

SPECIFICATION
PACKAGED COFFEE BEVERAGE

TECHNICAL FIELD

[0001] The present invention relates to packaged coffee beverage having superior flavor and storage stability, as well as a process for producing the same.

BACKGROUND ART

[0002] Coffee beverages are such products that their flavor, in particular, their taste and aroma are most highly regarded in evaluating their quality. In the industrial manufacture of coffee beverages, drip extraction is commonly adopted, but compared to the version of drip extraction that is typically performed at home, coffee beans are kept in contact with boiling water for a longer time and immediately after the extraction, low-boiling compounds which are important aroma components are vaporized or oxidized to give coffee beverages that taste or smell only poorly. To deal with this problem, various ideas have been proposed that aim to ensure that the taste of regular coffee as freshly brewed at home is reproduced in packaged beverages that are filled into cans and other containers.

[0003] One example is a two-stage extraction method, in which coffee beans are first extracted with warm water at the higher temperature (50°C-90°C) and then extracted with water of the lower temperature (0°C-40°C) to produce a quality coffee beverage having superior taste and aroma (Patent Document 1), and another example is a method in which coffee beans are

extracted sequentially at three temperature stages (low temperature, 10-30°C; medium temperature, 30-65°C; high temperature, 65-130°C) to produce a coffee beverage having superior flavor, in particular, superior aroma (Patent Document 2). A method has also been proposed, in which liquid coffee extracts are obtained from powders of coffee beans of different varietals or those which have been roasted to different degrees, and they are then mixed together; this method enables easy production of a coffee beverage in which the individual varietals are blended to exhibit their characteristic sensory features (Patent Document 3).

[0004] To enhance the richness of coffee, its concentration must be increased but then at a higher concentration, a sediment forms in the coffee during storage to potentially lower its storage stability. To deal with this problem, a method has been proposed that causes a polysaccharide decomposing enzyme to act on the liquid coffee extract so that any undesired components in it are decomposed to improve the stability of the coffee during storage (Patent Document 4). As regards a coffee beverage the concentration of which is adjusted to range from 1.4 to 1.8 in terms of soluble solids to present a strong coffee sense, it has been proposed that in order to ensure that the aggregation and sedimentation that take place after sterilization with heat, particularly in the case where milk components are contained, can be prevented effectively and economically, a liquid obtained by extracting coffee with boiling water and a coffee extract in powder form are mixed at a ratio ranging from 8:2 to 2:8 in terms of

soluble solids contained in the product (Patent Document 5).

Patent Document 1: Official Gazette of JP Hei 6-70682 A

Patent Document 2: Official Gazette of Patent No. 3057026

Patent Document 3: Official Gazette of JP 2000-175623 A

Patent Document 4: Official Gazette of JP Hei 4-45745 A

Patent Document 5: Official Gazette of JP 2000-69910 A

DISCLOSURE OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0005] In recent years, reflecting stronger consumer health concerns, the market of fancy drinks such as canned coffee, especially coffee beverage with limited addition of sugar or milk components is growing. Special preference is increasing for black coffee that has good flavor, in particular, good aroma and which tastes with high degree of richness.

[0006] As described above, various types of coffee beverage having good flavor have been proposed but it has been necessary to use equipment and technology for controlling the extraction temperature or equipment and the like for mixing plural kinds of liquid extract. With coffee beverage that is enhanced in richness or coffee concentration (in particular, black coffee), no product is available that satisfies both requirements for flavor and storage stability and the beverage described in aforementioned Patent Document 4 which uses a polysaccharide decomposing enzyme has had the problem of presenting the flavor peculiar to the enzyme.

[0007] Hence, the object of the present invention is to provide a packaged coffee beverage (in particular, black coffee) that can be stored with adequate stability and which

yet presents a high degree of richness and allows consumers to taste the flavor inherent in coffee.

MEANS FOR SOLVING THE PROBLEMS

[0008] The present inventors made an intensive study with a view to solving the above-mentioned problems and found as a result that by incorporating a dry coffee extract in a liquid coffee extract prepared to have a good balance of taste and smell, there could be imparted richness that had been impossible to obtain from the liquid extract alone. The inventors also found that the resulting coffee beverage was superior in storage stability. The present invention has been accomplished on the basis of these findings.

[0009] Thus, the present invention provides the following.

1. A packaged coffee beverage prepared by mixing a liquid coffee extract and a dry coffee extract, the liquid coffee extract being obtained by extraction with warm water with 30-65°C and the dry coffee extract being such that when it is diluted with water, it has an absorbance of 0.8 or less at a wavelength of 680 nm per wt% of soluble solids.
2. The packaged coffee beverage according to 1 above, wherein the dry coffee extract is obtained by spray drying.
3. The packaged coffee drink according to 1 or 2 above, wherein the absorbance is 0.5 or less.
4. The packaged coffee beverage according to any one of 1 to 3 above, which is produced by a process including such a step that the liquid coffee extract and the dry coffee extract are mixed be present at a ratio ranging from 8:2 to 5:5 in terms of soluble solids in the coffee beverage.

5. The packaged coffee beverage according to any one of 1 to 4 above, wherein the soluble solids derived from coffee beans account for 0.9-1.5 wt% based on the total weight of the beverage.

6. The packaged coffee beverage according to any one of 1 to 5 above, which is black coffee.

7. The packaged coffee beverage according to any one of 1 to 6 above, which is provided in a heated state.

8. A process for producing the packaged coffee beverage according to 1 above, which comprises:

step 1 in which warm water with 30-65°C is added to coffee beans to prepare a liquid coffee extract;

step 2 in which the prepared liquid coffee extract is mixed with a dry coffee extract to prepare a coffee beverage, the dry coffee extract being such that when it is diluted with water, it has an absorbance of 0.8 or less at a wavelength of 680 nm per wt% of soluble solids; and

step 3 in which the prepared coffee beverage is packaged in a container.

ADVANTAGES OF THE INVENTION

[0010] The coffee beverage of the present invention has a dry coffee extract incorporated in a liquid coffee extract prepared to have a good balance of taste and smell, so there can be imparted richness that has been impossible to obtain from the liquid extract alone. This coffee beverage has high degrees of bitterness and richness and yet it does not let consumers sense any unpleasant taste such as pungency, harshness or disgusting sourness.

[0011] As a further advantage, the coffee beverage of the present invention has good storage stability, so it is provided as a long-standing packaged beverage. In addition, the use of warm water with moderate temperature as an extraction medium enables the production of coffee beverage having good taste and smell in satisfactory balance.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIG. 1 is a diagram showing the absorbance at wavelength 680 nm of the packaged coffee beverage of the present invention before and after storage at 55°C for 2 or 3 weeks.

[0013] The "black coffee" as referred to herein means coffee beverages to which no milk components have been added and specifically encompasses coffee beverages to which neither sweetness components nor milk components have been added, as well as coffee beverages of a sweetened type (preferably, a slightly sweetened type) to which sweetness components have been added (but no milk components have been added) in amounts within such a range that the flavor of the coffee will not be considerably impaired. The milk components refers to those components that are added to impart the milk flavor or milk sense to coffee beverages and it primarily means milk, in particular, cow's milk, and dairy products; examples include raw milk, cow's milk, specialty cow's milk, partially defatted milk, skim milk, processed milk, and milk drinks, and exemplary dairy products include cream, concentrated whey, concentrated milk, defatted concentrated milk, sugar-free condensed milk, sweetened defatted condensed milk, whole

powdered milk, powdered skim milk, cream powder, whey powder, butter milk powder, and formula milk. The sweetness components refers to those components that present sweetness, and examples that can be utilized include sugar-based sweeteners such as saccharides, oligosaccharides and sugar alcohols, as well as high-sweetness sweeteners such as natural non-sugar-based sweeteners and synthetic non-sugar-based sweeteners. Specific examples of sweetness components include sucrose, isomerized sugar, glucose, fructose, lactose, maltose, xylose, isomerized lactose, fructooligosaccharide, maltooligosaccharide, isomaltooligosaccharide, galactooligosaccharide, coupling sugar, isomaltulose, maltitol, sorbitol, erythritol, xylitol, lactitol, reduced isomaltulose, saccharified reduced starch, stevia extract, licorice extract, glycyrrhizin, thaumatin, monellin, aspartame, alitame, saccharin, acesulfame K, sucralose, and dulcin. The sweetness components in amounts within such a range that the flavor of the coffee will not be considerably impaired are specifically such that the proportion of the sweetness components relative to the whole coffee beverage is not more than 6 wt%, preferably not more than 5 wt%.

(Liquid coffee extract)

The coffee beverage of the present invention has a dry coffee extract incorporated in a liquid coffee extract prepared to have a good balance of taste and smell, so it has richness and yet realizes a clean finish.

[0014] The aforementioned liquid coffee extract in the coffee beverage of the present invention is one that is

obtained by extracting coffee beans with warm water having a moderate temperature, specifically 30-65°C, preferably 40-65°C, and more preferably 45-60°C. If a clean finish is especially important, one may use a liquid coffee extract obtaining by extracting coffee beans with warm water with 45-50°C. As is generally known, the temperature of the water used in the step of coffee extraction is a factor that determines the flavor and other aspects of coffee, as shown below. If cold water (less than 30°C) is used as an extraction medium, there will be no excessive bitterness and sourness and a clean finish is exhibited to give a sharp taste; on the other hand, a body sense (richness) is lacking. Another problem with the cold water is the need to use large amounts of coffee beans because extraction takes a prolonged time to give only a low yield. If hot water (with a temperature in excess of 65°C) is used as an extraction medium, pungency components and the like are extracted excessively, so the product has not only richness but also a strong pungency and is particularly difficult to drink if it is black coffee. As another problem, soluble components are extracted excessively, making it difficult to control the balance between the bitterness and sourness of coffee.

[0015] Since warm water having a moderate temperature is used as an extraction medium in the present invention, not only the low-boiling aroma components but also the soluble components of coffee are extracted in reasonable rather than excessive amounts to give a liquid extract having a good balance between taste and smell. The coffee beans from which

the liquid coffee extract of the present invention is to be prepared may consist of a single kind; however, since the distinctive characteristics of coffee beans (their flavor such as taste and smell) can be extracted by using the above-mentioned moderately warm water as an extraction medium, it is preferred to use blends of two or more kinds of coffee beans that differ in origin, the degree of roast, and the like or to use in admixture two or more kinds of liquid extract as obtained by using moderately warm water as an extraction medium. Here, cultivated species of coffee beans include, for example, *arabica*, *robusta*, and *liberica*, and varieties may include Mocha, Brazilian, Columbian, Guatemalan, Blue Mountain, Kona, Mandelin, Kilimanjaro, etc. Roasting can be performed by conventionally known methods and apparatuses, and the degree of roast is chosen as appropriate for a specific object and may be light, moderate, deep, and the like. Note, however, that in order to fully extract the inherent smell of roasted beans, the period of storage after roasting is preferably as short as possible and, specifically, it is advisable to use roasted beans stored for less than 14 days, preferably for less than 7 days. The coffee beans to be extracted are usually ground ones and the degree of grinding (which is usually coarse, medium, fine, or the like) is not particularly limited, either, and ground beans with various grain size distributions may be used.

[0016] The method of extraction is not particularly limited, either, and it can be performed with various types of coffee extractor (e.g., drip type, siphon type, boiling type,

jet type, and continuous type); it is particularly preferred to use the drip type. The drip type just referred to is an extraction of flow-down type, or a method of extraction in which a layer of the feed (roasted and ground coffee beans) is showered with warm water, which flows down through the feed. In the drip type extraction, coffee beans are usually placed on top of a metallic mesh, which may optionally be replaced by a cloth, paper, or any other materials that can support the layer of coffee beans while the liquid extract is being separated from the latter. If necessary, the interior of the extractor may be sealed in order to perform extraction under applied pressure. In the drip type extraction described above, one part by weight of ground coffee beans is usually percolated with 5-15 parts, preferably 7-10 parts, by weight of moderately warm water, which is flowed down to extract coffee. The extraction time, which varies with such factors as the type and size of the extractor, is usually in the range of from about 15 to 50 minutes, preferably from about 20 to 40 minutes.

[0017] A word about the extraction process: considering that the aroma components of coffee are susceptible to oxidation, extraction may be performed in an inert gas. If desired, the industrial extractor may overall be purged with an inert gas; in an alternative method, the equipment may overall be evacuated to remove oxygen before an inert gas is supplied to revert the pressure to one atmosphere.

[0018] (Dry coffee extract)

The dry coffee extract to be used in the present

invention can be produced by any conventionally known methods; in one example, a coffee grind is percolated with water to obtain a liquid coffee extract, which is optionally concentrated or otherwise processed before it is dried. The coffee beans to serve as the feed are in no way limited and one or more kinds selected in terms of origin, the degree of roast and the like, as appropriate for a specific object, are used independently or in admixture. What is more, the method of extraction and the method of concentration are in no way limited, either.

[0019] A distinct feature of the present invention is that the dry coffee extract is added as a component that provides a heavy sense, namely, as a richness-imparting component. Its effect is more pronounced than that of a coffee extract that is obtained by concentrating the liquid coffee extract but which is yet to be dried (this extract is hereinafter referred to simply as "a coffee extract" as opposed to the "dry coffee extract"). Although the mechanism is not known, it is expected to be due to the inclusion of polysaccharides and other richness components in the dry coffee extract. Therefore, the dry coffee extract to be used in the present invention is preferably one that is prepared by extraction in a continuous multi-tube process under high temperature and pressure (specifically under applied pressure at 100°C or above, say, at about 150°C), followed by concentrating, drying, and reduction to powder to make a product containing large amounts of polysaccharides and other richness components. The drying method may be by spray drying or

freeze drying but the former will exhibit a marked effect. Hence, the dry coffee extract to be used in the present invention is preferably obtained by spray drying.

[0020] The dry coffee extract to be used in the present invention is further characterized in that when it is diluted with water, it has an absorbance of 0.8 or less, preferably 0.6 or less, more preferably 0.5 or less at a wavelength of 680 nm per wt% of soluble solids. Using the dry coffee extract having this feature, one can suppress the occurrence of sedimentation and other artifacts during storage to produce a coffee beverage having superior storage stability.

[0021] The soluble solids as referred to in the present invention can be measured with a refractometer. The refractometer is a device that depends on the nature of a soluble substance to refract light in an aqueous solution for displaying the concentration of a certain component in the aqueous solution in terms of a sucrose concentration (Brix value); a suitable refractometer that may be used is RX-5000 (product of ATAGO CO., LTD.) or the like. The absorbance of the dry coffee extract can be measured by a common absorbance meter; if the absorbance exceeds 1.0, its measurement value involves a considerable error, so measurement is desirably made after the sample is diluted to give an absorbance of less than 1.0. A suitable absorbance meter that may be used is UV-1700 (product of SHIMADZU CORPORATION) or the like.

[0022] (Coffee beverage)

In the present invention, coffee beverage having superior flavor (also called aroma) and storage stability is obtained

by a process comprising the step of extracting coffee beans at the moderate temperature defined above to make a liquid coffee extract and the step of mixing the resulting liquid coffee extract with the dry coffee extract described above to prepare a liquid mixture. The liquid coffee extract and the dry coffee extract are mixed to be present at a ratio ranging from 8:2 to 5:5, preferably from 7:3 to 5:5, in terms of soluble solids in the coffee beverage. In the mixing step, the dry coffee extract is preferably added to the liquid coffee extract after it is dissolved in water and optionally filtered through a mesh or the like to remove insoluble solids. The mixture thus obtained has the advantage that the occurrence of sedimentation during storage can be reduced.

[0023] The coffee beverage of the present invention, either in the form of the liquid mixture solely consisting of the liquid coffee extract and the dry coffee extract or after sweetness components, various additives and the like are optionally added to the liquid mixture, is filled into a container such as a can or PET bottle, sterilized with heat, and supplied to the market. The additives to be used here are not particularly limited as long as they are not deleterious to the effect of the present invention; examples that may be added include pH modifiers such as sodium hydrogencarbonate, sodium carbonate, potassium carbonate and sodium hydroxide, emulsifiers such as sucrose fatty acid esters, sorbitan fatty acid esters and polyglycerol fatty acid esters, and flavors such as coffee flavor.

[0024] The coffee beverage of the present invention retains

the inherent aroma of coffee, so it is preferably provided either as black coffee or as one that contains milk components in very small amounts that are not deleterious to the effect of the present invention; it is particularly preferred to use the coffee beverage as black coffee.

[0025] By the expression "milk components in very small amounts" is specifically meant that the proportion of milk components relative to the overall beverage is no more than 2 wt%.

[0026] Since the coffee beverage of the present invention retains the inherent aroma of coffee and can yet suppress the occurrence of sedimentation after manufacture, it is used with advantage as a coffee beverage having high coffee concentration. For example, it is used with advantage as a coffee beverage in which the soluble solids derived from coffee beans account for at least 0.9 wt%, preferably at least 1.2 wt%, of the total weight of the beverage. There is no particular upper limit for the amount of the soluble solids derived from coffee beans but considering the flavor of coffee and the stability during storage, it is no more than 1.5 wt%, preferably no more than 1.4 wt%. The term "soluble solids derived from coffee beans" as used in the present invention means those soluble solids contained in the coffee beverage which are free from sweetness components, milk components, pH modifiers, flavors, and any other components that are not derived from coffee beans.

[0027] (Packaged coffee beverage)

The packaged coffee beverage of the present invention is

manufactured by packaging the above-described coffee beverage in a container by the usual technique. Specifically, it is manufactured by a process comprising the following steps:

step 1 in which warm water with 30-65°C is added to coffee beans to prepare a liquid coffee extract;

step 2 in which the prepared liquid coffee extract is mixed with a dry coffee extract to prepare a coffee beverage, the dry coffee extract being such that when it is diluted with water, it has an absorbance of 0.8 or less at a wavelength of 680 nm per wt% of soluble solids; and

step 3 in which the prepared coffee beverage is packaged in a container.

[0028] Before the above-mentioned step 3, milk components, sweeteners, pH modifiers and other components may optionally be added to the coffee beverage. If desired, step 3 may be followed by sterilization with heat (for example, retort sterilization in a retort) or, alternatively, the coffee beverage, either direct from step 2 or to which the above-mentioned milk components, sweeteners, pH modifiers and other components have been added, may be sterilized with heat (for example, sterilized by high-temperature and short-time heating, or UHT sterilization method), followed by hot packing or aseptic filling (packaging step 3). The sterilization conditions may be set as appropriate for the properties of the contents, the container, and the like; specifically, in the case of UHT sterilization method, the conditions are usually at 120-150°C for about 1-120 seconds, preferably at 130-145°C for about 30-120 seconds; in the case of retort sterilization

method, the conditions are usually at 110-130°C for about 10-30 minutes, preferably at 120-125°C for about 10-20 minutes.

[0029] The packaged coffee beverage of the present invention can be used with particular advantage as a hot beverage that is to be sold as heated (to about 50-70°C, preferably about 50-60°C, more preferably about 55-60°C) at vendors and the like. Packaged hot coffee beverages that are to be sold as heated usually suffer the following problems: as they are stored in a heated state, the coffee component and the incorporated milk components tend to deteriorate, causing sedimentation which may change the color tone (say, turbidity) of the coffee and its aroma; hence, in order to ensure that they will not be kept heated for too long, strict merchandise management is commonly performed as by controlling the time for which they are heated in vending machines or the like and destroying the product after the passage of a given period (say, three days). The coffee beverage of the present invention, however, has the advantageous feature that it can be stored (for example, three weeks) in a heated state, with sedimentation occurring to an extremely small extent and the deterioration of aroma being negligible, so it can be stored in a heated state without the need for strict merchandise management and it can be provided as a packaged coffee beverage that permits storage in a heated state for a longer period than before (say, for at least three days or from one to three weeks or more).

[0030] The coffee beverage of the present invention also has high storage stability, so it has the advantage that even

if it is filled into a container of large capacity (for example, a can with a capacity of 200-500 mL) and stored for a prolonged period (for example, six months or more), sedimentation is less likely to occur, enabling it to be provided as a packaged coffee beverage of high commodity value. A container of large capacity is usually packed with coffee beverage in a comparatively large amount that is determined by the capacity of the container, but then, it may be said that as more of the coffee beverage is packed in the container, the absolute amount of sedimentation from the coffee beverage will also increase, particularly in the case where the content of soluble solids derived from coffee beans is high (say, 0.9 wt% or more). If the absolute amount of sedimentation increases, the sediment deposited on the bottom of the container is easy to recognize visually by a consumer through its mouth when he or she is drinking the packaged beverage. Packaged beverages containing large amounts of visible sediment are generally disliked by consumers, so it may be said that coffee beverages, particularly those in which the content of the soluble solids derived from coffee beans is high (say, 0.9 wt% or more), are often packed in containers of small capacity (for example, cans with a capacity of about 100-900 mL). In contrast, as mentioned above, the coffee beverage of the present invention will experience an extremely small amount of sedimentation during prolonged storage, so even if a comparatively large amount of coffee beverage is packed in a container with a comparatively large capacity (with a capacity of about 200-500 mL, preferably about 300-

500 mL), sedimentation is less likely to occur, with the result that the packaged coffee beverage has high commodity value.

[0031] Thus, packaged hot coffee beverages that are to be sold as heated (to about 50-70°C, preferably about 50-60°C, more preferably about 55-60°C) and packaged coffee beverages that have been filled into containers of large capacity (a capacity of about 200-500 mL, preferably about 300-500 mL) are preferred embodiments of the packaged coffee beverage of the present invention.

[0032] The container for the packaged coffee beverage of the present invention may be of any common type, as exemplified by aluminum cans, stainless steel cans, PET bottles, glass bottles, paper containers, etc; in the case of packaged hot coffee beverages, aluminum cans and stainless steel cans that are capable of suppressing oxidative deterioration are preferred.

EXAMPLES

[0033] On the following pages, the present invention is described in greater detail by means of examples, which are by no means intended to limit the present invention.

[0034] EXAMPLE 1

1-1. Preparation of liquid coffee extract, dry coffee extract, and coffee extract

To prepare a liquid coffee extract, medium-roasted Brazilian coffee beans were ground with a grinder (product of NIPPON GRANULATOR CO., LTD.) to make a powder at least 80% of which consisted of particles with a size of 710 μm or more;

the powder was drip-extracted with warm (55°C) water to make a liquid extract with Brix 2.4, which was then passed through a 500-mesh filter to remove insoluble solids.

[0035] Three kinds of instant coffee were used as dry coffee extracts; they were Instant Coffees 1 and 2 (which had been prepared by extracting Brazilian coffee beans by the continuous multi-tube extraction method, concentrating the extract, and spray drying the concentrate) and Instant Coffee 3 (which had been prepared by extracting Brazilian coffee beans by the continuous multi-tube extraction method, concentrating the extract, and freeze drying the concentrate). These were dissolved in 20 volumes of boiling water and passed through a 500-mesh filter to remove insoluble solids; the filtrates were diluted with pure water to prepare instant coffee solutions with Brix 4.0.

[0036] Table 1 shows the absorbance values at a wavelength of 680 nm per 1 wt% of soluble solids in water dilutions of Instant Coffees 1-3. Those values were computed by the following procedure: first, Instant Coffees 1-3 were diluted about 30-fold with water and passed through a 500-mesh filter to remove insoluble solids; then, the content of soluble solids (Brix) was measured with RX-5000 (product of ATAGO CO., LTD.) and the absorbance at OD 680 nm was measured with UV-1700 (product of SHIMADZU CORPORATION); finally, the measurement values of absorbance as obtained by the foregoing procedure were divided by the measurement values of Brix to compute absorbance values at a wavelength of 680 nm per 1 wt% of soluble solids.

[0037] The coffee extract was prepared from a commercial product (Brazilian, Brix 50), which was diluted with water and passed through a 500-mesh filter to remove insoluble solids; the filtrate was further diluted with pure water for use as a coffee extract solution with Brix 4.0.

[0038] 1-2. Preparation of packaged coffee beverage

The above-described liquid coffee extract, instant coffee solutions and coffee extract solution were mixed according to the formulations shown in Table 1, and a pH modifier (sodium bicarbonate) was further added to prepare various types of black coffee with pH 6.8. The black coffee preparations thus obtained were filled into stainless steel containers in an amount of 190 g per container and sterilized under conditions equivalent to 121°C x 10 min to thereby make packaged black coffee samples. Table 2 shows the proportions of soluble solids in the respective coffee beverages.

[0039]

[Table 1]

		Amount Incorporated (g/1000 g)						
		Test Example		Comparative Example				
		1	2	1	2	3	4	5
Liquid coffee extract		375	375	375	583			375
Instant coffee solution								
Type of Instant Coffee	Absorbance							
Instant Coffee 1	0.334	125				350		
Instant Coffee 2	0.771		125					
Instant Coffee 3	0.957			125				
Coffee extract solution							350	125
Sodium bicarbonate		q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.
Pure water		q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.
Made up to		1000	1000	1000	1000	1000	1000	1000

[0040] [Table 2]

	Proportion of soluble solids (%)						
	Test Example		Comparative Example				
	1	2	1	2	3	4	5
Liquid coffee extract	0.9	0.9	0.9	1.4			0.9
Instant coffee solution							
Instant Coffee 1	0.5				1.4		
Instant Coffee 2		0.5					
Instant Coffee 3			0.5				
Coffee extract solution						1.4	0.5
Total solids content	1.4	1.4	1.4	1.4	1.4	1.4	1.4

[0041] 1-3. Sensory evaluation of flavor

Four experienced panelists were asked to make sensory evaluation of the black coffee samples by a five-score rating system (5, strong or good; 4, rather strong or rather good; 3, fair; 2, rather weak or rather poor; 1, weak or poor), with the coffee smell, coffee sense, body, rich taste, clean finish, and ease in drinking being taken as indices, and the scores were averaged. The evaluation was on a cold basis. The results are shown in Table 3.

[0042] 1-4. Evaluation of keeping quality

The packaged coffee beverages of Test Examples 1-3 were stored at 60°C for 3 weeks and the sediment deposited on the bottom of each container was visually inspected over time. Note that storage at 60°C for 3 weeks is equivalent to storage at ordinary temperatures for about 10 months, and generally speaking, the occurrence of sedimentation to some extent after storage at 60°C for about 2 weeks is in a tolerable range for coffee beverage products to be described as stable. The results of evaluation of keeping quality are shown in Table 3 (-, sedimentation absent; ±, sedimentation slight; +, sedimentation present; ++, sedimentation extensive).

[0043]

[Table 3]

	Test Example		Comparative Example				
	1	2	1	2	3	4	5
Evaluation of flavor							
Coffee smell	4.5	4.3	4.3	3.3	3.0	2.0	3.5
Coffee sense	4.5	4.5	4.3	4.0	2.3	2.3	3.5
Coffee body	4.6	4.6	4.3	2.8	3.1	2.8	3.5
Rich taste	4.4	4.4	4.2	3.0	3.0	2.5	3.8
Ease in drinking	4.6	4.4	4.3	2.8	3.8	3.0	3.3
Clean finish	4.8	4.6	4.4	3.9	2.8	3.0	3.3
Evaluation of keeping quality							
60°C x 1 wk	-	+	++				
60°C x 2 wk	±	+	++				
60°C x 3 wk	+	++	++				

[0044] As Table 3 shows, the samples of the packaged coffee beverage of the present invention (Test Examples 1 and 2) that were prepared by mixing the liquid coffee extract obtained by extraction at the moderate temperature with the dry coffee extracts (instant coffee) which, when diluted with water, would have absorbance values of no more than 0.8 at a wavelength of 680 nm per 1 wt% of soluble solids and then packing the mixture into containers were superior in coffee flavor (coffee smell, coffee sense, coffee body, rich taste, ease in drinking, and clean finish) over the packaged coffee beverage prepared from the liquid coffee extract alone (Comparative Example 2), the packaged coffee beverage prepared

from the dry coffee extract alone (Comparative Example 3), the packaged coffee beverage prepared from the coffee extract alone (Comparative Example 4), and the packaged coffee beverage prepared from the mixture of the liquid coffee extract and the coffee extract (Comparative Example 5). Table 3 also shows that the samples of the packaged coffee beverage of the present invention (Test Examples 1 and 2) were less likely to experience sedimentation during storage at 60°C and, hence, had superior storage stability compared to the packaged coffee beverage prepared by mixing the liquid coffee extract with Instant Coffee 3 having an absorbance of 0.957 (Comparative Example 1). Thus, by mixing the liquid coffee extract obtained by extraction at the moderate temperature with the dry coffee extracts (instant coffee) which, when diluted with water, would have absorbance values of no more than 0.8 at a wavelength of 680 nm per 1 wt% of soluble solids and then packing the mixture into containers, there could be obtained packaged coffee beverages that satisfied both requirements for good coffee flavor and high keeping quality.

[0045] EXAMPLE 2

2-1. Preparation of liquid coffee extract and dry coffee extract

To prepare a liquid coffee extract, coffee beans in blend were ground with a grinder (product of NIPPON GRANULATOR CO., LTD.) to make a powder at least 80% of which consisted of particles with a size of 710 µm or more; the powder was drip-extracted with warm (60°C) water to make a liquid extract with Brix 2.0, which was then passed through a 500-mesh filter

to remove insoluble solids.

[0046] Instant coffee was used as a dry coffee extract; it was such instant coffee that when diluted with water, it would have an absorbance of 0.29 at a wavelength of 680 nm per 1% of soluble solids (this instant coffee had been prepared by extracting Brazilian coffee beans by the continuous multi-tube extraction method, concentrating the extract, and spray drying the concentrate). The procedure of determining the absorbance of the dry coffee extract was the same as in Example 1: first, the instant coffee was diluted about 30-fold with water and passed through a 500-mesh filter to remove insoluble solids; then, the content of soluble solids (Brix) was measured with RX-5000 (product of ATAGO CO., LTD.) and the absorbance at OD 680 nm was measured with UV-1700 (product of SHIMADZU CORPORATION); finally, the measurement value of absorbance as obtained by the foregoing procedure was divided by the measurement value of Brix to compute the absorbance value at a wavelength of 680 nm per 1 wt% of soluble solids. The thus obtained instant coffee was diluted in 20 volumes of boiling water and passed through a 500-mesh filter to remove insoluble solids; the filtrate was further diluted with pure water for use as an instant coffee solution with Brix 3.9.

[0047] 2-2. Preparation of packaged coffee beverage

A 467 g portion of the above-described liquid coffee extract was mixed with 120 g of the above-described instant coffee solution and centrifuged to remove insoluble solids; thereafter, a pH modifier (sodium bicarbonate) and water were added to make a total of 1000 g, thereby preparing black

coffee with pH 6.8 and 1.4 wt% (Brix) soluble solids derived from coffee beans. The black coffee thus obtained was filled into aluminum containers in an amount of 300 g per container and sterilized under conditions equivalent to 121°C x 10 min to thereby make packaged black coffee samples.

[0048] 2-3. Evaluation of keeping quality

The packaged coffee beverage samples (black coffee in aluminum container) prepared in 2-2 above were stored at 55°C for 2 or 3 weeks. After the 2- or 3-week storage, the aluminum containers of the packaged coffee beverage were opened and the coffee beverage was transferred into polyethylene terephthalate (PET) bottles in an amount of 300 g or 500 g per bottle; the coffee beverage in PET bottles was then stored in a refrigerator (5°C) for 10 days. After the 10-day storage, the color tone of the coffee beverage was measured, with the absorbance at a wavelength of 680 nm taken as an index, and compared with the color tone of the coffee beverage as freshly prepared (i.e., 300 g or 500 g of the coffee beverage prepared in 2-2 above was filled into PET bottles but not stored either at 55°C or in a refrigerator). The results are shown in FIG. 1.

[0049] As FIG. 1 shows, the coffee beverage of the present invention that had been stored in aluminum containers at 55°C for 2 or 3 weeks was transferred into PET bottles and then stored in a refrigerator (5°C) for 10 days; yet, it experienced little change in color tone (absorbance at a wavelength of 680 nm) compared to the beverage as freshly prepared (but not stored).

[0050] In addition, the above-described beverage samples that were stored in a refrigerator for 10 days after the 2- or 3-week storage at 55°C and the beverage as freshly prepared (but not stored) were visually inspected for any sedimentation that might occur on the bottom of the container. The results are shown in Table 4.

[0051] [Table 4]

		300 g	500 g
Sedimentation	As freshly prepared (before storage)	-	-
	55°C x 2 weeks + 5°C x 10 days	±	±
	55°C x 3 weeks + 5°C x 10 days	±	±

-: Sedimentation absent

+: Sedimentation present

±: Sedimentation slight

++: Sedimentation extensive

[0052] As Table 4 shows, the coffee beverage of the present invention experienced barely recognizable sedimentation even when it was stored in a comparatively large volume of 300 g or 500 g and this was in a tolerable range for coffee beverage products to be described as stable.

[0053] In addition, the packaged coffee beverage of the present invention was drunk and evaluated for its flavor; even after storage first at 55°C, then in a refrigerator, it was confirmed to maintain flavor almost comparable to what was exhibited by the beverage as freshly prepared (but not stored).

CLAIMS

1. A packaged coffee beverage prepared by mixing a liquid coffee extract and a dry coffee extract, the liquid coffee extract being obtained by extraction with warm water with 30-65°C and the dry coffee extract being such that when it is diluted with water, it has an absorbance of 0.8 or less at a wavelength of 680 nm per wt% of soluble solids, wherein the dry coffee extract is obtained by concentration and spray drying of a liquid coffee extract.
2. The packaged coffee drink according to claim 1, wherein the absorbance is 0.5 or less.
3. The packaged coffee beverage according to claim 1 or 2, which is produced by a process including such a step that the liquid coffee extract and the dry coffee extract are mixed be present at a ratio ranging from 8:2 to 5:5 in terms of soluble solids in the coffee beverage.
4. The packaged coffee beverage according to any one of claims 1 to 3, wherein the soluble solids derived from coffee beans account for 0.9-1.5 wt% based on the total weight of the beverage.
5. The packaged coffee beverage according to any one of claims 1 to 4, which is black coffee.
6. The packaged coffee beverage according to any one of claims 1 to 5, which is provided in a heated state.
7. A process for producing the packaged coffee beverage according to claim 1, which comprises:

step 1 in which warm water with 30-65°C is added to coffee beans to prepare a liquid coffee extract;

step 2 in which the prepared liquid coffee extract is mixed with a dry coffee extract to prepare a coffee beverage, the dry coffee extract being such that when it is diluted with water, it has an absorbance of 0.8 or less at a wavelength of 680 nm per wt% of soluble solids, wherein the dry coffee extract is obtained by concentration and spray drying of a liquid coffee extract; and

step 3 in which the prepared coffee beverage is packaged in a container.