of 1 g or more, 3 g or more, 5 g or more, 8 g or more, 10 g or more, 12 g or more, 14 g or more, 16 g or more, 18 g or more, or 20 g or more per liter of the coffee beverage. In addition, saccharose is preferably added in an amount of 50 g or less, 40 g or less, 30 g or less, 20 g or less, 15 g or less, less than 14 g, 12 g or less, 10 g or less, less than 10 g, less than 8 g, or less than 6 g per liter of the coffee beverage. In an embodiment, the amount of saccharose added is preferably 1 g/L or more and less than 6 g/L and more preferably from 2 to 6 g/L. In addition, in another embodiment, the amount of saccharose added is preferably 6 g/L or more and less than 8 g/L and more preferably from 9 to 10 g/L. Furthermore, in another embodiment, the amount of saccharose added is preferably 10 g/L or more and less than 14 g/L and more preferably from 12 to 14 g/L. Moreover, in another embodiment, the amount of saccharose added is preferably from 14 to 50 g/L and more preferably from 20 to 40 g/L.

[0041]

Additional sweetener

An additional sweetener can be used as a raw material for the coffee beverage. The additional sweetener is a sweetener other than the saccharose described above. The additional sweetener has, among others, a function of adjusting the sweetness of the coffee beverage.

[0042]

The additional sweetener is not particularly limited, and examples include sugars, such as grape sugar, fruit sugar, malt sugar, oligosaccharides, trehalose, maltitol, and palatinose; sugar alcohols, such as xylitol, sorbitol, and erythritol; and artificial sweeteners, such as aspartame, acesulfame potassium, saccharin sodium, and sucralose. One of these additional sweeteners may be used alone, or two or more thereof may be used in combination.

[0043]

The additional sweetener is preferably added in an amount of 1 g or more, 3 g or more, 5 g or more, 8 g or more, 10 g or more, 12 g or more, 14 g or more, 16 g or more, 18 g or more, or 20 g or more per liter of the coffee beverage. In addition, the additional sweetener is preferably added in an amount of 30 g or less, 20 g or less, 15 g or less, 12 g or less, 10 g or less, 8 g or less, or 6 g or less per liter of the coffee beverage. In an embodiment, the amount of the additional sweetener added is preferably from 1 to 20 g/L and more preferably from 3 to 16 g/L.

[0044]

Emulsifier

An emulsifier can be used as a raw material for the coffee beverage. The emulsifier has, among others, a function of improving dispersion stability of the beverage base and the coffee

beverage. According to an embodiment of the present invention, the beverage base preferably further contains an emulsifier.

[0045]

The emulsifier is not particularly limited, and examples include fatty acid esters, such as saccharose fatty acid esters, glycerol fatty acid esters, sorbitan fatty acid esters, and polyglycerol fatty acid esters; and lecithin. The fatty acid of the fatty acid ester here is not particularly limited, and examples include lauric acid, myristic acid, palmitic acid, and stearic acid. One of these emulsifiers may be used alone, or two or more thereof may be used in combination.

[0046]

The emulsifier preferably has a hydrophilic-lipophilic balance (HLB) of 3 or more, 5 or more, 7 or more, 10 or more, 12 or more, 13 or more, or 15 or more. In addition, the hydrophilic-lipophilic balance (HLB) of the emulsifier is preferably 20 or less, 19 or less, 18 or less, 17 or less, 16 or less, 15 or less, or 13 or less. In an embodiment, the HLB of the emulsifier is preferably from 7 to 20, more preferably from 10 to 19, even more preferably from 12 to 18, and particularly preferably from 14 to 17. The emulsifier having an HLB in the above range is preferable in that it has high stability. The HLB value of the emulsifier can be increased, for example, by increasing the number of carbons in the fatty acid.

[0047]

The emulsifier is preferably added in an amount of 0.01 g or more, 0.1 g or more, 0.2 g or more, 0.3 g or more, 0.5 g or more, 1 g or more, 2 g or more, 3 g or more, 5 g or more, 8 g or more, or 10 g or more per liter of the coffee beverage. In addition, the emulsifier is preferably added in an amount of 30 g or less, 20 g or less, 15 g or less, 12 g or less, 10 g or less, 8 g or less, 6 g or less, or 3 g or less per liter of the coffee beverage. In an embodiment, the amount of the emulsifier added is preferably from 0.01 to 20 g/L, more preferably from 0.1 to 10 g/L, and even more preferably from 0.2 to 3 g/L.

[0048]

Additional thickener

An additional thickener can be used as a raw material for the coffee beverage. The additional thickener has, among others, a function of preventing creaming and/or precipitation, by adjusting the viscosity of the coffee beverage, for example. The additional thickener means a thickener other than gellan gum.

[0049]

The additional thickener is not particularly limited, and examples include pectin, gum arabic, carrageenan, locust bean gum, guar gum, welan gum, xanthan gum, chitin, chitosan, mannan, and than gum. One of these additional thickeners may be used alone, or two or more thereof may be used in combination.

[0050]

The additional thickener is preferably added in an amount of 0.1 g or more, 0.2 g or more, 0.3 g or more, 0.5 g or more, 0.7 g or more, 1 g or more, 1.2 g or more, 1.5 g or more, 2 g

or more, or 3 g or more per liter of the coffee beverage. In addition, the additional thickener is preferably added in an amount of 10 g or less, 7.5 g or less, 5 g or less, 3 g or less, 2 g or less, 1.7 g or less, 1.5 g or less, 1.2 g, or 1 g or less per liter of the coffee beverage. In an embodiment, the amount of the additional thickener added is preferably from 0.3 to 5 g/L, more preferably from 0.5 to 3 g/L, and even more preferably from 0.7 to 2 g/L.

[0051]

pH Adjuster

A pH adjuster can be used as a raw material for the coffee beverage. The pH adjuster has a function of adjusting the pH of the beverage base and the coffee beverage.

[0052]

The pH adjuster is not particularly limited, and examples include sodium bicarbonate (sodium hydrogen carbonate), sodium citrate (monosodium citrate, disodium citrate, and trisodium citrate), sodium phosphate (sodium dihydrogen phosphate, disodium hydrogen phosphate, and trisodium phosphate), potassium phosphate (potassium dihydrogen phosphate, dipotassium hydrogen phosphate, and tripotassium phosphate), sodium gluconate, potassium gluconate, and sodium lactate. One of these pH adjusters may be used alone, or two or more thereof may be used in combination.

[0053]

The amount of the pH adjuster added is preferably added in an amount such that the pH in the beverage base or the coffee beverage is adjusted to a value set.

[0054]

Perfume

A perfume can be used as a raw material for the coffee beverage. The perfume has a function of adjusting the aroma of the coffee beverage.

[0055]

The perfume is not particularly limited, and examples include phenols, such as guaiacol, 4-methylguaiacol, 4-ethylguaiacol, and 4-vinylguaiacol; pyrazines, such as 2-methylpyrazine, 2-ethylpyrazine, 2,5-dimethylpyrazine, 2,6-dimethylpyrazine, 2,3-dimethylpyrazine, 2-ethyl-6-methylpyrazine, 2-ethyl-5-methylpyrazine, 2,3,5-trimethylpyrazine, 2-ethyl-3,5-dimethylpyrazine, and 2,3-diethyl-5-methylpyrazine; and tertiary thiols, such as 3-mercapto-3-methylbutyl formate, 3-mercapto-3-methylbutyl acetate, 4-mercapto-4-methyl-2-pentanone, and 4-mercapto-4-methyl-2-pentanol. One of these perfumes may be used alone, or two or more thereof may be used in combination.

[0056]

The amount of the perfume added can be appropriately set according to a desired coffee beverage.

[0057]

Additive

An additive can be used as a raw material for the coffee beverage. Examples of the additive include an antioxidant, a pigment, a preservative, a seasoning, an acidulant, and a vitamin. One of these additives may be used alone, or two or more thereof may be used in combination.

[0058]

Homogenization

The homogenization is a process of homogenizing the mixture (liquid mixture) of the added raw materials. Specifically, the homogenization is a process of uniformly dispersing oil, protein, and the like originating from raw materials (such as coffee beans, the milk component, and the plant-based cream) to prepare a beverage base in which no or almost no creaming and no or almost no precipitation occur.

[0059]

In the homogenization, the components are dispersed usually by applying shear, vibration, stirring, and/or the like to the mixture (liquid mixture) of the added raw materials.

[0060]

The apparatus used for the homogenization is not particularly limited, and examples include a homogenizer, a mixer, a Milder, and a colloid mill.

[0061]

The homogenization temperature is preferably 40°C or higher, 50°C or higher, 60°C or higher, 70°C or higher, or 80°C or higher. In addition, the homogenization temperature is preferably 95°C or lower, 90°C or lower, 80°C or lower, 70°C or lower, 60°C or lower, or 50°C or lower. In an embodiment, the homogenization temperature is preferably from 40 to 70°C and more preferably from 50 to 60°C. In addition, in another embodiment, the homogenization temperature is preferably from 50 to 95°C, more preferably from 60 to 90°C, and even more preferably from 70 to 80°C.

[0062]

The homogenization pressure is preferably 0.5 MPa or more, 1 MPa or more, 2 MPa or more, 3 MPa or more, 5 MPa or more, 8 MPa or more, 10 MPa or more, 12 MPa or more, 15 MPa or more, 20 MPa or more, 25 MPa or more, or 30 MPa or more. In addition, the homogenization pressure is preferably 60 MPa or less, 50 MPa or less, 40 MPa or less, 30 MPa or less, 25 MPa or less, 20 MPa or less, 15 MPa or less, 12 MPa or less, 10 MPa or less, 8 MPa or less, 5 MPa or less, or 3 MPa or less. In an embodiment, the homogenization pressure is preferably from 0.1 to 15 MPa, more preferably from 1 to 10 MPa, and even more preferably from 2 to 5 MPa. In addition, in an embodiment, the homogenization pressure is preferably from 5 to 50 MPa, more preferably from 8 to 30 MPa, even more preferably from 10 to 25 MPa, and particularly preferably from 15 to 25 MPa.

[0063]

Beverage base

The beverage base contains at least one of a milk component or a plant-based cream, gellan gum, and sodium caseinate, and/or a component derived therefrom. In addition, the beverage base usually contains a coffee extract and water, and/or a component derived therefrom. Furthermore, the beverage base contains saccharose, an additional sweetener, an emulsifier, an additional thickener, a pH adjuster, a perfume, and an additive, and/or a component derived therefrom. "A component derived therefrom" means a component produced by ionization, oxidation, degeneration, decrease in molecular weight, and/or the like of each component added as a raw material due to dissolution in water, homogenization, and/or the like. [0064]

The pH of the beverage base is preferably 1 or higher, 2 or higher, 3 or higher, 4 or higher, 5 or higher, 6 or higher, 6.5 or higher, or 6.9 or higher. In addition, the pH of the beverage base is preferably 14 or lower, 12 or lower, 10 or lower, 8 or lower, 7 or lower, 6.5 or lower, or 6 or lower. In an embodiment, the pH of the beverage base is preferably 7.0 or lower, more preferably lower than 7.0, even more preferably 6.0 or higher and lower than 7.0, and still more preferably 6.5 or higher and lower than 7.0. The beverage base having a pH of 7.0 or lower is preferable in that the resulting coffee beverage has high stability. The pH of the beverage base is usually adjusted with a pH adjuster. [0065]

In the beverage base, prescribed raw materials are added and homogenized, and thus no or almost no creaming and no or almost no precipitation occur. In a preferred embodiment, a packaged coffee beverage can be manufactured by subjecting the beverage base to sterilization and filling described later. [0066]

Modified example

An embodiment in which the mixing includes the addition and the homogenization, that is, an embodiment in which homogenization is performed after all the raw materials are added, has been described above. However, the mixing can be appropriately modified. [0067]

In an embodiment, the mixing includes:

first homogenization in which a first solution containing at least one of a milk component or a plant-based cream, gellan gum, and sodium caseinate is homogenized to prepare a homogenized solution;

addition in which a coffee extract is added to the homogenized solution to obtain a second solution; and

second homogenization in which the second solution is homogenized to obtain a beverage base. [0068]

In the embodiment described above, oil and/or protein derived from the milk component and/or the plant-based cream is homogenized in advance in the first homogenization, and then

various raw materials is added and the second homogenization is performed. Oil and/or protein derived from the milk component and/or the plant-based cream is homogenized in two stages, and thus creaming and precipitation in the beverage base can be further suppressed.

[0069]

First homogenization

The first homogenization is a process of homogenizing a first solution containing at least one of a milk component and a plant-based cream, gellan gum, and sodium caseinate to prepare a homogenized solution.

[0070]

The first solution contains at least one of a milk component or a plant-based cream, gellan gum, and sodium caseinate. In addition, the first solution preferably further contains water and an emulsifier.

[0071]

The homogenization temperature in the first homogenization is preferably 50°C or higher, 55°C or higher, 60°C or higher, 65°C or higher, or 70°C or higher. In addition, the homogenization temperature in the first homogenization is preferably 95°C or lower, 90°C or lower, 85°C or lower, 80°C or lower, 75°C or lower, or 70°C or lower. In an embodiment, the homogenization temperature in the first homogenization is preferably from 50 to 95°C and more preferably from 65 to 75°C.

[0072]

The homogenization pressure in the first homogenization is preferably 8 MPa or more, 10 MPa or more, 12 MPa or more, 15 MPa or more, 20 MPa or more, 25 MPa or more, or 30 MPa or more. The homogenization pressure in the first homogenization is preferably 60 MPa or less, 50 MPa or less, 40 MPa or less, 30 MPa or less, 25 MPa or less, 20 MPa or less, or 15 MPa or less. In an embodiment, the homogenization pressure in the first homogenization is preferably from 8 to 30 MPa and more preferably from 10 to 25 MPa.

[0073]

Addition

The addition is a process of adding a coffee extract to the homogenized solution obtained in the first homogenization to obtain a second solution. In the addition, water, saccharose, an additional sweetener, an emulsifier, an additional thickener, a pH adjuster, a perfume, an additive, and/or the like may be further added. The second solution has undergone the first homogenization, and thus oil and/or protein is suitably homogenized.

[0074]

Second homogenization

The second homogenization is a process of homogenizing the second solution obtained in the addition to obtain a beverage base.

[0075]

The homogenization temperature in the second homogenization can be the same as that in the first homogenization.

[0076]

In addition, in an embodiment, the homogenization temperature in the second homogenization can be lower than that in the first homogenization. For example, the homogenization temperature in the second homogenization is preferably 30°C or higher, 40°C or higher, or 50°C or higher. Furthermore, the homogenization temperature in the second homogenization is preferably 70°C or lower, 65°C or lower, 60°C or lower, or 50°C or lower. In an embodiment, the homogenization temperature in the second homogenization is preferably from 40 to 70°C, more preferably from 40 to 65°C, and even more preferably from 50 to 60°C.

[0077]

The homogenization pressure in the second homogenization can also be the same as that in the first homogenization.

[0078]

In addition, in an embodiment, the homogenization pressure in the second homogenization can be lower than that in the first homogenization. For example, the homogenization pressure in the second homogenization is preferably 0.5 MPa or more, 1 MPa or more, 2 MPa or more, 3 MPa or more, or 5 MPa or more. Furthermore, the homogenization pressure in the second homogenization is preferably 8 MPa or less, 5 MPa or less, or 3 MPa or less. In an embodiment, the homogenization pressure in the second homogenization is preferably from 0.5 to 8 MPa and more preferably from 1 to 5 MPa.

[0079]

Sterilization

The manufacturing method according to the first embodiment may include sterilization. The sterilization is a process of heating the beverage base to obtain a sterilized beverage base. Since the method includes the sterilization, the resulting coffee beverage can prevent or suppress quality deterioration and/or occurrence of food poisoning due to bacterial contamination.

[0080]

The sterilization method is not particularly limited, and examples include ultra-high temperature sterilization (UHT sterilization). It has been known in the art that application of sterilization treatment, such as ultra-high temperature sterilization (UHT sterilization), for a beverage base may cause creaming and/or precipitation. However, in the beverage base manufactured by the method according to the present embodiment, gellan gum and a given amount of sodium caseinate are added, and thus the occurrence of creaming and/or precipitation due to the sterilization treatment can be prevented or suppressed.

[0081]

The temperature of the ultra-high temperature sterilization (UHT sterilization) is preferably from 120 to 150°C and more preferably from 130 to 145°C.

[0082]

The time of the ultra-high temperature sterilization (UHT sterilization) is preferably from 1 to 120 seconds and more preferably from 10 to 100 seconds.

[0083]

The sterilized beverage base obtained by sterilization is appropriately cooled. The temperature of the sterilized beverage base after cooling is preferably 45°C or lower, 40°C or lower, 35°C or lower, 30°C or lower, 25°C or lower, or 20°C or lower. The temperature of the sterilized beverage base after cooling is preferably 1°C or higher, 3°C or higher, 5°C or higher, 8°C or higher, 10°C or higher, or 12°C or higher. In an embodiment, the temperature of the sterilized beverage base after cooling is preferably from 3 to 40°C and more preferably from 5 to 30°C.

[0084]

Filling

The manufacturing method according to the first embodiment may include filling. The filling includes filling the beverage base or the sterilized beverage base into a container. This can make the coffee beverage into a packaged coffee beverage. That is, in an embodiment, the coffee beverage is preferably a packaged beverage.

[0085]

The container is not particularly limited, and examples include a can, a bottle, a PET bottle, and a paper pack. Among these, the container is preferably a bottle or a PET bottle. In addition, the filling is preferably performed in a sterile environment.

[0086]

According to the first embodiment described above, a coffee beverage with high stability can be manufactured. The resulting coffee beverage can correspond to, for example, any one of coffee beverages according to second to fifth embodiments described below.

[0087]

Second embodiment: coffee beverage

According to a second embodiment of the present invention, a coffee beverage is provided. The coffee beverage contains at least one of a milk component or a plant-based cream, from 0.2 to 0.4 g/L of gellan gum, and from 0.48 to 1.0 mass% of casein. Here, at least part of the casein is derived from sodium caseinate. The coffee beverage according to the second embodiment is preferably manufactured by the method according to the first embodiment.

[0088]

According to the coffee beverage, a coffee beverage with high stability can be manufactured. Specifically, the coffee beverage contains a given amount of gellan gum and a given amount of casein, and at least part of the casein is derived from sodium caseinate, and thus creaming and/or precipitation can be prevented or suppressed. Consequently, the resulting coffee beverage has high stability. As a result, the coffee beverage has various effects. For example, it can be stored for a long period of time, its quality is not reduced by vibration and shock during

transportation, and high quality can be maintained even under high temperature and high humidity.

[0089]

The coffee beverage according to the present embodiment contains at least one of a milk component or a plant-based cream, gellan gum, and casein. In addition, the coffee beverage contains sodium caseinate and a component derived therefrom. In addition, the coffee beverage may also contain a coffee extract, water, saccharose, an additional sweetener, an emulsifier, an additional thickener, a pH adjuster, a perfume, an additive, and a component derived therefrom.

[0090]

At least one of milk component or plant-based cream

Examples of the milk component and the plant-based cream include those described in the description of the first embodiment. The milk component and/or plant-based cream contained in the coffee beverage is preferably a component derived from a powder raw material. The milk component and/or plant-based cream in the form of powder increases the storage stability of the milk component and/or plant-based cream in the manufacturing process, and is lightweight and reduces transportation cost. Thus, the milk component and/or plant-based cream in the form of powder is preferable in that it is excellent in manufacturing cost. The milk component and/or plant-based cream that is a component derived from a powder raw material may be likely to cause creaming and/or precipitation in the manufacturing process of the coffee beverage and in the resulting coffee beverage, compared with a component derived from a liquid raw material. However, according to the coffee beverage according to the present embodiment, the occurrence of creaming and/or precipitation can be prevented or suppressed.

[0091]

Gellan gum

Examples of the gellan gum include those described in the description of the first embodiment.

[0092]

The content of the gellan gum is from 0.2 to 0.4 g/L and preferably from 0.25 to 0.35 g/L. With the content of the gellan gum in the above range, the viscosity and the like of the coffee beverage are in suitable ranges in the present embodiment, and a coffee beverage with high stability can be obtained.

[0093]

Casein

Casein is a type of phosphoprotein. Casein is usually derived from casein contained in a milk component, sodium caseinate, and the like. Here, at least part of the casein is preferably derived from sodium caseinate. Consequently, sodium caseinate exhibits a stabilizing effect in the manufacturing process of the coffee beverage, and a coffee beverage with high stability can be obtained.

[0094]

The content of casein is from 0.48 to 1.0 mass%, preferably from 0.5 to 1.0 mass%, more preferably from 0.8 to 1.0 mass%, even more preferably from 0.9 to 1.0 mass%, and particularly preferably from 0.91 to 1.0 mass% relative to a total mass of the coffee beverage. With the content of casein in the above range, a coffee beverage with high stability can be obtained. In the present specification, the content of casein can be measured by a method described in Examples.

[0095]

Coffee extract, water, sodium caseinate, saccharose, additional sweetener, emulsifier, additional thickener, pH adjuster, perfume, additive, and component derived therefrom

Examples of the coffee extract, water, sodium caseinate, saccharose, the additional sweetener, the emulsifier, the additional thickener, the pH adjuster, the perfume, the additive, and the component derived therefrom include those described in the description of the first embodiment.

[0096]

The coffee beverage preferably has a Brix (solid content in the coffee beverage) of 1% or more, 2% or more, 3% or more, 4% or more, 5% or more, 8% or more, 10% or more, or 15% or more. In addition, the Brix of the coffee beverage is preferably 60% or less, 50% or less, 40% or less, 30% or less, 20% or less, 15% or less, or 10% or less. In an embodiment, the Brix of the coffee beverage is preferably from 3 to 30%, more preferably from 4 to 20%, and even more preferably from 5 to 15%. In the present specification, the value of Brix can be calculated as the ratio of the mass of the dried solid obtained by drying the coffee beverage to the total mass of the coffee beverage (mass of dried solid/total mass of coffee beverage $\times$ 100).

[0097]

The coffee beverage preferably has a particle size distribution having a volume-based mean diameter D [4,3] of 0.3 μm or less and preferably 0.25 μm or less. The lower limit of the volume-based mean diameter D [4,3] is not particularly limited and is preferably 0.01 μm or greater, 0.05 μm or greater, 0.08 μm or greater, 0.1 μm or greater, 0.15 μm or greater, or 0.2 μm or greater. In an embodiment, the coffee beverage has a particle size distribution having a volume-based mean diameter D [4,3] preferably of 0.05 to 0.3 μm and more preferably of 0.1 to 0.3 μm . With the volume-based mean diameter D [4,3] of the coffee beverage of 0.3 μm or less, components in the coffee beverage are uniformly dispersed without aggregation and the like, and thus high stability can be obtained. In the present specification, the value of the volume-based mean diameter D [4,3] can be measured by a method described in Examples.

[0098]

The coffee beverage is preferably a packaged beverage. Here, examples of the container include a can, a bottle, a PET bottle, and a paper pack. The coffee beverage made into a packaged beverage can be consumed immediately after purchase and can be easily consumed by consumers.

[0099]

Third embodiment: coffee beverage

According to a third embodiment of the present invention, a coffee beverage is provided. The coffee beverage contains at least one of a milk component or a plant-based cream, from 0.2 to 0.4 g/L of gellan gum, and from 0.91 to 1.0 mass% of casein. The coffee beverage according to the third embodiment is preferably manufactured by the method according to the first embodiment.

[0100]

According to the coffee beverage, a coffee beverage with high stability can be manufactured. Specifically, the coffee beverage contains a given amount of gellan gum and a given amount of casein, and thus creaming and/or precipitation can be prevented or suppressed. Consequently, the resulting coffee beverage has high stability. As a result, the coffee beverage has various effects. For example, it can be stored for a long period of time, its quality is not reduced by vibration and shock during transportation, and high quality can be maintained even under high temperature and high humidity.

[0101]

The coffee beverage according to the present embodiment contains at least one of a milk component or a plant-based cream, gellan gum, and casein. In addition, the coffee beverage may also contain a coffee extract, water, sodium caseinate, saccharose, an additional sweetener, an emulsifier, an additional thickener, a pH adjuster, a perfume, an additive, and a component derived therefrom.

[0102]

At least one of milk component or plant-based cream

Examples of the milk component and the plant-based cream include those described in the description of the first embodiment. The milk component and/or plant-based cream contained in the coffee beverage is preferably a component derived from a powder raw material. The milk component and/or plant-based cream in the form of powder increases the storage stability of the milk component and/or plant-based cream in the manufacturing process, and is lightweight and reduces transportation cost. Thus, the milk component and/or plant-based cream in the form of powder is preferable in that it is excellent in manufacturing cost. The milk component and/or plant-based cream that is a component derived from a powder raw material may be likely to cause creaming and/or precipitation in the manufacturing process of the coffee beverage and in the resulting coffee beverage, compared with a component derived from a liquid raw material. However, according to the coffee beverage according to the present embodiment, the occurrence of creaming and/or precipitation can be prevented or suppressed.

[0103]

Gellan gum

Examples of the gellan gum include those described in the description of the first embodiment.

[0104]

The content of the gellan gum is from 0.2 to 0.4 g/L and preferably from 0.25 to 0.35 g/L. With the content of the gellan gum in the above range, the viscosity and the like of the coffee beverage are in suitable ranges in the present embodiment, and a coffee beverage with high stability can be obtained.

[0105]

Casein

Casein is a type of phosphoprotein. Casein is usually derived from casein contained in a milk component, sodium caseinate, and the like. Here, at least part of the casein is preferably derived from sodium caseinate. Consequently, sodium caseinate exhibits a stabilizing effect in the manufacturing process of the coffee beverage, and a coffee beverage with high stability can be obtained.

[0106]

The content of casein is from 0.91 to 1.0 mass%, preferably from 0.91 to 0.95 mass%, and more preferably from 0.91 to 0.93 mass% relative to the total mass of the coffee beverage. With the content of casein in the above range, a coffee beverage with high stability can be obtained.

[0107]

Coffee extract, water, sodium caseinate, saccharose, additional sweetener, emulsifier, additional thickener, pH adjuster, perfume, additive, and component derived therefrom

Examples of the coffee extract, water, sodium caseinate, saccharose, the additional sweetener, the emulsifier, the additional thickener, the pH adjuster, the perfume, the additive, and the component derived therefrom include those described in the description of the first embodiment.

[0108]

The coffee beverage preferably has a Brix (solid content in the coffee beverage) of 1% or more, 2% or more, 3% or more, 4% or more, 5% or more, 8% or more, 10% or more, or 15% or more. In addition, the Brix of the coffee beverage is preferably 60% or less, 50% or less, 40% or less, 30% or less, 20% or less, 15% or less, or 10% or less. In an embodiment, the Brix of the coffee beverage is preferably from 3 to 30%, more preferably from 4 to 20%, and even more preferably from 5 to 15%.

[0109]

The coffee beverage preferably has a particle size distribution having a volume-based mean diameter $D_{[4,3]}$ of 0.3 μm or less and preferably 0.25 μm or less. The lower limit of the volume-based mean diameter $D_{[4,3]}$ is not particularly limited and is preferably 0.01 μm or greater, 0.05 μm or greater, 0.08 μm or greater, 0.1 μm or greater, 0.15 μm or greater, or 0.2 μm or greater. In an embodiment, the coffee beverage has a particle size distribution having a volume-based mean diameter $D_{[4,3]}$ preferably of 0.05 to 0.3 μm and more preferably of 0.1 to 0.3 μm . With the volume-based mean diameter $D_{[4,3]}$ of the coffee beverage of 0.3 μm or less,

components in the coffee beverage are uniformly dispersed without aggregation and the like, and thus high stability can be obtained.

[0110]

The coffee beverage is preferably a packaged beverage. Here, examples of the container include a can, a bottle, a PET bottle, and a paper pack. The coffee beverage made into a packaged beverage can be consumed immediately after purchase and can be easily consumed by consumers.

[0111]

Fourth embodiment: coffee beverage

According to a fourth embodiment of the present invention, a coffee beverage is provided. The coffee beverage contains at least one of a milk component or a plant-based cream, from 0.2 to 0.4 g/L of gellan gum, from 0.48 to 1.0 mass% of casein, and from 0.065 to 0.3 g/100 g of β -lactoglobulin. The coffee beverage according to the fourth embodiment is preferably manufactured by the method according to the first embodiment.

[0112]

According to the coffee beverage, a coffee beverage with high stability can be manufactured. Specifically, the coffee beverage contains a given amount of gellan gum, a given amount of casein, and a given amount of β -lactoglobulin, and thus creaming and/or precipitation can be prevented or suppressed. Consequently, the resulting coffee beverage has high stability. As a result, the coffee beverage has various effects. For example, it can be stored for a long period of time, its quality is not reduced by vibration and shock during transportation, and high quality can be maintained even under high temperature and high humidity.

[0113]

The coffee beverage according to the present embodiment contains at least one of a milk component or a plant-based cream, gellan gum, casein, and β -lactoglobulin. In addition, the coffee beverage may also contain a coffee extract, water, sodium caseinate, saccharose, an additional sweetener, an emulsifier, an additional thickener, a pH adjuster, a perfume, an additive, and a component derived therefrom.

[0114]

At least one of milk component or plant-based cream

Examples of the milk component and the plant-based cream include those described in the description of the first embodiment. The milk component and/or plant-based cream contained in the coffee beverage is preferably a component derived from a powder raw material. The milk component and/or plant-based cream in the form of powder increases the storage stability of the milk component and/or plant-based cream in the manufacturing process, and is lightweight and reduces transportation cost. Thus, the milk component and/or plant-based cream in the form of powder is preferable in that it is excellent in manufacturing cost. The milk component and/or plant-based cream that is a component derived from a powder raw material may be likely to cause creaming and/or precipitation in the manufacturing process of the coffee beverage and in

the resulting coffee beverage, compared with a component derived from a liquid raw material. However, according to the coffee beverage according to the present embodiment, the occurrence of creaming and/or precipitation can be prevented or suppressed.

[0115]

Gellan gum

Examples of the gellan gum include those described in the description of the first embodiment.

[0116]

The content of the gellan gum is from 0.2 to 0.4 g/L and preferably from 0.25 to 0.35 g/L. With the content of the gellan gum in the above range, the viscosity and the like of the coffee beverage are in suitable ranges in the present embodiment, and a coffee beverage with high stability can be obtained.

[0117]

Casein

Casein is a type of phosphoprotein. Casein is usually derived from casein contained in a milk component, sodium caseinate, and the like. Here, at least part of the casein is preferably derived from sodium caseinate. Consequently, sodium caseinate exhibits a stabilizing effect in the manufacturing process of the coffee beverage, and a coffee beverage with high stability can be obtained.

[0118]

The content of casein is from 0.48 to 1.0 mass%, preferably from 0.5 to 1.0 mass%, more preferably from 0.8 to 1.0 mass%, even more preferably from 0.9 to 1.0 mass%, and particularly preferably from 0.91 to 1.0 mass% relative to the total mass of the coffee beverage. With the content of casein in the above range, a coffee beverage with high stability can be obtained.

[0119]

β -Lactoglobulin

β -Lactoglobulin is a whey protein derived from a milk component. β -Lactoglobulin is usually derived from β -lactoglobulin contained in a milk component. β -Lactoglobulin may cause precipitation and the like by binding to casein.

[0120]

The content of β -lactoglobulin is from 0.065 to 0.3 g/100 g, preferably from 0.1 to 0.3 g/100 g, and more preferably from 0.15 to 0.25 g/100 g relative to the total mass of the coffee beverage. With the content of β -lactoglobulin in the above range, a coffee beverage with high stability can be obtained. In the present specification, the content of β -lactoglobulin can be measured by a method of Examples.

[0121]

The ratio of the content of β -lactoglobulin to the content of casein (β -lactoglobulin/casein), which is a ratio of only the numerical values of the contents excluding the units, is preferably 0.04 or more, 0.06 or more, 0.08 or more, 0.1 or more, 0.2 or more, 0.4 or

more, 0.6 or more, 0.8 or more, or 1 or more. In addition, the ratio (β -lactoglobulin/casein) is preferably 2 or less, 1.7 or less, 1.4 or less, 1 or less, 0.8 or less, 0.6 or less, 0.4 or less, or 0.2 or less. In an embodiment, the ratio (β -lactoglobulin/casein) is preferably from 0.04 to 1.7, more preferably from 0.06 to 1.4, even more preferably from 0.08 to 0.4, and particularly preferably from 0.15 to 0.3. The ratio (β -lactoglobulin/casein) can be controlled by adjusting the amount of the milk component added and the amount of sodium caseinate added.

[0122]

Coffee extract, water, sodium caseinate, saccharose, additional sweetener, emulsifier, additional thickener, pH adjuster, perfume, additive, and component derived therefrom

Examples of the coffee extract, water, sodium caseinate, saccharose, the additional sweetener, the emulsifier, the additional thickener, the pH adjuster, the perfume, the additive, and the component derived therefrom include those described in the description of the first embodiment.

[0123]

The coffee beverage preferably has a Brix (solid content in the coffee beverage) of 1% or more, 2% or more, 3% or more, 4% or more, 5% or more, 8% or more, 10% or more, or 15% or more. In addition, the Brix of the coffee beverage is preferably 60% or less, 50% or less, 40% or less, 30% or less, 20% or less, 15% or less, or 10% or less. In an embodiment, the Brix of the coffee beverage is preferably from 3 to 30%, more preferably from 4 to 20%, and even more preferably from 5 to 15%.

[0124]

The coffee beverage preferably has a particle size distribution having a volume-based mean diameter $D_{[4,3]}$ of 0.3 μm or less and preferably 0.25 μm or less. The lower limit of the volume-based mean diameter $D_{[4,3]}$ is not particularly limited and is preferably 0.01 μm or greater, 0.05 μm or greater, 0.08 or greater, 0.1 μm or greater, 0.15 μm or greater, or 0.2 μm or greater. In an embodiment, the coffee beverage has a particle size distribution having a volume-based mean diameter $D_{[4,3]}$ preferably of 0.05 to 0.3 μm and more preferably of 0.1 to 0.3 μm . With the volume-based mean diameter $D_{[4,3]}$ of the coffee beverage of 0.3 μm or less, components in the coffee beverage are uniformly dispersed without aggregation and the like, and thus high stability can be obtained.

[0125]

The coffee beverage is preferably a packaged beverage. Here, examples of the container include a can, a bottle, a PET bottle, and a paper pack. The coffee beverage made into a packaged beverage can be consumed immediately after purchase and can be easily consumed by consumers.

[0126]

Fifth embodiment: coffee beverage

According to a fifth embodiment of the present invention, a coffee beverage is provided. The coffee beverage contains at least one of a milk component or a plant-based cream, from 0.2

to 0.4 g/L of gellan gum, and from 0.48 to 1.0 mass% of casein. Here, the volume-based mean diameter $D_{[4,3]}$ of the coffee beverage has a particle size distribution of 0.3 μm or less. The coffee beverage according to the fifth embodiment is preferably manufactured by the method according to the first embodiment.

[0127]

According to the coffee beverage, a coffee beverage with high stability can be manufactured. Specifically, the coffee beverage contains a given amount of gellan gum and a given amount of casein, and the coffee beverage has a given particle size distribution, and thus creaming and/or precipitation can be prevented or suppressed. Consequently, the resulting coffee beverage has high stability. As a result, the coffee beverage has various effects. For example, it can be stored for a long period of time, its quality is not reduced by vibration and shock during transportation, and high quality can be maintained even under high temperature and high humidity.

[0128]

The coffee beverage according to the present embodiment contains at least one of a milk component or a plant-based cream, gellan gum, and casein. In addition, the coffee beverage may also contain a coffee extract, water, sodium caseinate, saccharose, an additional sweetener, an emulsifier, an additional thickener, a pH adjuster, a perfume, an additive, and a component derived therefrom.

[0129]

At least one of milk component or plant-based cream

Examples of the milk component and the plant-based cream include those described in the description of the first embodiment. The milk component and/or plant-based cream contained in the coffee beverage is preferably a component derived from a powder raw material. The milk component and/or plant-based cream in the form of powder increases the storage stability of the milk component and/or plant-based cream in the manufacturing process, and is lightweight and reduces transportation cost. Thus, the milk component and/or plant-based cream in the form of powder is preferable in that it is excellent in manufacturing cost. The milk component and/or plant-based cream that is a component derived from a powder raw material may be likely to cause creaming and/or precipitation in the manufacturing process of the coffee beverage and in the resulting coffee beverage, compared with a component derived from a liquid raw material. However, according to the coffee beverage according to the present embodiment, the occurrence of creaming and/or precipitation can be prevented or suppressed.

[0130]

Gellan gum

Examples of the gellan gum include those described in the description of the first embodiment.

[0131]

The content of the gellan gum is from 0.2 to 0.4 g/L and preferably from 0.25 to 0.35 g/L. With the content of the gellan gum in the above range, the viscosity and the like of the coffee beverage are in suitable ranges in the present embodiment, and a coffee beverage with high stability can be obtained.

[0132]

Casein

Casein is a type of phosphoprotein. Casein is usually derived from casein contained in a milk component, sodium caseinate, and the like. Here, at least part of the casein is preferably derived from sodium caseinate. Consequently, sodium caseinate exhibits a stabilizing effect in the manufacturing process of the coffee beverage, and a coffee beverage with high stability can be obtained.

[0133]

The content of casein is from 0.48 to 1.0 mass%, preferably from 0.5 to 1.0 mass%, more preferably from 0.8 to 1.0 mass%, even more preferably from 0.9 to 1.0 mass%, and particularly preferably from 0.91 to 1.0 mass% relative to the total mass of the coffee beverage. With the content of casein in the above range, a coffee beverage with high stability can be obtained. The content of casein can be measured by a method of Examples.

[0134]

Coffee extract, water, sodium caseinate, saccharose, additional sweetener, emulsifier, additional thickener, pH adjuster, perfume, additive, and component derived therefrom

Examples of the coffee extract, water, sodium caseinate, saccharose, the additional sweetener, the emulsifier, the additional thickener, the pH adjuster, the perfume, the additive, and the component derived therefrom include those described in the description of the first embodiment.

[0135]

The coffee beverage preferably has a particle size distribution having a volume-based mean diameter $D_{[4,3]}$ of 0.3 μm or less and preferably 0.25 μm or less. The lower limit of the volume-based mean diameter $D_{[4,3]}$ is not particularly limited and is preferably 0.01 μm or greater, 0.05 μm or greater, 0.08 μm or greater, 0.1 μm or greater, 0.15 μm or greater, or 0.2 μm or greater. In an embodiment, the coffee beverage has a particle size distribution having a volume-based mean diameter $D_{[4,3]}$ preferably of 0.05 to 0.3 μm and more preferably of 0.1 to 0.3 μm . With the volume-based mean diameter $D_{[4,3]}$ of the coffee beverage of 0.3 μm or less, components in the coffee beverage are uniformly dispersed without aggregation and the like, and thus high stability can be obtained. The value of the volume-based mean diameter $D_{[4,3]}$ can be measured by a method described in Examples.

[0136]

The coffee beverage preferably has a Brix (solid content in the coffee beverage) of 1% or more, 2% or more, 3% or more, 4% or more, 5% or more, 8% or more, 10% or more, or 15% or more. In addition, the Brix of the coffee beverage is preferably 60% or less, 50% or less, 40% or

less, 30% or less, 20% or less, 15% or less, or 10% or less. In an embodiment, the Brix of the coffee beverage is preferably from 3 to 30%, more preferably from 4 to 20%, and even more preferably from 5 to 15%.

[0137]

The coffee beverage is preferably a packaged beverage. Here, examples of the container include a can, a bottle, a PET bottle, and a paper pack. The coffee beverage made into a packaged beverage can be consumed immediately after purchase and can be easily consumed by consumers.

Examples

[0138]

Hereinafter, the present invention will be specifically described by illustrating examples, but the present invention is not limited to the following examples.

[0139]

Method for manufacturing coffee beverage

Example 1

Mixing

Per liter of a coffee beverage, 12.2 g of an instant coffee, 35 g of saccharose, 27 g of a semi-skimmed milk powder, 16 g of a creamer, 0.5 g of sodium caseinate, 0.3 g of high acyl gellan gum, 0.6 g of a sugar ester (saccharose palmitate, HLB of 16), and 1.38 g of sodium bicarbonate, as well as a remaining amount of water were mixed. The resulting liquid mixture was homogenized using a high-pressure homogenizer under conditions of a temperature of 65°C and a pressure of 20 MPa, and a beverage base was obtained. The pH of the beverage base at 20°C was measured using a pH meter and found to be 6.92.

[0140]

Sterilization

The beverage base obtained in the mixing was subjected to ultra-high temperature sterilization (UHT) at 136 to 140°C for 19 to 90 seconds, and a sterilized beverage base was obtained. The sterilized beverage base obtained in the sterilization was cooled to 35°C.

[0141]

Filling

Into a transparent polyethylene terephthalate (PET) bottle container (volume: 271.7 mL), 250 mL of the sterilized beverage base obtained in the sterilization was filled, and a coffee beverage (packaged coffee beverage) was manufactured. The pH of the coffee beverage at 20°C was measured using a pH meter and found to be 6.67.

[0142]

Example 2

A coffee beverage was manufactured in the same manner as in Example 1 except that the amount of sodium caseinate added was changed to 1 g per liter of the coffee beverage. The pH of

the beverage base and the pH of the coffee beverage were measured in the same manner as in Example 1 and found to be 6.93 and 6.76, respectively.

[0143]

Example 3

A coffee beverage was manufactured in the same manner as in Example 1 except that the amount of sodium caseinate added was changed to 1.5 g per liter of the coffee beverage. The pH of the beverage base and the pH of the coffee beverage were measured in the same manner as in Example 1 and found to be 6.97 and 6.74, respectively.

[0144]

Example 4

A coffee beverage was manufactured in the same manner as in Example 2 except that the amount of sodium bicarbonate added was changed to 1.6 g per liter of the coffee beverage. The pH of the beverage base and the pH of the coffee beverage were measured in the same manner as in Example 1 and found to be 7.00 and 6.73, respectively.

[0145]

Example 5

A coffee beverage was manufactured in the same manner as in Example 2 except that 0.9 g of monoglyceride (HLB of 5) was used per liter of the coffee beverage in place of the sugar ester. The pH of the beverage base and the pH of the coffee beverage were measured in the same manner as in Example 1 and found to be 6.90 and 6.71, respectively.

[0146]

Example 6

A coffee beverage was manufactured in the same manner as in Example 2 except that no sodium caseinate was added. The pH of the beverage base and the pH of the coffee beverage were measured in the same manner as in Example 1 and found to be 6.97 and 6.66, respectively.

[0147]

Example 7

A coffee beverage was manufactured in the same manner as in Example 2 except that no high acyl gellan gum was added. The pH of the beverage base and the pH of the coffee beverage were measured in the same manner as in Example 1 and found to be 6.94 and 6.67, respectively.

[0148]

Example 8

A coffee beverage was manufactured in the same manner as in Example 2 except that neither sodium caseinate nor high acyl gellan gum was added. The pH of the beverage base and the pH of the coffee beverage were measured in the same manner as in Example 1 and found to be 6.83 and 6.73, respectively.

[0149]

Example 9

A coffee beverage was manufactured in the same manner as in Example 2 except that sodium caseinate, high acyl gellan gum, and sugar ester were not added. The pH of the beverage base and the pH of the coffee beverage were measured in the same manner as in Example 1 and found to be 6.89 and 6.75, respectively.

[0150]

Example 10

A coffee beverage was manufactured in the same manner as in Example 2 except that the amount of the semi-skimmed milk powder added was changed to 13.5 g per liter of the coffee beverage and no sodium caseinate was added. The pH of the beverage base and the pH of the coffee beverage were measured in the same manner as in Example 1 and found to be 6.98 and 6.73, respectively.

[0151]

Example 11

A coffee beverage was manufactured in the same manner as in Example 2 except that the amount of the semi-skimmed milk powder added was changed to 13.5 g per liter of the coffee beverage. The pH of the beverage base and the pH of the coffee beverage were measured in the same manner as in Example 1 and found to be 6.99 and 6.78, respectively.

[0152]

Example 12

A coffee beverage was manufactured in the same manner as in Example 2 except that the amount of sodium caseinate added was changed to 1.5 g per liter of the coffee beverage and the amount of the semi-skimmed milk powder added was changed to 13.5 g per liter of the coffee beverage. The pH of the beverage base and the pH of the coffee beverage were measured in the same manner as in Example 1 and found to be 6.80 and 6.70, respectively.

[0153]

Examples 1 to 12 are listed in Table 1-1 and Table 1-2 below.

[0154]

[Table 1-1]

	Casein Na (g/L)	High acyl gellan gum (g/L)	Monoglyceride (g/L)	Sugar ester (g/L)	Semi-skimmed milk powder (g/L)	Sodium bicarbonate (g)	pH (Beverage base)	pH (Coffee beverage)
Example 1	0.5	0.3	0	0.6	27	1.38	6.92	6.67
Example 2	1	0.3	0	0.6	27	1.38	6.93	6.76
Example 3	1.5	0.3	0	0.6	27	1.38	6.97	6.74
Example 4	1	0.3	0	0.6	27	1.6	7.00	6.73
Example 5	1	0.3	0.9	0	27	1.38	6.90	6.71
Example 6	0	0.3	0	0.6	27	1.38	6.97	6.66
Example 7	1	0	0	0.6	27	1.38	6.94	6.67
Example 8	0	0	0	0.6	27	1.38	6.83	6.73
Example 9	0	0	0	0	27	1.38	6.89	6.75

[0155]

[Table 1-2]

	Casein Na (g/L)	High acyl gellan gum (g/L)	Monoglyceride (g/L)	Sugar ester (g/L)	Semi-skimmed milk powder (g/L)	Sodium bicarbonate (g)	pH (Beverage base)	pH (Coffee beverage)
Example 10	0	0.3	0	0.6	13.5	1.38	6.98	6.73
Example 11	1	0.3	0	0.6	13.5	1.38	6.99	6.78
Example 12	1.5	0.3	0	0.6	13.5	1.38	6.80	6.70

[0156]

Evaluation

The packaged coffee beverages manufactured in Examples 1 to 12 (each containing 250 mL of the coffee beverage in a 271.7-mL volume transparent PET bottle container) were evaluated for creaming based on aggregation or floating of oil and precipitation based on aggregation or sedimentation of protein.

[0157]

Creaming

The packaged coffee beverages were stored at 5°C. After 5 weeks, the packaged coffee beverages were visually observed and evaluated according to the criteria below. The obtained results are listed in Tables 2-1 and 2-2 below.

[0158]

The storage condition of 5°C for 5 weeks is an indicator of the stable state of the manufactured packaged coffee beverages during cooling.

[0159]

◎: Fat on the upper part of the liquid surface does not float.

○: Fat of less than 0.5 mm floats on the upper part of the liquid surface.

△: Fat of 0.5 or more and less than 2.0 mm floats on the upper part of the liquid surface.

×: Fat of 2 mm or more floats on the upper part of the liquid surface.

[0160]

Precipitation

The packaged coffee beverages were stored at 45°C. After 5 weeks and 10 weeks, the packaged coffee beverages were visually observed and evaluated according to the criteria below. The obtained results are listed in Tables 2-1 and 2-2 below.

[0161]

The storage condition of 45°C for 5 weeks is an indicator of the stable state of the manufactured packaged coffee beverages during cooling. In addition, the storage condition of 45°C for 10 weeks is an indicator of the storage state at a normal temperature after about 16 months.

[0162]

◎: When 250 mL of the packaged coffee beverage is transferred to another container (a 271.7-mL volume transparent PET bottle container), no precipitate is observed at the bottom of the other container.

○: When 250 mL of the packaged coffee beverage is transferred to another container (a 271.7-mL volume transparent PET bottle container), precipitation was slightly observed in a linear range in a depression at the bottom of the other container.

△: When 250 mL of the packaged coffee beverage is transferred to another container (a 271.7-mL volume transparent PET bottle container), precipitation was slightly observed in a wider range than a linear range in a depression at the bottom of the other container.

×: When 250 mL of the packaged coffee beverage is transferred to another container (a 271.7-mL volume PET transparent bottle container), precipitation was clearly observed in a depression at the bottom of the other container.

[0163]

[Table 2-1]

	Creaming (5 weeks)	Precipitation (5 weeks)	Precipitation (10 weeks)
Example 1	◎	○	△
Example 2	◎	◎	○
Example 3	◎	○	△
Example 4	◎	○	△
Example 5	◎	◎	△
Example 6	○	○	×
Example 7	×	×	×
Example 8	×	×	×
Example 9	×	×	×

[0164]

[Table 2-2]

	Creaming (5 weeks)	Precipitation (5 weeks)	Precipitation (10 weeks)
Example 10	×	△	△
Example 11	△	○	△
Example 12	△	○	△

[0165]

Coffee beverage

The contents of casein and β -lactoglobulin in the coffee beverages manufactured in Examples 2 and 6 as well as Examples 3 and 10 to 12 described above were measured. In addition, the volume-based mean diameters D [4,3] of the coffee beverages were measured. The obtained results are listed in Tables 3-1 and 3-2. In Table 3-2, “-” indicates that the measurement was not performed.

[0166]

The content of casein in the coffee beverages was measured according to the Kjeldahl method (ISO 8968-1: 2014 [IDF 20-1: 2014]).

[0167]

In addition, the content of β -lactoglobulin in the coffee beverages was measured by high-performance liquid chromatography according to ISO 13875: 2005.

[0168]

Furthermore, the volume-based mean diameters $D_{[4,3]}$ of the coffee beverages were measured by a laser diffraction/scattering method.

[0169]

[Table 3-1]

	High acyl gellan gum (g/L)	Casein (mass%)	β - Lactoglobulin (g/100 g)	β - Lactoglobulin/casein	Volume-based mean diameter D [4,3] (μm)	Creaming (5 weeks)	Precipitation (5 weeks)	Precipitation (10 weeks)
Example 2	0.3	0.919	0.18	0.20	0.236	⊙	⊙	○
Example 6	0.3	0.906	0.17	0.19	0.236	○	○	×

[0170]

[Table 3-2]

	High acyl gellan gum (g/L)	Casein (mass%)	β -Lactoglobulin (g/100 g)	β - Lactoglobulin/casein	Creaming (5 weeks)	Precipitation (5 weeks)	Precipitation (10 weeks)
Example 3	0.3	0.931	0.17	0.18	⊙	○	△
Example 10	0.3	0.472	0.0640	0.14	×	△	△
Example 11	0.3	0.491	-	-	△	○	△
Example 12	0.3	0.561	0.0658	0.12	△	○	△

Claims

1. A method for manufacturing a coffee beverage, comprising mixing at least one of a milk component or a plant-based cream, gellan gum, and sodium caseinate to obtain a beverage base, wherein
sodium caseinate is added to the beverage base in an amount of 0.1 to 2.0 g per liter of the coffee beverage.
2. The method according to claim 1, wherein the at least one of the milk component or the plant-based cream is added in the form of powder.
3. The method according to claim 1 or 2, wherein the beverage base has a pH of 7.0 or lower.
4. The method according to any one of claims 1 to 3, wherein the gellan gum comprises high acyl gellan gum.
5. The method according to any one of claims 1 to 4, wherein the beverage base further comprises an emulsifier.
6. The method according to claim 5, wherein the emulsifier has a HLB of 10 or more.
7. The method according to any one of claims 1 to 6, wherein the coffee beverage is a packaged beverage.
8. A coffee beverage comprising:
at least one of a milk component or a plant-based cream;
from 0.2 to 0.4 g/L of gellan gum; and
from 0.48 to 1.0 mass% of casein;
wherein at least part of the casein is derived from sodium caseinate.
9. A coffee beverage comprising:
at least one of a milk component or a plant-based cream;
from 0.2 to 0.4 g/L of gellan gum;
from 0.48 to 1.0 mass% of casein; and
from 0.065 to 0.3 g/100 g of β -lactoglobulin.
10. The coffee beverage according to claim 8 or 9, wherein the coffee beverage has a volume-based mean diameter D [4,3] of 0.3 μ m or less.

11. A coffee beverage comprising:
at least one of a milk component or a plant-based cream;
from 0.2 to 0.4 g/L of gellan gum; and
from 0.48 to 1.0 mass% of casein;
wherein the coffee beverage has a particle size distribution having a volume-based mean diameter $D_{[4,3]}$ of 0.3 μm or less.
12. The coffee beverage according to any one of claims 8 to 11, wherein the milk component and/or the plant-based cream is a component derived from a powder raw material.
13. The coffee beverage according to any one of claims 8 to 12, wherein the gellan gum comprises high acyl gellan gum.
14. The coffee beverage according to any one of claims 8 to 13, further comprising an emulsifier.
15. The coffee beverage according to claim 14, wherein the emulsifier has a HLB of 10 or more.
16. The coffee beverage according to any one of claims 8 to 15, wherein the coffee beverage is a packaged beverage.