Trial Decision

Invalidation No. 2012-800076

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The case of trial regarding the invalidation of Japanese Patent No. 3938968 "a method for masking astringency" between the parties above has resulted in the following trial decision.

Conclusion

The correction shall be approved as requested.

The demand for trial of the case was groundless.

The costs in connection with the trial shall be borne by the Demandant.

Reasons

I. History of the procedures

(1) The application for the invention according to Claim 1 of the Patent No. 3938968 was filed on March 17, 1997, and the patent right on the invention was established on April 6, 2007.

(2) Against this, the Demandant, JK Sucralose Japan, submitted a demand for trial dated May 10, 2012, which demanded a trial decision that "Patent No. 3938968 shall be invalidated. The costs for the trial shall be borne by the Demandee." together with Evidences A Nos. 1 to 7. The Demandant alleges that the patent invention was patented in breach of Article 29(2) of the Patent Act and fails to satisfy the requirement prescribed in Article 36(4) and (6)(i) of the Patent Act, and the Patent falls under Article 123(1)(ii) and (iv) of the Patent Act and should be invalidated.

(3) The Demandee, San-Ei Gen F.F.I., Inc., submitted a written correction request and a written reply dated July 30, 2012 and demanded a trial decision that "the demand for trial is groundless and the costs for the trial shall be borne by the Demandant," and asserted that the reasons for invalidation alleged by the Demandant are groundless.

(4) The Demandant submitted a written refutation dated September 6, 2012, and alleged that the correction request should not be approved since it does not conform to the requirement under the proviso to Article 132-2(1) (iii) of the Patent Act and does not conform to the provision of Article 126 (3) to (5) of the Patent Act, which is applied mutatis mutandis pursuant to Article 134-2(5) of the Patent Act;
even if it is approved, the patent invention after the corrections fails to satisfy the requirement prescribed in Article 36 (6) (ii) of the Patent Act, and also it should be invalidated since it does not conform to the provision of Article 36(4) and (6)(i) and Article 29(2) of the Patent Act, which are mentioned as the original reasons for invalidation.

(5) The amendment on the statement of the demand was approved through the decision of acceptance or non-acceptance of amendment on September 13, 2012, and an invitation to reply was made. In response to this, the Demandee submitted a reply dated October 18, 2012 (hereinafter, referred to also as "Second Written Reply").

(6) Prior to the oral proceeding conducted on March 1, 2013, the Demandee submitted an oral proceedings statement brief dated February 15, 2013 and the

Demandant submitted an oral proceedings statement brief dated February 15, 2013.

(7) Thereafter, the Demandant submitted a written statement dated March 5, 2013 and the Demandee submitted a written statement dated March 21, 2013.

(8) The Demandant submitted a written statement dated May 10, 2013 after the notice of conclusion of proceedings to file a petition to resume the proceedings. However, even when the contents thereof are taken into consideration, the necessity for resuming the proceedings is not found.

II. The matters of correction and the judgment on whether the matters of correction are approved or disapproved

(1) Matters of correction

The contents of the correction request submitted on July 30, 2012 are intended to correct the specification at the time of the registration of the Patent as in the corrected specification attached to the written correction request. Please note that the underlines in the following (1-1) to (1-3) are added in the original text.

(1-1) Correction 1

In the claim in the specification of Patent No. 3938968,
"[Claim 1] A method for masking astringency, comprising using, in an astringency-exhibiting beverage selected from tea, black tea, and coffee, sucralose in an amount of 0.0012 to 0.003% by weight relative to the beverage." was corrected to
"[Claim 1] A method for masking astringency, comprising using, in an astringency-exhibiting beverage selected from tea, black tea, and coffee, sucralose in such an amount that ranges from 0.0012 to 0.003% by weight relative to the beverage and does not exhibit sweetness."

(1-2) Correction 2

Paragraph [0008] in the specification before the correction states, "As a result, they have found that a high intensity sweetener unexpectedly decreases or softens excessive astringency in an amount not greater than a sweetness threshold and further it does not cause any damage on a general taste." This statement is corrected as follows.

"As a result, they have found that sucralose unexpectedly decreases or softens excessive astringency in an amount not greater than a sweetness threshold and further it does not cause any damage on a general taste."

(1-3) Correction 3

After the description "This invention provides a method for masking astringency, which is characterized by using sucralose in an amount that is not greater than a sweetness threshold and is 1/100 or more of the sweetness threshold in an astringency-exhibiting product" in paragraph [0009] of the specification before the correction, the following description is inserted.

"Specifically, the present invention is a method for masking astringency, which is characterized by using, in an astringency-exhibiting beverage selected from tea, black tea, and coffee, sucralose in an amount that ranges from 0.0012 to 0.003% by weight

relative to the beverage and does not exhibit sweetness."

(1-4) Correction 4

In the description "··· 0.0014 parts of sucralose or 0.0035 parts of aspartame were filled with water up to 100 parts in total" in paragraph [0019] of the specification before the correction, the phrase "or 0.0035 parts of aspartame" is deleted.

(1-5) Correction 5

In the description "··· 0.003 parts of sucralose or 0.01 parts of SK sweet Z-3) (enzyme-treated stevia manufactured by Nippon Paper Industries Co., Ltd.) were filled with water up to 100 parts in total" in paragraph [0020] of the specification before the correction, the phrase "or 0.01 parts of SK sweet Z-3) (enzyme-treated stevia manufactured by Nippon Paper Industries Co., Ltd.)" is deleted.

(1-6) Correction 6

In the description "0.0016 parts of sucralose or 0.005 parts of SK sweet Z-3 (enzyme-treated stevia manufactured by Nippon Paper Industries Co., Ltd.) were filled with water up to 100 parts in total" in paragraph [0021] of the specification before the correction, the phrase "or 0.005 parts of SK sweet Z-3 (enzyme-treated stevia manufactured by Nippon Paper Industries Co., Ltd.)" is deleted.

(2) Approval or disapproval of corrections

(2-1) Regarding Correction 1 (correction of the claim)

This correction is for correcting the amount of sucralose to be added to the beverage from "0.0012 to 0.003% by weight relative to the beverage" to "the amount that ranges from 0.0012 to 0.003% by weight relative to the beverage and does not exhibit sweetness," and it is intended for restriction of the scope of the component ratio.

"The amount that does not exhibit sweetness" after the correction is based on the description "This invention provides a method for masking astringency, which is characterized by using sucralose in an amount that is not greater than a sweetness threshold and is 1/100 or more of the sweetness threshold in an astringency-exhibiting product" in paragraph [0009] of the patent specification (publication of examined patent application); and the description "the amount not greater than the sweetness threshold in the present application needs only be an amount that does not exhibit sweetness" in paragraph [0013].

Then, as discussed below, simply specifying "0.0012 to 0.003% by weight relative to the beverage" may include a case that is outside the range not exhibiting sweetness. As described above, the amount of sucralose to be mixed in masking astringency is not greater than the sweetness threshold as of the filing; that is, sucralose is used in an amount that does not exhibit sweetness. Considering this, it is reasonable to understand that Correction 1 is for restriction of the range of "0.0012 to 0.003% by weight relative to the beverage" "in an amount that does not exhibit sweetness".

Meanwhile, in this regard, the Demandant alleges that Correction 1 is not intended for restriction since it is highly probable that sweetness is exhibited in the entire range of the specified % by weight (0.0012 to 0.003% by weight).

As described in Evidence A No. 10 listed below (see Indication (K10-iii)) (This Evidence is a document published after the filing of the present patent, but a similar description is found in Evidence A No. 8 (see Indication (K8-ii)), it is recognized that the sweetness threshold of sucralose in an aqueous solution is 0.0006% (Note: the unit for the figure is understood as % by weight). However, as paragraph [0013] states "For example, when 3 g of black tea was steeped in 150 g of 100°C hot water for 3 minutes or 10 minutes and extract liquids were used as samples, it was confirmed that the former had a sweetness threshold of sucralose of 0.0009% by weight while the latter had a sweetness threshold of 0.004% by weight. It is therefore considered that even when the same high intensity sweetener is used, the sweetness threshold is varied depending on the type or the intensity of astringency, other tastes such as saltiness or bitterness in a product, or the conditions such as temperatures for storage or usage of the product." (paragraph [0013] of the specification of the present case), and it is recognized that the sweetness threshold in a product (beverage) is varied in a different manner from the sweetness threshold in an aqueous solution.

In the case of Examples 1 to 4 described in the patent specification, they fail to clarify whether or not the amounts of sucralose used therein do not exceed the sweetness threshold. However, when the data of the below-described Evidence B No. 14 based on Examples 1 to 4 are examined, they indicate that the sweetness threshold is varied depending on various conditions as described above. Considering this, even if: the Demandee's explanation in page 2, line 6 to page 4, line 21 of the written statement dated March 21, 2013 summarized in the below-described Evidence B No. 22 is examined; and it is understood that the raw materials of each beverage used in Evidence B No. 14 are to some extent similar to the raw materials of each beverage used in Examples 1 to 4 in the patent specification (they are the same in terms of the formulated amount, the other components and the amounts thereof) but it is not understood that they are identical or very nearly identical to each other, the data of Evidence B No. 14 (see Indication (Z14-iii)) explains that there is a possibility that the sweetness is not exhibited even in the range of the percentage by weight of sucralose (0.0012 to 0.003% by weight) specified in the patent invention.

In contrast, the data of Evidence A No. 11 presented by the Demandant show large differences from Examples 1 to 4 of the patent specification in terms of not only the raw materials of each beverage but also their formulated amounts and the presence and the amount of other component (see Indication (K11-v)). For example, the oolong tea beverage corresponding to Example 1is the same in that the amount of sucralose is 0.0012% by weight, but the raw material for oolong tea extract is not the same as that of Example 1; its amount used therein was 10.0% by weight, which is largely different from 2.5 parts by weight/100 parts by weight of beverage in Example 1. There is also a difference in that Sodium L-ascorbate is not contained although it is contained in Example 1. For the green tea beverage, the black tea beverage, and the black coffee in Examples 2 to 4, similar differences are found. Thus, it is not determined in accordance with the data of Evidence A No. 11 that the amounts of sucralose used in Examples 1 to 4 are an amount capable of exhibiting sweetness. Even if the data support that there is a possibility that sweetness is exhibited in the range of the percentage by weight (0.0012 to 0.003% by weight) of sucralose specified in the patent invention, that fact alone is not enough to overturn the determination that there is a possibility that the sweetness is not exhibited. (see "VII. C" or "VIII. A" described

below)

Accordingly, the allegation of the Demandant cannot be adopted.

In view of the above, Correction 1 is made within the scope of the matters disclosed in the Specification (no drawing is attached; the same applies hereafter) originally attached to the application of the patent, and it is also obvious that Correction 1 does not substantially enlarge or alter the Claim.

(2-2) Regarding Correction 2

Correction 2 restricts "high intensity sweetener" to a specific example, "sucralose," and it is considered that this correction aims to clarify an ambiguous statement, which is not always consistent with the invention using sucralose specified in the Claim.

In view of the above, Correction 2 is made within the scope of the matters disclosed in the Specification originally attached to the application of the patent, and it is also obvious that Correction 2 does not substantially enlarge or alter the Claim.

(2-3) Regarding Correction 3

Correction 3 adds the explanation on the invention specified in the Claim in line with Correction 1, and this is for clarifying an ambiguous statement.

In view of the above, Correction 3 is made within the scope of the matters disclosed in the Specification originally attached to the application of the patent, and it is also obvious that Correction 3 does not substantially enlarge or alter the Claim.

(2-4) Regarding Corrections 4 to 6

Corrections 4 to 6 aim to delete the statements on "aspartame" and "SK sweet Z-3 (enzyme-treated stevia manufactured by Nippon Paper Industries Co., Ltd.)," which are alternatives to sucralose and are not relevant to the (corrected) patent invention of the present case, together with their amounts to be formulated; and this is for clarifying ambiguous statements.

In view of the above, Corrections 4 to 6 are made within the scope of the matters disclosed in the Specification originally attached to the application of the patent, and it is also obvious that Corrections 4 to 6 do not substantially enlarge or alter the Claim.

(2-5) Summary

Accordingly, the corrections dated July 30, 2012 aim at matters prescribed in the Patent Act Article 134-2(1) proviso No. 1 or No. 3 and comply with the provisions of Article 126(3) and (4) of the Patent Act, which is applied mutatis mutandis in the provisions of Article 134(5). Therefore, the Corrections shall be approved.

III. Patent Invention after the corrections

As described above, the Corrections are approved, so that the patent invention specified in Claim 1 of the scope of the claim after the correction (hereinafter, referred to also as "corrected patent invention") is as follows.

"[Claim 1] A method for masking astringency, comprising using, in an astringency-exhibiting beverage selected from tea, black tea, and coffee, sucralose in such an amount that ranges from 0.0012 to 0.003% by weight relative to the beverage and does

not exhibit sweetness."

IV. Allegation of the Demandant

The Demandant alleges that the corrected patent invention of Patent No. 3938968 could also have been easily invented by a person skilled in the art before the filing based on the inventions disclosed in Evidences A Nos. 1 to 7, it should not be patented under the provision of Article 29 (2) of the Patent Act; and the Patent falls under the provision of Article 123(1), No. 2 of the Patent Act and should be invalidated (hereinafter, referred to also as "Reason for Invalidation 1").

Further, the Demandant alleges that since the corrected patent invention of Patent No. 3938968 violates the requirements for enablement and the requirements for support, it fails to satisfy the requirements prescribed in Article 36(4) and (6) No. 1 of the Patent Act, the Patent falls under Article 123(1) No. 4 of the Patent Act and should be invalidated (hereinafter, referred to also as "Reason for Invalidation 2" and "Reason for Invalidation 3," respectively).

Furthermore, the Demandant alleges that since the phrase "amount that does not exhibit sweetness" added to the patent invention along with the correction request is unclear and fails to satisfy the requirements prescribed in Article 36(6), No. 2 of the Patent Act, the patent falls under the provision of Article 123(1), No. 4 of the Patent Act and should be invalidated (hereinafter, referred to also as "Reason for Invalidation 4").

Meanwhile, the amendment on reasons for request additionally including these Reasons for Invalidation is approved through a decision on acceptance or non-acceptance dated September 13, 2012, based on the provision of Article 131-2(2) of the Patent Act.

Then, as means of proof, the following Evidences A Nos. 1 to 11 were submitted.

Evidences A Nos. 1 to 7 were attached to the written demand for invalidation trial; Evidences A Nos. 8 and 9 were attached to the written refutation; and Evidences A Nos. 10 and 11 were attached to the oral proceedings statement brief dated February 15, 2013.

Note

Evidence A No. 1:	"Monthly Magazine, A Technical Journal on Food Chemistry & Chemicals 10", Food Chemicals Newspaper Inc., October 1, 1985, Cover page, pages 40 to 47, 127
Evidence A No. 2:	Japanese Unexamined Patent Application Publication No. H7-274829
Evidence A No. 3:	Japanese Unexamined Patent Application Publication No. H4-23965
Evidence A No. 4:	Japanese Unexamined Patent Application Publication No. H3-251160
Evidence A No. 5:	Japanese Unexamined Patent Application Publication No. S58-162260
Evidence A No. 6:	US Patent No. 4915969 and partial translations thereof
Evidence A No. 7:	Japanese Unexamined Patent Application Publication No. H2-177870

Evidence A No. 8: Beverage Japan, No. 215, pages 43 to 45 (1999, No. 11)
Evidence A No. 9: Can. J. Physiol. Pharmacol., Vol. 72, pages 435 to 439 (1994), and partial translations thereof
Evidence A No. 10: Journal of Japanese Society of Food Chemistry, Vol. 2(2), 1995, pages 110 to 114
Evidence A No. 11: Test report on sensory evaluation by Japan Food Research Laboratories, December 20, 2012

V. Allegation of the Demandee

Meanwhile, the Demandee demands a trial decision that the demand for trial of the case is groundless and the costs in connection with the trial shall be borne by the Demandant.

Then, as means of proof, Evidences B Nos. 1 to 4 and Evidences B Nos. 6 to 24 were submitted.

Please note that Evidence B No. 5 was deleted (see the oral proceedings record). Then, Evidences B Nos. 1 to 4 and 6 were attached to the written reply; Evidences B Nos. 7 to 13 (Annexed sheets 1 to 9 were attached to Evidence B No. 12) were attached to the second written replay; Evidences B Nos. 14 to 21 were attached to the oral proceedings statement brief dated February 15, 2013; and Evidences B Nos. 22 to 24 were attached to the written statement dated March 21, 2013.

Note

Evidence B No. 1: "Beverage Glossary" edited by Japan Soft Drink Association and one other, Beverage Japan, Inc., June 25, 1999, Cover page, reference page 11, imprint
Evidence B No. 2: "New Edition: Food chemistry Glossary" edited by Susumu OKAMOTO, Kabushiki Kaisha Kenpakusha, March 1, 1996, (new edition 3rd issue), Cover page, pages 48 to 51, 76 to 77, 102 to 103, 152 to 153 and 230 to 231, and imprint
Evidence B No. 3: "Foodstuff Illustration Dictionary", Shogakukan Inc., March 1, 1996, First edition, 10th issue, Cover page, a part of a table of contents, pages 252 to 257, imprint
Evidence B No. 4: "JIS Sensory Evaluation Analysis - Vocabulary JIS Z 8144:2004", Deliberation of Japanese Industrial Standards Committee, Japan Standards Association, revised March 20, 2004, Cover page, pages 20 to 21, imprint
Evidence B No. 6: "Proceedings of the Research Society of Japan Sugar Refineries' Technologists", Research Society of Japan Sugar Refineries' Technologists, edited by Research Laboratory of Japan Sugar Refiners' Association, No. 26, July 1, 1976, Cover page, pages 7 to 17, imprint
Evidence B No. 7: "JIS Sensory Evaluation Terms, JIS Z 8144-1990", Deliberation of Japanese Industrial Standards Committee, Japan Standards Association, established March 1, 1990, Cover page, pages 2 to 4, 6, 13 to 15, 19, and imprint
Evidence B No. 8: Muneyuki NAKAGAWA, "The Relationship between Astringency and the Reaction Aspects of Astringents for Protein

", Journal of Japanese Society for Food Science and Technology, Vol. 19, No. 11, November 1972, pages 531 to 537

Evidence B No. 9: Shiro Ohashi, et al., "Effects of thaumatin,a natural sweetener,on improvement of flavor ", New Food Industry, Vol. 27, No. 3, 1985, pages 33 to 39, imprint

Evidence B No. 10: "Kagaku Sosetsu (Elements of chemistry) No. 14, Chemistry on taste and smell", edited by The Chemical Society of Japan, published by Japan Scientific Societies Press, February 10, 1985, 5th issue, cover page, pages 100 to 101, imprint

Evidence B No. 11: "Experiment Report" prepared by Koji YOSHINAKA, employee of the Demandee, dated October 11, 2012

Evidence B No. 12: Written statement "The sweet substances known at the time in 1997" dated October 15, 2012, prepared by Koji YOSHINAKA, employee of the Demandee

Attached Document 1: Table of research results on sweet substances known at the time in 1997

Attached Document 2: Kagaku Sosetsu (Elements of chemistry) No. 14, "Chemistry on taste and smell", edited by The Chemical Society of Japan, published by Japan Scientific Societies Press, February 10, 1985, 5th issue, cover page, pages 85 to 95, 100 to 119, 122 to 125, and imprint

Attached Document 3: Monthly Magazine "A Technical Journal on Food Chemistry & Chemicals" May 1985, Vol. 1, No. 1, published by Food Chemicals Newspaper Inc., cover page, pages 50 to 53, and 115

Attached Document 4: Monthly Magazine "A Technical Journal on Food Chemistry & Chemicals" October 1985, Vol. 1, No. 6, published by Food Chemicals Newspaper Inc., cover page, pages 10 to 13, 22 to 23, 26 to 27, 32 to 39, 76 to 79, 92 to 93, and 127

Attached Document 5: "Genealogy of sweet and the science thereof", Kabushiki Kaisha Korin, published June 20, 1986, cover page, pages 84 to 85, 92 to 93, 100 to 101, 290 to 291, 296 to 297, 302 to 303, and imprint

Attached Document 6: Separate Volume "A Technical Journal on Food Chemistry & Chemicals 4, Directory of Sweeteners" Food Chemicals Newspaper Inc., published December 20, 1990, cover page, pages 4 to 5, 14 to 15, 88 to 89, 106 to 107, 130 to 131, 138 to 139, 142 to 143, 150 to 151, 212 to 215, 218 to 219, 253 to 257, 280 to 281, and 296

Attached Document 7: Kikan Kagaku Sosetsu (Quarterly Magazine, Elements of Chemistry), No. 40, 1999, "Molecular recognition on taste and smell", edited by The Chemical Society of Japan, Japan Scientific Societies Press, 1st edition, February 25, 1999, pages 22 to 25, 30 to 57, 60 to 63, 68 to 69, and imprint

Attached Document 8: Official Journal of the European Communities, 19. 2. 97, "DIRECTIVE 96/83/EC OF THE EUROPEAN PARLIAMENT

AND OF THE COUNCIL" No L 48/16 to 48/19

Attached Document 9: National Publication of International Patent Application No. H8-503206

Evidence B No. 13: Response (report) by Akira HASEGAWA at Representative Office in Japan of Tate & Lyle dated March 19, 2012 to inquiry of San-Ei Gen F.F.I., Inc. on "The global usage state of sucralose at the time in 1997"

Evidence B No. 14: "Experiment Report 3" prepared by Koji YOSHINAKA, employee of the Demandee, dated February 14, 2013

Evidence B No. 15: "New Edition: Sensory Evaluation Handbook", edited by Sensory Test Committee of Union of Japanese Scientists and Engineers, JUSE Press, Ltd. published March 7, 1995, cover page, pages 398 to 403, and imprint

Evidence B No. 16: Noriko KOBAYASHI, et al., "New Sweetener, Aspartame", Research Society of Japan Sugar Refineries' Technologists, No. 26, 1997, pages 7 to 17

Evidence B No. 17: "Statistical Method of Sake Tasting (XII) Psychophysical Method (1)" Shin SATO, magazine of Brewing Society of Japan, Vol. 52 (1957), No. 5, pages 361 to 357, material for explaining the year of publication (web)

Evidence B No. 18: "Sensory Evaluation Analysis - Method JIS Z 9080:2004", Deliberation of Japanese Industrial Standards Committee, Japan Standards Association, March 20, 2004, cover page, pages 6, 11 to 12, 22 and imprint

Evidence B No. 19: "Experiment Report 4" prepared by Koji YOSHINAKA, employee of the Demandee, dated February 14, 2013

Evidence B No. 20: "New Edition: Sensory Evaluation Handbook", edited by Sensory Test Committee of Union of Japanese Scientists and Engineers, JUSE Press, Ltd. published March 7, 1995, cover page, pages 301 to 306, 845, and imprint

Evidence B No. 21: Cover page of Official Journal of the European Communities, Volume 40 (February 19, 1997)

Evidence B No. 22: Comparison table between raw material extracts used in Examples 1 to 4; and raw material extracts used in Experiment Report 3 (Evidence B No. 14)

Evidence B No. 23: "Basics for Statistics learned through color imaging", Nikkyoken Co., Ltd. 1st edition 1st issue published October 16, 2006, cover page, pages 6 to 8, and imprint

Evidence B No. 24: "Starter's Book for Understanding Statistics", Gijutsu-Hyohron Co., Ltd., 1st edition 9th issue published on July 1, 2012, cover page, pages 54 to 61, and imprint

VI. Outline of each of Evidences A and B

Please note that the underlines are added by the body at the discretion of the body.

[Evidences A No. 1]

(K1-i) This is an article entitled "Characteristics and application of thaumatin as flavor enhancer" (title on page 40).

(K1-ii) "4. Flavor enhancement of coffee or black tea

Flavor of coffee is created by the balance of aroma, bitterness, acidity, and roast aroma, and a quite complicated and fine balance is required. Thaumatin acts on these flavor components to give an effect of emphasizing and harmonizing these flavor components. In the case that milk is contained, thaumatin exhibits a specific effect of emphasizing a milk flavor and adding an imparting effect of milk-like sweetness. FIG. 2 shows effects on each flavor component when 'Neo Saint Marc C' as a thaumatin formulation was used in a coffee beverage. An appropriate amount of Neo Saint Marc C to be used in coffee is about 2% relative to the amount of coffee beans used in food, and this usage amount especially emphasizes aroma; for bitterness and acidity, it highlights them while slightly softening their sharpness to thereby provide refreshed bitterness and acidity, further emphasizing milk flavor and sweetness.

Black tea is featured by a bracing flavor with aroma acting as a main component, and the astringency of tannic acid derived from black tea is prominent and becomes a cause for damaging the flavor. Thaumatin has an effect of masking and reducing astringency of tannic acid and also emphasizing the flavor of black tea. FIG. 3 shows effects on each flavor component when Neo Saint Marc C was used in a black tea beverage.

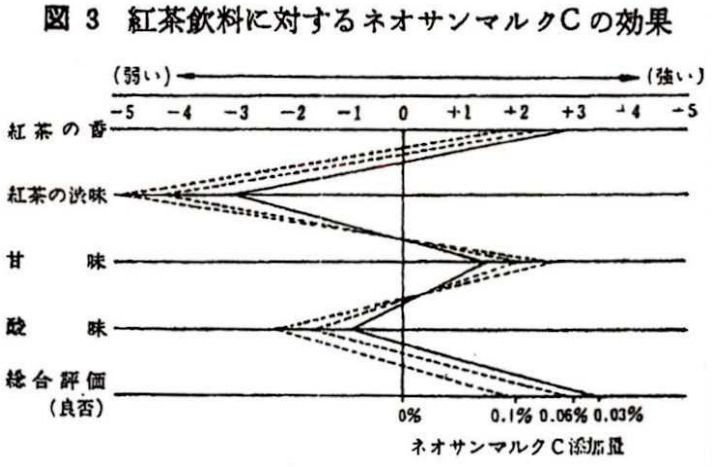

図３　紅茶飲料に対するネオサンマルクＣの効果　　FIG. 3 Effects of Neo Saint Marc C on black tea beverage

弱い　Weak

強い　Strong

紅茶の香　　Flavor of black tea

紅茶の渋味　　Astringency of black tea

甘味　Sweetness

酸味　Acidity

総合評価（良否）　　General evaluation (good or bad)

ネオサンマルクＣ添加量　Added amount of Neo Saint Marc C

Use of 'Neo Saint Marc C' in a black tea beverage reduces the astringency by 50% or more, emphasizes the flavor of black tea, and emphasizes sweetness in relation with softening the stimulatory of acidity thereby making it mild." (page 42, line 10 of the right column to page 43, line 23 from the bottom of the right column)

(K1-iii) "5. Masking of bitterness, saltiness, acidity, and astringency

After drinking of thaumatin at a concentration of not greater than a sweetness threshold, for example, a 0.0001% solution, when a solution of caffeine (0.05%) as a bitter substance, vitamin C (0.1%) as an acid substance, common salt (0.5%) as a salty substance, and tannic acid (0.02%) as an astringent substance was drunk, how each taste is felt was studied, and results thereof are shown below.

· Caffeine: bitterness was reduced by half and softened.

· Vitamin C: astringency and sharpness disappeared, and thus mild acidity is provided. Further, a drug-like taste disappeared.

· Common salt: salty taste was reduced by half, thereby being sweetened.

· Tannic acid: astringency was reduced by half and softened.

In this way, even when a taste-exhibiting substance and thaumatin do not coexist in an aqueous solution, an effect of softening and reducing each taste can be obtained. This effect is produced by hydrogen bond between thaumatin and taste bud cells. These effects can be obtained by using 0.1 to 0.2% of 'Neo Saint Marc D' as a thaumatin formulation during eating or drinking.

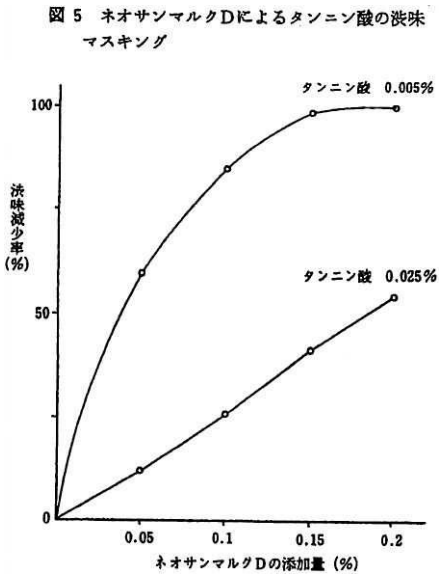

図５　ネオサンマルクＤによるタンニン酸の渋味マスキング　FIG. 5 Masking of astringency of tannic acid by Neo Saint Marc D

タンニン酸　Tannic acid

渋味減少率　Reduction rate of astringency

ネオサンマルクＤの添加量　Added amount of Neo Saint Marc D

As examples showing effects obtained by coexistence of a taste-exhibiting

substance and thaumatin, FIGS. 4 and 5 show changes of bitterness of caffeine and astringency of tannic acid by added amounts of 'Neo Saint Marc D.' (page 43, line 22 from the bottom of the right column to page 44, line 17 from the bottom of the left column)

(K1-iv) "Closing

Thaumatin is a protein having sweetness, and is a specific material as a sweetener or a flavor enhancer. Its usefulness is recognized worldwide, and its use in food is likely to be approved.

This article adopted the aspect of a flavor enhancer of thaumatin, but its functional effect is thought to make a large contribution to the enhancement of food flavors." (page 47, lines 7 to 15 of the right column)

[Evidences A No. 2]

(K2-i) "[Claim 1] A tea beverage comprising a sugar alcohol in the range of 0.2 to 3% by weight.
[Claim 2] The tea beverage according to Claim 1, wherein the sugar alcohol is at least one selected from erythritol, sorbitol, and maltitol." (Claims 1 and 2 of the scope of claims)

(K2-ii) "[0003] Bitterness and astringency of a tea beverage are caused by each component; for example, chatechins such as epicatechin, epigallocatechin, epicatechin gallate, and epigallocatechin gallate; amino acids such as arginine; caffeine; or tannin extracted from tea (tea leaves). Appropriate bitterness or astringency is essential for flavor, but excessive bitterness or astringency is not suitable for general preference, and it is not preferred especially by young people. ···(omitted)." (paragraph [0003])

(K2-iii) "[0008] A tea beverage according to the present invention is prepared by adding a specific amount of sugar alcohol or a specific sweetener component to a liquid extracted from tea (tea leaves), wherein the addition of sweetener component suppresses excessive bitterness and astringency to appropriate ranges, the sweetness is controlled appropriately, a peculiar bracing aroma is maintained, and the beverage gives a good flavor to be suitable for the preferences of a wide range of people. The above effect cannot be obtained even when a component other than sugar alcohol, such as sucrose, isomerized sugar, or glucose, is used as the sweetener component for controlling bitterness and astringency." (paragraph [0008])

(K2-iv) "[0010] Sugar alcohol has a light sweetness, which is about 50 to 90% that of sugar, and it is a light sweetness component and suitably fits to a healthy image of a tea beverage as a low-calorie and non-carious beverage. Further, erythritol, sorbitol, and maltitol do not react with an amino acid such as arginine, which is one of bitter or astringent components in a tea beverage, and thereby do not cause an offensive smell such as caramel smell or grain smell, which is found when a sugar component is added. Even when heat sterilization treatment is conducted, it preferably causes no damage on a bracing flavor of a tea beverage. ··· (omitted)." (paragraph [0010])

(K2-v) "[0011] The reason why the content of sugar alcohol in a tea beverage is limited to the above specific range is that when the content is less than 0.2% by weight, bitterness and astringency are not controlled in an appropriate range although sweetness is not felt; and when the content exceeds 3% by weight, sweetness is felt although bitterness and astringency are controlled, and the flavor as a whole is damaged. This tea beverage contains sugar alcohol in the above specific range, which controls

excessive bitterness and astringency in an appropriate range and the sweetness is 'slightly felt' or 'not felt'; and since each maintains a peculiar aroma, the flavor is good as a whole and suitable for the preferences of a wide range of people." (paragraph [0011])

(K2-vi) "[0014] Example 1

3500 g of desalted water was heated to 90°C, and 35 g of oolong tea (manufactured by Tea Land Kabushiki Kaisha) was added thereto and steeped for 3 minutes; and thereafter, tea (tea leaves) was filtrated by using cloth and an extract was obtained. Next, desalted water was added to the extract and the Brix degree thereof was adjusted to 0.3, and then, the resultant beverage was divided into fractions, and erythritol powder (manufactured by Nikken Chemical Laboratory Co., Ltd.) was added to each fraction. As shown in Table-1, seven tea beverage samples each having a different erythritol concentration were prepared. These tea beverage samples were evaluated by four persons, who have been involved in food research for many years, in terms of bitterness, astringency, and sweetness. Results thereof are shown in Table-1.

[0015] These evaluations and judgments were based on the following criteria, respectively.

(1) Evaluation on bitterness and astringency

[0016] [Table 1]

[Rank]	[Evaluation]	[Judgment]
1	Weak bitterness and astringency, easy to drink	Good
2	Between Ranks 1 and 3	Good
3	Feel bitterness and astringency, but easy to drink	Good
4	Feel strong bitterness and astringency, but easy to drink	Good
5	Strong bitterness and astringency, and hard to drink	Bad

(2) Evaluation on sweetness

[0017] [Table 2]

[Evaluation]	[Judgment]
Not feel sweetness	Good
Slightly feel sweetness	Good
Slightly feel sweetness and slow aftertaste	Bad
Feel sweetness but quick aftertaste	Bad
Feel sweetness	Bad
Feel sweetness and slow aftertaste	Bad

[0018] Example 2

This example was prepared in the same manner as in Example 1 except that green tea (manufactured by Irokuen Kabushiki Kaisha) was used instead of oolong tea, As shown in Table-2, seven tea beverage samples each having a different erythritol concentration were prepared and these tea beverage samples were evaluated in the same manner as in Example 1 in terms of bitterness, astringency and sweetness. Results thereof are shown in Table-2.

[0019] [Table 3]

表－１．烏竜（ウーロン）茶飲料の評価結果

サンプル番号	エリスリトール濃度（%）	苦味、渋味（ランク）	甘味の評価	総合判定
サンプル 1-1	0	5	甘味は感じない	×
サンプル 1-2	0．2	4	甘味は感じない	○
サンプル 1-3	0．3	3	甘味は感じない	○
サンプル 1-4	0．5	3	甘味は感じない	○
サンプル 1-5	1．0	2	甘味は感じない	○
サンプル 1-6	2．0	2	甘味は感じない	○
サンプル 1-7	3．0	2	僅かに甘味を感じる	○

表－１．烏竜（ウーロン）茶飲料の評価結果　Table-1. Evaluation results of oolong tea beverage
サンプル番号　Sample No.
エリスリトール濃度　Erythritol concentration
苦味、渋味（ランク）　Bitterness, astringency (rank)
甘味の評価　Evaluation on sweetness
総合判定　Synthetic judgment
甘味は感じない　Not feel sweetness
僅かに甘味を感じる　Slightly feel sweetness
サンプル　Sample

[0020] [Table 4]

表－２．煎茶飲料の評価結果

サンプル番号	エリスリトール濃度（%）	苦味、渋味（ランク）	甘味の評価	総合判定
サンプル 2-1	0	5	甘味は感じない	×
サンプル 2-2	0．2	4	甘味は感じない	○
サンプル 2-3	0．3	4	甘味は感じない	○
サンプル 2-4	0．5	2	甘味は感じない	○
サンプル 2-5	1．0	2	甘味は感じない	○
サンプル 2-6	2．0	2	甘味は感じない	○
サンプル 2-7	3．0	2	僅かに甘味を感じる	○

表－２．　煎茶飲料の評価結果　Table-2. Evaluation results of green tea
サンプル番号　Sample No.
エリスリトール濃度　Erythritol concentration
苦味、渋味（ランク）　Bitterness, astringency (rank)

甘味の評価　Evaluation on sweetness
総合判定　Synthetic judgment
甘味は感じない　Not feel sweetness
僅かに甘味を感じる　Slightly feel sweetness
サンプル　Sample

[0021]
As is obvious from Table-1 and Table-2, oolong tea beverages and green tee beverages satisfy the requirements of the present invention and contain sugar alcohol (erythritol) in the concentration range of 0.2 to 3% by weight, and they control excessive bitterness and astringency in an appropriate range, so that sweetness is "slightly felt" or "not felt"; and therefore, they are suitable for preference. However, when oolong tea beverages and green tea beverages do not satisfy the requirements of the present invention and do not contain sugar alcohol (erythritol), they give strong bitterness and astringency and are hard to drink.

[0022] Example 3

3500 g of desalted water was heated to 70°C and 33 g of green tea (manufactured by Irokuen Kabushiki Kaisha) was added thereto and steeped for 3 minutes; and thereafter, tea (tea leaves) was filtrated by using cloth and an extract was obtained. Next, desalted water was added to the extract and the Brix degree of the resultant beverage was adjusted to 0.4, and then, the resultant beverage was divided into fractions, and erythritol powder (manufactured by Nikken Chemical Laboratory Co., Ltd.) or sucrose powder (manufactured by Higashi-nihon Seito Kabushiki Kaisha) was added to each fraction. As shown in Table-3, 11 tea beverage samples each having a different concentration of sweetness component were prepared. Next, 180 g of each of tea beverage samples was filled in a 200-ml metal can and packed as a canned beverage; and these sample cans were sterilized by heat at 125°C for 20 minutes. Next, after the tea beverage samples were stored for one week, the evaluation on bitterness, astringency, and sweetness was conducted in the same manner as in Example 1, and at the same time, the pH measurement and the aroma evaluation were conducted. Results thereof are shown in Table-3. Please note that the evaluations and judgments on the aroma were based on the following criteria.

(3) Evaluation on aroma

[0023] [Table 5]

[Rank]	[Evaluation]	[Judgment]
○	Feel tea aroma	Good
△	Feel weak tea aroma	Bad
×	Feel weak tea aroma and offensive smell	Bad

[0024] Example 4

3500 g of desalted water was heated to 95°C, and 44 g of black tea (packed in a paper bag and manufactured by Mitsui Norin Co., Ltd.) was added thereto and steeped for 3 minutes; and an extract was obtained. Next, deodorized and desalted water was added to the extract and thereby, the Brix degree of the resultant beverage was adjusted to 0.3, and then, the resultant beverage was divided into fractions, and erythritol powder (manufactured by Nikken Chemical Laboratory Co., Ltd.), sorbitol powder

(manufactured by Kishida Chemical Co., Ltd.), maltitol powder (manufactured by Tokyo chemical Industry Co., Ltd.), or sucrose powder (manufactured by Higashi-nihon Seito Kabushiki Kaisha) was added to each fraction. As shown in Table-4, 17 tea beverage samples each having a different concentration of sweetness component were prepared. Next, 180 g of each of tea beverage samples was packed as a canned beverage in the same manner as in Example 3, and sterilized by heat. Next, after the tea beverage samples were stored for one week, the evaluation on bitterness, astringency, and sweetness was conducted in the same manner as in Example 1, and at the same time, the pH measurement and the aroma evaluation were conducted in the same manner as in Example 3. Results thereof are shown in Table-4.

[0025] [Table 6]

表－３　煎茶飲料の評価結果（加熱殺菌、保存品）

サンプル番号	甘味成分 名称	濃度(%)	PH	苦味、渋味（ランク）	甘味の評価	香り（ランク）	総合判定
サンプル 3－1	無添加	0	5.51	5	甘味は感じない	○	×
サンプル 3－2	エリスリトール	0．2	5.54	4	甘味は感じない	○	○
サンプル 3－3	エリスリトール	0．5	5.56	3	甘味は感じない	○	○
サンプル 3－4	エリスリトール	1．0	5.51	3	甘味は感じない	○	○
サンプル 3－5	エリスリトール	2．0	5.53	2	甘味は感じない	○	○
サンプル 3－6	エリスリトール	3．0	5.53	2	僅かに甘味を感じる	○	○
サンプル 3－7	エリスリトール	4．0	5.55	2	甘味を感じる（切れは早い）	○	×
サンプル 3－8	蔗糖	0．2	5.53	3 ～ 4	甘味は感じない	△	×
サンプル 3－9	蔗糖	1．0	5.49	3	僅かに甘味を感じる	×	×
サンプル 3－10	蔗糖	2．0	5.45	2	僅かに甘味を感じ、切れが遅い	×	×
サンプル 3－11	蔗糖	4．0	5.48	2	甘味を感じ、切れが遅い	×	×

表－３．煎茶飲料の評価結果（加熱殺菌、保存品）　Table-3. Evaluation results on green tea beverages (heat-sterilized and stored products)

サンプル番号　Sample No.

甘味成分　名称　濃度　Sweetness component　Name　Concentration

苦味、渋味（ランク）　Bitterness, astringency (rank)

甘味の評価　Evaluation on sweetness

香り（ランク）　Aroma(rank)

総合判定　Synthetic judgment

サンプル　Sample

エリスリトール　Erythritol

無添加　Not added

蔗糖　Sucrose

甘味は感じない　Not feel sweetness

僅かに甘味を感じる　Slightly feel sweetness

甘味を感じる（切れは早い）　Feel sweetness (quick aftertaste)

僅かに甘味を感じ、切れが遅い　Slightly feel sweetness, slow aftertaste

甘味を感じ、切れが遅い　Feel sweetness and slow aftertaste

[0026] [Table 7]

表－４．紅茶飲料の評価結果（加熱殺菌、保存品）

サンプル番号	甘味成分 名称	濃度(%)	PH	苦味、渋味（ランク）	甘味の評価	香り（ランク）	総合判定
サンプル 4-1	無添加	0	5.14	5	甘味は感じない	○	×
サンプル 4-2	エリスリトール	0.1	5.17	5	甘味は感じない	○	×
サンプル 4-3	エリスリトール	0.2	5.17	4	甘味は感じない	○	○
サンプル 4-4	エリスリトール	0.3	5.16	4	甘味は感じない	○	○
サンプル 4-5	エリスリトール	0.5	5.15	4	甘味は感じない	○	○
サンプル 4-6	エリスリトール	1.0	5.16	3	甘味は感じない	○	○
サンプル 4-7	エリスリトール	2.0	5.16	3	甘味は感じない	○	○
サンプル 4-8	エリスリトール	4.0	5.15	2	甘味を感じる	○	×
サンプル 4-9	ソルビトール	0.5	5.05	4	甘味は感じない	○	○
サンプル 4-10	ソルビトール	1.0	4.97	3	甘味は感じない	○	○
サンプル 4-11	マルチトール	1.0	5.13	3	甘味は感じない	○	○
サンプル 4-12	蔗糖	0.1	5.15	5	甘味は感じない	△	×
サンプル 4-13	蔗糖	0.2	5.14	4	甘味は感じない	△	×
サンプル 4-14	蔗糖	1.0	5.09	3	甘味は感じない	△	×
サンプル 4-15	蔗糖	2.0	5.08	2	甘味を感じる	△	×
サンプル 4-16	蔗糖	3.0	5.05	2	甘味を感じ、切れが遅い(芋臭)	△×	×
サンプル 4-17	蔗糖	4.0	5.03	2	甘味を感じ、切れが遅い(芋臭)	△×	×

表－４．紅茶飲料の評価結果（加熱殺菌、保存品） Table-4. Evaluation results on black tea beverage (heat-sterilized and stored products)
サンプル番号 Sample No.
甘味成分 名称 濃度 Sweetness component Name Concentration
苦味、渋味（ランク） Bitterness, astringency (rank)
甘味の評価 Evaluation on sweetness
香り（ランク） Aroma (rank)
総合判定 Synthetic judgment
サンプル Sample
エリスリトール Erythritol
ソルビトール Sorbitol
マルチトール Maltitol
無添加 Not added
蔗糖 Sucrose
甘味は感じない Not feel sweetness
甘味を感じる Feel sweetness
甘味を感じ、切れが遅い（芋臭）Feel sweetness and slow aftertaste (potato-like smell)

[0027]
The following points are clarified from Table-3 and Table-4.
(A) Green tea beverages and black tea beverages that satisfy the requirements of the present invention and contain sugar alcohol in the concentration range of 0.2 to 3% by weight each maintain a peculiar aroma and control excessive bitterness and astringency in an appropriate range, and are suitable for preferences to such a degree that the sweetness is "slightly felt" or "not felt".

(B) Green tea beverages and black tea beverages that do not satisfy the requirements of the present invention and do not contain sugar alcohol in a required concentration have strong bitterness and astringency and are hard to drink (Samples 3-1, 4-1, and 4-2).

(C) Green tea beverages and black tea beverages that do not satisfy the requirements of the present invention and contain an excessive amount of sugar alcohol have reduced bitterness and astringency, but give sweetness and are not suitable for preferences (Samples 3-7 and 4-8).

(D) Green tea beverages and black tea beverages that do not satisfy the requirements of the present invention and contain a sweetness component (sucrose) other than sugar alcohol have reduced bitterness and astringency, but cause damage on one or both of a peculiar aroma and sweetness and are not suitable for preferences (Samples 3-8 to 3-11 and 4-12 to 4-17)." (paragraphs [0014] to [0027])

[Evidence A No. 3]

(K3-i) "Glycyrrhetic acid monoglucuronide is a substance obtained by enzymatically conducting partial hydrolysis of glycyrrhizin and removing one molecule from two molecules of a sugar portion of glucuronic acid, and was confirmed to exhibit strong sweetness and have a flavor improving effect like that of glycyrrhizin. However, it is remarkably different from glycyrrhizin in that it has a much stronger flavor improving effect than glycyrrhizin and provides that effect at a lower concentration, of about 1/20 that of glycyrrhizin. Therefore, since it exhibits about 5 times the sweetness of glycyrrhizin and about 1,000 time stronger sweetness than sugar, even use thereof at a concentration not greater than its sweetness detection threshold (0.00035%) is enough to achieve a purpose of flavor improvement." (page 1, line 13 of the lower right column to page 2, line 5 of the upper left column)

(K3-ii) "Further, it can mask unfavorable bad smells in various foods and drinks such as cooked odor of fruits, green-smelling taste of grains, bitterness, astringency and raw smelling taste of citruses, and chemical smells of vitamins.

Utilization of the above-described characteristics allows a flavor improver of the present invention to be used widely in improving flavors of drinks such as juices, cola, cider, lactic acid beverage, lactic acid bacteria beverage, coffee, black tea and cocoa, ··· (omitted) ··· paste products such as cubic rice crackers, and various other foods and drinks, and in reducing an addition amount of a flavoring agent." (page 2, line 18 of the upper left column to line 12 of the upper right column)

(K3-iii) "Example 4

Glycyrrhetic acid monoglucuronide was added to commercially available orange nectar (natural fruit juice) so that its concentration was 0.0014%, and the obtained example was compared by 10 panelists with the original solution with no addition of glycyrrhetic acid monoglucuronide in terms of the flavor and the quality of taste. All of the panelists stated that green-smelling taste and astringency of orange were masked in the example with glycyrrhetic acid monoglucuronide, and the example was mild and had improved mouthfeel." (page 3, line 9 from the bottom of the upper left column to the last line)

(K3-iv) "[Effect of the Invention]

A flavor improver of the present invention composed of glycyrrhetic acid monoglucuronide provides a remarkable flavor improvement at a concentration not greater than the sweetness detection threshold of glycyrrhetic acid monoglucuronide, so that the sweetness of glycyrrhetic acid monoglucuronide is not an obstacle in use. Thus, it can be used in a wider range of foods and drinks than glycyrrhizin." (page 3, lines 1 to 8 of the upper right column)

[Evidence A No. 4]

(K4-i) "<1> A low-calorie beverage composition comprising an inorganic electrolyte component and an organic acid component, wherein the composition contains a stevia extract as a sweetener in an amount of 2 to 15 mg per mEq/liter of the inorganic electrolyte cation." (<1> for the scope of the claim represents encircled number 1)

(K4-ii) "The present invention relates to a low-calorie beverage composition, and more particularly to a low-calorie beverage composition containing an inorganic electrolyte component and an organic acid component.

Low-calorie drinks for sports are known as beverage compositions for making up for water and electrolytes lost by sweating in sports and the like. This kind of low-calorie beverage compositions contain an inorganic electrolyte, or inorganic and organic electrolytes to compensate for cations such as Na, K, Mg, Ca and anions such as Cl^- and phosphate ions, all released by sweating. However, if the inorganic electrolyte is supplied in an amount sufficient to compensate for the cations and/or anions depleted, the resulting beverage is given an undesirable taste such as bitter taste, harsh taste, astringent taste, or the like, and leaves a bad taste in one's mouth when taken. A sweetener is used to avoid such undesirable aftertaste. While natural saccharides, e.g., sugar, are the most preferred sweeteners in terms of taste, an excessive supply of natural saccharide results in superfluity of calorie. Therefore a synthetic sweetener is usually used conjointly with sugar or a like saccharide to reduce the calorie so that a low-calorie beverage composition is obtained.

Synthetic sweeteners heretofore used, such as aspartame, saccharine, etc., are inferior in the quality of sweet taste to natural saccharides and, after addition, impair the taste stability of the beverage, deteriorating the taste thereof in a few months. Moreover, because of the foregoing drawback of synthetic sweeteners, the amount of natural saccharide cannot be sufficiently reduced, and currently the natural saccharide must be used in excess of specified quantity." (page 1, line 14 of the lower left column to page 2, line 5)

(K4-iii) "Our research revealed that when a stevia extract is used as a sweetener in an amount of 2 to 15 mg per mEq/l of inorganic electrolyte cation, the obtained beverage composition is entirely free of bad aftertaste such as bitter taste, astringent taste, harsh taste, or the like due to the inorganic electrolyte cation and is palatable, easy to take, and capable of retaining the good taste over a long period of time without adversely affecting a taste stability." (page 2, lines 7 to 14 of the upper right column)

(K4-iv) "<Sensory test>

The beverage composition of the present invention obtained in Example 1 (Beverage-1 of the present invention) and a beverage (Comparison beverage-1) prepared in the same manner as in Example 1 except that 120 mg/1000 ml of aspartame

was added instead of rebaudioside A were compared with each other through tasting of 10 panelists. Results thus obtained are shown in the following table.

第　2　表

	本発明飲料－1	比較飲料－1
にが味	○	○
しぶ味	○	○
後味の良さ	◎	△
甘味の良否	◎	○
全体評価	◎	○

第２表　Table 2
本発明飲料　Beverage of the present invention
比較飲料　Comparison beverage
にが味　Bitter taste
しぶ味　Astringent taste
後味の良さ　Aftertaste
甘味の良否　Quality of sweet taste
全体評価　Overall evaluation

◉ Not less than 9 of the 10 panelists rated the beverage as satisfactory.
○ Six to eight of the 10 panelists rated the beverage as satisfactory.
△ Three to five of the 10 panelists rated the beverage as satisfactory.
× Not more than 2 of the 10 panelists rated the beverage as satisfactory.

The above results show that the beverage of the present invention exhibited outstanding sweet taste in aftertaste and overall evaluation when compared with conventional sweeteners.
<Test for storage stability>
After the beverage-1 of the present invention and the comparison beverage-1 were stored at 30°C for 3 months, the foregoing sensory test was carried out, and results thereof are shown in below.

第　3　表

	本発明飲料－1	比較飲料－1
にが味	○	△
しぶ味	○	△
後味の良さ	◎	×
甘味の良否	◎	△
全体評価	◎	△

第３表　Table 3
本発明飲料　Beverage of the present invention

比較飲料　　Comparison beverage
にが味　Bitter taste
しぶ味　Astringent taste
後味の良さ　　Aftertaste
甘味の良否　　Quality of sweet taste
全体評価　　Overall evaluation

The beverage of the present invention exhibited little change in its taste when stored for a prolonged period of time, and is thus excellent in storage stability." (page 4, line 1 of the upper right column to line 2 below the table of the lower left column)

[Evidence A No. 5]

(K5-i) "A method for improving a taste of coffee and black tea, wherein a decomposition product of α-L-aspartyl-L-phenylalanine methyl ester is contained at a concentration of 5 to 50 mg% in a final product of coffee, black tea, and a processed food thereof." (the scope of the claim)

(K5-ii) "The present invention relates to a method for improving a taste of coffee, black tea, and a processed food thereof, wherein an astringent taste such as bitterness, astringency, or harsh taste is reduced by including a decomposition product of α-L-aspartyl-L-phenylalanine methyl ester (hereinafter, referred to as "aspartame") or allowing the coexistence of aspartame." (page 1, line 6 from the bottom of the lower left column to line 1 of the lower right column)

(K5-iii) "The present inventor has found that: a decomposition product of aspartame known as a sweetener has a prominent effect of improving a taste-exhibiting property of low-grade coffee or black tea; a complex system with aspartame prepared by addition of a decomposition product of aspartame or by coexistence with the decomposition product can soften an offensive taste such as bitterness, astringency, or harsh taste and improve preferences without damaging the original taste or flavor of coffee or black tea, regardless of whether a product is low-grade or high-grade; and further, it can maintain preferable taste and flavor of a product that it is drunk at a low temperature, or a canned, bottled, or pouched product or other product that is distributed after being heat-sterilized. Based on this finding, the present inventor completed the present invention." (page 2, line 9 of the upper right column to line 1 of the lower left column)

(K5-iv) "The decomposition product of aspartame used in the present invention is obtained by decomposing aspartame by heat. It is mainly diketopiperazine of aspartyl phenylalanine (··· structural formula is omitted ···), but also includes other decomposition products of aspartyl phenylalanine (··· structural formula is omitted ···).

Diketopiperazine of aspartyl phenylalanine is easily obtained by heating aspartame in a neutral region of pH. It is a substance that is completely safe to humans, but its taste is not sweet and it is a white fine crystal having a bracing taste and weak acidity." (page 2, line 10 of the lower left column to line 4 of the lower right column)

(K5-v) "Example 1

Diketopiperazine of aspartyl phenylalanine was added to percolated coffee so that samples were prepared at 1 mg%, 5 mg%, 10 mg%, 20 mg%, 50 mg%, and 70

mg%, respectively.

As a control, a sample with no addition was used. Sensory evaluation was conducted by paired preference test method by 30 well-trained taste panelists.

Results are shown in Table 1.

第 1 表

n = 30

	苦味渋味の強さ		味全体の好ましさ		風味の好ましさ		総合評価	
	本発明	対照	本発明	対照	本発明	対照	本発明	対照
1 mg% サンプル使用区	14 人	16 人	14 人	16 人	16 人	14 人	16 人	14 人
5 mg% サンプル使用区	9 *	21	17	13	17	13	20	10
10 mg% サンプル使用区	7 **	23	21 *	9	21 *	9	22 *	8
20 mg% サンプル使用区	5 ***	25	21 *	9	22 *	8	23 **	7
50 mg% サンプル使用区	6 **	24	20	10	21 *	9	21 *	9
70 mg% サンプル使用区	6 *	24	14	16	17	13	19	11

* 5 % 有意 ** 1 % 有意 *** 0.1 % 有意

第１表 Table 1
苦味渋味の強さ Intensity of bitterness or astringency
味全体の好ましさ Favorability of overall taste
風味の好ましさ Favorability of flavor
総合評価 Overall evaluation
本発明 Present Invention
対照 Control
サンプル使用区 Sample category
人 Number of panelists
５％有意 5% significant difference
１％有意 1% significant difference
０．１％有意 0.1% significant difference

Example 2

Sugar was added to the sample with 20 mg% of diketopiperazine of aspartyl phenylalanine in Example 1 so as to prepare a sample with sugar at a concentration of 5%. As a control, a sample with only sugar added at a concentration of 5% was used, and sensory evaluation was conducted by 30 taste panelists in the same manner as in Example 1.

Results are shown in Table 2."

第　2　表

n = 30

	本発明	対照	検定
苦味、渋味の強さ	7 人	23 人	**
味全体の好ましさ	21	9	*
風味の好ましさ	22	8	*
総合評価	21	9	*

* 5 % 有意　　** 1 % 有意

第２表　Table 2
苦味、渋味の強さ　Intensity of bitterness or astringency
味全体の好ましさ　Favorability of overall taste
風味の好ましさ　Favorability of flavor
総合評価　Overall evaluation
本発明　Present Invention
対照　Control
検定　Test
人　Number of panelists
５％有意　5% significant difference
１％有意　1% significant difference

(page 3, line 1 of the lower left column to the last line of the lower right column)

(K5-vi) "Example 3

50 mg% of aspartame was added to black tea, and the resultant beverage was packed in a can and sterilized by heat at 120°C for 4 minutes or more to prepare canned black tea. After the canned black tea was stored at room temperature for 14 days, it was further held in a vending machine at 5°C for 48 hours. The concentration of aspartame decomposition product in this black tea was 16 mg% and the concentration of remaining aspartame was 35 mg%.

As a control, a sample was prepared in the same manner as above except that sugar was added at a concentration of 7% instead of aspartame, and the sample was stored and held in a vending machine.

For two kinds of black tea (having the same sweetness) taken out from the vending machine, sensory evaluation was conducted in the same manner as in Example 1 by 30 taste panelists.

Results are shown in Table 3.

第 3 表

n = 30

	本発明	対照	検定
苦味、渋味の強さ	7 人	23 人	**
味全体の好ましさ	21	9	*
風味の好ましさ	16	12	−
総合評価	22	8	*
カロリー	対照の1/200	−	

第３表　Table 3
苦味、渋味の強さ　Intensity of bitterness or astringency
味全体の好ましさ　Favorability of overall taste
風味の好ましさ　Favorability of flavor
総合評価　Overall evaluation
カロリー　Calories
本発明　Present Invention
対照　Control
検定　Test
人　Number of panelists
対照の１／２００　1/200 of Control

-No significant difference　*5% significant difference　**1% significant difference

Example 4

125 g of aspartame and 6 g of gelatin were dissolved in and mixed with 250 ml of coffee liquid, packed in an aluminum can, and sterilized by heat at 120°C for 4 minutes, so that canned coffee jelly was prepared; and the canned coffee jelly was stored at 10°C for 7 days. After the storage, the concentration of aspartame decomposition product was 18 mg%.

Aside from the above, an unsterilized sample with addition of 35 mg% of aspartame was prepared as a control in the same manner as above, and stored at 10°C for 7 days.

For the above two kinds of coffee jelly, sensory evaluation was conducted by 30 taste panelists in the same manner as in Example 1.

Results are shown in Table 4.

第　4　表

n=30

	本発明	対照	検定
甘味の強さ	14 人	16 人	−
甘味の好ましさ	21	9	*
苦味、渋味の強さ	7	23	**
味全体の好ましさ	21	9	*
風味の好ましさ	21	9	*
総合評価	21	9	*

− 有意差なし　　* 5％有意　　** 1％有意

第４表　Table 4
甘味の強さ　Intensity of sweetness
甘味の好ましさ　Favorability of sweetness
苦味、渋味の強さ　Intensity of bitterness or astringency
味全体の好ましさ　Favorability of overall taste
風味の好ましさ　Favorability of flavor
総合評価　Overall evaluation
本発明　Present Invention
対照　Control
検定　Test
人　Number of panelists
有意差なし　No significant difference
５％有意　5% significant difference
１％有意　1% significant difference

As is obvious from the above results, it has been found that coffee and black tea according to the method of the present invention have reduced bitterness and astringency, and they are significantly favorable in terms of the overall taste." (page 4, line 1 of the upper left column to line 2 from the bottom of the lower left column)

[Evidence A No. 6]

This document is written in English, so the translation thereof prepared by the Demandant is shown below.

(K6-i) "[57] Abstract
Beverages such as carbonated, acid-pH soft drinks and tea and coffee can be sweetened with a combination of two components: 1, a chlorosucrose sweetener such as sucralose 2, cyclamate, either alone or together with one or two other low-calorie sweeteners, the sweetness contribution by the two components being from 90%:10% to 10%:90% respectively, the percentage of sweetness provided by the cyclamate in component 2 being from 30 to 100%." (page 1, Abstract of the right column)

(K6-ii) "Claim 1

A method of sweetening a beverage for incorporating therein a combination of two components: component 1, a chlorosucrose sweetener; and component 2, cyclamate, either alone or in combination with one or two other low calorie sweeteners, the sweetness contribution ratio of the two components in the mixture being from 90%:10% to 10%:90% respectively, the percentage sweetness contribution provided by the cyclamate in component 2 being from 30 to 100%.

Claim 2
A method according to claim 1 in which the chlorosucrose sweetener is 4,1',6'-trichloro-4,1',6'-trideoxygalactosucrose.

...omitted...

Claim 6
A method according to claim 2, in which the beverage is selected from the group consisting of cola, tea, and coffee." (8th column, line 9 to 9th column, line 16)

[Evidence A No. 7]

(K7-i) "1) An unpleasant taste masking composition, comprising: a flavoring agent having a bitter taste or unpleasant off-note, and a sufficient amount of a non-bitter intense sweetener to nullify the taste or unpleasant off-note of the flavoring agent.
2) ...omitted...
3) The composition according to Claim 2, wherein the chlorodeoxysugar derivative is 4,1',6'-trichloro-4,1',6'-trideoxygalactosucrose." (Claims 1,3 in Claim)

(K7-ii) "In a preferred embodiment, the chlorodeoxysugar derivative is 4-chloro-4-deoxy-α-D-galactopyranosyl-1,6-dichloro-1,6-dideoxy-β-D-fructofuranoside, which is also known as 4,1',6'-trichloro-4,1',6'-trideoxygalactosucrose (Sucralose)." (page 10, lines 2 to 8 of the upper left column)

(K7-iii) "Once prepared, the inventive unpleasant taste masking composition may be stored for future use or may be formulated with conventional additives, such as pharmaceutically acceptable carriers or confectionery ingredients to prepare a wide variety of ingestible compositions, such as foodstuffs, beverages, jellies, extracts, confectionery products, pharmaceutical compositions administered orally, and hygienic products such as a toothpastes, dental lotions, chewing gums, or mouth washes." (page 13, lines 2 to 10 of the upper left column)

[Evidence A No. 8]

This document was published two years later than the filing of the Patent, and is not a publicly-known document.

(K8-i) This is an article entitled "Characteristics of sucralose and application thereof to food".

(K8-ii) "2) Sensory characteristics
[High sweetness]

The threshold of sucralose in an aqueous solution is about 0.0006% and the threshold of sugar is about 0.61%; and the sweetness level at the threshold of sucralose is higher by about 1,000 times than sugar.

Practical sweetness level is about 600 times as much, and the sweetness level to

be expressed is varied depending on the kind of food to be used or the formulation of body. Thus, when the addition amount is determined, it is necessary to take a method wherein a test is first conducted at 600 times and the addition amount is appropriately increased or reduced." (page 43, line 22 of the middle column to line 18 from the bottom of the right column)

[Evidence A No. 9]

This document is written in English, so the translation thereof prepared by the Demandant is shown below.

(K9-i) "The mechanism of sweetness

The structural requirements of compounds possessing sweetness have been described (FIG. 1). Deutsch and Hansch (1966) suggested that generation of a sweet taste required a combination of hydrophobic bonding from one area on the molecule with electronic bonding from another. The highly intense sweeteners are more hydrophobic, giving rise to stronger absorption to the taste buds, in contrast to the simple sugars, which are more hydrophilic, less sweet, and weakly absorbed to the taste buds. Deutsch and Hansch (1966) observed a relationship between the sweetness of 2-amino-4-nitrobenzene derivatives and their partition coefficients between water and octanol. Shallenberger and Acree (1967, 1969) noted that sweetness required the presence of two electronegative atoms, designated A and B, separated by 2.5-4.0 Å (260-300 nm), and a hydrogen atom covalently linked to A. In carbohydrates, a pair of hydroxyls on adjacent carbon atoms (a glycol group) is assigned as the AH/B unit, with one hydroxyl acting as the AH subunit and the oxygen atom of the other hydroxyl as the B subunit. Shallenberger and Acree (1967) suggested that the sweetness sensation is caused by formation of a pair of hydrogen bonds between the AH/B unit and the proteinaceous receptor site on the tongue.

It was noted in these early studies, however, that although this mechanism explained all sweet-tasting compounds, many compounds filled these structural requirements but possessed no sweetness. Hence it was thought that there must be additional criteria accounting for the mechanism of sweetness, and one was described by Kier (1972) in a study of 1-alkoxy-2-amino-4-nitrobenzenes. This study recognized the influence of a third site, which is hydrophobic and binds the sweet compound to the receptor site. This third site, designated X by Schallenberger and Lindley (1977) and van der Heijden et al. (1978), provides a triangle of functional groups important in conferring sweet taste, X, AH, and B, and is known as the glucophore (FIG. 2). This hypothesis to explain the mechanism of sweetness is supported by the work conducted on sucrose derivatives by Hooft et al. (1991). In the case of sucralose, it appears that the two chlorine atoms present in the fructose portion of the molecule constitute the hydrophobic X-site, which is extended over the entire 'outside' region of the fructose portion. The hydrophobic and hydrophilic regions are situated on the opposite ends of the molecule, similar to sucrose, apparently unaffected by the third chlorine atom on the C4 of the pyranose ring." (page 436, line 19 from the bottom of the left column to line 6 from the bottom of the right column)

[Evidence A No. 10]

(K10-i) This is an article entitled "Comparison on taste characteristics between sucralose and other high intensity sweeteners" (Title on page 110)

(K10-ii) "2) Sweetness in aqueous solution

1 Noticeable threshold

A noticeable threshold was determined in accordance with a method of limits. That is, the test was conducted first from a low concentration of sucralose in solution (ascending series) to a high concentration thereof; then, from a high concentration (descending series) to a low concentration; and the noticeable threshold was calculated from an average value of respective noticeable and unnoticeable stimulus values." (page 111, lines 5 to 11 of the left column; note: "1" represents encircled number 1)

(K10-iii) "III Results

(1) Sweetness in aqueous solution

1) Noticeable threshold

The threshold of sucralose was measured and the threshold was estimated by t-test; and it was found to be 0.0006 ± 0.00014%. At this time, the level of significance was 1%. The most sensitive panelist had 0.00017% while the least sensitive panelist had 0.001%.

Likewise, the threshold of sucrose was measured, and the average value was 0.61 ± 0.0492%. The most sensitive panelist had 0.2% while the least sensitive panelist had 1.0%.

The threshold of sucralose was 0.0006%, while that of sucrose was 0.61%; and therefore it was found that the sweetness level of sucralose at the threshold was about 1,000 times as much." (page 111, lines 16 to 29 of the right column)

(K10-iv) "

表2　各食品における添加量と甘味倍率

食品	標準ショ糖添加量 (%)	スクラロース添加量 (%)	スクラロースのショ糖に対する甘味倍率
缶コーヒー	7.0	0.021	330
揚げ蒲鉾	2.5	0.004	625
麺つゆ	14.0	0.015	930
缶入りしるこ	15.0	0.06	250
炭酸飲料	12.6	0.025	500
無果汁ゼリー	20.0	0.067	300

表２　各食品における添加量と甘味倍率　　Table 2 Addition amount and sweetness level in each food

食品　Food

標準ショ糖添加量　　Standard addition amount of sucrose

スクラロース添加量　　Addition amount of sucralose

スクラロースのショ糖に対する甘味倍率　　Sweetness level of sucralose relative to sucrose

缶コーヒー　　Canned coffee

揚げ蒲鉾　　Fried fish paste

麺つゆ　Noodle soup

缶入りしるこ　　Canned sweet red-bean soup with pieces of rice cake

炭酸飲料　　Carbonated drink

無果汁ゼリー　　Jelly with no fruit juice

" (page 112, Table 2 of the right column)

(K10-v) "IV Discussion

(1) Noticeable threshold

Jenner R. M. reported that the noticeable threshold of sucralose was 0.00038% and that of sucrose was 0.31%. Results of this research show that they are about two times. However, when the results are converted in terms of the sweetness level relative to sucrose, they are about 1.2 times. That is, it is considered that there is a difference in the sensitivity on sweetness in the sensory test among panelists, but similar results are obtained.

(2) Sweetness level

Results show that when compared with the sweetness level at an equivalent sucrose concentration in an aqueous solution, the sweetness level at an equivalent sucralose concentration in food was varied depending on the kind of food.

The pH of the carbonated drink and the jelly with no fruit juice is as low as about 3 or 4, while the pH of other foods is almost 7. Further, the noodle soup originally contains 7% common salt and in addition, 4% common salt derived from soy source; in total, it contains 11% or a large amount of common salt, 7.3 times larger amount than the fried fish paste having 1.5%; and the noodle soup is a food having a large content of common salt. Like this, it is considered that the influence of the pH or the salt concentration is one factor, but regarding the determination on which component in food has an influence, it is necessary to conduct a series of tests with different concentrations of each food component from now on." (page 113, lines 1 to 19 in the item for Discussion in the right column)

(K10-vi) "V Summary

(1) Sucralose is a sweetener having a noticeable threshold of 0.0006%, and it is revealed that its sweetness level is varied under the influence of a part of food component such as the pH.

(2) Even in the case that sucralose is used in an aqueous solution and also applied to food, it is highly evaluated for preference, and this suggests that sucralose is a sweetener that can make a large contribution to the food industry." (page 114, lines 1 to 7 of the left column)

[Evidence A No. 11]

(K11-i) "Test Report" dated December 20, 2012, which was requested to Japan Food Research Laboratories by JK Sucralose Japan (Cover page)

(K11-ii) "Sensory evaluation

1 Client

JK Sucralose Japan

2 Samples

1) Sucralose

2) Erythritol

3) Thaumatin

4) Stevia extract

Please note that oolong tea extract (Brix 4.0), green tea extract powder No. 16714, black tea extract powder No. 17349, and coffee extract used in the test were provided by the client.

3 Purpose of test

For beverages with addition of each sample, sensory evaluation is conducted by using a beverage prepared without adding any sample as a reference, and then, the influence given by each sample (sweetener) on astringency and sweetness is investigated.

4 Outline of test

A beverage (test specimen) with addition of each sample was prepared, and sensory evaluation was conducted by seven panelists by using a beverage prepared without adding any sample as a reference. In accordance with a separate questionnaire, a sample for which a panelist felt that astringency was reduced most was selected and the presence or absence of sweetness of each test specimen was evaluated.

The test was conducted twice on different dates, on 4 kinds of beverages including oolong tea beverage, green tea beverage, black tea beverage, and black coffee.

5 Test results

Results of sensory evaluation are shown in Tables 1 to 14." (page 2)

(K11-iii) Tables 1 to 4 (Indication is omitted) show results of the sensory evaluation conducted by seven panelists twice, in which each panelists selected a test specimen having the most reduced astringency among sucralose, erythritol, thaumatin, and stevia extract in oolong tea beverage, green tea beverage, black tea beverage, and black coffee. Further, Tables 5 to 8 (Indication is omitted) show results of the sensory evaluation on the presence or absence of sweetness with the marks ○ and ×, which were obtained by two-time evaluations of seven panelists on the same four beverages.

Results including the above are shown in Tables 9 and 10.

表-9 官能評価結果(最も渋味が減っているものとして選択された数)

検体 / 飲料	1) スクラロース	2) エリスリトール	3) ソーマチン	4) ステビア抽出物
ウーロン茶飲料	8	3	0	3
緑茶飲料	6	0	3	5
紅茶飲料	10	2	0	2
ブラックコーヒー	10	3	0	1

表－９　官能評価結果（最も渋味が減っているものとして選択された数）

Table 9 Sensory evaluation results (the number of times when panelists selected a sample as having the most reduced astringency)

検体　Sample

スクラロース　Sucralose

エリスリトール　Erythritol

ソーマチン　Thaumatin

ステビア抽出物　Stevia extract

飲料　Beverage

ウーロン茶　Oolong tea

緑茶飲料　　Green tea
紅茶飲料　　Black tea
ブラックコーヒー　　Black coffee

表-10　官能評価結果(甘味を感じたパネリストの人数)

検体 / 飲料	1) スクラロース	2) エリスリトール	3) ソーマチン	4) ステビア抽出物
ウーロン茶飲料	14	10	0	12
緑茶飲料	11	5	4	8
紅茶飲料	14	9	0	12
ブラックコーヒー	14	6	0	9

表－１０　官能評価結果（甘味を感じたパネリストの人数）　Table 10 Sensory evaluation results (the number of panelists who felt sweetness)
検体　Sample
スクラロース　　Sucralose
エリスリトール　Erythritol
ソーマチン　　Thaumatin
ステビア抽出物　Stevia extract
飲料　Beverage
ウーロン茶　　Oolong tea
緑茶飲料　　Green tea
紅茶飲料　　Black tea
ブラックコーヒー　　Black coffee

(pages 3 to 7)

(K11-iv) Tables 11 to 14 (Indication is omitted) summarize comments of the panelists as sensory evaluation results. (pages 8 to 11)

(K11-v) "6 Test method

1) Panelists

Selected from staff members of Japan Food Research Laboratories. It should be noted that panelists were selected from staff members who were determined to be olfactory normal persons by an olfactometer [Daiichi Yakuhin Sangyo Co., Ltd.] and who were able to correctly identify tastes of aqueous solutions of 0.4% sucrose, 0.02% citric acid, 0.13% common salt, 0.05% monosodium glutamate, and 0.03% caffeine.

2) Preparation of test specimen

Beverages 1) to 4) were mixed at ratios (% by weight) in Table 15 with water (commercially available mineral water in a PET container) so that they were filled up to 100.0.

Please note that samples (sweeteners) were added in amounts as shown in Table 16, and a beverage prepared without addition of any sample was used as a reference.

表-15　飲料の調製

飲料	重量%	
1) ウーロン茶飲料	ウーロン茶抽出物(Brix4.0)	10.0
	検体	表-16
2) 緑茶飲料	緑茶エキスパウダー No.16714	0.3
	検体	表-16
3) 紅茶飲料	紅茶エキスパウダー No.17349	0.4
	検体	表-16
4) ブラックコーヒー	コーヒー抽出液*	45.0
	検体	表-16

＊　レフブリックス3.3度に調整した。

表－１５　飲料の調製　　Table 15 Preparation of beverages
飲料　Beverage
ウーロン茶飲料　Oolong tea beverage
緑茶飲料　Green tea beverage
紅茶飲料　Black tea beverage
ブラックコーヒー　Black coffee
重量％　wt.%
ウーロン茶抽出物　Oolong tea extract
検体　Sample
緑茶エキスパウダー　Green tea extract powder
紅茶エキスパウダー　Black tea extract powder
コーヒー抽出液　Coffee extract liquid
表－１６　Table 16
レフブリックス３．３度に調整した。　Adjusted to a refractometric Brix of 3.3

表-16　検体(甘味料)の添加量

検体	1) スクラロース	2) エリスリトール	3) ソーマチン	4) ステビア抽出物
重量%	0.0012	0.9	0.00024	0.0024

表－１６　検体（甘味料）の添加量　　Table 16 Addition amount of sample (sweetener)
検体　Sample
スクラロース　Sucralose
エリスリトール　Erythritol

ソーマチン　Thaumatin
ステビア抽出物　Stevia extract
重量%　wt.%

3) Method for implementation
A 3-digit random number was assigned to each beverage (test specimen), to which each sample was added, so that a panelist was not aware of which test specimen contained which sample (sweetener); and then, sensory evaluation was conducted.
The evaluation was conducted in order of the reference and a test specimen, and the test specimens were placed randomly.
4) Method for evaluation
A test specimen was compared with the reference, and a test specimen that a panelist felt had the most reduced astringency, was selected. Further, regarding whether or not each test specimen was sweet, a panelist was allowed to select either of 'felt' and 'not felt (no difference from the reference.)' In addition, the panelists were allowed to describe what they felt." (pages 12 to 13)

[Evidence B No. 1]
(Z1-i) The following data are described in the table entitled "4-2 Classification of sweeteners/classification by sweetness"

"Sugar (cane sugar, sucrose)	Degree of sweetness	1
Erythritol	Degree of sweetness	0.8
Sucralose	Degree of sweetness	600"

(reference page 11)

[Evidence B No. 2]
As elucidation of terms, the following items and explanations are found.
(Z2-i) "Catechins
This is known as tannin of tea, having strong astringency. This is present widely in green tea or fruits." (page 49)
(Z2-ii) "Chlorogenic acid
This is one kind of tannin, and is a main component for astringency of coffee." (page 76)
(Z2-iii) "Shibuol
This is a persimmon juice component, and is one kind of tannin and a polyphenol compound." (page 102)
(Z2-iv) "Naringin
This is a main component for bitterness of Chinese citron and grapefruits, and is a flavonoid glycoside. ··· omitted ··· When this is mixed in fruit juice, a sharp bitter taste is sensed. ·· (omitted)" (page 152)
(Z2-v) "Limonin
The name of this component is similar to limonene or an aromatic component of citrus, but this is a name of bitter substance contained in seeds of citrus." (page 230)

[Evidence B No. 3]
(Z3-i) In the item for a mandarin orange or an orange
"Navel orange

··· omitted ··· contains a large amount of limonoid or a bitter substance, and when it is used in a fruit juice product, bitterness appears, but ··· (omitted)" (page 253, the left column)

(Z3-ii) In the item for a pummelo and its family

"(omitted) ···. Pummelos also contain a large amount of vitamin C. They contain naringin or a bitter substance." (page 254, the left end column)

"Grapefruits

··· omitted ··· contain naringin or a bitter substance and are slightly bitter, but ··· omitted." (page 255, the right end column)

[Evidence B No. 4]

This evidence is for explaining vocabularies for JIS sensory evaluation analysis, and provides explanations on the following items.

(Z4-i) "3009 Bitterness The number of bitter substances is large, and especially, many organic compounds such as alkaloid, terpenes, flavanone glycosides, and peptides are categorized as bitter substances. Bitterness is intrinsically a signal for biodefence. Thus, many bitter substances have a low threshold value, and many of them also have pharmacological effects. Further, like humulons contained in beer, many of them contribute to preferences. As a standard substance in sensory evaluation analyses, caffeine is often used." (page 10 for explanation)

(Z4-ii) "3015 Astringency, astringent taste This is considered to be a combined sensation of the palate and the astringent sense of the oral mucosa. Shibuol of persimmon juice is an example of unpleasant astringency, but astringent tastes from, for example, catechins of tea and chlorogenic acid of coffee are an important element for the taste of food products thereof." (page 11 for explanation)

[Evidence B No. 6] This is the same document as Evidence B No. 16, so explanation is omitted.

[Evidence B No. 7]

This evidence is for explaining vocabulary for JIS sensory inspection, and provides explanations on the following items.

(Z7-i) "1013 Sensory test To inspect sensory characteristics by human sense organs." (Page 2)

(Z7-ii) "1021 Masking Phenomenon wherein when two stimuli are present simultaneously, and one of the stimuli is not partially or completely sensed." (page 2)

(Z7-iii) "2016 Panelist Personnel who conducts a sensory test (see JIS Z 9080)." (page 3)

(Z7-iv) "2017 Panel Group of panelists." (page 3)

(Z7-v) "2032 Paired comparison test Test method wherein two kinds of samples are presented to panelists, and they are compared in terms of the characteristics or relative merits." (page 4)

(Z7-vi) "3014 Astringency Taste that is caused in the mouth by substances typified by, for example, tannin of astringent persimmon." (page 6)

(Z7-vii) "1014 Sensory inspection The definition of JIS Z 8101 is

recited. This is a term corresponding to English expressions such as sensory inspection, sensory analysis, sensory evaluation, organoleptic test, and taste test, and is an act for measuring the quality of a product by using human sense as a sensor of a measuring device.

Sensory inspection is equivalent to a determination on whether or not the quality at a factory is good or a determination on whether to pass an inspection for product standards, and this is the most suitable English expression for *kanno-kensa*. However, sensory analysis should be translated into *kanno-bunseki*, and this is used in research scenes. Sensory evaluation is an evaluation by the sense, into which positive feeling is incorporated so that a product is improved or the best sample is selected from many samples, rather than simply determining whether to pass the standard. Organoleptic test has an old-fashioned nuance in present-day English. Taste test is a term having a casual nuance. The Japanese term *kanno-kensa* is derived from the fact that sake-tasting inspection has been called *kanno-kensa* from old times at the National Research Institute of Brewing of the Ministry of Finance. This signifies an inspection by ability of the five human senses (taste, smell, sight, hearing, and touch). Sensory inspection is to evaluate quality characteristics of a product by a sensory psychological method, rather than a physicochemical method, and it is roughly classified into one wherein inspection and evaluation are conducted by using the senses as a quality measurement device for a product, and another wherein the level of preference is evaluated emotionally; the former is called analytical sensory inspection and the latter is called preference sensory inspection.

Further, the former is called type I sensory test and the latter is called type II sensory test." (page 13)

(Z7-viii) "2016 Panelist The definition of 2017 panel JIS Z 9080 is recited. JIS Z 9080 indicates classifications: a consumer panel (panel selected as representative consumers) and an expert panel (panel that has expert knowledge and abilities and has been trained), and the panel used herein indicates an expert panel; that is, only a group of panelist." (page 14)

(Z7-ix) "2032 Paired comparison test Method for finding a slight difference in characteristics or preference by encoding two kinds of samples and comparing them with each other. This utilizes the fact that human sensory determination is further elaborated than absolute determination through simultaneous comparison between two kinds of sample, and corresponds to a special case of a method of paired comparisons." (page 15)

(Z7-x) "3014 Astringency This is a taste caused by tannin (present in astringent persimmon, tea, wine, etc.), and is considered as a physical sense, which converges protein on the lingual surface." (page 19)

[Evidence B No. 8]

(Z8-i) This is an article entitled "The threshold of astringent substance and reactivity with protein" (page 531, Title)

(Z8-ii) "An astringent substance has a function of solidifying protein of saliva or mucosal epithelia cells, and it is considered as allowing one to feel convergence as one kind of feeling." (page 531, lines 4 to 6 of the left column)

[Evidence B No. 9]

(Z9-i) This is an article entitled " Effects of thaumatin,a natural sweetener,on improvement of flavor " (page 33, Title)

(Z9-ii) "(omitted) ··· It is considered that thaumatin binds any of taste cells at the front of the tongue, which feel sweetness and saltiness in particular, taste cells at the periphery of the middle of the tongue, which feel acidity in particular, and taste cells at the rear of the tongue, which feel bitterness in particular. Different from other taste stimulating substances as described above, thaumatin is diversified in the binding position with taste cells, which is one of its major characteristics. It is considered that since thaumatin is protein that is charged as a cation and is quite rich in hydrophilicity, the binding form is a hydrogen bond with villous surface membrane." (page 33, lines 24 to 33 of the right column)

(Z9-iii) "(omitted) ··· The reason why thaumatin reduces saltiness of an alkali metal salt is that thaumatin binds to taste cells capable of receiving saltiness to thereby reduce bindings between a part of metal salts and taste cells; and since thaumatin is a high molecular substance, a complex produced by reaction with surface membranes of taste cells has a long residence time in the mouth and is gradually eluted by saliva to reduce saltiness." (page 34, lines 3 to 9 of the left column)

(Z9-iv) "Thaumatin is a protein charged as a cation, so it binds to an anion of an alkali metal salt, improving the taste-exhibiting property." (page 34, lines 13 to 15 of the left column)

(Z9-v) "For bitter stimulators such as alkaline earth metal salts, vitamin B2, vitamin B6, lysine hydrochloride salts, and arginine hydrochloride salts, it is considered that thaumatin forms a hydrogen bond on the surface membranes of taste cells at the rear of the tongue and prevents bitter stimulators from reacting with the surface membranes of the cells as much as possible, thereby preventing a reduction of surface membrane potential density." (page 34, lines 24 to 29 of the left column)

(Z9-vi) "(omitted) ··· It is considered that thaumatin molecules electrically accumulated as a cation bind to the surface membranes of taste cells and increase the potential density at the surface membranes to thereby reduce the sensibility of bitterness; and the repulsion between ions of the same kind inhibits the reaction between bitter stimulators and the surface membranes of the taste cells. Further, the interaction with anions also improves a taste-exhibiting property of bitter stimulators." (page 34, lines 34 to 39 of the left column)

(Z9-vii) "Thus, the action mechanism for softening the acidity of thaumatin is largely different in that hydrogen bonds with the surface membranes of the taste cells prevent hydrogen ions from binding to the surface membranes, and further it is noteworthy that it is obtained with no change of pH." (page 34, lines 22 to 25 of the right column)

[Evidence B No. 10]

(Z10-i) "It may be considered that monellin non-specifically binds to the mouth epithelial tissue, and it is gradually eluted by saliva to maintain sweetness for long hours. This may be applied to thaumatin or miraculin." (page 101, lines 7 to 9)

[Evidence B No. 11]

(Z11-i) This is "Test Report" prepared by Koji YOSHINAKA of Sweetener Laboratory, 5th Department of San-Ei Gen F.F.I., Inc. on October 11, 2012.

(Z11-ii) "(Purpose)
Regarding the test verifying the effect of thaumatin described in Evidence A No. 1 'Monthly Magazine, A Technical Journal on Food Chemistry & Chemicals 10' (Food Chemicals Newspaper Inc., October 1, 1985), specifically the effect of softening astringency of tannic acid when a tannic acid aqueous solution is taken after an aqueous solution with a concentration of thaumatin not higher than the sweetness threshold is taken, the test confirmed whether the same effect is obtained even from sweeteners other than thaumatin.
(Method for testing)
Preparation of test samples: In accordance with the formulation of Table 1 described below, sweetener aqueous solutions were prepared as samples <1> to <5>. Amounts of sweeteners to be added to samples <1> to <5> were adjusted so that sweetness is not sensed. Further, as an astringent substance, 0.02% tannic acid (Kishida Chemical Co., Ltd.) aqueous solution was used in the same manner as in Evidence A No. 1. (Note by the board: <1> to <5> represent encircled numbers 1 to 5.)

＜表１＞甘味料水溶液（数値は重量％を示す。）

	①	②	③	④	⑤
砂糖	0.6	－	－	－	－
スクラロース	－	0.0006	－	－	－
アスパルテーム	－	－	0.0024	－	－
エリスリトール	－	－	－	1	－
ソーマチン	－	－	－	－	0.0001
水にて合計	100	100	100	100	100

＜表１＞甘味料水溶液（数値は重量を示す。） <Table 1> Sweetener aqueous solution (numerical values indicate weights)
砂糖 Sugar
スクラロース Sucralose
アスパルテーム Aspartame
エリスリトール Erythritol
ソーマチン Thaumatin
水にて合計 Water filled up to total

Test contents: 13 well-trained expert panelists (researchers of San-Ei Gen F.F.I., Inc.) took each sweetener aqueous solution, tasted the tannic acid aqueous solution, and then evaluated astringency by sense. In comparison with the case where only the tannic acid aqueous solution was taken without taking a sweetener aqueous solution (the following evaluation method (1)), panelists selected a sweetener aqueous solution that panelists felt reduced astringency in the above evaluation, and ○ was given to an evaluation sheet. The samples were place randomly so that the contents of the samples were not known to the panelists. (Blind test)
Evaluation method: Sensory evaluation was conducted in accordance with the following procedures (1) to (4).
(1) 0.02% tannic acid aqueous solution was taken, and the strength of astringency was

evaluated.
(Thereafter, the mouth was rinsed with water so that astringency did not remain.)
(2) About 10 ml of each sweetener aqueous solution was taken in the mouth, and taken down 3 seconds later.
(3) After being drunk, 0.02% tannic acid aqueous solution was taken 5 seconds later, and the astringency thereof was evaluated.
(4) When the astringency was reduced in (3) as compared to the strength of astringency in (1), ○ was described in the evaluation sheet.
(Results)

Results of sensory evaluation by 13 panelists are shown in Tables 2.

As shown in Table 2, all of the 13 panelists responded with the statement that thaumatin masked astringency. However, regarding sugar, sucralose, aspartame, and erythritol, merely one to two panelists stated the astringency-masking effect was observed.

（表 2）各甘味料水溶液を飲んだ後、渋味が和らぐ場合は○、和らがない場合は×

パネル NO.（性別、年齢）	①砂糖	②スクラロース	③アスパルテーム	④エリスリトール	⑤ソーマチン
パネル１（男、37）	×	×	×	×	○
パネル２（男、29）	×	×	×	×	○
パネル３（男、26）	×	×	×	×	○
パネル４（男、32）	×	×	×	×	○
パネル５（女、24）	×	×	×	×	○
パネル６（女、23）	○	×	×	×	○
パネル７（男、30）	○	×	○	×	○
パネル８（女、23）	×	×	×	×	○
パネル９（男、30）	×	×	×	×	○
パネル１０（男、27）	×	×	×	×	○
パネル１１（男、35）	×	×	×	○	○
パネル１２（男、35）	×	×	×	○	○
パネル１３（男、24）	×	○	×	×	○
○合計	2	1	1	2	13

（表２）各甘味料水溶液を飲んだ後、渋味が和らぐ場合は○、和らがない場合は× (Table 2) After taking each sweetener aqueous solution, the astringency is softened ○ or not softened ×
①砂糖　Sugar
②スクラロース　Sucralose
③アスパルテーム　Aspartame
④エリスリトール　Erythritol
⑤ソーマチン　Thaumatin
パネルＮｏ．（性別、年齢）　Panelist No. (Sex, Age)
パネル　Panelist
男　Male
女　Female
合計　Total

(Conclusion and discussion)

It was confirmed that the astringency of tannic acid was masked in the case where tannic acid aqueous solution was taken after taking the aqueous solution with the concentration of thaumatin not higher than the sweetness threshold. This is the same result as the test results described in Evidence A No. 1.

Meanwhile, regarding sweeteners other than thaumatin, such as sugar, sucralose, aspartame and erythritol, it was confirmed that they do not have a masking effect on astringency even when aqueous solutions of these sweeteners (not higher than the sweetness threshold) were taken before taking tannic acid aqueous solution.

From the above, it is considered that thaumatin and sucralose mask astringency by different mechanisms." (pages 1 to 2)

[Evidence B No. 12]

(Z12-i) "This is a search report entitled 'The sweet substances known at the time in 1997' prepared by Koji YOSHINAKA, of Sweetener Laboratory, 5th Department of San-Ei Gen F.F.I., Inc. on October 15, 2012." (page 1, Title)

(Z12-ii) "Regarding sweetener substances known at the time in 1997, at least 298 substances were present as in the attached document 1 to the best of my investigation. These were described in the attached documents 2 to 9, and those are compound names that were identifiable. ··· (omitted)." (page 1)

Attached documents 1 to 9 ··· omitted ···

[Evidence B No. 13]

(Z13-i) "This is a report entitled 'The global usage state of sucralose at the time in 1997' dated March 19, 2012, created by Akira HASEGAWA, Area Sales Manager of Japan, Korea, and Taiwan at Representative Office in Japan of Tate & Lyle. (page 1)

(Z13-ii) 'Regarding your recent inquiry on the usage state of sucralose at the time in 1997, I report as follows.

Please check the contents.

NOTE

(1) At the time in 1997, in which country was sucralose distributed and sold? In addition, at that time, please inform us of whether sucralose was easily available to those skilled in the art.

Our company sold sucralose as a food additive in the following 6 countries.

Canada, Australia, New Zealand, Russia, Romania, and Greece

At that time, sucralose was sold only by our company. In addition, the amount supplied was limited, and thus, we restricted the amount supplied and the number of samples. Further, we obliged customers in these countries to use sucralose as a raw material of product as a rule and not to transfer sucralose as it was to a third party, and therefore sucralose was not available even to those skilled in the art.

(2) Please inform us of how much share sucralose accounted for in the world market for sales of high intensity sweeteners at the time in 1997.

Sucralose accounted for 0.047% share of the world market for high intensity sweeteners at the time in 1997. Sweeteners mainly used at the time in 1997 were aspartame, acesulfame K, cyclamate, saccharin, and stevia.

(3) Please provide information on the supply of sucralose to Japan at the time in 1997.
In Japan, sucralose was not approved, and samples were not provided except San-Ei Gen F.F.I., Inc." (page 1)

[Evidence B No. 14]
(Z14-i) This is "Test Report 3" prepared by Koji YOSHINAKA of Sweetener Laboratory, 5th Department of San-Ei Gen F.F.I., Inc. on February 14, 2013. (page 1, Title)
(Z14-ii) (Purpose)
Regarding the matters to be examined C3 and C4 in Notification, tests were conducted. In accordance with Examples 1 to 4 in the patent specification, evaluation was made on the sweetness threshold when sucralose was added to each of an oolong tea beverage, a green tea beverage, a black tea beverage (peach flavor), and black coffee. Further, the astringency-masking effect of sucralose was checked for each beverage."
(Z14-iii) "(Test 1 Confirmation of sweetness threshold of sucralose)
Test contents: Sensory evaluation on each beverage was made by 7 well-trained panelists, and the threshold at which sweetness was sensed for each beverage was obtained by a method of limits.
Method for sensory evaluation: Beverage samples (Tables 1 to 4) were prepared while having gradually changing addition amount of sucralose at fixed intervals of concentration. The panelists evaluated samples in the order from a sample with a low concentration of sucralose, which obviously exhibited no sweetness (ascending series), and when sweetness was not sensed compared to a sample with no sucralose, they responded with the symbol "-"; when the panelists were not sure whether or not sweetness was sensed, they responded with "?"; and when sweetness was sensed, they responded with "+." Next, they evaluated samples in the order from a sample with a high concentration, at which sweetness was sensed (descending series), and they made responses on sweetness in the same manner as in the ascending series.
Concentrations at which sweetness was sensed first in the ascending series by respective panelists (noticeable stimulus value) and a concentration at which respective panelists did not sense sweetness or were not sure whether sweetness was sensed first in the descending series (unnoticeable stimulus value) were averaged, and the sweetness threshold of sucralose for each beverage condition was calculated. (Table 5)
<1. Oolong tea beverage>
In accordance with the formulation of Table 1, each raw material was dissolved in water, and oolong tea beverages were prepared. Since oolong tea extract No. 14266 described in the specification was not produced, "oolong tea extract M aqueous" of Maruzen Pharmaceuticals Co., Ltd., which was also an oolong tea extract, was used.

（表１）ウーロン茶飲料処方（重量%）

	①	②	③	④	⑤	⑥	⑦
ウーロン茶エキスM水性	2.5	2.5	2.5	2.5	2.5	2.5	2.5
L-アスコルビン酸ナトリウム	0.025	0.025	0.025	0.025	0.025	0.025	0.025
スクラロース	-	0.0008	0.0010	0.0012	0.0014	0.0016	0.0018
水にて合計	100.0	100.0	100.0	100.0	100.0	100.0	100.0

（表１）ウーロン茶飲料処方（重量%） (Table 1) Formulation for oolong tea

beverage (wt.%)
ウーロン茶エキスM水性　Oolong tea extract M aqueous
Ｌ－アスコルビン酸ナトリウム　Sodium L-ascorbate
スクラロース　Sucralose
水にて合計　Water filled up to total

<2. Green tea beverage>

In accordance with the formulation of Table 2, each raw material was dissolved in water and green tea beverages were prepared. Since maccha extract No. 13115 described in the specification was not produced, a liquid extract was obtained from commercially available maccha (Uji Maccha produced by Shohokuen).
Extraction method: 100 g of maccha was steeped in 500 g of hot water at 85°C for 15 minutes, and a liquid extract 1 was obtained. In addition, remaining tea leaves was steeped in 250 g of hot water at 85°C for 5 minutes, and a liquid extract 2 was obtained. Thus obtained liquid extracts 1 and 2 were mixed with each other to prepare a maccha liquid extract.

（表２）緑茶飲料処方（重量%）

	①	②	③	④	⑤	⑥	⑦
マッチャ抽出液	7.0	7.0	7.0	7.0	7.0	7.0	7.0
グルタミン酸ナトリウム	0.0075	0.0075	0.0075	0.0075	0.0075	0.0075	0.0075
マッチャフレーバー	0.1	0.1	0.1	0.1	0.1	0.1	0.1
L-アスコルビン酸ナトリウム	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
スクラロース	-	0.0010	0.0012	0.0014	0.0016	0.0018	0.002
水にて合計	100.0	100.0	100.0	100.0	100.0	100.0	100.0

（表２）緑茶飲料処方（重量%）　(Table 2) Formulation of green tea beverage (wt.%)
マッチャ抽出液　Maccha extract
グルタミン酸ナトリウム　Monosodium glutamate
マッチャフレーバー　Maccha flavor
Ｌ－アスコルビン酸ナトリウム　Sodium L-ascorbate
スクラロース　Sucralose
水にて合計　Water filled up to total

<3. Black tee beverage (peach flavor)>

In accordance with the formulation of Table 3, each raw material was dissolved in water, and the mixture was heated to 93°C and cooled, so that black tea beverages were prepared. As a black tea extract, commercially available black tea leaves (Assam tea imported by Kanon Inspekkusu Inc.) were used, and a liquid extract was obtained.
Extraction method: 100 g of ground black tea leaves was steeped in 1000 g of hot water at 90°C for 10 minutes, and the thus obtained liquid extract was used as a black tea extract.

（表３）紅茶飲料（ピーチ風味）処方（重量%）

	①	②	③	④	⑤	⑥	⑦
紅茶エキス	10.0	10.0	10.0	10.0	10.0	10.0	10.0
クエン酸（結晶）	0.06	0.06	0.06	0.06	0.06	0.06	0.06
L-アスコルビン酸ナトリウム	0.05	0.05	0.05	0.05	0.05	0.05	0.05
カラメル色素	0.025	0.025	0.025	0.025	0.025	0.025	0.025
1/5 白桃濃縮果汁（透明）	1.0	1.0	1.0	1.0	1.0	1.0	1.0
ピーチフレーバー	0.15	0.15	0.15	0.15	0.15	0.15	0.15
スクラロース	-	0.0020	0.0025	0.0030	0.0035	0.0040	0.0045
水にて合計	100.0	100.0	100.0	100.0	100.0	100.0	100.0

（表３）紅茶飲料（ピーチ風味）処方（重量%）　(Table 3) Formulation of Black tea beverage (peach flavor) (wt.%)
紅茶エキス　Black tea extract
クエン酸（結晶）　Citric acid (crystal)
Ｌ－アスコルビン酸ナトリウム　Sodium L-ascorbate
カラメル色素　Caramel dye
１／５白桃濃縮果汁（透明）　1/5 concentrated white peach juice (transparent)
ピーチフレーバー　Peach flavor
スクラロース　Sucralose
水にて合計　Water filled up to total

<4. Black coffee>

In accordance with the formulation of Table 4, each raw material was dissolved in water, packed in a can, and retorted at 120°C for 5 minutes, so that black coffee was prepared. Since coffee extract H was not produced, a liquid extract was obtained from commercially available coffee beans (Colombia supremo L=23 available from Union Coffee Roasters Inc.).
Extraction method: 500 g of ground coffee beans was subjected to extraction in 750 g of hot water at 85°C for 30 minutes, so that a liquid extract 1 was obtained. In addition, the remaining coffee beans were subjected to extraction in 500 g of hot water at 85°C for 30 minutes, so that a liquid extract 2 was obtained. The thus-obtained liquid extracts 1 and 2 were mixed with each other, so that a coffee liquid extract was obtained.

（表４）ブラックコーヒー処方（重量%）

	①	②	③	④	⑤	⑥	⑦
コーヒー抽出液	7.5	7.5	7.5	7.5	7.5	7.5	7.5
コーヒーフレーバー	0.1	0.1	0.1	0.1	0.1	0.1	0.1
スクラロース	-	0.0012	0.0014	0.0016	0.0018	0.0020	0.0022
水にて合計	100.0	100.0	100.0	100.0	100.0	100.0	100.0

（表４）ブラックコーヒー処方（重量%）(Table 4) Formulation of black coffee (wt.%)
コーヒー抽出液　Coffee liquid extract
コーヒーフレーバー　Coffee flavor
スクラロース　Sucralose
水にて合計　Water filled up to total

<Results>

（表５）各パネルが上昇系列で初めに＋をつけた濃度、下降系列ではじめに＋でなくなった濃度を示す。

	１．ウーロン茶		２．緑茶		３．紅茶		４．コーヒー	
パネル	上昇	下降	上昇	下降	上昇	下降	上昇	下降
1	0.0014	0.0012	0.0016	0.0016	0.0040	0.0035	0.0016	0.0016
2	0.0014	0.0012	0.0018	0.0016	0.0030	0.0025	0.0018	0.0016
3	0.0010	0.0012	0.0014	0.0012	0.0035	0.0040	0.0016	0.0014
4	0.0012	0.0010	0.0012	0.0012	0.0030	0.0030	0.0020	0.0016
5	0.0012	0.0012	0.0014	0.0014	0.0035	0.0035	0.0018	0.0018
6	0.0014	0.0012	0.0014	0.0014	0.0040	0.0035	0.0018	0.0016
7	0.0016	0.0014	0.0018	0.0014	0.0035	0.0025	0.0018	0.0016
平均	0.00131	0.00120	0.00151	0.00140	0.00350	0.00321	0.00177	0.00160
甘味の閾値	0.00126		0.00146		0.00336		0.00169	

（表５）各パネルが上昇系列ではじめに＋をつけた濃度、下降系列ではじめに＋でなくなった濃度を示す。 (Table 5) Indicated are a concentration at which sweetness was sensed (+) first in ascending series by each panelist and a concentration at which sweetness was not sensed (-) first in descending series.

ウーロン茶 Oolong tea

緑茶 Green tea

紅茶 Black tea

コーヒー Coffee

上昇 Ascending

下降 Descending

パネル Panelist

平均 Average

甘味の閾値 Sweetness threshold

Further, sweetness was not sensed from <1> in '3. Black tea beverage' (Note by the board: <number> signifies an encircled number; the same applies hereafter), although 1% of concentrated white peach juice was added. (None of the panelists sensed sweetness)" (pages 1 to 3)

(Z14-iv) "(Test 2 Confirmation of astringency-masking effect of sucralose)
Test contents: Sensory evaluation on each beverage was made by 7 well-trained panelists, and whether or not sucralose had astringency-masking effect in each beverage was determined by paired comparison test.
Method for sensory evaluation: For each beverage sample, sucralose addition category and sucralose-free category were prepared (Tables 6 to 9). <1> was assigned to one of the sucralose addition category and the sucralose-free category and <2> was assigned to the other so that the contents of beverages were not known to the panelists. Panelists compared <1> and <2> with each other and selected the category from which less sweetness was sensed. (Table 10)
<1. Oolong tea beverage>

In accordance with the formulation of Table 6, oolong tea beverages were prepared in the same manner as in Test 1.

（表６）ウーロン茶飲料処方（重量%）

	①	②
ウーロン茶エキスM水性	2.5	2.5
L-アスコルビン酸ナトリウム	0.025	0.025
スクラロース	0.0012	-
水にて合計	100.0	100.0

（表６）ウーロン茶飲料処方（重量%）(Table 6) Formulation of oolong tea beverage

ウーロン茶エキスM水性　Oolong tea extract M aqueous

Ｌ－アスコルビン酸ナトリウム　Sodium L-ascorbate

スクラロース　Sucralose

水にて合計　Water filled up to total

<2. Green tea beverage>

Preparation

In accordance with the formulation of Table 7, green tea beverages were prepared in the same manner as in Test 1.

（表７）緑茶飲料処方（重量%）

	①	②
マッチャ抽出液	7.0	7.0
グルタミン酸ナトリウム	0.0075	0.0075
マッチャフレーバー	0.1	0.1
L-アスコルビン酸ナトリウム	0.0025	0.0025
スクラロース	-	0.0014
水にて合計	100.0	100.0

（表７）緑茶飲料処方（重量%）　(Table 7) Formulation of green tea beverage (wt.%)

マッチャ抽出液　Maccha extract

グルタミン酸ナトリウム　Monosodium glutamate

マッチャフレーバー　Maccha flavor

Ｌ－アスコルビン酸ナトリウム　Sodium L-ascorbate

スクラロース　Sucralose

水にて合計　Water filled up to total

<3. Black tea beverage (peach flavor)>

In according to the formulation of Table 8, black tea beverages were prepared in the same manner as in Test 1.

（表８）紅茶飲料処方（重量%）

	①	②
紅茶エキス	10.0	10.0
クエン酸（結晶）	0.06	0.06
L-アスコルビン酸ナトリウム	0.05	0.05
カラメル色素	0.025	0.025
1/5 白桃濃縮果汁（透明）	1.0	1.0
ピーチフレーバー	0.15	0.15
スクラロース	0.003	-
水にて合計	100.0	100.0

（表８）紅茶飲料処方（重量%）(Table 8) Formulation of black tea beverage (wt.%)
紅茶エキス　　Black tea extract
クエン酸（結晶）　　Citric acid (crystal)
Ｌ－アスコルビン酸ナトリウム　　Sodium L-ascorbate
カラメル色素　　Caramel dye
１／５白桃濃縮果汁（透明）　　1/5 concentrated white peach juice (transparent)
ピーチフレーバー　　Peach flavor
スクラロース　　Sucralose
水にて合計　　Water filled up to total

<4. Black coffee>
In accordance with the formulation of Table 9, black coffee was prepared in the same manner as in Test 1.

（表９）ブラックコーヒー処方（重量%）

	①	②
コーヒー抽出液	7.5	7.5
コーヒーフレーバー	0.1	0.1
スクラロース	-	0.0016
水にて合計	100.0	100.0

（表９）ブラックコーヒー処方（重量%）　(Table 9) Formulation of black coffee (wt.%)
コーヒー抽出液　Coffee liquid extract
コーヒーフレーバー　　Coffee flavor
スクラロース　　Sucralose
水にて合計　　Water filled up to total

<Results>
（表１０）各パネルが「渋味が弱い」と評価したサンプル

パネル	ウーロン茶	緑茶	紅茶	コーヒー
1	①	②	①	②
2	①	②	①	②
3	①	②	①	②
4	①	②	①	②
5	①	②	①	②
6	①	②	①	②
7	①	②	①	②
スクラロース添加区を選択したパネル数	7名*	7名*	7名*	7名*

＊　p<0.05　スクラロースは有意に渋味をマスキングすると判断される。

（表１０）各パネルが「渋味が弱い」と評価したサンプル　(Table 10) Sample which was evaluated as 'weak astringency' by each panelist
パネル　Panelist
ウーロン茶　　Oolong tea

緑茶　Black tea
紅茶　Green tea
コーヒー　　Coffee
スクラロース添加区を選択したパネル数　　The number of panelists who selected sucralose-addition category
スクラロースは有意に渋味をマスキングすると判断される。　It is determined that sucralose significantly masks astringency.
７名　7 panelists

(Conclusion)
· For Examples 1 to 4 of the specification, the sweetness threshold of sucralose was confirmed, and it was confirmed that the addition amount of sucralose in Examples was not an amount that did not exhibit sweetness in that beverage.
· Even in the beverage containing white peach juice in Example 3 of the specification, the sweetness threshold of sucralose used was measured by use of a method of limits.
· In Examples 1 to 4 of the specification, it was confirmed by paired comparison test that sucralose masked astringency." (pages 3 to 4)

[Evidence B No. 15]
　　This is a new edition of sensory evaluation handbook and describes a method of limits as follows.
　　(Z15-i)　　"Chapter 11 Method for measuring threshold
11.1.2 Method of limits, method of minimal changes

[Method] An experimenter or a subject itself gradually changes a stimulus in a certain step-by-step manner, the judgment of the subject is obtained at each step, and the point at which the judgment is changed is determined.　In many cases, approaching to the point at which the judgment is changed is conducted from two directions, such as from a strong side and a weak side; and approaching from one direction is called descending series while approaching from the other direction is called ascending series.　As the value of R or the judgment change-point, the descending series has x and the ascending series has y.　In both series, if repetition is performed n times, the reaction series, x1, x2, ···, xi, ···, xn and y1, y2, ···, yi, ···, yn are used to obtain the following indexes depending on the purpose of measurement.

$$RL=\frac{1}{2}(\bar{x}+\bar{y})$$

$$DL_u=(\bar{x}-R_0)$$

$$DL_l=(R_0-\bar{y})$$

$$PSE=\frac{1}{2}(\bar{x}+\bar{y})$$

$$IU=\bar{x}-\bar{y}$$

　　However, DL_u, DL_i, and IU indicate an upper threshold, a lower threshold and

an uncertain range. Further, standard deviations s_x, s_y for respective series indicate the stability; and simultaneously, they are used to express the accuracy of estimation of numerical values such as a stimulus threshold RL and a difference threshold DL.

This is called a method of limits because it signifies that ends of series having changing judgment are determined; or a method of minimal changes because a stimulus is change little by little to a specific direction. By referring to the classification in 5.1, a case having no standard stimulus corresponds to A (Note by the board: encircling is omitted) in Table 5.1; and a case having a standard stimulus corresponds to B (Note by the board: encircling is omitted).

Procedures of this method are explained by referring to an example wherein RL of sound is measured by changing the frequency of an acoustic stimulus step-by-step. When the frequency is too low, it is not audible as a sound, so this case is expressed as '-'; when it is audible, it is expressed as '+'; and when it is impossible to determine whether it is audible, it is expressed as '?.' When the judgment is changed from '+' directly to '-,' it is considered that the change-point at that time is present therebetween and xi is defined. The same is applied to yi. Meanwhile, when the judgment is changed to '?,' that point is regarded as a change-point and values of x and y are defined. In Table 11.1, RL = 14.75 Hz. Table 11.2 shows an example for DL relative to R_o, wherein results of comparative judgment between each R and R_o are expressed by '+,' '-' or '?.' In this case, the series is brought to an end at the judgment of '?.' However, when the judgment is continued until the judgment of an opposite sign appears, this is called a complete up-and-down method shown in Table 11.3. In this case, two change-points of judgment are obtained for each series, so it is convenient to consider a point corresponding to DL_u and a point corresponding to DL_i as x and y, respectively, in any of ascending and descending series." (page 398, line 1 to page 400, line 5)

[Evidence B No. 16]

(Z16-i) "This is an article entitled 'New Sweetener, Aspartame.' Authors thereof are Noriko KOBAYASHI, Showa Women's University, Food Processing Laboratory, and two others (page 1, Title)"

(Z16-ii) "1. Threshold of aspartame

As a test method, a method of limits was used to obtain a discrimination threshold. That is, the test was conducted first from a lower concentration (ascending series) and then, from a higher concentration (descending series)." (page 7, lines 15 to 17)

(Z16-iii) "In the descending series, the test was started from a point (+) at which a taste was obviously sensed and gradually to lower concentrations, and when the judgment that the sense of the taste was not sure (?) or the taste was not sensed (-) was obtained, the value at that point is just an unnoticeable stimulus value and this is expressed as r'. Further, in the ascending series, the test was started from a point (-) at which the taste was not obviously sensed and gradually to higher concentrations, and the point (+) at which the taste was sensed first indicated just a noticeable stimulus value. When this is expressed as r", the stimulus value (RL) is obtained by the following equation.
RL = (r' + r")/2" (page 12, line 2 from the bottom to page 13, line 3)

[Evidence B No. 17]

(Z17-i) "(1) Measurement of stimulus threshold and terminal threshold

The stimulus threshold is defined by WUNDT as 'a lowermost stimulus value that can generate a sense.' The stimulus threshold is often written as RL.

The terminal threshold is a concept also defined by WUNDT, opposing to the stimulus threshold, and at present, it is interpreted in two ways: (a) a stimulus value at which a sense is no longer generated when a stimulus is increased further; that is, the uppermost stimulus value that can generate a sense; and (b) a stimulus value at which the intensity of a sense is not increased any more even when a stimulus is increased further; that is, the lower limit of stimulus value that can generate the most intensive sense." (page 10, lines 13 to 19)

(Z17-ii) "Method of limits

··· omitted ···

3. Measurement of stimulus threshold and terminal threshold

The descending series starts from a point (+) at which a taste is obviously sensed, the concentration is gradually decreased, and when the judgment that whether a taste is sensed is not sure or doubtful (?); or the taste is not sensed (-) is obtained, this series is brought to an end.

The last value in the above is just an unnoticeable stimulus value (γ').

Further, the ascending series starts from a point (-) at which a taste is not obviously sensed, and samples having a gradually increased concentration are presented. At this time, even when the judgment for "?" is obtained, the series is not brought to an end, and rather, when the judgment for "+" is obtained, it is discontinued. This last value is just a noticeable stimulus value (γ").

The value γ for stimulus threshold is obtained by the following equation.

$$\gamma = (\gamma' + \gamma'')/2$$

Simultaneously, an average deviation is obtained and may be used as a reference. Plan and others for experiment are made in accordance with general rules mentioned in PSE measurement. However, at this time, the distinctive tasting orders I and II are not applicable." (page 12, line 3 to page 13, line 26)

(Z17-iii) "Meanwhile, a method of limits is advantageous in that it is direct and easy in putting results in order, and it can advance research for a short time. Thus, it is a method having a wide applicable range and high utilization." (page 14, lines 7 to 8)

[Evidence B No. 18]

(Z18-i) "5.2.1 General The following test methods are used to determine whether or not two samples are different from each other.

a) Pair test (see 5.2.2)

··· omitted ···

5.2.2 Pair test (see 7.2)

5.2.2.1 Definition A method wherein two kinds of samples are presented to an evaluator and their properties or relative merits are compared (see JIS Z 8144)

5.2.2.2 Application Pair test is recommended for the following purposes.

a) To determine whether or not two samples are different; and when a difference is found, determine the direction of the difference.

b) To confirm whether or not preferences are different.

c) To select and train an evaluator.

A merit of this test method is that the method is simple compared to other test methods and causes a smaller sensory fatigue. A demerit of this test method is that since the test has to be conducted by preparing a pair of samples from samples to be compared, an increasing number of samples causes a drastic increase of testing times and finally it is impossible to conduct the test.

5.2.2.3 Evaluator The desired number of evaluator is 7 or more for experts, 20 or more for selected evaluators, and 30 or more for evaluators that are not selected based on the evaluation ability and not trained. In a large-scale test such as a consumer test, several hundreds of persons are needed.

5.2.2.4 Procedure In accordance with the previously determined order or the random order, one or more pairs of encoded samples are presented to an evaluator. Two samples of each pair are the same or different. The most suitable question pertaining to the difference, the direction of difference or the preference, is presented to the evaluator [see 5.2.2.2a) and b)]. A question on the difference and a question on the preference should not be asked simultaneously.

5.2.2.5 Analysis of result Indicated in 6.2.2" (page 6)

(Z18-ii) "6.2.2 Pair test method (see 7.2)

6.2.2.1 Statistical interpretation Two possible formats are available for this test method. The first is a test method pertaining to the detection and the determination of the direction of difference between two matters; and the second is a test method pertaining to the difference of preference between two matters.

This analysis is applied only to a case where each pair of the test is formed by A and B, two kinds of samples, which means AB or BA, not AA or BB.

In any case, a null hypothesis is that 'two matters are not distinguishable [based on either of the intensity and the preference]." In accordance with the statistical terminology, it is expressed that for each evaluator involved in the test, the probability that A or B exhibits a higher intensity (or more preferred) than the other is equal, that is expressed as $P_A=P_B=1/2$.

The interpretation of the result based on the number of evaluators that judge that A or B exhibits a higher intensity or more preferred than the other is determined by an alternative hypothesis relative to the null hypothesis. The alternative hypothesis determined before the implementation of the test determines the test as a two-sided test or one-sided test.

6.2.2.2 Two-sided test A two-sided test is used for simply finding whether there is an intensity difference between two matters [(sense) intensity test] or a preference difference [preference test]. The alternative hypothesis is written as $P_A \neq P_B$ (that is, $P_A>P_B$ or $P_A<P_B$).

When the number of evaluators selecting one sample is not less than a certain number in the 2nd column (pair test method) in the Attached Table 1, the null hypothesis is rejected with a significance level of 5%.

In this case, it is concluded that there is a difference between two matters. Then, if the number of evaluators selecting A is larger, it is concluded that A is significantly more intensive (or significantly more preferred) than B.

6.2.2.3 One-sided test A one-sided test is used to find whether, for example, A is more intensive [(sense) intensity test] or more preferred [preference test] than the other. The alternative hypothesis is $P_A>1/2$.

When the number of evaluators selecting A is not less than a certain number in

the 4th column (duo-trio test and pair test) in the Attached Table 1, the null hypothesis is rejected with a significance level of 5%. In this case, it is concluded that panelists significantly recognize that A is superior to B in terms of [(sense) intensity or preference].

Example In a test using 30 evaluators, 20 evaluators respond that they like A and 10 evaluators respond that they like B. Before the test, there is no reason that either of A and B is considered preferred (that is, the test is conducted as a two-sided test). The larger number (20) is compared with the number (21) in the 2nd column (pair test) present in the same line as 30 (number of evaluators) in the 1st column in the Attached Table 1. The number obtained by the test is smaller than the number in the Attached Table 1, so it is not the case that the null hypothesis is rejected with a significance level of 5% and it is impossible to conclude which is preferred.

Meanwhile, when it is expected that A is preferred in advance, the test is conducted as a one-sided test. The number of evaluators preferring A is compared with the number (20) in 4th column (duo-trio test and pair test) present in the same line as 30 (number of evaluators) in the 1st column in the Attached Table 1. The number obtained by the test is equal to the number in the Attached Table 1, so the null hypothesis is rejected with a significance level of 5% and it is concluded that A is significantly preferred." (pages 11 to 12)

(Z18-iii) Attached Table 1 Numerical Table ··· omitted ··· (page 22)

[Evidence B No. 19]

(Z19-i) This is "Test Report 4" prepared by Koji YOSHINAKA of Sweetener Laboratory, 5th Department of San-Ei Gen F.F.I., Inc. on February 14, 2013.

(Z19-ii) "(Purpose)

Regarding the matter to be examined C5 in Notification, tests were conducted. In accordance with Examples 1 to 4 in the patent specification, evaluation was made on the sweetness threshold when erythritol, stevia, and thaumatin were added to each of an oolong tea beverage, a green tea beverage, a black tea beverage (peach flavor), and black coffee. Further, the astringency-masking effects were compared among beverages containing each of sucralose, erythritol, stevia, and thaumatin at their concentrations that were not higher than those for the sweetness thresholds." (page 1)

(Z19-iii) "(Test 1 Confirmation of sweetness threshold)

Contents of test: Sensory evaluation on each beverage was made by 7 well-trained panelists, and the threshold at which sweetness was sensed for each beverage was obtained by a method of limits.

Method for sensory evaluation: Beverage samples (Tables 1 to 8) were prepared while having gradually changing addition amount of each sweetener at fixed intervals of concentration. The panelists evaluated samples in the order from a sample with a low concentration, which obviously exhibited no sweetness (ascending series), and when sweetness was not sensed compared to a sample with no sweetener, they responded with the symbol '-'; when the panelists were not sure whether or not sweetness was sensed, they responded with '?'; and when sweetness was sensed, they responded with '+.' Next, they evaluated samples in the order from a sample with a high concentration, at which sweetness was obviously sensed (descending series), and they made responses on sweetness in the same manner as in the ascending series.

Concentrations at which sweetness was sensed first in the ascending series by

respective panelists (noticeable stimulus value) and a concentration at which respective panelists did not sense sweetness or were not sure whether sweetness was sensed first in the descending series (unnoticeable stimulus value) were averaged, and the sweetness threshold of each sweetener for each beverage condition was calculated. (Tables 9 to 12)

<1. Oolong tea beverage>

In accordance with the formulations of Tables 1 and 2, each raw material was dissolved in water, and oolong tea beverages were prepared. Samples (A-1) to (a-8) using erythritol, samples (B-1) to (B-8) using stevia extract, and samples (C-1) to (C-8) using thaumatin were prepared. Since oolong tea extract No. 14266 described in the specification was not produced, 'oolong tea extract M aqueous' of Maruzen Pharmaceuticals Co., Ltd., which was also an oolong tea extract, was used. Further, in this test, Rebaudio J-100 of Morita Kagaku Kogyo Co., Ltd. was used as the stevia extract.

（表１）ウーロン茶飲料処方（重量%）

ウーロン茶エキスM水性	2.5
L-アスコルビン酸ナトリウム	0.025
甘味料	表2
水にて合計	100.0

（表１）ウーロン茶飲料処方（重量%）　(Table 1) Formulation of oolong tea beverage (wt.%)

ウーロン茶エキスM水性　Oolong tea extract M aqueous

Ｌ－アスコルビン酸ナトリウム　Sodium L-ascorbate

甘味料　Sweetener

水にて合計　Water filled up to total

表２　Table 2

（表2）甘味料（重量%）

	(A-1)	(A-2)	(A-3)	(A-4)	(A-5)	(A-6)	(A-7)	(A-8)
エリスリトール	0	1.0	1.5	2.0	2.5	3.0	3.5	4.0
	(B-1)	(B-2)	(B-3)	(B-4)	(B-5)	(B-6)	(B-7)	(B-8)
ステビア抽出物	0	0.0015	0.0020	0.0025	0.0030	0.0035	0.0040	0.0045
	(C-1)	(C-2)	(C-3)	(C-4)	(C-5)	(C-6)	(C-7)	(C-8)
ソーマチン	0	0.00020	0.00025	0.00030	0.00035	0.00040	0.00045	0.00050

（表２）甘味料（重量%）　(Table 2) Sweetener (wt.%)

エリスリトール　Erythritol

ステビア抽出物　Stevia extract

ソーマチン　Thaumatin

<2. Green tea beverage>

In accordance with the formulations of Tables 3 and 4, each raw material was dissolved in water and green tea beverages were prepared. Samples (A-1) to (A-8)

using erythritol, samples (B-1) to (B-8) using stevia extract, and samples (C-1) to (C-8) using thaumatin were prepared. Since maccha extract No. 13115 described in the specification was not produced, a liquid extract was obtained from commercially available maccha (Uji Maccha produced by Shohokuen).
Extraction method: 100 g of maccha was steeped in 500 g of hot water at 85°C for 15 minutes, and a liquid extract 1 was obtained. In addition, remaining tea leaves were steeped in 250 g of hot water at 85°C for 5 minutes, and a liquid extract 2 was obtained. The thus obtained liquid extracts 1 and 2 were mixed with each other to prepare a maccha liquid extract.

（表３）緑茶飲料処方（重量%）

マッチャ抽出液	7.0
グルタミン酸ナトリウム	0.0075
マッチャフレーバー	0.1
L-アスコルビン酸ナトリウム	0.0025
甘味料	表4
水にて合計	100.0

（表３）緑茶飲料処方（重量%） (Table 3) Formulation of green tea beverage (wt.%)
マッチャ抽出液 Maccha extract
グルタミン酸ナトリウム Monosodium glutamate
マッチャフレーバー Maccha flavor
Ｌ－アスコルビン酸ナトリウム Sodium L-ascorbate
甘味料 Sweetener
水にて合計 Water filled up to total
表４ Table 4

（表４）甘味料（重量%）

	(A-1)	(A-2)	(A-3)	(A-4)	(A-5)	(A-6)	(A-7)	(A-8)
エリスリトール	0	1.0	1.5	2.0	2.5	3.0	3.5	4.0
	(B-1)	(B-2)	(B-3)	(B-4)	(B-5)	(B-6)	(B-7)	(B-8)
ステビア抽出物	0	0.0015	0.0020	0.0025	0.0030	0.0035	0.0040	0.0045
	(C-1)	(C-2)	(C-3)	(C-4)	(C-5)	(C-6)	(C-7)	(C-8)
ソーマチン	0	0.00015	0.00020	0.00025	0.00030	0.00035	0.00040	0.00045

（表４）甘味料（重量%） (Table 4) Sweetener (wt.%)
エリスリトール Erythritol
ステビア抽出物 Stevia extract
ソーマチン Thaumatin

<3. Black tea beverage (peach flavor)>
In accordance with the formulation of Tables 5 and 6, each raw material was dissolved in water, and the mixture was heated to 93°C and cooled, so that black tea beverages were prepared. Note that the sweetness of thaumatin is reduced by heating at a high temperature. Thus, when thaumatin was used as a sweetener, thaumatin was added after heating to prepare a black tea beverage. Samples (A-1) to (a-8) using

erythritol, samples (B-1) to (B-8) using stevia extract, and samples (C-1) to (C-8) using thaumatin were prepared. As a black tea extract, commercially available black tea leaves (Assam tea imported by Kanon Inspekkusu Inc.) were used, and a liquid extract was obtained.
Extraction method: 100 g of ground black tea leaves was steeped in 1000 g of hot water at 90°C for 10 minutes, and the thus obtained liquid extract was used as a black tea extract.

（表５）紅茶飲料（ピーチ風味）処方（重量%）

紅茶エキス	10.0
クエン酸（結晶）	0.06
L-アスコルビン酸ナトリウム	0.05
カラメル色素	0.025
1/5 白桃濃縮果汁（透明）	1.0
ピーチフレーバー	0.15
甘味料	表6
水にて合計	100.0

（表５）紅茶飲料（ピーチ風味）処方（重量%） (Table 5) Formulation of black tea beverage (peach flavor) (wt.%)
紅茶エキス Black tea extract
クエン酸（結晶） Citric acid (crystal)
Ｌ－アスコルビン酸ナトリウム Sodium L-ascorbate
カラメル色素 Caramel dye
白桃濃縮果汁（透明） 1/5 concentrated white peach juice (transparent)
ピーチフレーバー Peach flavor
甘味料 Sweetener
水にて合計 Water filled up to total
表６ Table 6

（表６）甘味料（重量%）

	(A-1)	(A-2)	(A-3)	(A-4)	(A-5)	(A-6)	(A-7)	(A-8)
エリスリトール	0	3.0	4.0	5.0	6.0	7.0	8.0	9.0
	(B-1)	(B-2)	(B-3)	(B-4)	(B-5)	(B-6)	(B-7)	(B-8)
ステビア抽出物	0	0.005	0.006	0.007	0.008	0.009	0.010	0.011
	(C-1)	(C-2)	(C-3)	(C-4)	(C-5)	(C-6)	(C-7)	(C-8)
ソーマチン	0	0.0005	0.0006	0.0007	0.0008	0.0009	0.0010	0.0011

（表６）甘味料（重量%） (Table 6) Sweetener (wt.%)
エリスリトール Erythritol
ステビア抽出物 Stevia extract
ソーマチン Thaumatin

<4. Black coffee>
In accordance with the formulations of Tables 7 and 8, each raw material was dissolved in water, packed in a can, and retorted at 120°C for 5 minutes, so that black coffee was prepared. Since the sweetness of thaumatin is reduced by heating at a high temperature, thaumatin was added to black coffee after sterilization, and samples were

prepared. Samples (A-1) to (a-8) using erythritol, samples (B-1) to (B-8) using stevia extract, and samples (C-1) to (C-8) using thaumatin were prepared. Since coffee extract H was not produced, a liquid extract was obtained from commercially available coffee beans (Colombia supremo L=23 available from Union Coffee Roasters Inc.). Extraction method: 500 g of ground coffee beans was subjected to extraction in 750 g of hot water at 85°C for 30 minutes, so that a liquid extract 1 was obtained. In addition, the remaining coffee beans were subjected to extraction in 500 g of hot water at 85°C for 30 minutes, so that a liquid extract 2 was obtained. The thus-obtained liquid extracts 1 and 2 were mixed with each other, so that a coffee liquid extract was obtained.

（表7）ブラックコーヒー処方（重量%）

コーヒー抽出液	7.5
コーヒーフレーバー	0.1
甘味料	表8
水にて合計	100.0

（表７）ブラックコーヒー処方（重量%） (Table 7) Formulation of black coffee (wt.%)
コーヒー抽出液 Coffee liquid extract
コーヒーフレーバー Coffee flavor
甘味料 Sweetener
水にて合計 Water filled up to total
表８ Table 8

（表8）甘味料（重量%）

	(A-1)	(A-2)	(A-3)	(A-4)	(A-5)	(A-6)	(A-7)	(A-8)
エリスリトール	0	2.0	2.5	3.0	3.5	4.0	4.5	5.0
	(B-1)	(B-2)	(B-3)	(B-4)	(B-5)	(B-6)	(B-7)	(B-8)
ステビア抽出物	0	0.0015	0.0020	0.0025	0.0030	0.0035	0.0040	0.0045
	(C-1)	(C-2)	(C-3)	(C-4)	(C-5)	(C-6)	(C-7)	(C-8)
ソーマチン	0	0.00015	0.00020	0.00025	0.00030	0.00035	0.00040	0.00045

（表８）甘味料（重量%）(Table 8) Sweetener (wt.%)
エリスリトール Erythritol
ステビア抽出物 Stevia extract
ソーマチン Thaumatin

<Results>

（表９）ウーロン茶飲料において、各パネルが上昇系列で初めに＋をつけた濃度、下降系列ではじめに＋でなくなった濃度を示す。

	A：エリスリトール		B：ステビア抽出物		C：ソーマチン	
パネル	上昇	下降	上昇	下降	上昇	下降
1	1.5	1.0	0.0025	0.0020	0.00050	0.00045
2	3.0	3.0	0.0030	0.0030	0.00040	0.00035
3	2.0	2.0	0.0035	0.0035	0.00045	0.00045
4	3.5	3.0	0.0045	0.0040	0.00050	0.00045
5	2.5	2.5	0.0030	0.0030	0.00050	0.00045
6	3.0	2.5	0.0040	0.0040	0.00045	0.00045
7	2.0	1.5	0.0025	0.0025	0.00050	0.00045
平均	2.50	2.21	0.00329	0.00314	0.000471	0.000436
甘味の閾値	2.36		0.00321		0.000454	

（表９）ウーロン茶飲料において、各パネルが上昇系列で初めに＋をつけた濃度、下降系列ではじめに＋でなくなった濃度を示す。 (Table 9) For oolong tea beverage, indicated are a concentration at which sweetness was sensed first in ascending series by each panelist and a concentration at which sweetness was not sensed first in descending series.

エリスリトール Erythritol
ステビア抽出物 Stevia extract
ソーマチン Thaumatin
パネル Panelist
上昇 Ascending
下降 Descending
平均 Average
甘味の閾値 Sweetness threshold

（表１０）緑茶飲料において、各パネルが上昇系列で初めに＋をつけた濃度、下降系列ではじめに＋でなくなった濃度を示す。

	A：エリスリトール		B：ステビア抽出物		C：ソーマチン	
パネル	上昇	下降	上昇	下降	上昇	下降
1	1.5	1.5	0.0045	0.0030	0.00025	0.00015
2	2.0	2.0	0.0035	0.0030	0.00040	0.00035
3	1.5	2.0	0.0035	0.0025	0.00040	0.00040
4	2.0	1.5	0.0030	0.0025	0.00035	0.00035
5	2.0	1.5	0.0030	0.0025	0.00040	0.00035
6	2.5	2.0	0.0030	0.0030	0.00040	0.00025
7	2.0	2.0	0.0030	0.0025	0.00045	0.00040
平均	1.93	1.79	0.00336	0.00271	0.000379	0.000321
甘味の閾値	1.86		0.00304		0.000350	

（表１０）緑茶飲料において、各パネルが上昇系列で初めに＋をつけた濃度、下降系列ではじめに＋でなくなった濃度を示す。 (Table 10) For green tea beverage, indicated are a concentration at which sweetness was sensed first in ascending series by each panelist and a concentration at which sweetness was not sensed first in descending series.

エリスリトール　Erythritol
ステビア抽出物　Stevia extract
ソーマチン　Thaumatin
パネル　Panelist
上昇　Ascending
下降　Descending
平均　Average
甘味の閾値　Sweetness threshold

（表１１）紅茶飲料（ピーチ風味）において、各パネルが上昇系列で初めに＋をつけた濃度、下降系列ではじめに＋でなくなった濃度を示す。

	A：エリスリトール		B：ステビア抽出物		C：ソーマチン	
パネル	上昇	下降	上昇	下降	上昇	下降
1	5.0	5.0	0.008	0.007	0.0009	0.0008
2	6.0	6.0	0.009	0.008	0.0009	0.0008
3	4.0	4.0	0.007	0.007	0.0009	0.0009
4	7.0	7.0	0.010	0.009	0.0010	0.0010
5	7.0	7.0	0.009	0.008	0.0010	0.0009
6	6.0	6.0	0.010	0.008	0.0008	0.0008
7	5.0	5.0	0.010	0.008	0.0010	0.0009
平均	5.71	5.71	0.0090	0.0079	0.00093	0.00087
甘味の閾値	5.71		0.0084		0.00090	

（表１１）紅茶飲料（ピーチ風味）において、各パネルが上昇系列で初めに＋をつけた濃度、下降系列ではじめに＋でなくなった濃度を示す。　(Table 11) For black tea beverage (peach flavor), indicated are a concentration at which sweetness was sensed first in ascending series by each panelist and a concentration at which sweetness was not sensed first in descending series.
エリスリトール　Erythritol
ステビア抽出物　Stevia extract
ソーマチン　Thaumatin
パネル　Panelist
上昇　Ascending
下降　Descending
平均　Average
甘味の閾値　Sweetness threshold

（表１２）ブラックコーヒーにおいて、各パネルが上昇系列で初めに＋をつけた濃度、下降系列ではじめに＋でなくなった濃度を示す。

	A：エリスリトール		B：ステビア抽出物		C：ソーマチン	
パネル	上昇	下降	上昇	下降	上昇	下降
1	2.5	2.0	0.0040	0.0035	0.00020	0.00015
2	3.0	4.0	0.0045	0.0040	0.00030	0.00025
3	3.0	3.5	0.0035	0.0035	0.00035	0.00035
4	2.5	2.5	0.0035	0.0035	0.00040	0.00035
5	3.5	3.5	0.0035	0.0025	0.00040	0.00035
6	3.5	3.0	0.0035	0.0030	0.00030	0.00020
7	3.5	3.5	0.0040	0.0035	0.00045	0.00040
平均	3.07	3.14	0.00379	0.00336	0.000343	0.000293
甘味の閾値	3.11		0.00357		0.000318	

（表１２）ブラックコーヒーにおいて、各パネルが上昇系列で初めに＋をつけた濃度、下降系列ではじめに＋でなくなった濃度を示す。 (Table 12) For black coffee, indicated are a concentration at which sweetness was sensed first in ascending series by each panelist and a concentration at which sweetness was not sensed first in descending series.

エリスリトール Erythritol
ステビア抽出物 Stevia extract
ソーマチン Thaumatin
パネル Panelist
上昇 Ascending
下降 Descending
平均 Average
甘味の閾値 Sweetness threshold
(pages 1 to 5)

(Z19-iv) "(Test 2 Comparison among the astringency-masking effects of sweeteners)
Test contents: 7 well-trained panelists made comparison on the astringency-masking effect among sucralose, erythritol, stevia, and thaumatin when these sweeteners were added to each beverage of oolong tea beverage, green tea beverage, black tea beverage, and black coffee. The addition amount of sucralose conformed to the description of Examples of the specification. The addition amounts of other sweeteners were adjusted so that their conditions were equivalent to that of sucralose based on the ratio between the sweetness threshold of sucralose (described in Test Report 1) in the conditions for the above beverages and the addition amount described in the specification.
Method for sensory evaluation: For the above beverages, sensory evaluation was conducted on a blank free of a sweetener and samples, to which the above sweeteners were added. The panelists made comparison and evaluation on the blank and each of 4 kinds of samples containing respective sweeteners, and ranks from first to fourth were given to the samples in decreasing order of astringency reduction compared to the blank. Blind test was applied so that contents of test samples were not known to the panelists. Evaluation results were tested by Kramer method.

<1. Oolong tea beverage>

In accordance with the formulation of Table 13, oolong tea beverages were prepared in the same manner as in Test 1. The addition amount of sucralose of 0.0012% was about 95% of the sweetness threshold (0.00126%) of sucralose in this beverage. Thus, regarding the other sweeteners, their amounts were adjusted so as to be 95% of the sweetness threshold in this beverage.

（表１３）ウーロン茶飲料処方（重量%）

	ブランク	①	②	③	④
ウーロン茶エキスM水性	2.5	2.5	2.5	2.5	2.5
L-アスコルビン酸ナトリウム	0.025	0.025	0.025	0.025	0.025
スクラロース	-	0.0012	-	-	-
エリスリトール	-	-	2.24	-	-
ステビア抽出物	-	-	-	0.00305	-
ソーマチン	-	-	-	-	0.00043
水にて合計	100.0	100.0	100.0	100.0	100.0

（表１３）ウーロン茶飲料処方（重量%） (Table 13) Formulation of oolong tea beverage (wt.%)

ブランク Blank
ウーロン茶エキスM水性 Oolong tea extract M aqueous
Ｌ－アスコルビン酸ナトリウム Sodium L-ascorbate
スクラロース Sucralose
エリスリトール Erythritol
ステビア抽出物 Stevia extract
ソーマチン Thaumatin
水にて合計 Water filled up to total

<2. Green tea beverage>

In accordance with the formulation of Table 14, green tea beverages were prepared in the same manner as in Test 1. The addition amount of sucralose of 0.0014% was about 96% of the sweetness threshold (0.00146%) of sucralose in this beverage. Thus, regarding the other sweeteners, their amounts were adjusted so as to be 96% of the sweetness threshold in this beverage.

（表１４）緑茶飲料処方（重量%）

	ブランク	①	②	③	④
マッチャ抽出液	7.0	7.0	7.0	7.0	7.0
グルタミン酸ナトリウム	0.0075	0.0075	0.0075	0.0075	0.0075
マッチャフレーバー	0.1	0.1	0.1	0.1	0.1
L-アスコルビン酸ナトリウム	0.0025	0.0025	0.0025	0.0025	0.0025
スクラロース	-	0.0014	-	-	-
エリスリトール	-	-	1.78	-	-
ステビア抽出物	-	-	-	0.00291	-
ソーマチン	-	-	-	-	0.00034
水にて合計	100.0	100.0	100.0	100.0	100.0

（表１４）緑茶飲料処方（重量%） (Table 14) Formulation of green tea

beverage (we.%)
ブランク　Blank
マッチャ抽出液　Maccha extract
グルタミン酸ナトリウム　Monosodium glutamate
マッチャフレーバー　Maccha flavor
Ｌ－アスコルビン酸ナトリウム　Sodium L-ascorbate
スクラロース　Sucralose
エリスリトール　Erythritol
ステビア抽出物　Stevia extract
ソーマチン　Thaumatin
水にて合計　Water filled up to total

<3. Black tea beverage (peach flavor)>

In accordance with the formulation of Table 15, black tea beverages were prepared in the same manner as in Test 1. The addition amount of sucralose of 0.003% was about 89% of the sweetness threshold (0.00336%) of sucralose in this beverage. Thus, regarding the other sweeteners, their amounts were adjusted so as to be 89% of the sweetness threshold in this beverage.

（表１５）紅茶飲料（ピーチ風味）処方（重量%）

	ブランク	①	②	③	④
紅茶エキス	10.0	10.0	10.0	10.0	10.0
クエン酸（結晶）	0.06	0.06	0.06	0.06	0.06
L-アスコルビン酸ナトリウム	0.05	0.05	0.05	0.05	0.05
カラメル色素	0.025	0.025	0.025	0.025	0.025
1/5 白桃濃縮果汁（透明）	1.0	1.0	1.0	1.0	1.0
ピーチフレーバー	0.15	0.15	0.15	0.15	0.15
スクラロース	-	0.003	-	-	-
エリスリトール	-	-	5.09	-	-
ステビア抽出物	-	-	-	0.0075	-
ソーマチン	-	-	-	-	0.0008
水にて合計	100.0	100.0	100.0	100.0	100.0

（表１５）紅茶飲料（ピーチ風味）処方（重量%）　(Table 15) Formulation of black tea beverage (peach flavor) (wt.%)
ブランク　Blank
紅茶エキス　Black tea extract
クエン酸（結晶）　Citric acid (crystal)
Ｌ－アスコルビン酸ナトリウム　Sodium L-ascorbate
カラメル色素　Caramel dye
１／５白桃濃縮果汁（透明）　1/5 concentrated white peach juice (transparent)
ピーチフレーバー　Peach flavor
スクラロース　Sucralose
エリスリトール　Erythritol
ステビア抽出物　Stevia extract
ソーマチン　Thaumatin
水にて合計　Water filled up to total

<4. Black coffee>

In accordance with the formulation of Table 16, black coffee beverages were prepared in the same manner as in Test 1. The addition amount of sucralose of 0.0016% was about 95% of the sweetness threshold (0.00169%) of sucralose in this beverage. Thus, regarding the other sweeteners, their amounts were adjusted so as to be 95% of the sweetness threshold in this beverage.

（表１６）ブラックコーヒー処方（重量%）

	ブランク	①	②	③	④
コーヒー抽出液	7.5	7.5	7.5	7.5	7.5
コーヒーフレーバー	0.1	0.1	0.1	0.1	0.1
スクラロース	-	0.0016	-	-	-
エリスリトール	-	-	2.95	-	-
ステビア抽出物	-	-	-	0.00339	-
ソーマチン	-	-	-	-	0.0003
水にて合計	100.0	100.0	100.0	100.0	100.0

（表１６）ブラックコーヒー処方（重量%） (Table 16) Formulation of black coffee (wt.%)

ブランク Blank
コーヒー抽出液 Coffee liquid extract
コーヒーフレーバー Coffee flavor
スクラロース Sucralose
エリスリトール Erythritol
ステビア抽出物 Stevia extract
ソーマチン Thaumatin
水にて合計 Water filled up to total

<Results>

Ranks were given through sensory evaluation of the 7 panelists, and results thereof are shown in the following Tables 17 to 20.

（表１７）ウーロン茶飲料における順位付け結果

パネル	①スクラロース	②エリスリトール	③ステビア抽出物	④ソーマチン
1	1	2	3	4
2	1	4	2	3
3	1	3	2	4
4	1	2	3	4
5	1	2	3	4
6	1	2	3	4
7	1	2	3	4
平均	1.0	2.4	2.7	3.9
順位の和	7*	17	19	27**

＊ $p<0.01$ 渋味マスキング効果が有意に優れていると判断される
＊＊ $p<0.01$ 渋味マスキング効果が有意に劣っていると判断される

（表１７）ウーロン茶飲料における順位付け結果 (Table 17) Ranking results for oolong tea beverage

パネル　Panelist
スクラロース　Sucralose
エリスリトール　Erythritol
ステビア抽出物　Stevia extract
ソーマチン　Thaumatin
平均　Average
順位の和　Sum of ranks
＊　ｐ＜０．０１　渋味マスキング効果が有意に優れていると判断される
p<0.01 The astringency-masking effect is determined significantly excellent
＊＊　ｐ＜０．０１　渋味マスキング効果が有意に劣っていると判断される
p<0.01 The astringency-masking effect is determined significantly inferior

（表１８）緑茶飲料における順位付け結果

パネル	①スクラロース	②エリスリトール	③ステビア抽出物	④ソーマチン
1	2	1	4	3
2	1	3	2	4
3	1	3	2	4
4	1	3	2	4
5	1	3	2	4
6	1	3	2	4
7	1	2	3	4
平均	1.1	2.6	2.4	3.9
順位の和	8*	18	17	27**

＊　p<0.01　渋味マスキング効果が有意に優れていると判断される
＊＊　p<0.01　渋味マスキング効果が有意に劣っていると判断される

（表１８）緑茶飲料における順位付け結果　(Table 18) Ranking results for green tea beverage
パネル　Panelist
スクラロース　Sucralose
エリスリトール　Erythritol
ステビア抽出物　Stevia extract
ソーマチン　Thaumatin
平均　Average
順位の和　Sum of ranks
＊　ｐ＜０．０１　渋味マスキング効果が有意に優れていると判断される
p<0.01 The astringency-masking effect is determined significantly excellent
＊＊　ｐ＜０．０１　渋味マスキング効果が有意に劣っていると判断される
p<0.01 The astringency-masking effect is determined significantly inferior

（表１９）紅茶飲料（ピーチ風味）における順位付け結果

パネル	①ｽｸﾗﾛｰｽ	②ｴﾘｽﾘﾄｰﾙ	③ｽﾃﾋﾞｱ抽出物	④ｿｰﾏﾁﾝ
1	3	2	1	4
2	1	3	2	4
3	1	2	3	4
4	1	2	3	4
5	1	2	3	4
6	1	2	3	4
7	1	2	3	4
平均	1.3	2.1	2.6	4.0
順位の和	9*	15	18	28**

＊　p<0.01　渋味マスキング効果が有意に優れていると判断される
＊＊　p<0.01　渋味マスキング効果が有意に劣っていると判断される

（表１９）紅茶飲料（ピーチ風味）における順位付け結果　(Table 19) Ranking results for black tea beverage (peach flavor)

パネル　Panelist
スクラロース　Sucralose
エリスリトール　Erythritol
ステビア抽出物　Stevia extract
ソーマチン　Thaumatin
平均　Average
順位の和　Sum of ranks

＊　ｐ＜０．０１　渋味マスキング効果が有意に優れていると判断される
p<0.01 The astringency-masking effect is determined significantly excellent

＊＊　ｐ＜０．０１　渋味マスキング効果が有意に劣っていると判断される
p<0.01 The astringency-masking effect is determined significantly inferior

（表２０）ブラックコーヒーにおける順位付け結果

パネル	①ｽｸﾗﾛｰｽ	②ｴﾘｽﾘﾄｰﾙ	③ｽﾃﾋﾞｱ抽出物	④ｿｰﾏﾁﾝ
1	1	2	3	4
2	1	2	4	3
3	2	1	3	4
4	1	2	3	4
5	1	2	3	4
6	1	2	3	4
7	1	2	3	4
平均	1.1	1.9	3.1	3.9
順位の和	8*	13	22	27**

（表２０）ブラックコーヒーにおける順位付け結果　(Table 20) Ranking results for black coffee

パネル　Panelist
スクラロース　Sucralose
エリスリトール　Erythritol
ステビア抽出物　Stevia extract
ソーマチン　Thaumatin

平均　Average
順位の和　　Sum of ranks
＊　ｐ＜０．０１　渋味マスキング効果が有意に優れていると判断される
　　p<0.01 The astringency-masking effect is determined significantly excellent
＊＊　ｐ＜０．０１　渋味マスキング効果が有意に劣っていると判断される
　　p<0.01 The astringency-masking effect is determined significantly inferior
(pages 5 to 8)

(Z19-v)　"(Conclusion)
Regarding Examples 1 to 4 of the specification, comparison in the astringency-masking effect was made among sucralose, erythritol, stevia extract, and thaumatin at addition amounts not greater than the sweetness threshold.　Among these sweeteners, it was confirmed that sucralose was significantly excellent in the astringency-masking effect and thaumatin was significantly inferior in the astringency-masking effect." (page 8)

[Evidence B No. 20]
(Z20-i)　"8.5.3 Kramer Test
[Point of view]　To place focus on the total sum S_j of ranks of k sets for each individual." (page 305, lines 12 to 13)

[Evidence B No. 21]　··· omitted ···

[Evidence B No. 22]　Comparison table on raw material extracts used in Examples 1 to 4 and raw material extracts used in Evidence B No. 14 (Test Report 3)

実施例１～４で使用した原料エキスと実験報告書３（乙１４）で使用した原料エキスの対比表

実施例	実施例で使用した原料エキス	実験報告書３（乙１４）で使用した原料エキス	類似性に関する説明
1 ウーロン茶	・ウーロン茶エキストラクトNo.14266 ・製造中止：2005年6月 ・抽出方法・条件：他社の市販品の抽出方法・条件が不明のため、開示しません。	・「ウーロン茶エキスM水性」（丸善製薬株式会社） ・抽出方法・条件：社外秘のため開示してもらえず。	・実施例１と同じく工業的スケールで製造された市販品であるため、類似するものと考える。
2 緑　茶	・マッチャエキストラクトNo.13115 ・販売終了：2000年4月 ・抽出方法・条件： ①抹茶粉末を65℃前後の5倍量の熱水に15分間浸漬後、布に入れて機械的に加圧して抽出液を搾り出す。 ②抽出残渣を再び65℃前後の2.5倍量の熱水で5分間浸漬後、布に入れて機械的に加圧して抽出液を搾り出す。 ③上記①と②で得られた抽出液を合わせてマッチャエキストラクトとする。	・市販の抹茶粉末（宇治のお抹茶：松北園茶店）を用いて、実施例２の抽出方法・条件（左記載）に準じて、マッチャ抽出液（マッチャエキストラクト）を調製した。 ・抽出方法・条件： ①抹茶粉末100gを85℃の5倍量の熱水（500g）に15分間浸漬後、布に入れて手で抽出液を搾り出す。 ②抽出残渣を再び85℃前後の2.5倍量（250g）の熱水で5分間浸漬後、布に入れて手で抽出液を搾り出す。 ③上記①と②で得られた抽出液を合わせてマッチャ抽出液とした。	・マッチャエキストラクトNO.13115の調製法に準じてマッチャ抽出液を調製した。但し、ラボスケールのため機械的な加圧ができず、手搾りで行ったため濃い液が得られず、このため抽出温度を高めに設定した。この意味で製造条件は若干相違するが、得られたマッチャ抽出液は類似していると考える。
3 紅　茶	・市販の紅茶葉から調製した紅茶エキス（アッサムタイプ10倍抽出） ・抽出方法・条件： 市販の紅茶葉（アッサム）に、10倍量の熱水に浸漬し、得られた抽出液を紅茶エキスとする。	・市販の紅茶葉（アッサムティー：輸入者キャノン・インベックスインク）を用いて、実施例３の抽出条件に準じて、紅茶エキスを得た。 ・抽出方法・条件： 上記市販の紅茶葉（アッサム）100gを、10倍量の熱水（90℃に維持）1000gに10分間浸漬し、得られた抽出液を紅茶エキスとした。	・実施例３で使用した紅茶エキスの抽出温度と抽出時間の記録がなかったため、この点は社内実験の慣習に従っているとして、同条件で実施した。 得られた紅茶エキスは実施例３で使用した紅茶エキスと類似すると考える。

実施例	実施例で使用した原料エキス	実験報告書３（乙１４）で使用した原料エキス	類似性に関する説明
4 ブラックコーヒー	・コーヒーエキスH ・製造中止：2000年5月 ・コーヒー豆の種類：コロンビアを主としたブレンド ・抽出方法・条件： ①粗引きしたコーヒー豆（ミディアムロースト）20部を85℃の熱水30部で30分間抽出し、抽出液を得る。 ②抽出残渣を、再び85℃の熱水20部で30分間抽出し、抽出液を得る。 ③上記①と②で得られた抽出液を合わせてコーヒーエキスとする。	・市販のコーヒー豆（コロンビアスプレモL-23：(株)ユニオンコーヒーロースターズ）を用いて、実施例4の抽出条件に準じて、コーヒー抽出液を得た。 ・抽出方法・条件： ①粗引きしたコーヒー豆（ミディアムロースト）20部（500g）を85℃の熱水30部（750g）で30分間抽出し、抽出液を得る。 ②抽出残渣を、再び85℃の熱水20部（500g）で30分間抽出し、抽出液を得る。 ③上記①と②で得られた抽出液を合わせてコーヒー抽出液とした。	・実施例4と同じく粗引きで、ミディアムロストのコロンビア種の豆を用いて、コーヒーエキスHと同じ抽出方法・条件に従って、コーヒー抽出液を調製した。 従って、得られたコーヒー抽出液は実施例4で使用したコーヒーエキスHと類似すると考える。

実施例　Examples
実施例で使用した原料エキス　Raw material extract used in Example
実験報告書３（乙１４）で使用した原料エキス　Raw material extract used in Test Report 3 (Evidence B No. 14)
類似性に関する説明　Explanation on the similarity
ウーロン茶　Oolong tee
緑茶　Green tea
紅茶　Black tea
ウーロン茶エキストラクト　Oolong tea extract
製造中止：２００５年６月　Discontinuance of production: June 2005
抽出方法・条件：他社の市販品の抽出方法・条件が不明のため、開示しません。　Extraction method/conditions: Not disclosed, since extraction method/conditions of a commercially available product of other company are unknown.
「ウーロン茶エキスM水性」（丸善製薬株式会社）　"Oolong tea extract M aqueous" (Maruzen Pharmaceuticals Co., Ltd.)
抽出方法・条件：社外秘のため開示してもらえず。　Extraction method/conditions: Not disclosed since they are for in-company use only.
実施例１と同じく工業的スケールで製造された市販品であるため、類似するものと考える。　Since this is a commercially available product produced on an industrial scale like the product of Example 1, this is considered similar.
マッチャエキストラクト　Maccha extract
販売終了：２０００年４月　End of sales: April 2000
抽出方法・条件：　Extraction method/conditions:
①抹茶粉末を６５℃前後の５倍量の熱水に１５分間浸漬後、布に入れて機械的に加圧して抽出液を搾り出す。　(1) Maccha powder is steeped in 5 times its volume of hot water around 65°C for 15 minutes, and then placed in a cloth and mechanically pressed to squeeze a liquid extract.
②抽出残渣を再び６５℃前後の２．５倍量の熱水で５分間浸漬後、布に入れて機械的に加圧して抽出液を搾り出す。　(2) The extraction residue is steeped in 2.5 times its volume of hot water around 65°C for 5 minutes, and then placed in a cloth and mechanically pressed to squeeze a liquid extract.
③上記①と②で得られた抽出液を合わせてマッチャエキストラクトとする。
(3) Liquid extracts obtained in the above (1) and (2) are used as a maccha extract.

市販の抹茶粉末（宇治のお抹茶：松北園茶店）を用いて、実施例２の抽出方法・条件（左記載）に準じて、マッチャ抽出液（マッチャエキストラクト）を調製した。　Commercially available maccha powder (Uji Maccha produced by Shohokuen) was used and a maccha liquid extract (maccha extract) was prepared in accordance with the extraction method/conditions for Example 2.

抽出方法・条件：　Extraction method/conditions

①抹茶粉末１００ｇを８５℃の５倍量の熱水（５００ｇ）に１５分間浸漬後、布に入れて手で抽出液を搾り出す。　(1) 100 g of maccha powder was steeped in 5 times its volume of hot water (500 g) at 85°C for 15 minutes, and then placed in a cloth and squeezed by hand to provide a liquid extract.

②抽出残渣を再び８５℃前後の２．５倍量（２５０ｇ）の熱水で５分間浸漬後、布に入れて手で抽出液を搾り出す。　(2) The extract residue was steeped again in 2.5 times its volume of hot water (250 g) around 85°C for 5 minutes, and then placed in a cloth and squeezed by hand to provide a liquid extract.

③上記①と②で得られた抽出液を合わせてマッチャ抽出液とした。　(3) Liquid extracts obtained in the above (1) and (2) were mixed with each other and used as a maccha liquid extract.

マッチャエキストラクトＮＯ．１３１１５の調製法に準じてマッチャ抽出液を調製した。但し、ラボスケールのため機械的な加圧ができず、手搾りで行ったため濃い液が得られず、このため抽出温度を高めに設定した。この意味で製造条件は若干相違するが、得られたマッチャ抽出液は類似していると考える。

The maccha liquid extract was prepared in accordance with the preparation method for maccha extract No. 13115. However, mechanical pressure was not available since the extraction was conducted on a laboratory scale, and manual squeezing was adopted; and thus, a thick liquid was not obtained. Therefore, the extraction temperature was set to a higher level. In this regard, the production conditions were slightly different, but the obtained maccha liquid extract is considered to be similar.

市販の紅茶葉から調製した紅茶エキス（アッサムタイプ１０倍抽出）　Black tea extract prepared from commercially available black tea leaves (10 times extraction of Assam type)

抽出方法・条件：　Extraction method/conditions

市販の紅茶葉（アッサム）に、１０倍量の熱水に浸漬し、得られた抽出液を紅茶エキスとする。　Commercially available black tea leaves (Assam) are steeped in 10 times their volume of hot water, and the obtained liquid extract is used as a black tea extract.

市販の紅茶葉（アッサムティー：輸入者キャノン・インペックスインク）を用いて、実施例３の抽出方法・条件に準じて、紅茶エキスを得た。

Commercially available black tea leaves (Assam tea imported by Kanon Inpekkusu Inc.) were used and a black tea extract was obtained in accordance with the extraction method/conditions of Example 3.

抽出方法・条件：　Extraction method/conditions

上記市販の紅茶葉（アッサム）１００ｇを、１０倍量の熱水（９０℃に維持）

１０００ｇに１０分間浸漬し、得られた抽出液を紅茶エキスとした。100 g of the above commercially available black tea leaves (Assam) were steeped in 10 times their volume of 1000 g of hot water (kept at 90°C) for 10 minutes, and the obtained liquid extract was used as a black tea extract.
実施例３で使用した紅茶エキスの抽出温度と抽出時間の記録がなかったため、この点は社内実験の慣習に従っているとして、同じ条件で実施した。There was no record on the temperature and time period for extraction of the black tea extract used in Example 3, so it was considered that the extraction was conducted in accordance with in-company test practices, and therefore, it is considered that the same conditions as in the practices were applied.
得られた紅茶エキスは実施例３で使用した紅茶エキスと類似すると考える。It is considered that the obtained black tea extract was similar to the black tea extract used in Example 3.
ブラックコーヒー　　Black coffee
コーヒーエキスＨ　　Coffee extract H
製造中止：２０００年５月　　Discontinuance of production: May 2000
コーヒー豆の種類：コロンビアを主としたブレンド　Kind of coffee bean: blend mainly including beans from Colombia
抽出方法・条件：　　Extraction method/conditions
①粗挽きしたコーヒー豆（ミディアムロースト）２０部を８５℃の熱水３０部で３０分間抽出し、抽出液を得る。　　（1）20 parts of coarsely ground coffee beans (medium roasted) are subjected to extraction in 30 parts of hot water at 85°C for 30 minutes, and a liquid extract is obtained.
②抽出残渣を、再び８５℃前後の熱水２０部で３０分間抽出し、抽出液を得る。　（2）The extraction residue is again subjected to extraction in 20 parts of hot water around 85°C for 30 minutes, and a liquid extract is obtained.
③上記①と②で得られた抽出液を合わせてコーヒーエキスとする。　(3) Liquid extracts obtained in the above（1）and（2）were mixed and used as a coffee extract.
市販のコーヒー豆（コロンビアスプレモＬ＝２３：（株）ユニオンコーヒーロースターズ）を用いて、実施例４の抽出条件に準じて、コーヒー抽出液を得た。　Commercially available coffee beans (Colombia supremo L=23 available from Union Coffee Roasters Inc.) were used and a coffee liquid extract was obtained in accordance with the extraction conditions of Example 4.
抽出方法・条件：　　Extraction method/conditions
①粗挽きしたコーヒー豆（ミディアムロースト）２０部（５００ｇ）を８５℃の熱水３０部（７５０ｇ）で３０分間抽出し、抽出液を得る。　　（1）20 parts (500g) of coarsely ground coffee beans (medium roasted) were subjected to extraction in 30 parts (750 g) of hot water at 85°C for 30 minutes, and a liquid extract was obtained.
②抽出残渣を再び８５℃前後の熱水２０部（５００ｇ）で３０分間抽出し、抽出液を得る。　（2）The extraction residue was again subjected to extraction in 20 parts (500 g) of hot water around 85°C for 30 minutes, and a liquid extract was obtained.

③上記①と②で得られた抽出液を合わせてコーヒー抽出液とした。 (3) Liquid extracts obtained in the above (1) and (2) were mixed and used as a coffee extract.
実施例４と同じく粗引きで、ミディアムローストのコロンビア種の豆を用いて、コーヒーエキスHと同じ抽出方法・条件に従ってコーヒー抽出液を調製した。 Beans from Columbia, coarsely ground,medium roasted like those in Example 4 were used, and a coffee liquid extract was prepared in accordance with the same extraction method/conditions as for coffee extract H.
従って、得られたコーヒー抽出液は実施例４で使用したコーヒーエキスHと類似すると考える。 Therefore, it is considered that the obtained coffee liquid extract was similar to coffee extract H used in Example 4.

[Evidence B No. 23] ··· omitted ···

[Evidence B No. 24] ··· omitted ···

VII. Regarding the clarity of the corrected patent invention (Reason for Invalidation 4)

First, the examination will be made in the order of Reason for Invalidation 4 (clarity), Reason for Invalidation 2 (enabling requirements), and Reason for Invalidation 3 (support requirements) on inaccuracies in description, and thereafter, Reason for Invalidation 1 (inventive step).

A The object of Reason for Invalidation 4 alleged by the Demandee, which was added after the correction request, is that regarding "amount that does not exhibit sweetness" in the corrected patent invention, no definition or specific measurement method is indicated and the degree of "amount that does not exhibit sweetness" is not clear (Written Refutation, page 6, line 5 to page 7, line 12).

It is true that the "amount that does not exhibit sweetness" is not defined in the corrected patent specification as mentioned above. However, it is understood that the "amount that does not exhibit sweetness" signifies an amount at which sweetness is not sensed even when sucralose is added to a beverage. For example, paragraph [0008] of the corrected patent specification explains "sucralose unexpectedly decreases or softens excessive astringency when used in an amount not greater than a sweetness threshold " and paragraph [0009] describes "This invention provides ··· using sucralose in an amount that is not greater than a sweetness threshold and is 1/100 or more of the sweetness threshold in an astringency-exhibiting product." Considering the above, it is reasonable to understand that it is an amount that does not exceed the sweetness threshold in that beverage.

Then, the corrected patent specification does not define "sweetness threshold," but the "sweetness threshold" can be obtained by any of a method of limits in accordance with the description of Evidence B No. 15 (measurement of threshold), the description of Evidence B No. 16 (measurement of sweetness threshold of aspartame), the description of Evidence A No. 10 (threshold measurement of sweetness of sucralose), and the measurement data of Evidence B No. 14 (the sweetness threshold of sucralose is measured by a method of limits), and the allegation of the Demandee (see

the oral proceedings record, and the written statement dated March 21, 2013, page 5, lines 1 to 2). It is considered common to measure it by conducting tests from a lower concentration to a higher concentration (ascending series), then conducting tests from a higher concentration to a lower concentration (descending series), and using their averages. Thus, even though the corrected patent specification does not define a specific measurement method, it is not possible to assert that "sweetness threshold" is unclear when the common technical knowledge at the time of filing the application is taken into consideration.

B In this point, the Demandant also alleges that: it is known that sensing of sweetness is largely dependent on the subjective judgement of an individual and varies depending on the age or the physical condition even in the case of the same person; then, as described in paragraph [0013] of the corrected patent specification, it varies depending on the type or the intensity of astringency, other tastes in a product, or the conditions such as temperatures for storage or usage of the product; and thus, it is remarkably unclear (Written Refutation, page 6, lines 12 to 25).

However, in general, it is common technical knowledge to conduct sensory test by use of an appropriate number of panelists, and this prevents differences derived from the subjective judgement or the individual difference as much as possible. Considering the above, the allegation of the Demandant cannot be adopted.

C Further, the Demandant alleges that "the corrected specification does not describe at all that the concentrations of sucralose in Examples 1 to 4 are an amount that does not exhibit sweetness, and rather, it is inferred that the sucralose concentrations in Examples 1 to 4 are all within the concentration range that sufficiently exhibit sweetness as described below." (Written Refutation, page 6, lines 26 to the last line); and presents Evidence A No. 11 in the later description of the Written Refutation.

However, the corrected patent specification fails to explicitly describe whether the sucralose concentrations in Examples 1 to 4 are an amount that does not exhibit sweetness, but regarding the sucralose concentration, it has been intended to use sucralose in an amount that does not exhibit sweetness from the beginning of the application. Further, Evidence B No. 14 presented by the Demandee explains that, in those beverages, the range of sucralose concentration of "0.0012 to 0.003% by weight" ,in which the sucralose concentrations of Examples 1 to 4, and specified in the corrected patent invention are an amount of sucralose that does not exhibit sweetness. Considering the above, it is recognized that, in the range of sucralose concentration of "0.0012 to 0.003% by weight" in specific beverages (tea, black tea and coffee), the range indicates an "amount that does not exhibit sweetness" while astringency is reduced.

Indeed, Evidence A No. 11 indicates that sweetness is exhibited in specific beverages in the range of sucralose concentration of "0.0012 to 0.003% by weight". However, Evidence A No. 11 cannot be a supplementary test for Examples 1 to 4, in that the kind and amount of raw materials of used beverages are different from those of Examples 1 to 4 described in the corrected specification; and other components (for example, Sodium L-ascorbate, monosodium glutamate, and citric acid) that were contained in Examples 1 to 4 are not contained. It is not possible to confidently decide that sweetness derived from sucralose is exhibited in Examples 1 to 4, which fall within

the range of sucralose concentration of "0.0012 to 0.003% by weight". Further, it does not prove that so long as the concentration is in the range of "0.0012 to 0.003% by weight", sweetness is always exhibited (see also "II. (2) (2-1)").

After all, there may exist cases where sweetness is not exhibited at the sucralose concentration of "0.0012 to 0.003% by weight" although sweetness is sometimes exhibited in specific beverages. Although an example where sweetness is simply exhibited is indicated as shown in Evidence A No. 11, it is not enough to state that regarding "amount that does not exhibit sweetness" in the corrected patent invention, its definition or a specific measurement method thereof is not indicated and the degree of "amount that does not exhibit sweetness" is not clear.

In this connection, it can be said that the degree of amount corresponding to "amount that does not exhibit sweetness" is found by using sucralose in the concentration range of "0.0012 to 0.003% by weight" and making measurements, and it is not considered that this requires undue trial and error.

D In view of the above, it cannot be said that the corrected patent invention is unclear as the "amount that does not exhibit sweetness" is not defined in the corrected patent specification.

Accordingly, Reason for Invalidation 4 is groundless.

VIII. Regarding the enablement requirement of the corrected patent invention (Reason for Invalidation 2)

A Regarding the enablement requirement (Reason for Invalidation 2), the Demandant alleges as follows.

"The patent specification states 'The threshold of sweetness is a minimal value that exhibits sweetness of a sweet substance, but it is not always expressed as a definite value. That is, in accordance with tests of the inventors, for example, when 3 g of black tea was steeped in 150 g of 100°C hot water for 3 minutes or 10 minutes and liquid extracts were used as samples, it was confirmed that the former had a sweetness threshold of sucralose of 0.0009% by weight while latter had 0.004% by weight. It is therefore considered that even when the same high intensity sweetener is used, the sweetness threshold varies depending on the type or the intensity of astringency, other tastes such as saltiness or bitterness in a product, or the conditions such as temperatures for storage or usage of the product; but it is generally smaller than the amount for the case where sucralose is used as a sweetener. ' (paragraph [0013]). From this statement, the influence of sucralose varies depending on the substance to which sucralose is added, or the condition, and it is understood that it cannot be expressed as a definite value. It is also considered that the influence on astringency naturally varies depending on the extraction condition such as extraction temperature or extraction period of a beverage that exhibits astringency, the type and intensity of astringency, other tastes, and the various conditions such as temperatures for storage or usage of the product.

Nevertheless, the patent specification merely describes in Examples that the astringency in beverages containing specific amount of several commercially available extracts (Example 1: oolong tea extract No. 14266; Example 2: maccha extract No. 13115; Example 3: black tee extract; and Example 4: coffee extract H) was masked by mixing a specific amount of sucralose; and it does not describe at all the extraction

condition for each extract, the type and intensity of astringency, other tastes, and various conditions such as temperatures for storage or usage of the product. Further, the concentrations of 'extracts' are unclear, and in addition, other components such as citric acid, concentrated white peach juice, or SK sweet Z-3 (enzyme-treated stevia), which affect tastes, are contained. Thus, it is not considered that the amounts of sucralose used in Examples enable masking of astringency in astringency-exhibiting beverages selected from all of tea, black tea, and coffee.

That is, it is not clear that, in all the beverages that are obtained in various conditions other than the conditions described in Examples of the patent specification, '0.0012 to 0.003% by weight of sucralose relative to a beverage' enables masking of excessive astringency without affecting the physical properties of a product which is a working effect of the invention. Regarding what amount of sucralose should be added to produce such a working effect, finding such an amount requires trial and error or complicated and sophisticated experimentation beyond the extent that is expected of a person skilled in the art even in consideration of the contents described in the patent specification and the common technical knowledge as of the filing.

Accordingly, the detailed description of the invention of the patent is not clear and sufficient in such a manner as to enable any person ordinarily skilled in the art to which the invention pertains to work the patent invention." (see Demand, page 16, line 7 to page 17, line 8)

However, through the correction, the amount of sucralose is corrected to "using ··· in such an amount that ranges from 0.0012 to 0.003% by weight relative to the beverage and does not exhibit sweetness". Thus, the allegation that "the sweetness threshold is not always expressed as an absolute value" is overcome by restricting the amount to an "amount that does not exhibit sweetness". Then, the Demandee also recognizes that the amount of sucralose in the range of 0.0012 to 0.003% by weight sometimes exhibits sweetness, but it is reasonable to understand that the corrected patent invention is established on the premise that the sweetness threshold of sucralose is different (varies) depending on the beverage.

Indeed, the corrected patent specification describes in Examples 1 to 4 that astringency is reduced, but it fails to explicitly describe whether or not sweetness is exhibited.

However, from the beginning of the application it has been intended to use sucralose in an amount that does not exhibit sweetness. Further, although Evidence B No. 14 is presented and the supplementary data described therein are not the same as that of Examples 1 to 4 described in the corrected patent specification, it is explained that the range of sucralose concentration of "0.0012 to 0.003% by weight" ,in which the sucralose concentrations in Examples 1 to 4 ,and specified in the corrected patent invention are the amount at which sucralose does not exhibit sweetness. Considering the above, it is recognized that the range of sucralose concentration of "0.0012 to 0.003% by weight" can be the "amount that does not exhibit sweetness" while astringency is reduced in specific beverages (tea, black tea, and coffee). For finding the degree of amount corresponding to the "amount that does not exhibit sweetness", it is enough to measure it by using sucralose in the concentration range of "0.0012 to 0.003% by weight" and sensory test using many panelists is generally conducted. It is not recognized that these require undue trial and error (see the above "VII. Regarding

the clarity of the corrected patent invention C").

Then, it is recognized that a method of limits can be used to determine whether or not sweetness is exhibited (possibly whether sweetness is increased) by adding 0.0012 to 0.003% by weight of sucralose to a specific beverage; and it is not recognized that the determination requires undue trial and error. Then, not only Evidence B No. 14 but also Evidence A No. 11 confirms that addition of sucralose in the range of 0.0012 to 0.003% by weight reduces astringency.

Note that they are different only in that sweetness is not exhibited in Evidence B No. 14 while sweetness is exhibited in Evidence A No. 11. However, this is not a contradiction, and there is no alternative but to understand that the kind or amount of a beverage or the presence/absence of other component differentiates them in terms of whether sweetness is exhibited.

B In this regard, the Demandant alleges in the Written Refutation "the corrected specification does not describe at all that the sweetness threshold is determined by 'a method of limits'; and since there were many methods for determining the sweetness threshold other than 'method of limits' at the time of filing the patent application, it is not acknowledged as a self-evident matter from the description of the corrected specification to measure the 'amount that does not exhibit sweetness' in the invention by 'a method of limits' at the time of the filing the patent application." (Written Refutation, page 22 (7-3).

However, considering the descriptions of Evidences B No. 14 to 17 and Evidence A No. 10, it is considered as common technical knowledge to obtain the "amount that does not exhibit sweetness" by a method of limits. The Demandant does not explain at all what measurement method is suitable other than a method of limits and that the numerical value obtained thereby is substantially different from that obtained by a method of limits, and it is utterly impossible to adopt the allegation of the Demandant. Further, the Demandee alleges in the oral proceedings that the sweetness threshold is measured by a method of limits (see the oral proceedings record).

C Further, the Demandant alleges that:
(i) "The upper limit of '0.0012 to 0.003% by weight' of the invention is understood as the amount of sucralose used in Example 3. However, concentrated white peach juice, which is a sweetness-exhibiting component, is added to the beverage of Example 3, and it is hardly possible for panelists to determine whether the amount of sucralose is not greater than the sweetness threshold. Thus, it is unclear whether the concentration of sucralose used in each beverage of Examples 1 to 4 is the concentration that does not exhibit sweetness".;
(ii) "It is highly probable that the entire range of '0.0012 to 0.003% by weight relative to the beverage' in the invention is the 'amount that exhibits sweetness,'; the 'amount that does not exhibit sweetness' added by the correction cannot be determined unambiguously from the description of the specification, and thus, the range is unclear."; and
(iii) "Test Example 1 is not a test that proves that the amount of sucralose not exhibiting sweetness produces an astringency-masking effect for 'astringency-exhibiting beverage selected from tea, black tea, and coffee' in the invention; at least the sucralose concentration in Example 3 is an amount in the range obviously exhibiting sweetness,

and further, it is inferred that the sucralose concentrations in Examples 1, 2, and 4 are an amount in the range exhibiting sweetness. Therefore, all of Test Example 1 and Examples 1 to 4 are not a test that proves that, for 'astringency-exhibiting beverage selected from tea, black tea, and coffee', the 'amount that does not exhibit sweetness' of sucralose produces an astringency-masking effect." (Written Refutation, page 23 (7-4)).

With respect to the above

Regarding the point (i), the Demandant does not present any data, while the Demandee explains that sweetness is not sensed from a beverage with 1% of concentrated white peach juice by use of the data of Evidence B No. 14 (see Indication (Z14-iii)). It is also reasonable to understand that even if the sweetness of white peach is present, it is possible to determine whether addition of sucralose increases sweetness.

Regarding the point (ii), Evidence B No. 14 explains that any concentration in the range of "0.0012 to 0.003% by weight relative to the beverage" can be the "amount that does not exhibit sweetness" and it is recognized that the sweetness threshold can be determined by a method of limits. Thus, it is not recognized that the "amount that does not exhibit sweetness" is unclear.

Regarding the point (iii), Test Example 1 is acknowledged as alleged by the Demandant; even if there is no explicit description on whether the contents of sucralose in Examples 1 to 4 are the amount that does not exhibit sweetness, it has been intended to "use in an amount not greater than the sweetness threshold" from the beginning of the application; and the kinds of beverages in Evidence B No. 14 are not the same as those of Examples 1 to 4 and they are not always regarded as supplementary tests for Examples 1 to 4, but the amounts of beverages, other components, and their amounts conform to those of Examples 1 to 4 and there is no inconsistency. Considering the above, it is not possible to confidently decide that Examples 1 to 4 are not Examples of the corrected patent invention. It is not possible to determine that the amounts of sucralose used in Examples 1 to 4 exhibit sweetness based on the data that Evidence A No. 11 indicates sweetness is exhibited, because: although the amount of sucralose of 0.0012%, which is used in Example 1, is adopted for the oolong tea beverage, the amount of sucralose for the green tea beverage, the black tea beverage and the black coffee is 0.0012% relative to the beverages; they are different from the sucralose amounts of Examples 2 to 4 (0.0014%, 0.003% and 0.0016%); and above all, the raw materials for all beverages are different, their amounts are different, and in addition, the other components are not added.

Therefore, the above allegations (i) to (iii) of the Demandant are unreasonable and cannot be adopted.

Further, even when the descriptions of the Written Demand for Invalidation Trial, the Written Refutation and the Oral Proceedings Statement Brief are examined, no critical allegation that affects the above judgment is found.

D Therefore, it should be said that the corrected patent invention is described in the detailed description of the invention in such a manner that a person skilled in the art to which the invention pertains can easily work the invention.

Accordingly, the allegation of the Demandant that the patent violates Article 36 (4)(i) and should be invalidated is unreasonable and cannot be adopted.

IX. Regarding the support requirement of the corrected patent invention (Reason for

Invalidation 3)

Regarding the support requirement (Reason for Invalidation 3), the Demandant alleges as follows.

First, the Demandant makes the same allegation as in the above "VIII. Regarding the enablement requirement of the corrected patent invention" (the wording is also the same), and further, alleges as follows.

"The invention includes as Constituent Element A 'an astringency-exhibiting beverage selected from tea, black tea and coffee', and the degree of astringency possessed by these beverages may greatly vary depending on various conditions. On the other hand, Examples of the patent specification merely confirm that the problem can be specifically solved only for beverages obtained under the limited conditions.

Also, the detailed description of the invention does not describe or suggest that for beverages obtained under conditions other than those that confirm that the problem can be specifically solved in Examples, the problem to be solved by the invention can be resolved by having the constituent element of the invention in such a manner that a person skilled in the art can perceive so; and further, even in the absence of such description or suggestion, a person skilled in the art cannot perceive that the problem to be solved by the invention can be resolved in light of the common technical knowledge at the time of filing.

Accordingly, even in consideration of the contents described in the patent specification and the common technical knowledge at the time of filing, the specified contents cannot be expanded or generalized to the entire scope of the claim." (Demand, page 17, line 9 to page 18, line 24).

However, the opinion of the board is as examined in the above "VIII. Regarding the enablement requirement of the corrected patent invention." Then, since "using ··· in such an amount that ranges from 0.0012 to 0.003% by weight relative to the beverage and does not exhibit sweetness" is specified (by the correction), it is acceptable that the degree of astringency possessed by the beverage varies depending on various conditions as long as the astringency is reduced. A person skilled in the art can understand that using "in such an amount that ranges from 0.0012 to 0.003% by weight relative to the beverage and does not exhibit sweetness" can reduce the astringency, and it is reasonable to understand that sucralose is used in an amount that does not exhibit sweetness in Examples 1 to 4 described in the corrected patent specification where the astringency is reduced.

Therefore, in light of the common technical knowledge at the time of filing, a person skilled in the art can perceive that the problem to be solved by the corrected patent invention can be resolved; that is, masking of astringency is possible, by "using in such an amount that ranges from 0.0012 to 0.003% by weight relative to the beverage and does not exhibit sweetness" and there is no alternative but to state that the invention for which a patent is sought is described in the detailed description of the invention.

Accordingly, the allegation of the Demandant that the patent violates Article 36 (6)(i) and should be invalidated is unreasonable and cannot be adopted.

X. Regarding the easily-conceived property of the corrected patent invention (Reason for Invalidation 1)

The Demandant makes comparison between Evidence A No. 1 and the corrected patent invention to clarify a different feature, and alleges that the different feature is easily conceivable when Evidences A Nos. 2 to 7 are taken into consideration. Thus, the examination will be made in line with the above.

(1) Invention described in Evidence A No. 1

Indications of Evidence A No. 1 shown in the above "VI. Outline of each of Evidences A and B" are examined.

(A) "the astringency of tannic acid derived from black tea is prominent and becomes a cause for damaging the flavor. Thaumatin has an effect of masking and reducing astringency of tannic acid and also emphasizing the flavor of black tea." (Indication (K1-ii))

(B) FIG. 3 illustrates the effect on black tea beverage, in which "'Neo Saint Marc C' as a thaumatin formulation" was used, and shows cases where Neo Saint Marc C was added in amounts of 0.1%, 0.06%, and 0.03%, from which it is found that sweetness was weakened while astringency of black tea was intensified in the order (decreasing order of concentrations). (Indication (K1-ii))

(C) "Use of 'Neo Saint Marc C' in a black tea beverage reduces the astringency by 50% or more, emphasizes the flavor of black tea, and emphasizes sweetness in relation with softening the stimulatory of acidity thereby making it mild." (Indication (K1-ii))

(D) Descriptions on the masking of astringency are found as follows. "After drinking of thaumatin at a concentration of not greater than a sweetness threshold, for example 0.0001% solution, when a solution of caffeine (0.05%) as a bitter substance, vitamin C (0.1%) as an acid substance, common salt (0.5%) as a salty substance, and tannic acid (0.02%) as an astringent substance was drunk, how each taste is felt was studied, and results thereof are shown below". As a result of that, the Evidence describes as follows. "Vitamin C: astringency and sharpness disappeared, and thus mild acidity is provided. Further, a drug-like taste disappeared". "Tannic acid: astringency was reduced by half and softened". Then, the following explanation is added. "In this way, even when a taste-exhibiting substance and thaumatin do not coexist in an aqueous solution, an effect of softening and reducing each taste can be obtained. This effect is produced by hydrogen bond between thaumatin and taste bud cells. These effects can be obtained by using 0.1 to 0.2% of 'Neo Saint Marc D' as a thaumatin formulation during eating or drinking." (Indication (K-iii))

(E) FIG. 5 shows changes in the astringency of tannic acid by addition amounts of Neo Saint Marc D, and it is found that for 0.025% of tannic acid, when Neo Saint Marc D was added in amounts of 0.05%, 0.1%, 0.15%, and 0.2%, the astringency reduction ratio was increased in the order of 0.05%, 0.1%, 0.15%, and 0.2%. (Indication (K-iii))

In view of the above, it is recognized that Evidence A No. 1 discloses the following invention (hereinafter, referred to also as "Invention A-1") from the description of the above (A) in consideration of the description of the above (B) to(E).

<Invention A-1>

"A method for masking astringency, comprising adding thaumatin to a black tea beverage having astringency of tannic acid."

(2) Comparison

Then, a comparison between the corrected patent invention and Invention A-1 is made.
(a) "A black tea beverage having astringency of tannic acid" in Invention A-1 corresponds to "an astringency-exhibiting beverage selected from tea, black tea, and coffee" in the corrected patent invention, and the two are identical in terms of "beverage exhibiting astringency of black tea".

Regarding the beverage, the Demandee alleges that the invention refers to "an astringency-exhibiting beverage selected from tea, black tea, and coffee" while Invention A-1 refers to "black tea" alone; but it is sufficient as long as black tea or one of options is identical. Thus, the allegation of the Demandee cannot be a different feature.
(b) "Thaumatin" of Invention A-1 can be a sweetener while the corrected patent invention refers to "sucralose"; and the two of them are common in that they are "a sweetener". As described in paragraph [0012] of the specification of the case, it is known that both of them are high intensity sweeteners.
(c) Invention A-1 and the corrected patent invention are the same in that they are "a method for masking astringency".

Regarding the significance of the phrase "masking astringency", the corrected patent specification does not clearly define it, but describes "it is an important matter that the astringency is reduced to a mild level to correct a defective portion indicating this taste and enhance only an advantageous portion." (paragraph [0002]), and it describes that reducing the astringency to a mild level is an important matter. Further, it describes that "As a result, they have found that sucralose unexpectedly decreases or softens excessive astringency in an amount not greater than a sweetness threshold and further it does not cause any damage on a general taste." (paragraph [0008]). Furthermore, as the effect of the invention, it describes "according to the present invention, excessive astringency in various final products exhibiting astringency can be reduced or softened without adding a special process/treatment." (paragraph [0022]). In view of these descriptions, it is reasonable to understand that the phrase does not signify complete cover-up of astringency and it signifies masking of excessive astringency; and it is also reasonable to understand that it is sufficient with at least a reduction of an excessive portion of astringency, rather than complete elimination of astringency.

In view of the above, the two inventions are the same in that they are
"A method for masking astringency comprising using a sweetener in a beverage exhibiting astringency of black tea", while they are different from each other in the following different feature.
<Different feature>

Regarding the sweetener, the corrected patent invention uses "sucralose in such an amount that ranges from 0.0012 to 0.003% by weight relative to the beverage and does not exhibit sweetness" while Invention A-1 uses "thaumatin".

(3) Judgment on the different feature

First, the description of Evidence A No. 1 will be examined.

As pointed out in the above "(1) (D) ", regarding masking of astringency, the Evidence describes "After drinking of thaumatin at a concentration of not greater than a

sweetness threshold, for example a 0.0001% solution", "when a solution of ···tannic acid (0.02%) as an astringent substance was drunk" and "Tannic acid: astringency was reduced by half and softened." It explains that "In this way, even when a taste-exhibiting substance and thaumatin do not coexist in an aqueous solution, an effect of softening and reducing each taste can be obtained". However, this form does not describe a solution (beverage), in which tannin and thaumatin are present together in an aqueous solution. Thus, even when the concentration for drinking is not greater than the sweetness threshold, they are separately taken and it is not appropriate to understand that the above is applicable to a case where a taste-exhibiting substance and thaumatin are present together in an aqueous solution.

Indeed, the description "even when ··· do not coexist" (the underline is added by the board) is found (see indication (K1-iii)).

The above description is followed by (a) "These effects can be obtained by using 0.1 to 0.2% of 'Neo Saint Marc D' as a thaumatin formulation during eating or drinking" ,and (b) in FIG. 5 showing that Neo Saint Marc D masks astringency of tannic acid (0.025%), the astringency reduction ratio increases from the zero point almost linearly in response to increases of the addition amount of Neo Saint Marc D (see Indication (K1-iii)), however, the first measurement point is 0.05%. The amounts indicated by 0.1 to 0.2% or 0.05% are much larger compared to the above "concentration of not greater than a sweetness threshold, for example 0.0001% solution," and FIG. 3 shows that even 0.03% of neo Saint Marc C exhibited sweetness (see Indication (K1-ii)). In view of the above, it is understood that the amounts used in the above exhibit sweetness. In FIG. 5, no measurement point is indicated in a case that does not exceed the sweetness threshold expected to be present between 0 and 0.05%, so that range is merely an extrapolation. Then it is not reasonable to understand that the working effect of astringency-reduction is confirmed even in a case not exceeding the sweetness threshold.

Meanwhile, FIG. 3 (see Indication (K1-ii)) described prior to the above description explains that thaumatin masks and reduces astringency of tannic acid. However, in all of the cases for the concentrations of Neo Saint Marc C (thaumatin) of 0.1%, 0.06% and 0.03%, the figure merely indicates that sweetness is exhibited depending on the concentration.

In view of the foregoing, considering that Evidence A No. 1 includes no description that clearly refers to a beverage having thaumatin in an amount not greater than the sweetness threshold together with astringency, the premise of "even when ··· do not coexist" can be understood as intending for coexistence when sweetness is exhibited, and it is not possible to understand that the explanation is extended to the case for a aqueous solution in which thaumatin is present in an amount not greater than the sweetness threshold together with tannin.

After all, from the description of Evidence A No. 1, it is clear that thaumatin reduces astringency of a black tea beverage, but there is no alternative but to state that the Evidence does not disclose that the amount in the range not exceeding the sweetness threshold of thaumatin can reduce astringency of a black tea beverage.

The corrected patent specification describes in paragraph [0017] that 0.00008% of thaumatin does not have a masking effect on 0.04% by weight of aluminum tannate, but this does not indicate an inconsistency. Further, the data of Evidence B No. 11 confirms that even when sucralose, aspartame, or erythritol is taken in an amount not

greater than their sweetness thresholds before drinking of a tannic acid aqueous solution, they are different from thaumatin in that they do not show a masking effect on astringency (see "Z11-ii"). Considering this, it is presumed that thaumatin is possibly different in the action from the other three sweeteners.

Even if it is understood that Evidence A No. 1 suggests that astringency can be reduced when thaumatin is present in an amount not greater than the sweetness threshold together with astringency of black tea in a solution (beverage), this suggestion does not lead to a motive to replace thaumatin as a protein (peptide) (see Indication (K1-iv)) with sucralose as a sugar derivative having a significantly different chemical structure (see Indication (K7-ii)) just because they are high intensity sweeteners.

Now, considering the descriptions of Evidences A Nos. 2 to 7, it will be examined whether a person skilled in the art could have easily conceived of using sucralose instead of thaumatin in an amount not greater than the sweetness threshold of sucralose to reduce astringency of a black tea beverage (also beverages of green tea and coffee).

Evidence A No. 6 discloses that sucralose is added to a black tea beverage or the like (see indications (K6-i) to (K6-ii)); and Evidence A No. 7 discloses that sucralose is added to foods to mask an unpleasant taste possessed by a flavor agent (see Indications (K7-i) to (K7-iii)).

Then, it is easy to add sucralose to a black tea beverage, but Evidences A Nos. 6 and 7 do not disclose or suggest that the addition amount is an amount that does not exhibit sweetness or the addition amount can reduce astringency.

Meanwhile, as is clear from paragraph [0012] of the corrected patent specification, thaumatin, a stevia extract, and aspartame are in correspondence in that they are high intensity sweeteners, like sucralose.

Thus, Evidences A Nos. 2 to 5 are examined.

First, "decomposition product of aspartame" used in Evidence A No. 5, which is considered to soften astringency, is different from aspartame and does not exhibit sweetness (see Indication (K5-iv)); and thus, this is not relevant from the viewpoint of the sweetener. Evidence A No. 5 also describes the coexistence with aspartame, but it does not describe that aspartame softens astringency.

Next, Evidence A No. 4 discloses that use of a stevia extract softens astringency caused by an inorganic electrolyte cation group (see Indication (K4-iii)). However, it is intended for low-calorie beverages containing an inorganic electrolyte component and an organic acid component such as a low-calorie sports drink for supplying water and electrolytes (cations of Na, K, etc. and anions of Cl^-, phosphate ions, etc.), which are lost by sweating during sports, etc. (see Indications (K4-i) to (K4-ii)), and it is not intended for "an astringency-exhibiting beverage selected from tea, black tea, and coffee," which is different from that of Invention A-1. Further, it does not suggest at all whether usage in an amount that does not exhibit sweetness can soften astringency. Thus, there is no motive to combine with Invention A-1.

Then, Evidence A No. 3 discloses that use of glycyrrhetic acid monoglucuronide can improve the flavor of food even in a concentration "not greater than the sweetness detection threshold" (see Indications (K3-i) and (K3-iv)), and exemplifies "coffee and

black tea" as the food (see Indication (K3-ii)). However, masking of astringency is described only in Example 4 pertaining to orange nectar (natural fruit juice), and it is understood that it discloses that the astringency of citrus is masked at most. That is, it describes only flavor improvement for "coffee and black tea" and does not specifically refer to masking of astringency. Thus, Evidence A No. 3 is not intended for "an astringency-exhibiting beverage selected from tea, black tea, and coffee", which is different from that of Invention A-1. Hence, primarily, there is no motive to combine with Invention A-1. It is considered that "astringency selected from tea, black tea, and coffee" is derived from tannin while the astringency of citrus is derived from naringin or limonin; and it is recognized that their astringencies are derived from a different origin (see Indications of Evidences B Nos. 2 and 3).

Further, Evidence A No. 2 discloses that in a beverage containing a sugar alcohol in the range of 0.2 to 3% by weight, the astringency is reduced to an appropriate range, and also discloses a case where sweetness is not exhibited (see Indications (K2-i) to (K2-v)). However, as Evidence A No. 2 describes "The above effect cannot be obtained even when a component other than sugar alcohol, such as sucrose, isomerized sugar, or glucose, is used as the sweetener component for controlling ···astringency" (Indication (K2-iii)), a sugar alcohol alone is effective to reduce astringency and a sugar alcohol is a sweetener but is not a high intensity sweetener such as thaumatin or sucralose. Considering the above, it cannot be said that only one example for sugar alcohol easily leads to the replacement of thaumatin in Invention A-1 with sucralose and a method for reducing astringency by using it in an amount that does not exhibit sweetness.

In view of the above, even if it is publicly known that sucralose is added to a black tea beverage, etc. (Evidences A Nos. 6 and 7) and sucralose is a high intensity sweetener like thaumatin, a stevia extract, or glycyrrhetic acid monoglucuronide, it is impossible to predict that use of sucralose instead of thaumatin in Invention A-1 produces the same working effect even when the descriptions of Evidences A Nos. 2 to 5 are taken into consideration; and further, it is impossible to predict that the astringency is masked by adding it to a beverage in an amount that ranges from 0.0012 to 0.003% by weight and does not exhibit sweetness relative to the beverage.

It is recognized that the sweetness threshold of sucralose alone in an aqueous solution is 0.0006% by weight (see Indication (K10-iii) of Evidence A No. 10 attached to the written opinion in the history of the examination) while the range of "0.0012 to 0.003% by weight" specified in the corrected patent invention exceeds the sweetness threshold in an aqueous solution. Thus, the corrected patent invention seems to merely specify the range exhibiting sweetness. However, the corrected patent specification explains that when it is added to a beverage, the sweetness threshold varies and there are some cases where sweetness is not exhibited even in that range (paragraph [0013]), and a further explanation is made by reference to the supplementary data (see Evidence B No. 14). Then, as examined above, it should be said that a person skilled in the art cannot easily conceive that sucralose can be used in the range not exhibiting sweetness in the specific beverage, even when Evidences A Nos. 1 to 7 are taken into consideration together.

Moreover, even when other allegations and proof of the Demandee are

examined, none of the allegations and proof affect the above judgement.

Therefore, the corrected patent invention could not have been easily conceived by a person skilled in the art based on Invention A-1, even when the descriptions of Evidences A Nos. 2 to 7 as documents prior to the filing of the case are taken into consideration.

(4) Summary

Accordingly, the allegation of the Demandant pertaining to Reason for Invalidation 1 by means of proof is groundless, and cannot be adopted.

XI. Closing

As described above, the allegations and the means of proof by the Demandant cannot invalidate the patent relating to Claim 1 after the correction.

The costs in connection with the trial shall be borne by the Demandant under the provisions of Article 61 of the Code of Civil Procedure which is applied mutatis mutandis in the provisions of Article 169(2) of the Patent Act.

Therefore, the trial decision shall be made as described in the conclusion.

May 16, 2013

Chief administrative judge:	KAWAKAMI, Yoshihide
Administrative judge:	SEKI, Mihogi
Administrative judge:	OGAWA, Keiko