

DESCRIPTION

TITLE OF INVENTION

5

DENTIFRICE COMPOSITION

TECHNICAL FIELD

[0001]

10

The present invention relates to a dentifrice composition which contains sodium bicarbonate and which provides a good mouth-freshening sensation and also exhibits excellent foam production and foam performance during brushing.

BACKGROUND ART

15

[0002]

It is important for dentifrice compositions such as toothpastes to impart a real sense of effectiveness in that the mouth feels cleansed and refreshed after brushing. At the same time, poor foam production and foam performance during brushing tend to be perceived as an unpleasant feeling on use, which lowers the sense of effectiveness and also leads to a decline in the effects of use.

20

[0003]

A dentifrice composition is generally formulated with an abrasive as a cleaning agent and with a surfactant such as an anionic surfactant to ensure foam production. Also, sodium bicarbonate (baking soda) is added to impart a mouth-freshening sensation.

25

However, when a dentifrice composition is formulated with sodium bicarbonate in order to enhance the mouth-freshening sensation, the sodium bicarbonate sometimes affects the basic performance of the composition such as foam performance and also, due to its saltiness, may lead to a decline in the feeling on use.

[0004]

30

Patent Document 1 (JP No. 5033283) teaches that the unpleasant feeling on use due to specific bitter ingredients included in oral compositions is ameliorated by adding baking soda in at least a specific weight ratio. However, this art neither addresses nor even

mentions foam performance. Patent Document 2 (JP-A 2018-203640) discloses that when an anionic surfactant and xanthan gum are used together in a dentifrice composition, by including at least 1.4 wt% of each, the dribbling of foam from the mouth during brushing can be prevented and that the decline in the mouth-freshening sensation within such a combined system can be resolved by adding a bicarbonate.

PRIOR ART DOCUMENTS

PATENT DOCUMENTS

[0005]

- 10 Patent Document 1: JP No. 5033283
Patent Document 2: JP-A 2018-203640
Patent Document 3: JP-A 2017-514881

SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0006]

- The present invention was arrived at in light of the above circumstances. The object of this invention is to provide a sodium bicarbonate-containing dentifrice composition which imparts a good mouth-freshening sensation and also has an excellent foam performance that suitably generates foam during brushing and gives a foam that has body.

SOLUTION TO PROBLEM

[0007]

- The inventor, as a result of conducting extensive investigations in order to achieve the above object, has learned that by including (C) carrageenan and (D) a water-soluble zinc salt together in a dentifrice composition formulated with a specific amount of (A) sodium bicarbonate (baking soda) and with (B) an anionic surfactant, the composition suitably foams, component (A) prevents the body of the foam during brushing from weakening, giving a foam that has body, and the mouth-freshening sensation can be increased. That is, the inventor has discovered that a dentifrice composition which contains (A) sodium bicarbonate, (B) an anionic surfactant, (C) carrageenan and (D) a water-soluble zinc salt and in which the content of component (A) is from 0.1 to 2 wt%

imparts a good mouth-freshening sensation, suitably foams during brushing and has an excellent foam performance that gives a foam having body, and moreover is able to provide a good taste on use in which saltiness is suppressed. These findings ultimately led to the present invention.

5 [0008]

When component (A) is included in a dentifrice composition for the purpose of imparting a mouth-freshening sensation and component (B) is included to ensure foam production, at an increased content of component (A), the body of the foam during brushing weakens, the foam becomes fragile and readily collapses during brushing, resulting in an
10 insubstantial sensation in the mouth and diminished foam performance, in addition to which an unpleasant saltiness can be felt.

By contrast, in this invention, when components (C) and (D) are formulated together in a dentifrice composition that includes both a specific amount of component (A) and component (B), within the combination of these four ingredients, components (C) and (D)
15 together act in a specific manner as a foam body enhancer. As indicated above, what this does is to rapidly produce a large quantity of bubbles without weakening of the foam body during brushing, giving a foam with body that does not readily collapse and has resilience. In this way, the composition ensures foam production and foam performance and provides a good mouth-freshening sensation. Moreover, the unpleasant saltiness from component (A)
20 is suppressed, enabling a good taste to be imparted on use.

The invention has distinctive working effects that are obtainable by combining components (A), (B), (C) and (D). In the absence of component (C) or (D) in particular, the foam body improving effect is poor. Here, in the absence of component (B), even when a relatively large amount of surfactant other than this is added, the foam body is weak;
25 in the absence of component (C) or (D), even when a binder such as xanthan gum or sodium carboxymethylcellulose is included, the foam body is weak. In such cases, the working effects are inferior.

As shown in the subsequently described Comparative Examples, when components (A) and (B) were included but component (C) or (D) was not, the foam body
30 during brushing was inferior (Comparative Examples 5 to 7). In Comparative Examples 5 and 6 lacking component (C), even by including together with component (D) substances which, like component (C), are known to be binders, such as xanthan gum,

sodium carboxymethylcellulose or silicic anhydride (thickening), the foam body during brushing was inferior. When component (B) was not included, even by including components (A), (C) and (D) and additionally including the surfactant cocamidopropyl betaine or polyoxyethylene hydrogenated castor oil, the foam body during brushing was inferior (Comparative Examples 3 and 4). Also, even when components (A), (B), (C) and (D) were included, in Comparative Example 2 which has too much component (A), the foam body during brushing was inferior. By contrast, the dentifrice compositions of the subsequently described examples according to the invention in which components (A), (B), (C) and (D) are included and the amount of component (A) is within a specific range, the mouth-freshening sensation after rinsing was high, the foam body and foam production (volume of foam) during brushing were excellent, and saltiness was suppressed, resulting in a good taste.

[0009]

In the present invention, in addition to components (A), (B), (C) and (D), an abrasive (E) may also be included, this being a calcium-based abrasive and/or a silica-based abrasive.

Regarding the cause for weakening of the foam body by component (A) in dentifrice compositions, one major factor is thought to be that component (A) has some kind of effect on the bubbles formed by component (B). Also, generally, in cases where a calcium-based abrasive is included, foam performance such as foam production by the dentifrice composition tends to decrease. However, the dentifrice composition of the invention, owing to the inclusion of components (C) and (D), has an excellent foam production and foam body during brushing even when formulated with, as the abrasive (E), a calcium-based abrasive.

[0010]

In Patent Document 1, the toothpaste of Example 6 which is described as an oral composition in which the unpleasant feeling on use due to a specific bitter ingredient has been improved contains 30.0 wt% of baking soda and also zinc chloride, sodium lauryl sulfate, carrageenan and a silica-based abrasive (silicic anhydride), but the amount of baking soda is excessive, which adversely affects foam performance. In Patent Document 2, foam dribbling and the mouth-freshening sensation of a dentifrice composition are ameliorated through the combination of an anionic surfactant, xanthan gum and sodium

bicarbonate. Patent Document 3 (JP-A 2017-514881) discloses an oral care composition of improved phase stability that is formulated with a zinc ion source such as zinc citrate and a specific thickener system containing carrageenan, but makes no mention of including sodium bicarbonate in a dentifrice composition. Unlike this prior art, the present invention,
5 by combining components (A), (B), (C) and (D), increases the mouth-freshening sensation and improves the foam body of dentifrice compositions and exhibits distinctive and exceptional working effects that cannot be achieved in the absence of any of these ingredients.
[0011]

Accordingly, the invention provides the following dentifrice composition.

10 [1]

A dentifrice composition containing:

(A) sodium bicarbonate,

(B) an anionic surfactant,

(C) carrageenan, and

15 (D) a water-soluble zinc salt,

wherein the content of component (A) is from 0.1 to 2 wt%.

[2]

The dentifrice composition of [1], wherein the water-soluble zinc salt (D) is selected from the group consisting of zinc gluconate, zinc chloride and zinc citrate.

20 [3]

The dentifrice composition of [1] or [2], wherein the content of component (B) is from 1 to 3 wt%.

[4]

The dentifrice composition of any of [1] to [3], wherein the content of component (C) is from 0.1 to 1 wt%.

25 [5]

The dentifrice composition of any of [1] to [4], wherein the content of component (D) in terms of the amount of zinc ions is from 0.01 to 0.5 wt%.

[6]

30 The dentifrice composition of any of [1] to [5], wherein the weight ratio (B)/(D) between the content of component (B) and the content of component (D) in terms of zinc ions is from 3 to 100.

[7]

The dentifrice composition of any of [1] to [6], further containing 20 to 70 wt% of an abrasive (E).

[8]

5 The dentifrice composition of [7], wherein the abrasive (E) includes at least a calcium-based abrasive.

[9]

The dentifrice composition of any of [1] to [8] which is a toothpaste composition.

10

ADVANTAGEOUS EFFECTS OF INVENTION

[0012]

This invention makes it possible to provide sodium hydrogen carbonate-containing dentifrice compositions which impart a good mouth-freshening sensation and also suitably foam during brushing and have an excellent foam performance that gives a foam with body.

15

DESCRIPTION OF EMBODIMENTS

[0013]

The invention is described more fully below. The dentifrice composition of the invention contains (A) sodium bicarbonate, (B) an anionic surfactant, (C) carrageenan and
20 (D) a water-soluble zinc salt.

[0014]

The sodium bicarbonate (A) has the effect of imparting a mouth-freshening sensation to the dentifrice composition of the invention.

A commercial product such as that available from Asahi Glass Co., Ltd. under the
25 trade name Sodium Bicarbonate may be used as the sodium bicarbonate (baking soda).

[0015]

The sodium bicarbonate (A) content is from 0.1 to 2% (here and below, “%” stands for percent by weight), and preferably from 0.3 to 1%. At a content of less than 0.1%, a mouth-freshening sensation cannot be fully imparted. When too much is included, not only
30 is the foam body inferior, the taste of the dentifrice composition worsens due to the inherent saltiness of this ingredient; at more than 2%, the foam body weakens and the taste also becomes poor.

[0016]

The anionic surfactant (B) has a foam production-ensuring action.

The anionic surfactant is preferably an anionic surfactant having an alkyl, acyl, alkenyl or other hydrocarbon group of 10 to 18, especially 10 to 16, carbon atoms as exemplified by alkyl sulfuric acid salts, acyl amino acid salts (acyl sarcosinates, acyl glutaminates, etc.), α -olefin sulfonates, acyl taurine salts, alkylbenzene sulfonates and alkyl sulfoacetic acid salts. Specific examples include alkyl sulfates such as sodium lauryl sulfate and sodium myristyl sulfate, acyl sarcosinates such as sodium N-lauroyl sarcosinate and sodium N-myristoyl sarcosinate, acyl glutaminates such as palmitoyl glutamate and lauroyl glutamate, α -olefin sulfonates such as sodium tetradecene sulfonate, acyl taurine salts such as sodium lauroyl methyl taurate and sodium cocoyl methyl taurate, and sodium dodecylbenzene sulfonate, sodium hydrogenated coco fatty acid monoglyceride monosulfate and sodium lauryl sulfoacetate. Of these, from the standpoint of the quality of foam production and the foam body, alkyl sulfates, acyl sarcosinates and α -olefin sulfonates are preferred. One of these may be used alone or two or more may be used in combination.

[0017]

A commercial product may be used as the anionic surfactant. Specific products that may be used include, for example, sodium lauryl sulfate available under the trade name EMAL10G-3 from Kao Indonesia Chemicals, sodium lauroyl sarcosinate available under the trade name Soypon SLP from Kawaken Fine Chemical Co., Ltd., and sodium α -olefin sulfonate available under the trade name K Lipolan PJ-400CJ (sodium α -olefin sulfonate having 14 carbon atoms (common name, sodium tetradecene sulfonate)) from Lion Specialty Chemicals Co., Ltd.

[0018]

The anionic surfactant (B) content is preferably from 1 to 3%, more preferably from 1.5 to 2.7%, and even more preferably from 1.5 to 2.5%, of the overall composition. At a content of 1% or more, suitable foam production is obtained; at up to 3%, irritation by this ingredient itself is sufficiently suppressed and a pleasant feeling on use is maintained.

[0019]

In this invention, by jointly using (C) carrageenan and (D) a water-soluble zinc salt, the combination of these two ingredients acts as a foam body enhancer. In the absence of component (C) or component (D), the foam body-enhancing action is low, resulting in a

poor foam body. In the absence of component (D), the mouth-freshening sensation decreases and, due to the saltiness of component (C), the taste also worsens.

[0020]

5 A commercial product such as that available under the trade name GENUVISCO carrageenan-type TPC-1 from CP Kelco may be used as the carrageenan (C).

The carrageenan (C) content is preferably from 0.1 to 1%, more preferably from 0.2 to 0.8%, and even more preferably from 0.2 to 0.5%, of the overall composition. At a content of 0.1% or more, the foam body sufficiently improves; at up to 1%, dispersibility of the preparation can be fully ensured.

10 [0021]

The zinc ions in the water-soluble zinc salt (D) impart a foam body-improving action. In addition, this ingredient increases the mouth-freshening sensation-imparting effect by component (A) and also acts to suppress the saltiness of component (A).

15 Examples of the water-soluble zinc salt include zinc gluconate, zinc chloride, zinc citrate, zinc acetate, zinc lactate, zinc sulfate and zinc nitrate. Hydrates of these may also be used. In particular, zinc gluconate, zinc chloride and zinc citrate are preferred because of their high foam body-improving effect and minimal impact on flavor. One of these may be used alone or two or more may be used in combination.

20 A commercial product may be used as the water-soluble zinc salt. Specific products that may be used include, for example, zinc gluconate available under the trade name GLUCONAL ZN-P from Corbion N.V., zinc chloride available under the trade name Zinc Chloride from Junsei Chemical Co., Ltd., and zinc citrate available under the trade name Zinc Citrate Dihydrate from FUJIFILM Wako Pure Chemical Corporation.

[0022]

25 The water-soluble zinc salt (D) content in terms of the amount of zinc ions is preferably from 0.01 to 0.5%, and more preferably from 0.05 to 0.2%, of the overall composition. At a content (zinc ion amount) of 0.01% or more, the foam body is fully enhanced, a mouth-freshening feeling can be sufficiently obtained and the saltiness of component (A) is fully suppressed, resulting in a good taste. Including too much may
30 adversely impact foam production and make the metallic taste of this ingredient strongly apparent. However, at a content of up to 0.5%, suitable foam production is fully ensured and a good taste is retained.

[0023]

In addition, the weight ratio (B)/(D) between the content of component (B) and the content of component (D) in terms of zinc ions is preferably from 3 to 100, more preferably from 5 to 50, and even more preferably from 8 to 45. At a (B)/(D) weight ratio in the above
5 range, the foam body further increases and suitable foam production can be fully ensured. At a (B)/(D) weight ratio below 3, foam production may decrease; at above 100, a sufficient foam body may not be obtainable.

[0024]

An abrasive (E) may be additionally included in this invention.

10 The abrasive (E) is not particularly limited, so long as it is one that is commonly used in dentifrice compositions. However, it is preferable to use a calcium-based abrasive and/or a silica-based abrasive.

Calcium-based abrasives are abrasives which contain calcium in the compound. Examples include calcium carbonate and calcium phosphates such as dibasic calcium
15 phosphate dihydrate and anhydrate, monobasic calcium phosphate, tribasic calcium phosphate, tetrabasic calcium phosphate and calcium pyrophosphate. Of these, calcium carbonate is preferred.

Silica-based abrasives are abrasives which contain silica in the compound, and may even be a metal-silica composite containing a metal such as aluminum or zirconium.
20 Examples include precipitated silica (silicic anhydride), aluminosilicates and zirconosilicates.

One of these may be used alone or two or more may be used in combination. Commercial products may be used as these.

[0025]

The abrasive (E) preferably includes at least a calcium-based abrasive. From the
25 standpoint of cleansing ability, it is preferable for the primary abrasive to be a calcium-based abrasive and moreover for a silica-based abrasive to be used together with this.

In dentifrice compositions formulated with components (A) and (B), there is a tendency for component (A) to adversely affect the bubbles formed by component (B) and for the foam body to weaken. In general, when many calcium ions dissolve out, there is
30 similarly a tendency for the foam body to weaken. However, in this invention, even when a calcium-based abrasive is included as the primary abrasive within the abrasive (E), the addition of components (C) and (D) provides a foam body that is excellent and fully

suppresses the saltiness, resulting also in a good taste. Thus, particularly in a system in which calcium ions are present, components (C) and (D) have a remarkable, and desirable, foam body-improving action.

[0026]

5 The total content of the abrasive (E) is preferably from 20 to 70% of the overall composition.

In addition, when a calcium-based abrasive is included, the content thereof may be set to from 20 to 70% of the overall composition, although this content is preferably from 25 to 50%, and more preferably from 30 to 45%.

10 The content of the silica-based abrasive is preferably from 0 to 20%, and more preferably from 0 to 5%, of the overall composition.

When the primary abrasive is a calcium-based abrasive, in cases where another abrasive such as a silica-based abrasive is included as well, the respective abrasives are preferably used in a combined amount that falls within the above range in the total abrasive
15 content.

[0027]

The dentifrice composition of the invention can be prepared as a toothpaste, a liquid dentifrice or the like, although a toothpaste composition is especially preferred. A customary method may be used as the method of preparation. Depending on such considerations as
20 the purpose of the composition and the form in which it is to be used, other suitable known ingredients may be included in addition to the above-described ingredients. For example, in the case of toothpastes, it is possible to include surfactants, binders, humectants and also, where necessary, sweeteners, preservatives, colorants, flavors and effective ingredients. The contents thereof may be conventional amounts within ranges that do not detract from
25 the advantageous effects of the invention.

[0028]

Nonionic surfactants and amphoteric surfactants may be used as optional surfactants.

Examples of nonionic surfactants include polyoxyethylene fatty acid esters such as polyoxyethylene hydrogenated castor oil, sugar fatty acid esters such as sucrose fatty acid
30 esters, sugar alcohol fatty acid esters, sorbitan fatty acid esters, glycerol fatty acid esters, polyglycerol fatty acid esters, polyoxyethylene sorbitan fatty acid esters, polyoxyethylene higher alcohol ethers, fatty acid alkanolamides and polyoxyethylene polyoxypropylene

glycols. Of these, polyoxyethylene fatty acid esters having a hydrocarbon group of 12 to 18 carbon atoms and an average number of moles of added ethylene oxide of from 3 to 40, polyoxyethylene higher alcohol ethers having a hydrocarbon group of 12 to 18 carbon atoms and an average number of moles of added ethylene oxide of from 3 to 30, and
5 polyoxyethylene polyoxypropylene glycols having an oxyethylene (EO) and oxypropylene (PO) molar ratio EO/PO of from 1 to 6 are preferred. Polyoxyethylene hydrogenated castor oils having an average number of moles of added ethylene oxide of from 10 to 40 are especially preferred from the standpoint of the mouth-freshening sensation.

Amphoteric surfactants are exemplified by alkyl betaines, acetic acid betaine-type
10 surfactants such as fatty acid amidopropyl betaines, betaine-type surfactants such as alkylimidazolinium betaines, imidazoline-type surfactants such as N-fatty acid acyl-N-carboxymethyl-N-hydroxyethyl ethylenediamine salts, and imidazolium betaine-type surfactants such as 2-alkyl-N-carboxymethyl-N-hydroxyethyl imidazolium betaines.

The nonionic surfactant content is preferably from 0.05 to 1%, and especially from
15 0.1 to 0.5%, of the overall composition. A mouth-freshening sensation can be fully obtained at a lower amount of nonionic surfactant.

The amphoteric surfactant content is preferably from 0.1 to 2%, and especially from 0.1 to 1%, of the overall composition.

[0029]

20 Binders that may be included are organic binders other than carrageenan and/or inorganic binders. Specific examples include organic binders such as xanthan gum, sodium alginate, sodium carboxymethylcellulose and sodium polyacrylate; and inorganic binders such as thickening silica and thickening aluminum silica. As optional binders, the content of organic binder is preferably from 0 to 2%, and especially from 0.1 to 1.3%,
25 of the overall composition; and the content of inorganic binder is typically from 1 to 10%, and especially from 3 to 8%, of the overall composition.

[0030]

Examples of humectants include polyhydric alcohols such as glycerin, polyethylene glycol and propylene glycol, and sugar alcohols such as sorbitol. The humectant content is
30 typically from 5 to 40%, and especially from 10 to 30%, of the overall composition.

[0031]

The sweetener is exemplified by sodium saccharin.

Examples of preservatives include p-hydroxybenzoate esters, benzoic acid and salts thereof.

Examples of colorants include Blue No. 1, Yellow No. 4 and titanium dioxide.

[0032]

5 Examples of flavors include natural flavors such as peppermint oil, spearmint oil, anise oil, eucalyptus oil, wintergreen oil, cassia oil, clove oil, thyme oil, sage oil, lemon oil, orange oil, Japanese mint oil, cardamom oil, coriander oil, mandarin oil, lime oil, lavender oil, rosemary oil, laurel oil, chamomile oil, caraway oil, marjoram oil, bay oil, lemongrass oil, organum oil, pine needle oil, neroli oil, rose oil, jasmine oil, grapefruit oil, sweetie oil, 10 yuzu oil, iris concrete, absolute peppermint, absolute rose and orange flower; flavors obtained by the processing and treatment (head cut, tail cut, fractional distillation, liquid-liquid extraction, essence preparation, powdered flavor preparation, etc.) of these natural flavors; single flavors such as menthol, carvone, anethole, cineole, methyl salicylate, cinnamic aldehyde, eugenol, 3-L-menthoxypropane-1,2-diol, thymol, linalool, linalyl acetate, 15 limonene, menthone, menthyl acetate, N-substituted p-menthane-3-carboxamide, pinene, octyl aldehyde, citral, pulegone, carvyl acetate, anise aldehyde, ethyl acetate, ethyl butyrate, allyl cyclohexane propionate, methyl anthranilate, ethyl methylphenylglycidate, vanillin, undecalactone, hexanal, butanol, isoamyl alcohol, hexenol, dimethyl sulfide, cyclopentadiene, furfural, trimethylpyrazine, ethyl lactate and ethyl thioacetate; and blended flavors such as 20 strawberry flavor, apple flavor, banana flavor, pineapple flavor, grape flavor, mango flavor, butter flavor, milk flavor, fruit mix flavor and tropical fruit flavor. These flavors and other known flavor ingredients suitable for dentifrice compositions may be used in combination.

The flavor content is not particularly limited, although the above flavor ingredients are preferably used in an amount of from 0.000001 to 1% within the composition. Perfume 25 flavors using the above flavor ingredients are preferably included within the composition in an amount of from 0.1 to 2%.

[0033]

Examples of effective ingredients include fluorine-containing compounds such as sodium fluoride, sodium monofluorophosphate and stannous fluoride; whitening ingredients 30 such as sodium polyphosphate; bactericidal ingredients such as isopropyl methyl phenol, cetyl pyridinium chloride, benzalkonium chloride and benzethonium chloride; anti-inflammatory ingredients such as dipotassium glycyrrhizate, glycyrrhizic acid and

ε-aminocaproic acid; hypersensitivity ameliorating agents such as potassium nitrate and aluminum lactate; oral malodor-suppressing ingredients such as copper gluconate; and tissue-repairing ingredients such as allantoin. Effective ingredients may be used in effective amounts within ranges that do not detract from the advantageous effects of the invention.

5 In addition, where necessary, a medium-chain fatty acid triglyceride may be added (to a content of typically from 0.01 to 0.5% of the overall composition) as an oily ingredient and the composition may be adjusted to a pH of preferably from 6 to 10 (at 25°C) by adding a pH adjustor.

10 The water content of the composition is preferably from 10 to 40%, and especially from 20 to 30%.

EXAMPLES

[0034]

15 The invention is illustrated more fully below by way of Examples and Comparative Examples, although the invention is not limited by these Examples. In the Examples below, unless noted otherwise, all references to percent (%) are by weight.

[0035]

[Examples, Comparative Examples]

20 Dentifrice compositions (toothpaste compositions) formulated as shown in Tables 1 to 4 were prepared in the usual manner and evaluated by the methods described below. The results are presented in Tables 1 to 4. In the tables, (B)/(D) is the weight ratio of ((component (B) content)/(component (D) content in terms of zinc ions).

25 In the evaluations below, each subject carried out toothbrushing by placing 1 gram of the dentifrice composition on a toothbrush, brushing for 3 minutes and then rinsing the mouth with water.

[0036]

(1) Method for Evaluating Mouth-Freshening Sensation after Rinsing

30 Ten subjects brushed their teeth using the dentifrice composition and rinsed their mouths, after which they scored the mouth-freshening sensation on the 4-point scale shown below. The average score for the ten subjects was determined and the mouth-freshening sensation after rinsing was rated according to the criteria below based on the average score.

Scoring Criteria

- 5 4 points: Very freshening
 3 points: Freshening
 2 points: Slightly freshening
 1 point: Not freshening

Rating Criteria

- ◎: Average score was 3.0 points or more
 ○: Average score was at least 2.5 points but less than 3.0 points
 △: Average score was at least 2.0 points but less than 2.5 points
10 ×: Average score was less than 2.0 points

[0037]

(2) Method for Evaluating Foam Body during Brushing

 Ten subjects brushed their teeth using the dentifrice composition and scored the
foam body during brushing on the 4-point scale shown below. The average score for the
15 ten subjects was determined and the foam body during brushing was rated according to the
criteria below based on the average score.

 As used herein, “foam body” refers to the goodness of the foam resilience felt when
a dense mass of foam is present within the mouth.

Scoring Criteria

- 20 4 points: Foam body was excellent
 3 points: Foam body was good
 2 points: Foam body was somewhat good
 1 point: Foam body was not good

Rating Criteria

- 25 ◎: Average score was 3.0 points or more
 ○: Average score was at least 2.5 points but less than 3.0 points
 △: Average score was at least 2.0 points but less than 2.5 points
 ×: Average score was less than 2.0 points

[0038]

(3) Method for Evaluating Foam Production during Brushing

Ten subjects brushed their teeth using the dentifrice composition and scored the foam production (amount of foam produced) during brushing on the 4-point scale shown below. The average score for the ten subjects was determined and the foam production during brushing was rated according to the criteria below based on the average score.

Scoring Criteria

- 4 points: Foam production was excellent
- 3 points: Foam production was good
- 2 points: Foam production was somewhat good
- 1 point: Foam production was not good

Rating Criteria

- ⊙: Average score was 3.0 points or more
- : Average score was at least 2.5 points but less than 3.0 points
- △: Average score was at least 2.0 points but less than 2.5 points
- ×: Average score was less than 2.0 points

[0039]

(4) Method for Evaluating Saltiness during Brushing

Ten subjects brushed their teeth using the dentifrice composition and answered a questionnaire on the saltiness during brushing. The results were scored on the 4-point scale shown below. The average score for the ten subjects was determined and the saltiness during brushing was rated according to the criteria below based on the average score.

Scoring Criteria

- 4 points: Did not sense any saltiness
- 3 points: Sensed substantially no saltiness
- 2 points: Sensed a little saltiness
- 1 point: Sensed considerable saltiness

Rating Criteria

- ⊙: Average score was 3.0 points or more
- : Average score was at least 2.5 points but less than 3.0 points
- △: Average score was at least 2.0 points but less than 2.5 points
- ×: Average score was less than 2.0 points

[0040]

Details on the ingredients are given below.

(A) Sodium Bicarbonate

Available under the trade name Sodium Bicarbonate from Asahi Glass Co., Ltd.

5 (B) Sodium Lauryl Sulfate

Available under the trade name EMAL10G-3 from Kao Indonesia Chemicals

(B) Sodium Tetradecene Sulfonate

Available under the trade name K Lipolan PJ-400CJ from Lion Specialty Chemicals Co., Ltd.

10 (B) Sodium Lauroyl Sarcosinate

Available under the trade name Soypon SLP from Kawaken Fine Chemical Co., Ltd.
Cocamidopropyl Betaine (comparative ingredient)

Available under the trade name TEGO BETAIN ZF from Evonik Industries AG

(C) Carrageenan

15 Available under the trade name GENUVISCO carrageenan type TPC-1 from CP Kelco

(D) Zinc Gluconate

Available under the trade name GLUCONAL ZN-P from Corbion N.V.

(D) Zinc Chloride

20 Available under the trade name Zinc Chloride from Junsei Chemical Co., Ltd.

(D) Zinc Citrate Dihydrate

Available under the trade name Zinc Citrate Dihydrate from FUJIFILM Wako Pure Chemical Corporation.

(E) Calcium Carbonate

25 Available under the trade name Calci F from Sankyo Seifun KK

(E) Silicic Anhydride (abrasive)

Available under the trade name Sorbosil AC77 from PQ Corporation

[0041]

[Table 1]

Formulation (%)	Example										
	1	2	3	4	5	6	7	8	9	10	11
(A) Sodium bicarbonate	0.2	0.3	0.6	1.0	1.5	0.6	0.6	0.6	0.6	0.6	0.6
(B) Sodium lauryl sulfate	2.0	2.0	2.0	2.0	2.0	1.3	1.5	2.7	2.0	2.0	2.0
(C) Carrageenan	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.1	0.2	0.8
(D) Zinc gluconate	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
(D) Amount of zinc ions from component (D) (%)	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
(B)/(D) weight ratio	20.0	20.0	20.0	20.0	20.0	13.0	15.0	27.0	20.0	20.0	20.0
(E) Calcium carbonate	35	35	35	35	35	35	35	35	35	35	35
(E) Silicic anhydride (abrasive)	2	2	2	2	2	2	2	2	2	2	2
Xanthan gum	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Sodium carboxymethylcellulose	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Silicic anhydride (thickening)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Sodium monofluorophosphate	1	1	1	1	1	1	1	1	1	1	1
Sodium fluoride	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Propylene glycol	1	1	1	1	1	1	1	1	1	1	1
Polyethylene glycol 400	2	2	2	2	2	2	2	2	2	2	2
70% Sorbitol solution	10	10	10	10	10	10	10	10	10	10	10
Glycerin	10	10	10	10	10	10	10	10	10	10	10
Sodium pyrophosphate	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Sodium saccharin	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Polyoxyethylene (20) hydrogenated castor oil	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Medium-chain fatty acid triglyceride	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Titanium oxide	1	1	1	1	1	1	1	1	1	1	1
Flavor	1	1	1	1	1	1	1	1	1	1	1
Sodium hydroxide	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.
Purified water	balance	balance	balance	balance	balance	balance	balance	balance	balance	balance	balance
Total	100	100	100	100	100	100	100	100	100	100	100
Mouth-freshening sensation after rinsing	○	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
Foam body when brushing	◎	◎	◎	◎	○	◎	◎	◎	○	◎	◎
Foam production when brushing	◎	◎	◎	◎	◎	○	◎	◎	◎	◎	◎
Saltiness when brushing	◎	◎	◎	◎	○	◎	◎	◎	◎	◎	◎

[0042]

[Table 2]

Formulation (%)	Example							
	12	13	14	15	16	17	18	19
(A) Sodium bicarbonate	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
(B) Sodium lauryl sulfate	2.0	2.0	2.0	2.0	1.3	1.5	2.5	2.7
(C) Carrageenan	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
(D) Zinc gluconate	0.2	0.4	1.2	2.5	2.5	1.2	0.4	0.2
(D) Amount of zinc ions from component (D) (%)	0.03	0.06	0.17	0.36	0.36	0.17	0.06	0.03
(B)/(D) weight ratio	69.9	35.0	11.7	5.6	3.6	8.7	43.7	94.4
(E) Calcium carbonate	35	35	35	35	35	35	35	35
(E) Silicic anhydride (abrasive)	2	2	2	2	2	2	2	2
Xanthan gum	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Sodium carboxymethylcellulose	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Silicic anhydride (thickening)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Sodium monofluorophosphate	1	1	1	1	1	1	1	1
Sodium fluoride	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Propylene glycol	1	1	1	1	1	1	1	1
Polyethylene glycol 400	2	2	2	2	2	2	2	2
70% Sorbitol solution	10	10	10	10	10	10	10	10
Glycerin	10	10	10	10	10	10	10	10
Sodium pyrophosphate	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Sodium saccharin	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Polyoxyethylene (20) hydrogenated castor oil	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Medium-chain fatty acid triglyceride	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Titanium oxide	1	1	1	1	1	1	1	1
Flavor	1	1	1	1	1	1	1	1
Sodium hydroxide	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.
Purified water	balance	balance	balance	balance	balance	balance	balance	balance
Total	100	100	100	100	100	100	100	100
Mouth-freshening sensation after rinsing	○	◎	◎	◎	◎	◎	◎	○
Foam body when brushing	○	◎	◎	◎	◎	◎	◎	○
Foam production when brushing	◎	◎	◎	○	○	◎	◎	◎
Saltiness when brushing	○	◎	◎	◎	◎	◎	◎	○

[0043]

[Table 3]

Formulation (%)	Example									
	20	21	22	23	24	25	26	27	28	29
(A) Sodium bicarbonate	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
(B) Sodium lauryl sulfate	-	-	1.0	-	1.0	2.0	2.0	2.0	2.0	2.0
(B) Sodium tetradecene sulfonate	2.0	-	-	1.0	0.5	-	-	-	-	-
(B) Sodium lauroyl sarcosinate	-	2.0	1.0	1.0	0.5	-	-	-	-	-
(C) Carrageenan	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
(D) Zinc gluconate	0.7	0.7	0.7	0.7	0.7	0.7	-	0.7	-	0.7
(D) Zinc chloride	-	-	-	-	-	-	0.2	-	-	-
(D) Zinc citrate dihydrate	-	-	-	-	-	-	-	-	0.3	-
(D) Amount of zinc ions from component (D) (%)	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
(B)/(D) weight ratio	20.0	20.0	20.0	20.0	20.0	20.0	20.8	20.0	20.8	20.0
(E) Calcium carbonate	35	35	35	35	35	35	35	37	35	-
(E) Silicic anhydride (abrasive)	2	2	2	2	2	2	2	-	2	20
Xanthan gum	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Sodium carboxymethylcellulose	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Silicic anhydride (thickening)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Sodium monofluorophosphate	1	1	1	1	1	1	1	1	1	1
Sodium fluoride	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Isopropyl methyl phenol	-	-	-	-	-	0.05	-	-	-	-
Propylene glycol	1	1	1	1	1	1	1	1	1	1
Polyethylene glycol 400	2	2	2	2	2	2	2	2	2	2
70% Sorbitol solution	10	10	10	10	10	10	10	10	10	10
Glycerin	10	10	10	10	10	10	10	10	10	10
Sodium pyrophosphate	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Sodium saccharin	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Polyoxyethylene (20) hydrogenated castor oil	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Medium-chain fatty acid triglyceride	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Titanium oxide	1	1	1	1	1	1	1	1	1	1
Flavor	1	1	1	1	1	1	1	1	1	1
Sodium hydroxide	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.
Purified water	balance	balance	balance	balance	balance	balance	balance	balance	balance	balance
Total	100	100	100	100	100	100	100	100	100	100
Mouth-freshening sensation after rinsing	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
Foam body when brushing	◎	◎	◎	◎	◎	◎	◎	◎	◎	○
Foam production when brushing	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎
Saltiness when brushing	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎

[0044]

[Table 4]

Formulation (%)	Comparative Example						
	1	2	3	4	5	6	7
(A) Sodium bicarbonate	-	10	0.6	0.6	0.6	0.6	0.6
(B) Sodium lauryl sulfate	2.0	2.0	-	-	2.0	2.0	2.0
Cocamidopropyl betaine (comparative ingredient)	-	-	-	2.0	-	-	-
(C) Carrageenan	0.3	0.3	0.3	0.3	-	-	0.3
(D) Zinc gluconate	0.7	0.7	0.7	0.7	0.7	0.7	-
(D) Amount of zinc ions from component (D) (%)	0.10	0.10	0.10	0.10	0.10	0.10	-
(B)/(D) weight ratio	20.0	20.0	-	(20.0)	20.0	20.0	-
(E) Calcium carbonate	35	35	35	35	35	35	35
(E) Silicic anhydride (abrasive)	2	2	2	2	2	2	2
Xanthan gum	0.4	0.4	0.4	0.4	0.4	0.7	0.4
Sodium Carboxymethylcellulose	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Silicic anhydride (thickening)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Sodium monofluorophosphate	1	1	1	1	1	1	1
Sodium fluoride	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Propylene glycol	1	1	1	1	1	1	1
Polyethylene glycol 400	2	2	2	2	2	2	2
70% Sorbitol solution	10	10	10	10	10	10	10
Glycerin	10	10	10	10	10	10	10
Sodium pyrophosphate	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Sodium saccharin	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Polyoxyethylene (20) hydrogenated castor oil	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Medium-chain fatty acid triglyceride	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Titanium oxide	1	1	1	1	1	1	1
Flavor	1	1	1	1	1	1	1
Sodium hydroxide	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.	q.s.
Purified water	balance	balance	balance	balance	balance	balance	balance
Total	100	100	100	100	100	100	100
Mouth-freshening sensation after rinsing	×	◎	◎	◎	◎	◎	×
Foam body when brushing	◎	×	×	×	×	×	×
Foam production when brushing	◎	◎	×	◎	◎	◎	◎
Saltiness when brushing	◎	×	◎	◎	◎	◎	×

CLAIMS:

1. A dentifrice composition comprising:
(A) sodium bicarbonate,
5 (B) an anionic surfactant,
(C) carrageenan, and
(D) a water-soluble zinc salt,
wherein the content of component (A) is from 0.1 to 2 wt%.
- 10 2. The dentifrice composition of claim 1, wherein the water-soluble zinc salt (D) is selected from the group consisting of zinc gluconate, zinc chloride and zinc citrate.
3. The dentifrice composition of claim 1 or 2, wherein the content of component (B) is from 1 to 3 wt%.
- 15 4. The dentifrice composition of any one of claims 1 to 3, wherein the content of component (C) is from 0.1 to 1 wt%.
5. The dentifrice composition of any one of claims 1 to 4, wherein the content of
20 component (D) in terms of the amount of zinc ions is from 0.01 to 0.5 wt%.
6. The dentifrice composition of any one of claims 1 to 5, wherein the weight ratio (B)/(D) between the content of component (B) and the content of component (D) in terms of zinc ions is from 3 to 100.
- 25 7. The dentifrice composition of any one of claims 1 to 6, further comprising from 20 to 70 wt% of an abrasive (E).
8. The dentifrice composition of claim 7, wherein the abrasive (E) includes at least a
30 calcium-based abrasive.
9. The dentifrice composition of any one of claims 1 to 8 which is a toothpaste composition.