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(54) Title: USE OF N-'N-(3,3 DIMETHYLBUTYL)-L-ALPHA-ASPARTYL-L-PHENYLALANINE 1-METHYL ESTER (NEOTAME) TO MODIFY MOUTHFEEL PERCEPTION

(57) Abstract: This invention relates to the use of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester, or neotame, as a mouthfeel-modifying ingredient and to compositions having improved mouthfeel containing the same.

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TITLE

USE OF N-'N-(3,3 DIMETHYLBUTYL)-L-ALPHA-ASPARTYL-L-PHENYLALANINE 1-METHYL
ESTER (NEOTAME) TO MODIFY MOUTHFEEL PERCEPTION

BACKGROUND OF THE INVENTION

Field of the Invention

5 This invention relates to the use of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester, or neotame, to modify the mouthfeel perception of compositions.

10 Related Background Art

N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester is a highly intense non-nutritive sweetening agent useful to impart sweetness to a wide 15 variety of products, such as ingestible foods and pharmaceuticals, including oral-care products (e.g., mouthwash, toothpaste, cough syrups and the like). This sweetener, disclosed in U.S. Patent No. 5,480,668, is approximately 8,000 times as sweet as sucrose, on a 20 weight basis. Thus, very small quantities of this sweetening agent may be used to sweeten foods without adding calories.

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Mouthfeel-modifying ingredients are substances that are added to improve or modify the original mouthfeel of a composition. In this regard, mouthfeel is not related to the flavor of the composition, but describes the

5 perception of the composition in the mouth. The term mouthfeel is a sensory property that can be defined as the sensation produced by various attributes of a food or beverage on the surface of the oral cavity, where each attribute is responsible for producing a

10 characteristic tactile sensation. (A.S. Szczesniak, J Food Sci. 28, 385-389, (1963); R. Jowitt, J texture Studies, 5, 351-358 (1974); S. Hegenbart, Food Products Design, August, 20-35 (1992)) Attributes that are related to the mouthfeel effect include sensations such

15 as creamy, watery, body, dry, moist, wet, greasy, waxy, cool, hot, burning, cold, astringent, fullness, richness, syrupiness, mushy, throat catch and getaway. Moisture release, particle size, and meltaway are also significant mouthfeel components. The sensation of

20 mouthfeel is related to the sum total of a substance's physical and chemical interaction in the mouth from the first bite or sip, through chewing, passage through the mouth and the feel after swallowing.

25 Mouthfeel-modifying ingredients may be added to foods, beverages, oral-care products, pharmaceutical preparations, or other ingestible compositions to improve the acceptance of products by modifying the perception of the compositions in the mouth.

30 Mouthfeel-modifying ingredients may be used in any concentration necessary to achieve the desired mouthfeel properties of a product for a desired application. At threshold taste concentrations and higher, the mouthfeel-modifying ingredient contributes

35 its own taste to the composition or food products as well as modifying the mouthfeel of the composition or food product as a whole. When used at sub-threshold

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taste concentrations, the mouthfeel-modifying ingredient may modify the original mouthfeel of a composition without imparting a characteristic taste of its own.

5

Improving food product quality and providing a variety of foods with different tastes and textures is a continuing goal in the food industry. Commercial production of food expected to have a relatively long shelf life often requires the use of processing conditions, storage conditions and/or addition of ingredients, particularly preservatives, that may produce an undesirable mouthfeel perception of the food composition. Sorbate and benzoate preservatives, for instance, are described as having a "burn" in the mouth and throat. Mouthfeel modification is especially important in the preparation of specialty foods such as "low-calorie," "low-fat," "low sodium" or "non-dairy" foods. Food additives or substitutes must often be incorporated into such formulations to replace a portion of the calorie, salt, fat and/or cholesterol contributing ingredients of the food. Often, these specialty foods lack the smooth, rounded mouthfeel of the corresponding full-calorie, full-fat or all-dairy foods because the additives or substitutes possess undesirable mouthfeel characteristics which must be tolerated by consumers in need of these products. This is a particular problem for low-calorie foods sweetened with a high-potency sweetener, where bulking agents must be added to the food to replace the bulk provided by the sugar in the corresponding full-calorie products. The bulking agents may themselves, impart an undesirable mouthfeel, or they may interfere with the mouthfeel perception of the product.

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The use of mouthfeel-modifying ingredients could eliminate or substantially reduce the undesirable

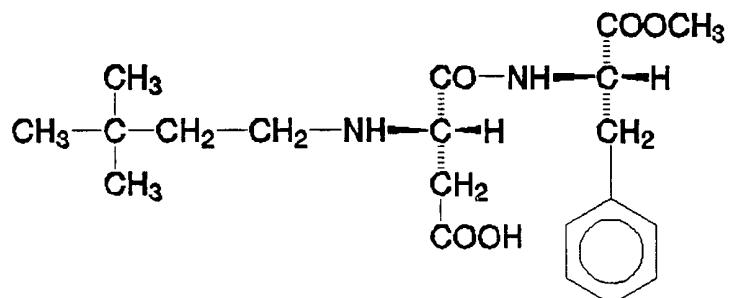
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mouthfeel perception of food compositions. Commonly used mouthfeel-modifying ingredients include propylene glycol, alginate, carboxymethyl cellulose, xanthan gum, fruit pulp, sugar solids, maltodextrin, polyols (such as glycerin, sorbitol, maltitol) and proteins (such as soy, whey protein and protein isolates). However, these ingredients may not always provide adequate mouthfeel modification. For example, the ingredients may not provide satisfactory mouthfeel modification to specific food compositions or may contribute undesirable flavors or may mask or suppress the desirable flavors of the foods to which they are added. Accordingly, it would be desirable to provide an ingredient that would be useful for modifying the mouthfeel of a variety of food and beverage compositions to provide such compositions having improved product quality.

SUMMARY OF THE INVENTION

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This invention relates to a method of using N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester, or neotame, of the formula



25

including salts thereof, crystalline forms thereof, and formulations thereof, to modify the mouthfeel of the composition. Although neotame is a known high-potency sweetener, it has now been discovered that neotame is particularly useful for modifying the overall mouthfeel

of compositions. Specifically, neotame may be used above, at, or below sweetness taste threshold amounts to enhance and improve the mouthfeel of compositions. Neotame is particularly effective for providing a 5 bodying effect that enhances and improves the creamy and rounded mouthfeel of vanilla-flavored compositions, dairy compositions, soy-based compositions, and that enhances and improves the feeling of fruit pulp and juice in fruit and berry juice-containing products or 10 fruit-flavored drinks that contain little or no actual fruit juice.

This invention also relates to the method of preparing compositions containing neotame in an amount effective 15 to modify the mouthfeel properties of the compositions by adding neotame to a composition in an amount sufficient to modify the mouthfeel of that composition.

This invention also relates to compositions comprising 20 neotame in an amount that is sufficient to improve the mouthfeel of the composition, but is less than the sweetness taste threshold concentration of the neotame in the composition.

25 DETAILED DESCRIPTION OF THE INVENTION

This invention relates to the use of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester, or neotame, to modify the mouthfeel perception 30 of compositions, that is the apparent perception of the composition in the mouth. Neotame has been found to act as a mouthfeel-modifying ingredient to improve the mouthfeel of compositions when added to a wide variety of food, medicinal, nutraceutical and pharmaceutical 35 compositions, as well as oral-care products. The compositions may be in any form, including solids, semi-solids, gels and liquids, for example, beverages,

dairy products, frozen dairy products, baked goods, cereals, gelatins, nutraceuticals and the like. Compositions containing neotame at concentrations above, at, or below threshold sweetness taste 5 concentrations possess improved mouthfeel compared to compositions without neotame.

According to the method of this invention, N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl 10 ester may be added to a composition to modify the mouthfeel profile of that composition. The neotame used in this invention may take any form. For example, it may be a salt or complex such as described in U.S. Patent Application No. 09/146,963, U.S. Patent 15 Application No. 09/146,964, U.S. Patent Application No. 09/148,134, U.S. Patent Application No. 09/146,965, U.S. Patent Application No. 09/154,568, and U.S. Provisional Patent Application No. 60/126,363, the disclosure of each of which is incorporated by 20 reference herein. Other exemplary forms of neotame that may be used in this invention include co-crystallized forms and cyclodextrin complexes, such as described in U.S. Patent Application No. 09/154,568 and U.S. Provisional Patent Application No. 60/100,867, the 25 disclosures of each of which are incorporated by reference herein. Agglomerates and various forms of neotame crystallized using different processes may also be used.

30 This invention also contemplates a method of preparing neotame-containing ingredient compositions that are used in the preparation of other compositions. For example, an ingredient composition of this invention may include neotame-ingredient mixtures, such as 35 beverage emulsions, dry ingredient mixtures (e.g., beverage mixes), or neotame-containing ingredients,

such as a co-dried neotame-sugar ingredient, or a neotame-soy-containing ingredient.

Neotame may be used to modify and improve the mouthfeel of the compositions which include ingestible products,

5 such as foods, medicinal, nutraceutical or pharmaceutical compositions, including oral-care compositions (e.g., mouthwash, toothpaste and the like). As used herein, the term "foods" includes both solid and liquid ingestible materials which usually do, 10 but need not, have nutritional value. Thus, neotame may be used to modify the mouthfeel of foods including, but not limited to soups, sauces, gravies, condiments, dressings, frostings, convenience foods, meat products, beverages, including soft drinks, such as fruit juice- 15 containing drinks, fruit-flavored drinks, carbonated soft drinks, flavored waters, soy-based drink products, teas, coffees and coffee-flavored drinks, dairy products, such as toppings, puddings, milk drink products, frozen desserts, cultured products (for 20 example, yogurt and cultured cheese products) and processed cheese products, candies, snack foods, vegetables, cereals, bakery products, cocoa- or chocolate-containing products, such as hot cocoa beverages or any of the above-described products that 25 may contain cocoa or chocolate, and the like.

Medicinal or pharmaceutical products include tablets, 30 syrups, liquid formulations, cough drops, chewable tablets and the like. Medicinal and pharmaceutical products include compositions that are available only by prescription as well as compositions that are available over the counter, such as non-prescription drugs, oral-care products, food supplements, nutraceuticals, herbal remedies, such as plant extracts, and the like. Neotame may be used to modify 35 the mouthfeel of such foodstuffs and medicinal and pharmaceutical compositions, especially soy or preserved, alcohol or vinegar-containing products,

canned and other shelf-stable products (e.g., dairy products, beverages, oral-care products, syrups, food supplements, etc.). These products often have a very astringent, alkaline or irritating mouthfeel which may 5 be preferably eliminated or reduced.

Advantageously, neotame has been shown to modify the mouthfeel of a wide variety of compositions, without modifying the flavor balance or profile of the 10 composition. Neotame can modify the mouthfeel perception of compositions containing a variety of individual flavoring ingredients and flavor-modifying or flavor-enhancing ingredients without distorting the flavor profiles of those ingredients. Neotame can 15 modify the mouthfeel perception of compositions containing such ingredients having different chemical structural classes, as well as complex natural essential oil ingredients and plant extract ingredients. Moreover, when present in less than 20 sweetening-effective concentrations, neotame does not contribute any of the bitter or metallic flavor defects commonly associated with use of certain other high-potency sweeteners.

25 Mouthfeel is a qualitative perception that may be described by different persons in slightly different terms. The general effect of neotame on the mouthfeel of ingestible compositions is to increase the perception of "body" and/or "creamy" characteristics of 30 the compositions in the mouth, compared to compositions without added neotame. This effect may be described as imparting a rounder, smoother, fuller, richer and/or thicker mouthfeel. In some compositions, neotame may only add or impart the above positive mouthfeel 35 characteristics. In other compositions, neotame may also mask or significantly reduce harsh, chalky, burning, and biting mouthfeel perceptions to provide

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compositions having improved mouthfeel. The use of neotame in foods, beverages, medicinal or pharmaceutical compositions, oral-care products, and the like, containing ingredients or additives 5 containing alcohol, preservatives, soy protein, etc. may provide such products having improved mouthfeel characteristics.

It has been discovered that use of neotame in vanilla-10 flavored compositions, containing vanilla flavoring ingredients, such as vanillin, vanilla bean or vanilla extract, significantly improves the smoothness and creaminess mouthfeel of such compositions. Accordingly, when used with neotame, vanilla-flavored 15 compositions possess a more rounded, more pleasant and fuller-bodied vanilla flavor.

The mouthfeel perception of mint flavors, particularly spearmint and peppermint, are also significantly 20 improved by combination with neotame. A composition containing neotame, above, at, or below sweetness taste threshold concentrations, in combination with a mint flavoring ingredient has a smoother, more rounded mouthfeel than a composition containing an equal 25 concentration of the mint ingredient alone.

Neotame has been found to modify the mouthfeel of chocolate-flavored products, e.g., pie fillings, hot cocoa mixes, and the like. Neotame has been found to 30 improve the creamy mouthfeel of dairy flavored soy-containing products. Addition of neotame to soy-containing food products, at less than taste threshold quantities, provides a positive smooth and creamy dairy-like mouthfeel, without adding calories, 35 sweetness or introducing non-dairy flavors.

Specifically, neotame reduces the alkaline mouthfeel typically present in many soy-containing products and

addition of neotame to these products provides products having a more palatable, creamy dairy-like mouthfeel. Accordingly, neotame may be useful for improving the mouthfeel characteristics of soy-containing products, 5 and may be especially useful for improving the mouthfeel of vanilla and chocolate flavored soy-containing products.

As will be appreciated by those skilled in the art, the 10 amount of neotame employed in a particular instance to achieve a particular effect can vary over a relatively wide range. The primary requirement is that the amount of neotame selected is sufficient to modify the mouthfeel characteristics of a composition. The 15 concentration of neotame employed to modify the mouthfeel perception in any particular compositions will vary depending on the amount of the mouthfeel desired and the amount of the sweetness desired from neotame. Neotame may be present in the compositions of 20 this invention in amounts from about 10 ppb (parts per billion) to about 1500 ppm (parts per million) to modify the mouthfeel perception thereof. Preferably, neotame may be present in compositions of this 25 invention in amounts from about 25 ppb to about 1000 ppm, and more preferably, in amounts from about 50 ppb to about 600 ppm, to improve the mouthfeel perception thereof.

Advantageously, neotame may be used to modify mouthfeel 30 characteristics of a composition when present in an amount that does not sweeten the composition. The threshold taste concentration of neotame in water is approximately 4 ppm. The sweetness taste threshold concentration of neotame may be greater than or less 35 than about 4 ppm (e.g., 20 ppm) depending on the physical characteristics (solid, liquid, semi-solid form) or the presence of other components in the food

or composition to which the neotame is added. The determination of the sweetness taste threshold concentration of neotame in a composition is considered to be within the ordinary skill of one in the art.

5 Typically, neotame may be present at below taste threshold concentrations in these compositions in amounts from about 10 ppb to less than about 20 ppm. More particularly, neotame may be present in sub-threshold taste amounts from about 50 ppb to about 10 15 ppm, preferably, in amounts from about 100 ppb to about 10 ppm, and more preferably, in amounts from about 50 ppb to about 10 ppm.

A beverage having improved mouthfeel, according to this 15 invention, may contain about 10 ppb to about 100 ppm neotame in the beverage. Preferably, the beverage may contain about 50 ppb to about 75 ppm neotame and more preferably, the beverage may contain about 100 ppb to about 50 ppm neotame. For example, a fruit-flavored 20 drink having improved mouthfeel, according to this invention, may contain about 100 ppb to about 15 ppm neotame in the drink. Preferably, the drink may contain about 0.5 ppm to about 10 ppm neotame, and more preferably, the drink may contain about 0.8 ppm to 25 about 5 ppm neotame.

A confectionery having improved mouthfeel, such as chewing gum, hard candy, soft candy, or nougat, according to this invention, may contain about 10 ppb 30 to about 1500 ppm neotame in the confectionery product. For example, a chewing gum may contain about 50 ppb to about 1000 ppm, and preferably, may contain about 100 ppb to about 250 ppm neotame.

35 A whipped topping having improved mouthfeel, according to this invention, may contain about 50 ppb to about 75 ppm neotame in the topping. Preferably, the topping

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may contain about 100 ppb to about 50 ppm, and more preferably, the topping may contain about 120 ppb to about 40 ppm neotame.

5 A vanilla flavored instant pudding having improved mouthfeel, according to this invention, may contain about 10 ppb to about 75 ppm neotame in the pudding. Preferably, the pudding may contain about 50 ppb to about 60 ppm, and more preferably, the pudding may 10 contain about 100 ppb to about 50 ppm neotame.

A reconstituted hot cocoa drink, prepared from a dry cocoa mix, according to this invention may contain about 100 ppb to about 25 ppm neotame in the ready-to-drink cocoa. Preferably, the cocoa may contain about 1 ppm to about 20 ppm, and more preferably, may contain about 2 ppm to about 15 ppm neotame. 15

A no-sugar added chocolate pie filling according to 20 this invention may contain about 100 ppb to about 200 ppm neotame in the pie filling. Preferably, the pie filling may contain about 1 ppm to about 150 ppm, and more preferably, may contain about 5 ppm to about 100 ppm neotame.

25 The compositions described herein may be prepared according to conventional techniques. The compositions may be prepared using any convenient method for incorporating neotame, in any form, into the 30 compositions, or ingredients used therein, in the proportions stated and in a manner suitable to provide the desired consistency, homogeneity of dispersion, etc. of the composition. Neotame, optionally together with other additives, may be dry blended with the 35 composition or dry blended with an ingredient used in the preparation of the composition. For example, neotame may be blended or mixed into powdered drink

mixes, salt substitutes, puddings, frostings, dressings, sauces, syrups, gravies, and the like, or may be mixed with other dry or wet (liquid) ingredients that are used in the preparation of these compositions.

5 Alternatively, neotame, optionally together with other flavoring additives, may be dissolved in a suitable solvent, such as water, water/alcohol, alcohol, propylene glycol, glycerin, triacetin, and the like and/or flavor oil mixtures or plant extracts, then

10 added in solution to a composition or combined with an ingredient used in the preparation of the composition. The neotame-containing solution may be sprayed onto the composition, may be blended into the composition, may be blended into or complexed with an ingredient used in

15 the preparation of the composition, or the composition may be dipped into the solution. Solutions containing neotame, together with one or more flavoring additives, may also be dried and then added as a solid to a composition or combined with an ingredient used in the

20 preparation of the composition. Other exemplary compositions containing neotame that may be used in this invention are described in U.S. Patent Application No. 09/213,860, U.S. Patent Application No. 09/215,460, U.S. Patent Application No. 09/215,461 and U.S. Patent

25 Application No. 09/213,263, the disclosures of each of which are incorporated by reference herein.

There are several additional ingredients that may be included in the neotame-containing compositions of this

30 invention. Flavoring additives, adjuvants and the like may be conventionally combined with neotame. Such co-ingredients, or adjuvants are well known in the art for such use and have been extensively described in the literature. Apart from the requirement that the co-

35 ingredients are ingestibly acceptable and thus non-toxic or otherwise non-deleterious, conventional materials may be used and broadly include other

flavoring ingredients, vehicles, stabilizers, emulsifiers, thickeners, surface active ingredients, conditioners, flavor-modifiers, flavor-enhancers and encapsulants.

5

It is anticipated that the use of neotame as a mouthfeel-modifying ingredient may require the reformulation of some of the compositions. It is considered within the skill of one in the art to adjust 10 ingredient use and formulations in the preparation of the compositions of this invention to take advantage of the mouthfeel-modifying properties of neotame.

15 The Examples which follow are intended as an illustration of certain preferred embodiments of the invention, and no limitation of the invention is implied.

20 Solutions of the test compositions of Examples 1-36 were prepared by dissolving the flavoring ingredient of the Example in filtered, treated water. Solutions of ingredients that were not directly soluble in water were first prepared as a 1.0% ethanol solution, using anhydrous ethanol. These solutions were then diluted 25 with neotame-containing filtered, treated water, such that the final neotame concentration of the tasting solution was 0.5, 1.0 or 2.0 ppm. The solutions were then allowed to age overnight prior to evaluation.

30

EXAMPLE 1

35 Caffeine (1,3,7-trimethyl-2,6-dioxopurine) is used to impart astringency and bitterness in beverages. Addition of neotame at a concentration of 0.5 and 1 ppm to an aqueous solution containing 55 ppm caffeine improved the mouthfeel of the composition by imparting body to the astringency. At 2 ppm, neotame imparted a pronounced mouthfeel to the composition.

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EXAMPLE 2

Addition of 2 ppm of neotame to a 0.1% by weight aqueous solution of fluid extract of Kola (available 5 from Frutarom Meer Corp., North Bergen, New Jersey), improved the mouthfeel of the composition.

EXAMPLE 3

Addition of 2 ppm of neotame to a 0.1 wt % aqueous 10 solution of licorice extract (available from Frutarom Meer Corp.) improved the mouthfeel of the composition.

EXAMPLE 4

Addition of 2 ppm of neotame to a 0.1 wt % aqueous 15 solution of Fenugreek extract (available from Frutarom Meer Corp.) improved the mouthfeel of the composition.

EXAMPLE 5

Addition of 2 ppm of neotame to an aqueous solution 20 containing 25 ppm of spearmint oil enhanced the mouthfeel of the product by imparting a rounder mouthfeel.

EXAMPLE 6

25 Addition of 2 ppm of neotame to an aqueous solution containing 10 ppm of 3-cis-hexenol improved the mouthfeel of the composition.

EXAMPLE 7

30 Addition of 2 ppm of neotame to an aqueous solution containing 20 ppm of phenyl ethyl alcohol improved the mouthfeel of the composition by providing good mouthfeel and body to the product.

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EXAMPLE 8

Addition of 2 ppm of neotame to an aqueous solution containing 5 ppm of benzaldehyde improved the mouthfeel of the product.

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EXAMPLE 9

Addition of 2 ppm of neotame to an aqueous solution containing 5 ppm of cinnamic aldehyde (3-phenyl-2-propen-al) improved the mouthfeel of the product by 10 reducing the harsh mouthfeel of the composition and imparting a richness on the tongue.

EXAMPLE 10

Addition of 2 ppm of neotame to an aqueous solution 15 containing 20 ppm of ethyl butyrate improved the mouthfeel of the composition by providing a bodying effect that imparted a fruity mouthfeel to the product.

EXAMPLE 11

20 Addition of 2 ppm of neotame to an aqueous solution containing 25 ppm of delta dodecalactone (5-hydroxy-dodecanoic acid, delta lactone) improved the mouthfeel of the composition.

EXAMPLE 12

25 Addition of 2 ppm neotame to a solution of trans-2-hexenal at a concentration of 10 ppm in water, improved the mouthfeel of the composition.

EXAMPLE 13

30 Addition of 2 ppm neotame to a solution of citral (3,7-dimethyl-2,6-octadienal) at a concentration of 25 ppm in water, improved the mouthfeel by providing a bodying effect that imparted a pulpy character to the composition.

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EXAMPLE 14

Addition of 2 ppm neotame to a solution of iso-amyl acetate at a concentration of 20 ppm in water, improved the mouthfeel of the composition by imparting body to 5 the banana-flavored composition.

EXAMPLE 15

Addition of 2 ppm neotame to a solution of methyl anthranilate at a concentration of 20 ppm in water, had 10 a greatly improved mouthfeel.

EXAMPLE 16

Addition of 2 ppm neotame to a solution of ethyl maltol at a concentration of 20 ppm in water, greatly improved 15 the mouthfeel of the composition by providing a bodying effect that imparted a more natural caramel perception.

EXAMPLE 17

Addition of 2 ppm neotame to a solution of ethyl 20 vanillin at a concentration of 25 ppm in water, improved the mouthfeel of the composition by imparting a creamy, dairy and marshmallow-like character.

EXAMPLE 18

25 Addition of 2 ppm neotame to a solution of diacetyl (2,3-butanedione) at a concentration of 20 ppm in water, improved the mouthfeel of the composition by imparting a creamy cakey character to the composition.

30 EXAMPLE 19

Addition of 2 ppm neotame to a solution of ionone alpha (4-(2,6,6-trimethyl-2-cyclohexen-1-yl)-3-buten-2-one) at a concentration of 20 ppm in water, improved the mouthfeel of the composition.

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EXAMPLE 20

Addition of 2 ppm neotame to a solution of raspberry ketone (4-(p-methoxy phenyl)-2-butanone) at a concentration of 10 ppm in water, improved the 5 mouthfeel of the composition.

EXAMPLE 21

Addition of 2 ppm neotame to a solution of tetradecalactone delta (5-hydroxy tetradecanoic acid, 10 delta lactone) at a concentration of 50 ppm in water, improved the mouthfeel of the composition by increasing to the creamy richness of the composition.

EXAMPLE 22

15 Addition of 2 ppm neotame to a solution of 2-acetylpyrazine at a concentration of 5 ppm in water, improved the mouthfeel of the composition.

EXAMPLE 23

20 Addition of 2 ppm of neotame to an aqueous solution containing 5 ppm of 2,3-dimethyl-pyrazine improved the mouthfeel of the composition.

EXAMPLE 24

25 Addition of 0.5 ppm neotame to a solution of black strap molasses (available from Bush Boake Allen), at a concentration of 0.3% by weight in water, improved the mouthfeel of the composition. This effect was also evident when neotame was added at concentrations of 1.0 30 and 2.0 ppm.

EXAMPLE 25

Addition of 0.5 ppm, 1.0 ppm and 2.0 ppm neotame to 35 solutions of sulfurol (4-methyl-5-thiazolylethanol) at a concentration of 25 ppm in water, improved the mouthfeel of each of the compositions.

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EXAMPLE 26

Addition of neotame at 0.5 ppm or 1.0 ppm to a solution of eugenol (4-allyl-2-methoxyphenol) at a concentration of 2.0 ppm in water improved the mouthfeel of the 5 composition by imparting a creamy character to the composition.

EXAMPLE 27

Addition of 2.0 ppm neotame to an aqueous solution of 10 0.5% ethanol improved the mouthfeel of the composition by imparting a noticeable body to the composition.

EXAMPLE 28

Addition of 0.5 ppm neotame to a solution of hexanol 15 (hexyl alcohol) at a concentration of 20 ppm in water, improved the mouthfeel of the composition by imparting an improved richness. Addition of 1.0 ppm neotame, multiplied the effect, providing the composition with increased richness and body.

20

EXAMPLE 29

Addition of neotame at 0.5 ppm and 1.0 ppm to a solution of anethole (1-methoxy-4-propenylbenzene) at a concentration of 15 ppm in water, improved the 25 mouthfeel of the composition by providing a bodying effect that imparted an anise cordial and black licorice effect that duplicates the mouthfeel of the sugar content in a cordial.

30

EXAMPLE 30

Addition of 0.5 ppm neotame to a solution of menthol (isopropyl-4-methylcyclohexan-2-ol) at a concentration of 30 ppm in water improved the mouthfeel of the composition. With 1 ppm added neotame, the composition 35 had a smooth mouthfeel. With 2 ppm added neotame, the composition developed a candy-like mouthfeel.

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EXAMPLE 31

Addition of 0.5 ppm neotame to a 50 ppm solution of acetic acid in water, added body and improved the mouthfeel of the composition. At 1.0 ppm, and 2.0 ppm 5 neotame further augmented the perception of body.

EXAMPLE 32

Addition of 0.5 ppm neotame to an aqueous solution of butyric acid at a concentration of 50 ppm, improved the 10 mouthfeel of the composition by providing a bodying effect that enhanced the dairy, cheesy, sour mouthfeel characteristics of the composition and by reducing the harsh mouthfeel of the composition. This effect was also observed when higher concentrations of neotame 15 (1.0 and 2.0 ppm) were evaluated.

EXAMPLE 33

Addition of 0.5 ppm to a solution of 2-methyl-2-pentenoic acid at a concentration of 20 ppm in water, 20 improved the mouthfeel of the composition by improving the body of the composition. When added at 2.0 ppm, the neotame provided a noticeably improved mouthfeel.

EXAMPLE 34

25 Addition of 0.5 ppm, 1.0 ppm on 2.0 ppm to a solution of orange oil (available from Bush Boake Allen), at a concentration of 50 ppm in water, improved the mouthfeel of the composition by providing a bodying effect that imparted a very natural orange juice 30 mouthfeel.

EXAMPLE 35

Addition 0.5 ppm or 1.0 ppm neotame to an aqueous solution of lime oil (50 ppm, distilled West Indian 35 Lime Oil, available from Natural Citrus and Allied, Lake Success, New York), improved the mouthfeel of the composition. When added at 2.0 ppm, neotame provided a

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bodying effect that imparted a rich citrus lime mouthfeel.

EXAMPLE 36

5 Addition of neotame at 0.5 ppm to a solution of Nestle® Hydrolyzed Vegetable Protein (4BE), at a concentration of 0.4% by weight in water, improved the mouthfeel by imparting a savory mouthfeel and body.

10

EXAMPLE 37

Addition of neotame at 1.5 ppm to a vanilla flavored sweetened milk (composed of 0.5% Madagascar Bourbon Vanilla, 5% sugar and 2% fat reduced milk) improved the mouthfeel by imparting a smoother and more rounded
15 mouthfeel character.

Addition of neotame at 1.5 ppm to a vanilla flavored sweetened milk (composed of 0.25% Madagascar Bourbon Vanilla, 5% sugar and 2% fat reduced milk) improved the
20 mouthfeel by imparting a rich and creamy mouthfeel character.

EXAMPLE 38

A hot cocoa drink, prepared by reconstituting sugar-
25 sweetened hot cocoa mix containing 3 ppm neotame, possessed a rich body mouthfeel similar to that of a hot cocoa drink prepared by reconstituting a sugar-
sweetened hot cocoa mix containing 0.65% carboxymethyl
cellulose.

30

EXAMPLE 39

Addition of 30 ppm neotame to 10% peach juice-
containing drink improved the mouthfeel of the
composition. Addition of 27 ppm neotame to 5% and 7.5%
35 peach juice-containing drinks provided a bodying effect
that imparted a mouthfeel that was similar to that of a
peach juice drink containing 10% juice.

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EXAMPLE 40

Addition of 25 ppm neotame to canned Del Monte Peach Slices in Lite syrup improved the mouthfeel of the composition by imparting a thick mouthfeel,
5 characteristic of peaches canned in heavy syrup.

EXAMPLE 41

Addition of 1 ppm to Kraft Fat Free Whip Topping improved the mouthfeel of the composition by imparting
10 a fuller and more even mouthfeel.

EXAMPLE 42

Addition of 60 ppm neotame to Jewel brand, canned, unsweetened white grapefruit juice improved the
15 mouthfeel of the composition by providing a bodying effect that imparted a mouthfeel characteristic of fresh grapefruit sections in heavy syrup.

EXAMPLE 43

20 Addition of 60, 75, 100 ppm neotame to Realime® brand juice, diluted with water, improved the mouthfeel of the composition. Bench panel testers reported that the composition tasted as though it contained lots of sugar in it and was syrupy.

25

EXAMPLE 44

Addition of 1 ppm neotame to Campbell's Reduced Sodium Soup improved the mouthfeel of the composition.

30

EXAMPLE 45

Addition of 200 ppm neotame to a no sugar added sherbet product, sweetened with neotame, improved the mouthfeel of the composition by imparting a full mouthfeel.

35

EXAMPLE 46

Addition of 1 ppm neotame to Dean's Fat Free Fluid Milk, fortified with nonfat dry milk, improved the

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mouthfeel of the composition by providing a bodying effect that imparted a mouthfeel characteristic similar to that of a higher fat-containing milk.

5

EXAMPLE 47

Addition of 1 ppm neotame to Kool-Aid® brand unsweetened Lemonade Mix, sweetened with a normal amount of sugar, improved the mouthfeel of the composition.

10

EXAMPLE 48

A lemonade drink prepared by diluting Kool-Aid® brand Unsweetened Lemonade Mix containing 6 ppm neotame and sweetened with 33% less than the conventional amount of 15 sugar, improved the mouthfeel of the drink by providing a bodying effect that imparted a mouthfeel that was similar to that of a Kool-Aid® drink sweetened with a conventional amount of sugar. The Kool-Aid® drink prepared using 33% less sugar, without added neotame, 20 was noticeably watery.

EXAMPLE 49

A lemonade drink, prepared by reconstituting a lemonade mix containing 8 ppm neotame and 4.9% sugar (50% of the 25 conventional amount of sugar), possessed a mouthfeel similar to that of a conventional sugar-sweetened lemonade.

EXAMPLE 50

30 Addition of 1 to 2 ppm neotame to a diet supplement drink (Schiff Products Inc., Women's Natural Replacement Dietary Supplement Powder, Vanilla Flavored) improved the mouthfeel of the composition.

35

EXAMPLE 51

Addition of 1 to 2 ppm neotame to Ross Products Ensure Plus Vanilla Nutrition Beverage improved the mouthfeel

of the composition by enhancing the creaminess of the product to provide a more milkshake-like mouthfeel.

EXAMPLE 52

5 Addition of 2 ppm neotame to Ross Products Ensure Plus Chocolate Nutrition Beverage improved the mouthfeel of the composition by enhancing the creaminess of the product to provide a more milkshake-like mouthfeel.

10

EXAMPLE 53

A reconstituted orange juice beverage, prepared from frozen Minute Maid® Pulp Free concentrate, containing 50% of the conventional amount of juice concentrate and 4 ppm neotame, possesses a mouthfeel having more body
15 that a similar reconstituted orange juice beverage, containing 65% of the conventional amount of juice concentrate without added neotame.

EXAMPLE 54

20 A reconstituted orange juice beverage, prepared from frozen Minute Maid® Pulp Free concentrate, containing 65% of the conventional amount of juice concentrate and 3 ppm neotame, possessed an improved mouthfeel compared to the beverage prepared without neotame. The
25 mouthfeel of the neotame-containing beverage was characterized as being heavy, rich and full.

EXAMPLE 55

A reconstituted orange juice beverage, prepared from
30 frozen Minute Maid® Pulp Free concentrate, containing 85% of the conventional amount of juice concentrate and 2 ppm neotame, possessed an improved mouthfeel compared to the beverage prepared without neotame. The mouthfeel of the neotame-containing beverage was
35 characterized as having a body similar to that of fresh squeezed orange juice.

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EXAMPLE 56

Addition of 1 to 2 ppm neotame to Mead Johnson Boost Vanilla Nutritional Energy Beverage improved the mouthfeel of the composition by decreasing throat burn.

5

EXAMPLE 57

Crystal Light® Tropical Passions Ready to Drink low calorie soft drink, containing 1 to 2 ppm neotame, possessed an improved mouthfeel compared to the 10 beverage without added neotame. Neotame improved the mouthfeel of the composition by decreasing throat catch or burn caused by the benzoate and sorbate preservatives.

15

EXAMPLE 58

Crystal Light® Lemonade Ready to Drink low calorie soft drink, containing 1 to 2 ppm neotame, possessed an improved mouthfeel compared to the beverage without 20 added neotame. Neotame improved the mouthfeel of the composition by decreasing throat catch or burn caused by the benzoate and sorbate preservatives.

EXAMPLE 59

Crystal Light® Raspberry Ice Ready to Drink low calorie 25 soft drink, containing 1 to 2 ppm neotame, possessed an improved mouthfeel compared to the beverage without added neotame. Neotame improved the mouthfeel of the composition by decreasing throat catch or burn caused by the benzoate and sorbate preservatives.

30

EXAMPLE 60

A chicken soup broth, composed of a warm water solution of chicken soup flavor (3% by wt) and containing 0.25 ppm neotame, possessed an improved mouthfeel compared 35 to the broth without added neotame. Neotame improved the mouthfeel of the broth by providing a bodying effect that imparted a richer, fuller mouthfeel.

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EXAMPLE 61

A beef gravy, composed of a warm water solution of beef gravy flavor (10% by wt) and containing 200 ppb neotame, possessed an improved mouthfeel compared to 5 the gravy without added neotame. Neotame improved the mouthfeel of the gravy by providing a bodying effect that imparted a richer, fuller mouthfeel.

Other variations or modifications, which will be 10 obvious to those skilled in the art, are within the scope and teachings of this invention. This invention is not to be limited except as set forth in the following claims.

WE CLAIM:

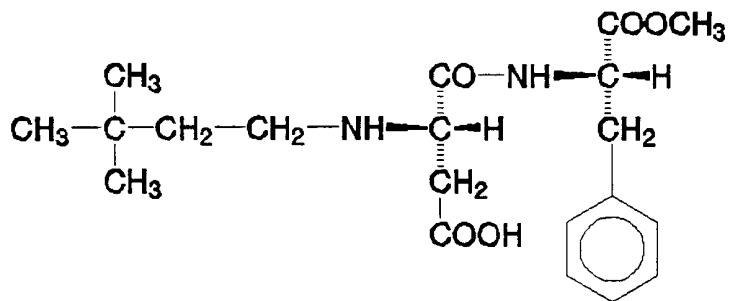
1. A method for modifying the mouthfeel of a composition, comprising adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester to said composition in an amount from about 10 ppb to about 1500 ppm.
2. The method according to claim 1, wherein said composition is a food or pharmaceutical composition.
3. The method according to claim 2, comprising adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester in an amount from about 50 ppb to about 600 ppm.
4. The method according to claim 3, wherein said N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester is present in an amount which does not impart sweetness to said composition.
5. The method according to claim 1, wherein said composition is a beverage.
6. The method according to claim 5, wherein said beverage is selected from a fruit juice-containing drink, a fruit-flavored drink, a flavored water, a soy-based drink product, a tea, a coffee and a coffee-flavored drink.
7. The method according to claim 1, wherein said composition is a dairy product.
8. The method according to claim 5, wherein said dairy product is selected from a topping, a pudding, a frozen dessert, a milk drink, a cultured product and a cheese product.

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9. The method according to claim 1, wherein said composition is a cocoa- or chocolate-containing product.

10. The method according to claim 1, comprising adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester to said composition in an amount from about 10 ppb to about 20 ppm.

11. A composition comprising N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester of the formula



wherein said N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester is present in the composition in an amount sufficient to improve the mouthfeel of the composition and said amount is less than the sweetness taste threshold concentration of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester in the composition.

12. The composition according to claim 11, wherein said composition is a beverage.

13. The composition according to claim 12, wherein said beverage is selected from a fruit juice-containing drink, a fruit-flavored drink, a flavored water, a soy-based drink product, a tea, a coffee and a coffee-flavored drink.

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14. The composition according to claim 11, wherein said composition is a dairy product.

15. The composition according to claim 15, wherein said dairy product is selected from a topping, a pudding, a frozen dessert, a milk drink, a cultured product and a cheese product.

16. The composition according to claim 11, wherein said composition is a cocoa- or chocolate-containing product.

17. The composition according to claim 11, comprising N- [N- (3,3-dimethylbutyl) -L- α -aspartyl] -L-phenylalanine 1-methyl ester in an amount from about 10 ppb to about 20 ppm.

18. A beverage having improved mouthfeel comprising N- [N- (3,3-dimethylbutyl) -L- α -aspartyl] -L-phenylalanine 1-methyl ester in an amount which does not impart sweetness to said beverage.

19. A fruit juice-containing drink having improved mouthfeel comprising N- [N- (3,3-dimethylbutyl) -L- α -aspartyl] -L-phenylalanine 1-methyl ester in an amount which does not impart sweetness to said drink.

20. A fruit-flavored drink having improved mouthfeel comprising N- [N- (3,3-dimethylbutyl) -L- α -aspartyl] -L-phenylalanine 1-methyl ester in an amount which does not impart sweetness to said drink.

21. A hot cocoa beverage having improved mouthfeel comprising N- [N- (3,3-dimethylbutyl) -L- α -aspartyl] -L-phenylalanine 1-methyl ester in an amount which does not impart sweetness to said beverage.

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22. A soy-based drink having improved mouthfeel comprising N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester in an amount which does not impart sweetness to said drink.

23. A flavored water beverage having improved mouthfeel comprising N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester in an amount which does not impart sweetness to said beverage.

24. An iced tea beverage having improved mouthfeel comprising N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester in an amount which does not impart sweetness to said beverage.

25. A dairy product having improved mouthfeel comprising N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester in an amount which does not impart sweetness to said product.

26. A whipped topping having improved mouthfeel comprising N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester in an amount which does not impart sweetness to said topping.

27. A pudding having improved mouthfeel comprising N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester in an amount which does not impart sweetness to said pudding.

28. A cheese product having improved mouthfeel comprising N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester in an amount which does not impart sweetness to said product.

29. A cocoa- or chocolate-containing product having improved mouthfeel comprising N-[N-(3,3-

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dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester in an amount which does not impart sweetness to said composition.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 00/28734

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A23L1/236 C07K5/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A23L C07K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, FSTA

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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E	WO 00 69283 A (NUTRASWEET CO) 23 November 2000 (2000-11-23) page 3, line 25-29; examples 1-80 page 18, line 1-5 ----	1-21,23, 25,29
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A	US 5 126 258 A (JANDA KIM ET AL) 30 June 1992 (1992-06-30) figures 1,5 ----	1-29
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Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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