

Description

Title of the Invention: COFFEE BEVERAGE

Field of the Invention

[0001] The present invention relates to a coffee beverage.

Background of the Invention

[0002] The taste and flavor of a coffee beverage include bitterness, sourness, sweetness, richness, and the like, which are sensed on the tongue as a sense of taste, and an odor that is sensed by the nose as a sense of smell. In addition, the odor of the coffee beverage includes orthonasal aroma, which is directly sensed by the nose as an odor of fresh coffee, and retronasal aroma, which spreads from the throat to the nose when the coffee beverage is drunk. The retronasal aroma is an important element that defines favorable taste of the coffee beverage.

[0003] As an aroma component of the coffee beverage, for example, a pyrrole such as an acetylpyrrole is known. It has been reported that blending of the pyrrole in a food and drink can improve its aroma and flavor to provide high preference of the food and drink (Patent Document 1). In addition, it has also been reported that a coffee beverage having high drinkability can be obtained by maintaining odors of furfurals, dimethylpyrazines, or acetylpyrroles or the like (Patent Document 2).

[0004] In addition, caffeine, a dicaffeoylquinic acid, or the

like is known as a bitterness component of the coffee beverage. Further, chlorogenic acids including dicaffeoylquinic acids are known to have a health action.

Citation List

Patent Document

[0005] [Patent Document 1] JP-A-2006-20526

[Patent Document 2] WO 2011/096283 A1

Summary of the Invention

[0006] The present invention is as described below.

(i) A coffee beverage, comprising the following components (A) and (B):

(A) acetylmethylpyrrole at a content of less than 0.1 ppm by mass; and

(B) a dicaffeoylquinic acid,

in which a mass ratio of the component (A) to the component (B), $[(A)/(B)]$, is 0.00055 or less.

(ii) A soluble coffee, comprising the following components (A) and (B):

(A) acetylmethylpyrrole at a content of less than 3 ppm by mass in dry solids; and

(B) a dicaffeoylquinic acid,

in which a mass ratio of the component (A) to the component (B), $[(A)/(B)]$, is 0.00055 or less.

(iii) A method of reducing coarseness of a coffee beverage, comprising adjusting a content of acetylmethylpyrrole as a component (A) in

a coffee beverage to less than 0.1 ppm by mass.

(iv) A method of improving retronasal aroma of a coffee beverage, comprising adjusting a content of acetylmethylpyrrole as a component (A) in a coffee beverage to less than 0.1 ppm by mass.

Detailed Description of the Invention

[0007] The present invention provides a coffee beverage and a soluble coffee having reduced coarseness and having good sharpness of bitterness and good retronasal aroma. The present invention also provides a method of reducing coarseness of a coffee beverage and a method of improving retronasal aroma of a coffee beverage.

[0008] The inventors of the present invention made investigations on bitterness to develop a coffee beverage having high preference. The coffee beverage is a drink having favorable bitterness, and a typical example thereof is espresso. People tend to like a coffee beverage that provides good sharp bitterness when drunk without lasting bitterness. When unfavorable bitterness remains as an aftertaste, the taste of the coffee beverage may deteriorate. The term "aftertaste" as used herein refers to "feeling that remains in the mouth" described in JIS Z 8144:2004. As a result of an investigation on the cause of deteriorated sharpness of bitterness, it found that coarseness is involved in the deterioration of sharpness of bitterness and that the deteriorated sharpness of bitterness causes deterioration of retronasal aroma. Further, as a result of a detailed investigation to reduce coarseness of a coffee beverage, it found that a specific aroma component in the coffee

beverage is involved in the coarseness. In addition, it found that when a content of the aroma component in the coffee beverage is reduced, a coffee beverage having suppressed coarseness and having sharpness of bitterness and retronasal aroma improved by the suppressed coarseness is produced.

[0009] According to the present invention, a coffee beverage and a soluble coffee having suppressed coarseness and having sharpness of bitterness and retronasal aroma improved by the suppressed coarseness can be provided. According to the present invention, a method of reducing coarseness of a coffee beverage and a method of improving retronasal aroma of a coffee beverage can also be provided.

[0010] The coffee beverage of the present invention comprises, as a component (A), acetylmethylpyrrole (2-acetyl-1-methylpyrrole), which is a substance responsible for coarseness.

A content of the component (A) in the coffee beverage of the present invention is less than 0.1 ppm by mass, and is preferably 0.09 ppm by mass or less, more preferably 0.08 ppm by mass or less, more preferably 0.06 ppm by mass or less, even more preferably 0.03 ppm by mass or less, from the viewpoints of further reducing coarseness and improving sharpness of bitterness and retronasal aroma. It should be noted that a lower limit of the content of the component (A) is not particularly limited and may be 0 ppm by mass, but may be 0.0001 ppm by mass or 0.001 ppm by mass, from the viewpoint of production efficiency. The content of the component (A) in the coffee

beverage of the present invention ranges preferably from 0 to 0.09 ppm by mass, more preferably from 0 to 0.08 ppm by mass, more preferably from 0 to 0.06 ppm by mass, more preferably from 0.0001 to 0.06 ppm by mass, even more preferably from 0.001 to 0.03 ppm by mass. It should be noted that, in the present description, the component (A) is analyzed in conformity to a method described in Examples below. In addition, in the present description, the concept that the content of the component (A) is 0 ppm by mass encompasses the case where the content of the component (A) is below the detection limit in the analysis of the content of the component (A) in conformity to a method described in Examples below.

[0011] Thus, the coffee beverage of the present invention comprises a significantly reduced amount of the component (A) as compared to that of a normal coffee beverage and hence has suppressed coarseness. As a result, the coffee beverage provides sharp bitterness without lasting bitterness, and thus results in sufficiently high retronasal aroma when drunk.

[0012] The coffee beverage of the present invention comprises a dicaffeoylquinic acid as a component (B). The term "dicaffeoylquinic acid" as used herein is a general term collectively encompassing 3,4-dicaffeoylquinic acid, 3,5-dicaffeoylquinic acid, and 4,5-dicaffeoylquinic acid, and a content of the dicaffeoylquinic acid is defined based on the total amount of the three of compounds described above. It should be noted that, in the present description, the component (B) is analyzed in conformity to a method described

in Examples below.

[0013] A mass ratio of the component (A) to the component (B), $[(A)/(B)]$, in the coffee beverage of the present invention is 0.00055 or less, and is preferably 0.00045 or less, more preferably 0.00035 or less, even more preferably 0.00025 or less, from the viewpoints of further improving richness of bitterness, sharpness of bitterness, and retronasal aroma. It should be noted that the lower limit of the mass ratio $[(A)/(B)]$ is not particularly limited and may be 0, but may be 0.000001 or 0.00001, from the viewpoint of production efficiency. The mass ratio $[(A)/(B)]$ in the coffee beverage of the present invention ranges preferably from 0 to 0.00055, more preferably from 0 to 0.00045, more preferably from 0.000001 to 0.00035, even more preferably from 0.00001 to 0.00025.

[0014] A content of the component (B) in the coffee beverage of the present invention is preferably 30 ppm by mass or more, more preferably 50 ppm by mass or more, more preferably 70 ppm by mass or more, even more preferably 80 ppm by mass or more, from the viewpoints of imparting bitterness and improving richness of bitterness, and is preferably 300 ppm by mass or less, more preferably 250 ppm by mass or less, more preferably 200 ppm by mass or less, even more preferably 150 ppm by mass or less, from the viewpoint of improving sharpness of bitterness. The content of the component (B) in the coffee beverage of the present invention ranges preferably from 30 to 300 ppm by mass, more preferably from 50 to 250 ppm by mass, more preferably from 70 to 200 ppm by mass, even more preferably

from 80 to 150 ppm by mass.

[0015] The coffee beverage of the present invention may further comprise caffeine as a component (C).

A content of the component (C) in the coffee beverage of the present invention is preferably 0.005% by mass or more, more preferably 0.01% by mass or more, more preferably 0.015% by mass or more, even more preferably 0.02% by mass or more, from the viewpoint of imparting bitterness, and is preferably 0.15% by mass or less, more preferably 0.1% by mass or less, more preferably 0.075% by mass or less, even more preferably 0.05% by mass or less, from the viewpoint of improving sharpness of bitterness. The content of the component (C) in the coffee beverage of the present invention ranges preferably from 0.005 to 0.15% by mass, more preferably from 0.01 to 0.1% by mass, more preferably from 0.015 to 0.075% by mass, even more preferably from 0.02 to 0.05% by mass. It should be noted that, in the present description, the component (C) is analyzed in conformity to a method described in Examples below.

[0016] The coffee beverage of the present invention may further comprise a chlorogenic acid as a component (D). The term "chlorogenic acid" as used herein is a general term collectively encompassing: monocaffeoylquinic acids including 3-caffeoylquinic acid, 4-caffeoylquinic acid, and 5-caffeoylquinic acid; monoferuloylquinic acids including 3-feruloylquinic acid, 4-feruloylquinic acid, and 5-feruloylquinic acid; and the dicaffeoylquinic acids including 3,4-dicaffeoylquinic acid,

3,5-dicaffeoylquinic acid, and 4,5-dicaffeoylquinic acid.

[0017] A content of the component (D) in the coffee beverage of the present invention is preferably 0.01% by mass or more, more preferably 0.05% by mass or more, more preferably 0.07% by mass or more, more preferably 0.1% by mass or more, more preferably 0.12% by mass or more, even more preferably 0.15% by mass or more, from the viewpoint of physiological activity, and is preferably 2% by mass or less, more preferably 1% by mass or less, more preferably 0.8% by mass or less, more preferably 0.5% by mass or less, even more preferably 0.3% by mass or less, from the viewpoint of taste and flavor. The content of the component (D) in the coffee beverage of the present invention ranges preferably from 0.01 to 2% by mass, more preferably from 0.05 to 1% by mass, more preferably from 0.07 to 0.8% by mass, more preferably from 0.1 to 0.8% by mass, more preferably from 0.12 to 0.5% by mass, even more preferably from 0.15 to 0.3% by mass. It should be noted that, in the present description, the content of the component (D) is defined based on the total amount of the nine kinds of chlorogenic acids described above, and the component (D) is analyzed in conformity to a method described in Examples below.

[0018] A mass ratio of the component (B) to the component (D), $[(B)/(D)]$, in the coffee beverage of the present invention is preferably 0.04 or more, more preferably 0.05 or more, more preferably 0.06 or more, even more preferably 0.07 or more, from the viewpoints of a physiological effect and richness of bitterness, and is

preferably 0.2 or less, more preferably 0.18 or less, more preferably 0.16 or less, even more preferably 0.14 or less, from the viewpoints of taste and flavor and improving sharpness of bitterness. The mass ratio [(B)/(D)] in the coffee beverage of the present invention ranges preferably from 0.04 to 0.2, more preferably from 0.05 to 0.18, more preferably from 0.06 to 0.16, even more preferably from 0.07 to 0.14.

[0019] A Brix (20°C) of the coffee beverage of the present invention is preferably 0.8 or more, more preferably 1.0 or more, more preferably 1.2 or more, even more preferably 1.5 or more, from the viewpoint of imparting richness, and is preferably 3.0 or less, more preferably 2.5 or less, even more preferably 2.3 or less, from the viewpoint of ease of drinking. The Brix (20°C) of the coffee beverage of the present invention ranges preferably from 0.8 to 3.0, more preferably from 1.0 to 2.5, more preferably from 1.2 to 2.5, even more preferably from 1.5 to 2.3.

[0020] The coffee beverage of the present invention preferably has an acidic property from the viewpoint of taste and flavor. Specifically, the pH (20°C) of the coffee beverage is preferably 4.0 or more, more preferably 4.3 or more, even more preferably 4.5 or more, and is preferably 6.0 or less, more preferably 5.9 or less, even more preferably 5.8 or less. The pH (20°C) of the coffee beverage ranges preferably from 4.0 to 6.0, more preferably from 4.3 to 5.9, even more preferably from 4.5 to 5.8.

[0021] The coffee beverage of the present invention may be,

for example, prepared by using a coffee extract as such having a reduced content of the component (A) and a controlled mass ratio of the component (A) to the component (B), or prepared by the coffee extract diluted with water.

[0022] The coffee extract having a reduced content of the component (A) and a controlled mass ratio of the component (A) to the component (B) can be prepared by, for example, (i) subjecting a raw material roasted coffee bean extract to any chromatography such as reversed phase chromatography or liquid chromatography to fractionate the component (A), to thereby reduce the content of the component (A) in the raw material roasted coffee bean extract, or (ii) controlling the amounts of the components (A) and (B) to be extracted from roasted coffee beans and the amounts of the components (A) and (B) to be adsorbed on activated carbon by a method involving placing roasted coffee beans and activated carbon having average particle sizes controlled within specific ranges with the same container, feeding a solvent for extraction in the container to yield a coffee extract solution, and bringing the coffee extract solution into contact with the activated carbon in the container. It should be noted that, as a fractionation method in the method (i), a known method may be employed appropriately. The method (ii) is described below.

[0023] The roasted coffee beans to be used in the present invention have an average particle size of preferably from 0.90 to 1.40 mm, more preferably from 0.96 to 1.33 mm. The term "average

particle size" as used herein refers to a mass average particle size calculated by determining particle sizes in conformity to the section 6.3 of JIS K1474, determining the particle size distribution in conformity to the section 6.4, and calculating a mass average particle size in conformity to the section 6.4-b)-7).

An L value of the roasted coffee beans, measured with a colorimeter, is preferably from 10 to 60, more preferably from 13 to 40, more preferably from 15 to 35, even more preferably from 20 to 30, and a mixture of coffee beans having different roasting degrees may be used. In the case of using a mixture of coffee beans having different roasting degrees, the roasted coffee beans have a roasting degree calculated as a sum of values each determined by multiplying an L value of roasted coffee beans to be used by a content ratio of the roasted coffee beans. In addition, when roasted coffee beans having a large L value are used, a coffee extract having a high content of the component (B) can be obtained. The term "L value" as used herein refers to a value as determined by measuring the lightness of roasted coffee beans with a colorimeter under the assumption that black has an L value of 0 and white has an L value of 100. As the colorimeter, for example, a spectrophotometer SE2000 (manufactured by Nippon Denshoku Industries Co., Ltd.) may be used. It should be noted that a roasting method and roasting conditions are not particularly limited. Examples of the kind of the coffee beans include *Coffea Arabica*, *Coffea Robusta* and *Coffea Liberica*, and one coffee bean or a mixture

of two or more coffee beans may be used.

[0024] In addition, the activated carbon to be used in the present invention has an average particle size of preferably from 0.30 to 0.60 mm, more preferably from 0.32 to 0.45 mm. The term "average particle size" as used in this case also refers to a mass average particle size calculated in conformity to JIS K1474. It should be noted that examples of a raw material from which the activated carbon is derived include a wood material (for example, sawdust), coal, and palm shell or the like, and of those, palm shell activated carbon is preferred. In addition, activated carbon having been activated by a gas such as water vapor or a chemical may be used, and of those, activated carbon activated by water vapor is preferred. A usage amount of the activated carbon is preferably from 10 to 35% by mass, more preferably from 20 to 28% by mass, with respect to that of the roasted coffee beans.

[0025] The roasted coffee beans and activated carbon having average particle sizes controlled may be obtained by, if necessary, pulverizing roasted coffee beans and activated carbon and sieving the pulverized products to collect ones having desired average particle sizes. The pulverization method is not particularly limited, and a known method and apparatus may be used. It should be noted that classification of the roasted coffee beans and activated carbon may be performed by using, for example, a sieve manufactured by Tyler (JIS Z 8801-1).

[0026] Next, the roasted coffee beans and activated carbon are

placed in a container. Examples of the container include a drip extractor and a column extractor.

In addition, after placing the activated carbon in the container, the activated carbon may be washed by passing water through the container before placing the roasted coffee beans. It should be noted that the water used for the washing is discharged outside the container. The temperature of the water is preferably from 60 to 100°C, more preferably from 70 to 95°C. An amount of the water to be used for the washing is, with respect to that of the activated carbon, preferably from 5 to 200 times by mass, more preferably from 15 to 50 times by mass.

[0027] Next, a solvent for extraction is fed to the container containing the roasted coffee beans and activated carbon placed therein.

From the viewpoint of taste and flavor, the solvent for extraction is preferably water, and tap water, natural water, distilled water, ion-exchange water, or the like may be appropriately selected and used.

A temperature of the solvent for extraction is preferably from 70 to 90°C, more preferably from 77 to 87°C.

[0028] In addition, after feeding a constant amount of the solvent for extraction to the roasted coffee beans, the feed of the solvent for extraction may be stopped, and the state may be maintained for a predetermined period of time. In this case, the amount of the solvent for extraction to be fed is preferably from

0.5 to 10 times by mass with respect to that of the roasted coffee beans, and the period of time for which the state is maintained is preferably from 1 to 20 minutes, more preferably from 5 to 16 minutes, from the viewpoint of taste and flavor.

[0029] Next, the coffee extract is discharged outside the container, and the discharge is preferably stopped when an extraction ratio of the coffee extract solution, that is, a ratio of the mass of the coffee extract solution to the mass of the roasted coffee beans reaches a predetermined amount. The extraction ratio of the coffee extract solution is preferably from 1 to 15 times by mass, more preferably from 4 to 12 times by mass, with respect to the roasted coffee beans.

The discharged coffee extract solution is cooled, and, after that may be treated by filtration, centrifugation, or the like.

[0030] Thus, a coffee extract having the content of acetylmethylpyrrole as the component (A) reduced to less than 0.1 ppm by mass can be obtained. In the resultant coffee extract, the mass ratio of the component (A) to the dicaffeoylquinic acid as the component (B), $[(A)/(B)]$, is typically 0.00055 or less, and if necessary, the component (B) may be added to adjust the mass ratio $[(A)/(B)]$ within the range described above.

[0031] In addition, as required, the coffee beverage of the present invention may contain one or two or more of additives such as a sweetener, a milk component, an antioxidant, a flavor, an organic acid, an organic acid salt, an inorganic acid, an inorganic acid

salt, an inorganic salt, a dye, an emulsifier, a preservative, a seasoning, an acidulant, an amino acid, a pH regulator, and a quality stabilizer. The coffee beverage of the present invention may be a black coffee beverage or a milk coffee beverage.

[0032] The coffee beverage of the present invention may be provided as a packaged coffee beverage by filling a conventional package, such as a molded container formed of polyethylene terephthalate as a main component (a so-called PET bottle), a metal can, a paper package in combination with metal foil or a plastic film, and a bottle, with the beverage.

In addition, the coffee beverage can be produced, for example, by putting the beverage in a container such as a metal can and, when sterilized with heating is feasible, conducting heat sterilization under the sterilization conditions defined by the corresponding law (the Food Sanitation Act in Japan). In the case of a container such as a PET bottle or a paper container to which retort sterilization cannot be applied, the coffee beverage is previously sterilized for example, at a high temperature for a short time sterilization under the equivalent conditions as aforementioned above, by a plate-type heat exchanger or the like, is cooled to a predetermined temperature, and then is filling in a container.

[0033] Next, the soluble coffee of the present invention is described.

The term "soluble coffee" as used herein refers to a product obtained by concentrating or drying the coffee extract having a

reduced content of the component (A), and has solids concentration higher than that of a coffee beverage to be generally drunk. The dry solids in the soluble coffee is typically from 10 to 100% by mass, and is preferably from 20 to 99.9% by mass, more preferably from 25 to 99% by mass, even more preferably 30 to 98% by mass, from the viewpoint of handling. It should be noted that the "dry solids" is measured in conformity to a method described in "Measurement of dry solids" in Examples below.

Examples of the soluble coffee include a dilutable portion-type beverage and instant coffee or the like. A form of the instant coffee may be a one requiring measurement by a spoon, a package suitable for brewing/infusing and a stick-like package containing a one-cup dose.

[0034] A content of the component (A) in the dry solids of the soluble coffee of the present invention is less than 3 ppm by mass, and is preferably 2.7 ppm by mass or less, more preferably 2.4 ppm by mass or less, more preferably 1.8 ppm by mass or less, even more preferably 0.9 ppm by mass or less, from the viewpoints of further reducing coarseness and improving sharpness of bitterness and retronasal aroma. It should be noted that the lower limit of the content of the component (A) is not particularly limited and may be 0 ppm by mass, but may be 0.001 ppm by mass or 0.01 ppm by mass, from the viewpoint of production efficiency. The content of the component (A) in the dry solids of the soluble coffee of the present invention ranges preferably from 0 to 2.7 ppm by mass, more preferably

from 0 to 2.4 ppm by mass, more preferably from 0.001 to 1.8 ppm by mass, even more preferably from 0.01 to 0.9 ppm by mass by mass.

[0035] A mass ratio $[(A)/(B)]$ in the soluble coffee of the present invention is 0.00055 or less as in the coffee beverage described above. The preferred embodiment of the mass ratio $[(A)/(B)]$ is as described above for the coffee beverage. In addition, the preferred aspect of the mass ratio $[(B)/(D)]$ in the soluble coffee of the present invention is also as described above for the coffee beverage.

[0036] A content of the component (B) in the dry solids of the soluble coffee of the present invention is preferably 0.03% by mass or more, more preferably 0.05% by mass or more, more preferably 0.07% by mass or more, even more preferably 0.08% by mass or more, from the viewpoints of imparting bitterness and improving richness of bitterness, and is preferably 0.9% by mass or less, more preferably 0.75% by mass or less, more preferably 0.6% by mass or less, even more preferably 0.45% by mass or less, from the viewpoint of improving sharpness of bitterness. The content of the component (B) in the dry solids of the soluble coffee of the present invention ranges preferably from 0.03 to 0.9% by mass, more preferably from 0.05 to 0.75% by mass, more preferably from 0.07 to 0.6% by mass, even more preferably from 0.08 to 0.45% by mass.

[0037] A content of the component (C) in the dry solids of the soluble coffee of the present invention is preferably 0.05% by mass or more, more preferably 0.1% by mass or more, more preferably 0.15%

by mass or more, even more preferably 0.2% by mass or more, from the viewpoint of imparting bitterness, and is preferably 4.5% by mass or less, more preferably 3% by mass or less, more preferably 2.25% by mass or less, even more preferably 1.5% by mass or less, from the viewpoint of improving sharpness of bitterness. The content of the component (C) in the dry solids of the soluble coffee of the present invention ranges preferably from 0.05 to 4.5% by mass, more preferably from 0.1 to 3% by mass, more preferably from 0.15 to 2.25% by mass, even more preferably from 0.2 to 1.5% by mass.

[0038] A content of the component (D) in the dry solids of the soluble coffee of the present invention is preferably 0.1% by mass or more, more preferably 0.5% by mass or more, more preferably 0.7% by mass or more, more preferably 1.0% by mass or more, more preferably 1.2% by mass or more, even more preferably 1.5% by mass or more, from the viewpoint of physiological activity, and is preferably 60% by mass or less, more preferably 30% by mass or less, more preferably 24% by mass or less, more preferably 15% by mass or less, even more preferably 9% by mass or less, from the viewpoint of taste and flavor. The content of the component (D) in the dry solids of the soluble coffee of the present invention ranges preferably from 0.1 to 60% by mass, more preferably from 0.5 to 30% by mass, more preferably from 0.7 to 24% by mass, more preferably from 1.0 to 15% by mass, more preferably from 1.2 to 15% by mass, even more preferably from 1.5 to 9% by mass.

[0039] The soluble coffee of the present invention can be

obtained by drying the above-mentioned coffee extract. As a drying method, there are given spray drying freeze drying, and the like.

[0040] Hereinafter, the method of reducing coarseness of a coffee beverage and the method of improving retronasal aroma of a coffee beverage are described.

The method of reducing coarseness of a coffee beverage and the method of improving retronasal aroma of a coffee beverage of the present invention each comprise adjusting a content of acetylmethylpyrrole as the component (A) in the coffee beverage to less than 0.1 ppm by mass. The preferred embodiment of the content of the component (A) is as described above for the coffee beverage.

In addition, the method of reducing coarseness of a coffee beverage and the method of improving retronasal aroma of a coffee beverage of the present invention may each comprise: adjusting the content of the component (A) and a mass ratio $[(A)/(B)]$ in the coffee beverage from the viewpoints of further reducing coarseness and improving sharpness of bitterness and retronasal aroma; adjusting a content of the dicaffeoylquinic acid as the component (B) and a mass ratio $[(B)/(D)]$ in the coffee beverage from the viewpoints of improving richness of bitterness and improving sharpness of bitterness; adjusting a content of caffeine as the component (C) from the viewpoints of imparting bitterness and taste and flavor; adjusting a content of the chlorogenic acid as the component (D) in the coffee beverage from the viewpoints of physiological activity and taste and flavor; adjusting a pH from the viewpoint of taste

and flavor; and adjusting a Brix from the viewpoint of imparting richness. The preferred aspects of the contents of the components (A), (B), (C), and (D), mass ratio [(A)/(B)], mass ratio [(B)/(D)], pH, and Brix in the coffee beverage are as described above for the coffee beverage.

[0041] That is, the present invention further discloses the following coffee beverage, soluble coffee, as well as method of reducing coarseness of a coffee beverage, and method of improving retronasal aroma of a coffee beverage regarding the embodiments described above.

[0042] <1-1>

A coffee beverage, comprising the following components (A) and (B):

(A) acetylmethylpyrrole at a content of less than 0.1 ppm by mass; and

(B) a dicaffeoylquinic acid,

in which a mass ratio of the component (A) to the component (B), [(A)/(B)], is 0.00055 or less.

[0043] <1-2>

A method of reducing coarseness of a coffee beverage, comprising adjusting a content of acetylmethylpyrrole as a component (A) in a coffee beverage to less than 0.1 ppm by mass.

[0044] <1-3>

A method of improving retronasal aroma of a coffee beverage, comprising adjusting a content of acetylmethylpyrrole as a component

(A) in a coffee beverage to less than 0.1 ppm by mass.

[0045] <1-4>

The method according to the above-mentioned item <1-2> or <1-3>, further comprising adjusting a mass ratio of the acetylmethylpyrrole as the component (A) to a dicaffeoylquinic acid as a component (B), $[(A)/(B)]$, in the coffee beverage to 0.00055 or less.

<1-5>

The coffee beverage according to the above-mentioned item <1-1> or the method according to the above-mentioned item <1-4> ("the coffee beverage, the method of reducing coarseness of a coffee beverage, or the method of improving retronasal aroma of a coffee beverage" is hereinafter referred to as "coffee beverage or the like"), in which the mass ratio $[(A)/(B)]$ is preferably 0.00045 or less, more preferably 0.00035 or less, even more preferably 0.00025 or less, and is preferably 0 or more, more preferably 0.000001 or more, even more preferably 0.00001 or more.

<1-6>

The coffee beverage or the like according to the above-mentioned item <1-1>, <1-4>, or <1-5>, in which the mass ratio $[(A)/(B)]$ is preferably from 0 to 0.00055, more preferably from 0 to 0.00045, more preferably from 0.000001 to 0.00035, even more preferably from 0.00001 to 0.00025.

<1-7>

The coffee beverage or the like according to any one of the above-mentioned items <1-1> to <1-6>, in which a content of the

component (A) in the coffee beverage is preferably 0.09 ppm by mass or less, more preferably 0.08 ppm by mass or less, more preferably 0.06 ppm by mass or less, even more preferably 0.03 ppm by mass or less, and is preferably 0 ppm by mass or more, more preferably 0.0001 ppm by mass or more, even more preferably 0.001 ppm by mass.

<1-8>

The coffee beverage or the like according to any one of the above-mentioned items <1-1> to <1-7>, in which the content of the component (A) in the coffee beverage is preferably from 0 to 0.09 ppm by mass, more preferably from 0 to 0.08 ppm by mass, more preferably from 0 to 0.06 ppm by mass, more preferably from 0.0001 to 0.06 ppm by mass, even more preferably from 0.001 to 0.03 ppm by mass.

<1-9>

The coffee beverage or the like according to any one of the above-mentioned items <1-1> and <1-4> to <1-8>, in which the dicaffeoylquinic acid as the component (B) is preferably at least one selected from the group consisting of 3,4-dicaffeoylquinic acid, 3,5-dicaffeoylquinic acid, and 4,5-dicaffeoylquinic acid.

<1-10>

The coffee beverage or the like according to any one of the above-mentioned items <1-1> and <1-4> to <1-9>, in which a content of the component (B) in the coffee beverage is preferably 30 ppm by mass or more, more preferably 50 ppm by mass or more, more preferably 70 ppm by mass or more, even more preferably 80 ppm by mass or more, and is preferably 300 ppm by mass or less, more preferably 250 ppm

by mass or less, more preferably 200 ppm by mass or less, even more preferably 150 ppm by mass or less.

[0046] <1-11>

The coffee beverage or the like according to any one of the above-mentioned items <1-1> and <1-4> to <1-10>, in which the content of the component (B) in the coffee beverage is preferably from 30 to 300 ppm by mass, more preferably from 50 to 250 ppm by mass, more preferably from 70 to 200 ppm by mass, even more preferably from 80 to 150 ppm by mass.

<1-12>

The coffee beverage or the like according to any one of the above-mentioned items <1-1> to <1-11>, preferably further comprising caffeine as a component (C), in which a content of the component (C) in the coffee beverage is preferably 0.005% by mass or more, more preferably 0.01% by mass or more, more preferably 0.015% by mass or more, even more preferably 0.02% by mass or more, and is preferably 0.15% by mass or less, more preferably 0.1% by mass or less, more preferably 0.075% by mass or less, even more preferably 0.05% by mass or less.

<1-13>

The coffee beverage or the like according to any one of the above-mentioned items <1-1> to <1-12>, preferably further comprising caffeine as a component (C), in which the content of the component (C) in the coffee beverage is preferably from 0.005 to 0.15% by mass, more preferably from 0.01 to 0.1% by mass, more preferably

from 0.015 to 0.075% by mass, even more preferably from 0.02 to 0.05% by mass.

<1-14>

The coffee beverage or the like according to any one of the above-mentioned items <1-1> to <1-13>, preferably further comprising a chlorogenic acid as a component (D), in which a content of the component (D) in the coffee beverage is preferably 0.01% by mass or more, more preferably 0.05% by mass or more, more preferably 0.07% by mass or more, more preferably 0.1% by mass or more, more preferably 0.12% by mass or more, even more preferably 0.15% by mass or more, and is more preferably 2% by mass or less, more preferably 1% by mass or less, more preferably 0.8% by mass or less, more preferably 0.5% by mass or less, even more preferably 0.3% by mass or less.

<1-15>

The coffee beverage or the like according to any one of the above-mentioned items <1-1> to <1-14>, preferably further comprising the chlorogenic acid as the component (D), in which the content of the component (D) in the coffee beverage is preferably from 0.01 to 2% by mass, more preferably from 0.05 to 1% by mass, more preferably from 0.07 to 0.8% by mass, more preferably from 0.1 to 0.8% by mass, more preferably from 0.12 to 0.5% by mass, even more preferably from 0.15 to 0.3% by mass.

<1-16>

The coffee beverage or the like according to any one of the

above-mentioned items <1-1> to <1-15>, in which a mass ratio of the component (B) to the component (D), $[(B)/(D)]$, in the coffee beverage is preferably 0.04 or more, more preferably 0.05 or more, more preferably 0.06 or more, even more preferably 0.07 or more, and is preferably 0.2 or less, more preferably 0.18 or less, more preferably 0.16 or less, even more preferably 0.14 or less.

<1-17>

The coffee beverage or the like according to any one of the above-mentioned items <1-1> to <1-16>, in which the mass ratio of the component (B) to the component (D), $[(B)/(D)]$, in the coffee beverage is preferably from 0.04 to 0.2, more preferably from 0.05 to 0.18, more preferably from 0.06 to 0.16, even more preferably from 0.07 to 0.14.

<1-18>

The coffee beverage or the like according to any one of the above-mentioned items <1-1> to <1-17>, in which the coffee beverage has a Brix (20°C) of preferably 0.8 or more, more preferably 1.0 or more, more preferably 1.2 or more, even more preferably 1.5 or more, and of preferably 3.0 or less, more preferably 2.5 or less, even more preferably 2.3 or less.

<1-19>

The coffee beverage or the like according to any one of the above-mentioned items <1-1> to <1-18>, in which the coffee beverage has the Brix (20°C) of preferably from 0.8 to 3.0, more preferably from 1.0 to 2.5, more preferably from 1.2 to 2.5, even more preferably

from 1.5 to 2.3.

<1-20>

The coffee beverage or the like according to any one of the above-mentioned items <1-1> to <1-19>, in which the coffee beverage has the pH (20°C) of preferably 4.0 or more, more preferably 4.3 or more, even more preferably 4.5 or more, and of preferably 6.0 or less, more preferably 5.9 or less, even more preferably 5.8 or less.

<1-21>

The coffee beverage or the like according to any one of the above-mentioned items <1-1> to <1-20>, in which the coffee beverage has the pH (20°C) of preferably from 4.0 to 6.0, more preferably from 4.3 to 5.9, even more preferably from 4.5 to 5.8.

<1-22>

The coffee beverage or the like according to any one of the above-mentioned items <1-1> to <1-21>, which is preferably a packaged coffee beverage.

[0047] <1-23>

The coffee beverage or the like according to any one of the above-mentioned items <1-1> to <1-22>, which is preferably a black coffee beverage or a milk coffee beverage.

<1-24>

The coffee beverage according to any one of the above-mentioned items <1-1> and <1-5> to <1-23>, preferably further comprising one or two or more of additives selected from the group consisting of

a sweetener, a milk component, an antioxidant, a flavor, an organic acid, an organic acid salt, an inorganic acid, an inorganic acid salt, an inorganic salt, a dye, an emulsifier, a preservative, a seasoning, an acidulant, an amino acid, a pH regulator, and a quality stabilizer.

[0048] <2-1> .

A soluble coffee, comprising the following components (A) and (B) :

(A) acetylmethylpyrrole at a content of less than 3 ppm by mass in dry solids; and

(B) a dicaffeoylquinic acid,

in which a mass ratio of the component (A) to the component (B), $[(A)/(B)]$, is 0.00055 or less.

[0049] <2-2>

The soluble coffee according to the above-mentioned item <2-1>, in which a content of the dry solids is preferably from 10 to 100% by mass, more preferably from 20 to 99.9% by mass, more preferably from 25 to 99% by mass, even more preferably from 30 to 98% by mass.

<2-3>

The soluble coffee according to the above-mentioned item <2-1> or <2-2>, in which the soluble coffee preferably comprises a dilutable portion-type beverage or instant coffee.

<2-4>

The soluble coffee according to any one of the above-mentioned items <2-1> to <2-3>, in which a content of the component (A) in

the dry solids of the soluble coffee is preferably 2.7 ppm by mass or less, more preferably 2.4 ppm by mass or less, more preferably 1.8 ppm by mass or less, even more preferably 0.9 ppm by mass or less, and is preferably 0 ppm by mass or more, more preferably 0.001 ppm by mass or more, even more preferably 0.01 ppm by mass or more.

<2-5>

The soluble coffee according to any one of the above-mentioned items <2-1> to <2-4>, in which the content of the component (A) in the dry solids of the soluble coffee is preferably from 0 to 2.7 ppm by mass, more preferably from 0 to 2.4 ppm by mass, more preferably from 0.001 to 1.8 ppm by mass, even more preferably from 0.01 to 0.9 ppm by mass.

<2-6>

The soluble coffee according to any one of the above-mentioned items <2-1> to <2-5>, in which the mass ratio $[(A)/(B)]$ is preferably 0.00045 or less, more preferably 0.00035 or less, even more preferably 0.00025 or less, and is preferably 0 or more, more preferably 0.000001 or more, even more preferably 0.00001 or more.

<2-7>

The soluble coffee according to any one of the above-mentioned items <2-1> to <2-6>, in which the mass ratio $[(A)/(B)]$ is preferably from 0 to 0.00055, more preferably from 0 to 0.00045, more preferably from 0.000001 to 0.00035, even more preferably from 0.00001 to 0.00025.

<2-8>

The soluble coffee according to any one of the above-mentioned items <2-1> to <2-7>, in which a content of the component (B) in the dry solids of the soluble coffee is preferably 0.03% by mass or more, more preferably 0.05% by mass or more, more preferably 0.07% by mass or more, even more preferably 0.08% by mass or more, and is preferably 0.9% by mass or less, more preferably 0.75% by mass or less, more preferably 0.6% by mass or less, even more preferably 0.45% by mass or less.

<2-9>

The soluble coffee according to any one of the above-mentioned items <2-1> to <2-8>, in which the content of the component (B) in the dry solids of the soluble coffee is preferably from 0.03 to 0.9% by mass, more preferably from 0.05 to 0.75% by mass, more preferably from 0.07 to 0.6% by mass, even more preferably from 0.08 to 0.45% by mass.

<2-10>

The soluble coffee according to any one of the above-mentioned items <2-1> to <2-9>, preferably further comprising caffeine as a component (C), in which a content of the component (C) in the dry solids of the soluble coffee is preferably 0.05% by mass or more, more preferably 0.1% by mass or more, more preferably 0.15% by mass or more, even more preferably 0.2% by mass or more, and is preferably 4.5% by mass or less, more preferably 3% by mass or less, more preferably 2.25% by mass or less, even more preferably 1.5% by mass or less.

[0050] <2-11>

The soluble coffee according to any one of the above-mentioned items <2-1> to <2-10>, preferably further comprising caffeine as the component (C), in which the content of the component (C) in the dry solids of the soluble coffee is preferably from 0.05 to 4.5% by mass, more preferably from 0.1 to 3% by mass, more preferably from 0.15 to 2.25% by mass, even more preferably from 0.2 to 1.5% by mass.

<2-12>

The soluble coffee according to any one of the above-mentioned items <2-1> to <2-11>, preferably further comprising a chlorogenic acid as a component (D), in which a content of the component (D) in the dry solids of the soluble coffee is preferably 0.1% by mass or more, more preferably 0.5% by mass or more, more preferably 0.7% by mass or more, more preferably 1.0% by mass or more, more preferably 1.2% by mass or more, even more preferably 1.5% by mass or more, and is preferably 60% by mass or less, more preferably 30% by mass or less, more preferably 24% by mass or less, more preferably 15% by mass or less, even more preferably 9% by mass or less.

<2-13>

The soluble coffee according to any one of the above-mentioned items <2-1> to <2-12>, preferably further comprising a chlorogenic acid as the component (D), in which the content of the component (D) in the dry solids of the soluble coffee is preferably from 0.1 to 60% by mass, more preferably from 0.5 to 30% by mass, more preferably

from 0.7 to 24% by mass, more preferably from 1.0 to 15% by mass, more preferably from 1.2 to 15% by mass, even more preferably from 1.5 to 9% by mass.

<2-14>

The coffee beverage or the like according to the above-mentioned item <2-12> or <2-13>, in which a mass ratio of the component (B) to the component (D), $[(B)/(D)]$, in the coffee beverage is preferably 0.04 or more, more preferably 0.05 or more, more preferably 0.06 or more, even more preferably 0.07 or more, and is preferably 0.2 or less, more preferably 0.18 or less, more preferably 0.16 or less, even more preferably 0.14 or less.

<2-15>

The coffee beverage or the like according to any one of the above-mentioned items <2-12> to <2-14>, in which the mass ratio of the component (B) to the component (D), $[(B)/(D)]$, in the coffee beverage is preferably from 0.04 to 0.2, more preferably from 0.05 to 0.18, more preferably from 0.06 to 0.16, even more preferably from 0.07 to 0.14.

Example

[0051] 1. Analysis of Acetylmethylpyrrole

GC-MS was used as an apparatus for the analysis. The model numbers of constituent units of the apparatus were as described below.

·Types of apparatus: 6890N/5975 inert (Agilent Technologies, Inc.)

·Column: AQUATIC-2 0.25 mm×60 m, film thickness: 1.4 μm (GL Sciences

Inc.)

·Introduction system: splitless

[0052] Analysis conditions were as described below.

·Temperature: sample injection port: 220°C

 column: 40°C (retention for 1 min)→temperature
increase at 10°C/min→260°C

·Gas flow rate: helium (carrier gas): 1 mL/min

·Ion source temperature: 230°C

·Ionization method: EI

·Set mass number: m/z 123, 108

[0053] 2. Analyses of chlorogenic acids and caffeine

HPLC was used as an apparatus for the analysis. The model numbers of constituent units of the apparatus were as described below.

·UV-VIS detector: L-2420 (Hitachi High-Technologies Corporation)

·Column oven: L-2300 (Hitachi High-Technologies Corporation)

·Pump: L-2130 (Hitachi High-Technologies Corporation)

·Autosampler: L-2200 (Hitachi High-Technologies Corporation)

·Column: Cadenza CD-C18, 4.6 mm in inner diameter×150 mm in length,
particle diameter: 3 µm (Imtakt Corporation)

[0054] Analysis conditions were as described below.

·Sample injection amount: 10 µL

·Flow rate: 1.0 mL/min

·Set wavelength of UV-VIS detector: 325 nm

·Set temperature of column oven: 35°C

·Eluent A: solution containing 0.05 M acetic acid, 0.1 mM 1-hydroxyethane-1,1-diphosphonic acid, 10 mM sodium acetate, and 5 (V/V)% acetonitrile

·Eluent B: acetonitrile

[0055] Concentration Gradient Condition

Time	Eluent A	Eluent B
0.0 min	100%	0%
10.0 min	100%	0%
15.0 min	95%	5%
20.0 min	95%	5%
22.0 min	92%	8%
50.0 min	92%	8%
52.0 min	10%	90%
60.0 min	10%	90%
60.1 min	100%	0%
70.0 min	100%	0%

[0056] In HPLC, 1 g of a sample was weighed accurately, and after that, the sample was diluted to 10 mL with the eluent A, filtered with a membrane filter (GL Chromatodisc 25A, pore size: 0.45 μ m, GL Sciences Inc.), and then subjected to the analysis.

[0057] Retention time of each chlorogenic acid

Chlorogenic acids

·Monocaffeoylquinic acid: three peaks in total at 5.3 min, 8.8 min, and 11.6 min

·Monoferuloylquinic acid: three peaks in total at 13.0 min, 19.9

min, and 21.0 min

·Dicafeoylquinic acid: three peaks in total at 36.6 min, 37.4 min, and 44.2 min

The content (mass%) of each of the nine kinds of the chlorogenic acids was determined from the value of area thereof determined in the analysis by using 5-cafeoylquinic acid as a reference material. Dicafeoylquinic acids

·Dicafeoylquinic acid: three peaks in total at 36.6 min, 37.4 min, and 44.2 min.

The content (mass%) of each of the three kinds of the dicafeoylquinic acids was determined from the value of area thereof determined in the analysis by using 5-cafeoylquinic acid as a reference material.

It should be noted that the analysis of caffeine was carried out in the same manner as in the cases of the chlorogenic acids except that caffeine was used as a reference material and the wavelength of the UV-VIS detector was set to 270 nm. The retention time of caffeine was 18.9 min.

[0058] 3. Measurement of Brix

The sugar refractometer index (Brix) at 20°C of a sample was measured with a saccharimeter (Atago RX-5000 (manufactured by Atago Co., Ltd.)).

[0059] 4. Measurement of Dry solids

The dry solids is a ratio of a mass of a dried product obtained by freeze drying a soluble coffee to a mass of the soluble coffee,

and is defined by the following expression: (mass of freeze-dried product/mass of soluble coffee)×100. 20 g of the soluble coffee was weighed accurately in a dedicated glass container, and the soluble coffee was frozen while rotating the container in an ethanol bath at -80°C. After the freezing, the resultant was freeze-dried with a freeze-drying machine (FD-81, manufactured by Tokyo Rikakikai Co., Ltd.). Conditions of the freeze drying are described below. The pressure was adjusted to 0.08 Torr, and then the resultant was left to stand at room temperature for 20 hours.

[0060] 5. Sensory Evaluation

Five expert panelists drunk each coffee beverage and evaluated its bitterness, coarseness, sharpness of bitterness, and retronasal aroma in accordance with the following criteria. After that, discussion was made to determine the final score.

[0061] Evaluation criteria of bitterness

- 5: Sufficiently strong bitterness
- 4: Strong bitterness
- 3: Slightly strong bitterness
- 2: Slightly weak bitterness
- 1: Weak bitterness

[0062] Evaluation Criteria of Coarseness

- 5: No coarseness is felt
- 4: Coarseness is hardly felt
- 3: Coarseness is slightly felt
- 2: Coarseness is felt

1: Coarseness is strongly felt

[0063] Evaluation Criteria of Sharpness of Bitterness

5: Very good sharpness of bitterness

4: Good sharpness of bitterness

3: Slight sharpness of bitterness

2: Slightly bad sharpness of bitterness

1: Bad sharpness of bitterness

[0064] Evaluation Criteria of Retronasal Aroma

5: Very good retronasal aroma

4: Good retronasal aroma

3: Slight retronasal aroma

2: Slightly bad retronasal aroma

1: Bad retronasal aroma

[0065] Production Example 1

A dicaffeoylquinic acid preparation used in Examples was prepared by the following method.

A hot-water extract from green coffee beans was dissolved in a small amount of eluent (30 mL of acetic acid/9,200 mL distilled water/800 mL of acetonitrile), and subjected to fractionation through medium-pressure preparative column chromatography. The resultant fractions were dried with an evaporator and freeze-dried to yield powder. The purity of 3,5-dicaffeoylquinic acid was 98.5%, the purity of 3,4-dicaffeoylquinic acid was 97.3%, and the purity of 4,5-dicaffeoylquinic acid was 98.3%. An equal mass of 3,5-dicaffeoylquinic acid, 3,4-dicaffeoylquinic acid, and

980 min 0% 100%

[0068] Retention time of each dicaffeoylquinic acid

·3,5-Dicaffeoylquinic acid: 702 min

·3,4-Dicaffeoylquinic acid: 658 min

·4,5-Dicaffeoylquinic acid: 787 min

[0069] Example 1

90 g of palm shell activated carbon activated with water vapor (average particle size: 0.358 mm) was placed in a drip extractor (inner diameter: 73 mm, volume: 11 L). Subsequently, hot water at 85°C was fed for 10 minutes through a shower from above the activated carbon to sterilize the activated carbon. An amount of the hot water fed was 25 times by mass with respect to that of the activated carbon. After that, 400 g of roasted coffee beans having an L value of 25 (average particle size: 0.965 mm) was placed on the activated carbon. Subsequently, 0.25 kg of hot water at 85°C was fed from the lower part of the drip extractor to fill the bottom of the extractor with the hot water. Next, hot water at 85°C was fed through a shower from above the roasted coffee beans at a rate of 1.25 g/sec, and the feed of the hot water was stopped. The state was maintained for 10 minutes. An amount of the hot water fed was 2.55 times by mass with respect to that of the roasted coffee beans. After maintaining the state, while hot water at 85°C was fed through a shower at a rate of 1.25 g/sec, the coffee extract solution was discharged at the same rate. The discharge of the coffee extract solution was stopped when the amount of the collected solution reached

2.4 kg, and the resultant collected solution was obtained as a coffee extract.

Next, the coffee extract was diluted with water to prepare a coffee beverage. The coffee beverage was analyzed and subjected to the sensory evaluation. The results are shown in Table 1.

[0070] Example 2

0.03 ppm by mass of acetylmethylpyrrole was added to the coffee beverage obtained in Example 1 to prepare a coffee beverage. The resultant coffee beverage was analyzed and subjected to the sensory evaluation. The results are shown in Table 1.

[0071] Example 3

0.06 ppm by mass of acetylmethylpyrrole was added to the coffee beverage obtained in Example 1 to prepare a coffee beverage. The resultant coffee beverage was analyzed and subjected to the sensory evaluation. The results are shown in Table 1.

[0072] Example 4

0.09 ppm by mass of acetylmethylpyrrole was added to the coffee beverage obtained in Example 1 to prepare a coffee beverage. The resultant coffee beverage was analyzed and subjected to the sensory evaluation. The results are shown in Table 1.

[0073] Example 5

The coffee beverage obtained in Example 1 was diluted twice with distilled water. The resultant coffee beverage was analyzed and subjected to the sensory evaluation. The results are shown in Table 1.

[0074] Example 6

0.0173% by mass of caffeine was added to the coffee beverage obtained in Example 5 to prepare a coffee beverage. The resultant coffee beverage was analyzed and subjected to the sensory evaluation. The results are shown in Table 1.

[0075] Example 7

The dicaffeoyquinic acid preparation in an amount of 83.0 ppm by mass in terms of the concentration of the dicaffeoylquinic acid was added to the coffee beverage obtained in Example 6 to prepare a coffee beverage. The resultant coffee beverage was analyzed and subjected to the sensory evaluation. The results are shown in Table 1.

[0076] Example 8

0.0955% by mass of caffeine was added to the coffee beverage obtained in Example 1 to prepare a coffee beverage. The resultant coffee beverage was analyzed and subjected to the sensory evaluation. The results are shown in Table 1.

[0077] Example 9

0.02 ppm by mass of acetylmethylpyrrole was added to the coffee beverage obtained in Example 6 to prepare a coffee beverage. The resultant coffee beverage was analyzed and subjected to the sensory evaluation. The results are shown in Table 1.

[0078] Example 10

The dicaffeoyquinic acid preparation in an amount of 83.0 ppm by mass in terms of the concentration of the dicaffeoylquinic acid

was added to the coffee beverage obtained in Example 9 to prepare a coffee beverage. The resultant coffee beverage was analyzed and subjected to the sensory evaluation. The results are shown in Table 1.

[0079] Example 11

The coffee extract obtained in Example 1 was concentrated with a plate concentrator to a Brix of 15. 100 g of the resultant concentrated solution was spray-dried to yield 18.7 g of instant coffee. 2 g of the resultant instant coffee was dissolved in 180 g of hot water to prepare a coffee beverage. The coffee beverage had good sharpness of bitterness and good retronasal aroma.

[0080] Comparative Example 1

A coffee beverage was prepared in the same manner as in Example 1 except that the treatment with the activated carbon was not performed in Example 1. The resultant coffee beverage was analyzed and subjected to the sensory evaluation. The results are shown in Table 1.

[0081] Comparative Example 2

0.1 ppm by mass of acetylmethylpyrrole was added to the coffee beverage obtained in Example 1 to prepare a coffee beverage. The resultant coffee beverage was analyzed and subjected to the sensory evaluation. The results are shown in Table 1.

[0082] Comparative Example 3

0.1 ppm by mass of acetylmethylpyrrole was added to the coffee beverage obtained in Comparative Example 1 to prepare a coffee

beverage. The resultant coffee beverage was analyzed and subjected to the sensory evaluation. The results are shown in Table 1.

[0083] Comparative Example 4

A commercially available canned black coffee beverage containing no sugar was analyzed and subjected to the sensory evaluation. The results are shown in Table 1.

[0084] [Table 1]

	Examp e 1	Examp e 2	Examp e 3	Examp e 4	Examp e 5	Examp e 6	Examp e 7	Examp e 8	Examp e 9	Examp e 10	Compar ative Examp e 1	Compar ative Examp e 2	Compar ative Examp e 3	Compar ative Examp e 4
Analysis	(A) 2-Acetyl-1-me thylpyrrole (ppm by mass)	0	0.03	0.06	0.09	0	0	0	0.02	0.02	0.1	0.1	0.2	0.1
	(B) Dicafeoylqui nic acid (ppm by mass)	166.0	166.0	166.0	166.0	83.0	166.0	166.0	83.0	166.0	147.0	166.0	147.0	13.0
	(C) Caffeine (mg/100 g)	34.7	34.7	34.7	34.7	17.4	34.7	130.2	34.7	34.7	130.2	34.7	130.2	46.3
	(D) Chlorogenic acid (% by mass)	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.19	0.2	0.19	0.039
	(A)/(B) (mass ratio)	0	0.0001 8	0.0003 6	0.0005 4	0	0	0	0.0002 4	0.0001 2	0.0006 8	0.0006 0	0.0013 6	0.0076 9
	(B)/(D) (mass ratio)	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.166	0.077	0.083	0.077	0.033
	pH (20°C)	5.57	5.57	5.57	5.57	5.57	5.57	5.57	5.57	5.57	5.67	5.57	5.67	5.64
	Brix (20°C)	2.06	2.06	2.06	2.06	1.03	1.15	2.06	1.03	1.15	2.06	2.06	2.06	0.92
	Bitterness	4	4	4	4	2	4	5	3	4	5	4	5	2
	Coarseness	5	4	3	3	5	5	4	3	4	2	2	1	2
Evaluation	Sharpness of bitterness	5	4	4	3	5	4	4	3	3	1	2	1	2
	Retronasal aroma	5	4	4	3	4	5	3	3	4	2	2	1	2

[0085] It found from Table 1 that a coffee beverage having suppressed coarseness and having improved sharpness of bitterness and retronasal aroma can be obtained by reducing the content of acetylmethylpyrrole as the component (A) in the coffee beverage to less than 0.1 ppm by mass.

CLAIMS

[Claim 1] A coffee beverage, comprising the following components (A) (B) and (D):

(A) acetylmethylpyrrole at a content of 0.06 ppm by mass or less;

(B) a dicaffeoylquinic acid at a content of from 30 to 300 ppm by mass, and

(D) a chlorogenic acid at a content of from 0.01 to 2% by mass,

wherein a mass ratio of the component (A) to the component (B), $[(A)/(B)]$, is 0.00055 or less, and

wherein a mass ratio of the component (B) to the component (D), $[(B)/(D)]$, is from 0.04 to 0.2.

[Claim 2] The coffee beverage according to claim 1, further comprising caffeine as a component (C), wherein a content of the component (C) in the coffee beverage is from 0.005 to 0.15% by mass.

[Claim 3] The coffee beverage according to claim 1 or 2, wherein a content of the component (D) in the coffee beverage is from 0.05 to 1% by mass.

[Claim 4] The coffee beverage according to claim 3, wherein the mass ratio of the component (B) to the component (D), $[(B)/(D)]$, is from 0.05 to 0.18.

[Claim 5] The coffee beverage according to any one of claims 1 to 4, wherein a content of the component (A) in the coffee beverage is from 0.0001 to 0.06 ppm by mass.

[Claim 6] The coffee beverage according to any one of claims 1 to 5, wherein the coffee beverage has a Brix of from 0.8 to 3.0.

[Claim 7] The coffee beverage according to any one of claims 1 to 6, which is a packaged coffee beverage.

[Claim 8] A soluble coffee, comprising the following components (A), (B) and (D):

(A) acetylmethylpyrrole at a content of from 0.001 to 1.8 ppm by mass in dry solids,

(B) a dicaffeoylquinic acid at a content of from 0.03 to 0.9% by mass in dry solids, and

(D) a chlorogenic acid at a content of from 0.1 to 60% by mass in dry solids,

wherein a mass ratio of the component (A) to the component (B), $[(A)/(B)]$, is 0.00055 or less,

wherein a mass ratio of the component (B) to the component (D), $[(B)/(D)]$, is from 0.04 to 0.2, and

wherein a content of the dry solids is from 10 to 100% by mass.

[Claim 9] The soluble coffee according to claim 8, wherein a content of the dry solids is from 20 to 99.9% by mass.

[Claim 10] The soluble coffee according to claim 8 or 9, wherein a content of the component (B) in the dry solids of the soluble coffee is from 0.05 to 0.75% by mass.

[Claim 11] The soluble coffee according to any one of claims 8 to 10, further comprising caffeine as a component (C), wherein a content of the component (C) in the dry solids of the soluble coffee is from 0.05 to 4.5% by mass.

[Claim 12] The soluble coffee according to any one of claims 8 to 11, wherein a content of the component (D) in the dry solids of the soluble coffee is from 0.5 to 30% by mass.

[Claim 13] The soluble coffee according to claim 12, wherein the mass ratio of the component (B) to the component (D), $[(B)/(D)]$, is from 0.05 to 0.18.