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BILLAT-ROSSI et al.(10) **Pub. No.: US 2016/0205979 A1**(43) **Pub. Date: Jul. 21, 2016**(54) **TASTE-MODIFYING COMBINATIONS**(71) Applicant: **FIRMENICH SA**, Geneva 8 (CH)(72) Inventors: **Maryline BILLAT-ROSSI**, Geneva 8 (CH); **Kasia AEBERHARDT**, Geneva 8 (CH)(73) Assignee: **Firmenich SA**, Geneva 8 (CH)(21) Appl. No.: **14/654,832**(22) PCT Filed: **Dec. 12, 2013**(86) PCT No.: **PCT/EP2013/076380**

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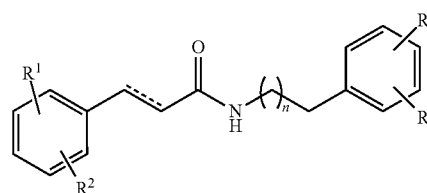
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(57)

ABSTRACT

The present invention relates to the use of a compound according to formula (I) in the form of any one of its stereoisomers or a mixture thereof, and wherein n is an integer from 0 to 2; the dotted line represents a carbon-carbon single or double bond; and each of R¹ to R⁴, when taken independently from each other, represents a hydrogen atom or represents a R⁵ or OR⁵ group, R⁵ representing a C₁ to C₅, or even a C₁ to C₃, alkyl group; and optionally one of the groups R₁ to R₄ represents —OH; and/or when R₁ and R₂ are taken together, and/or R₃ and R₄ are taken together, represent a OCH₂O group, provided said groups taken together are adjacent substituents of the phenyl group; as an ingredient in combination with other ingredients to confer, enhance, improve or modify the kokumi or umami taste of a flavored article.



(I)

TASTE-MODIFYING COMBINATIONS

FIELD

[0001] The present invention relates to the field of taste. More particularly, it concerns the use of certain cinnamic acid derived amides as taste-enhancing ingredients to impart or reinforce the tastes known as kokumi or umami.

[0002] The present invention also concerns compositions or articles containing at least one of the aforementioned compounds.

BACKGROUND

[0003] Various cinnamic acid derived amides are known to naturally occur in plants such as *Zanthoxylum rubescens* (Rutaceae) [Amides from *Zanthoxylum Rubescens*. Adesina, S. K.; Reisch, J. *Phytochem.* 1989, 3, 839-842.] or Piperaceae [Chemical constituents of peppers (Piper spp.) and application to food preservation: naturally occurring antioxidative compounds. Nakatani, N.; Inatani, R.; Ohta, H.; Nishioka, A., *Environ. Health Perspectives* 1986, 67, 135-142].

[0004] Since vanilloid amides, such as capsaicin or piperine are usually found in pepper or *capsicum* species, they generally have a pungent or hot taste. It would be desirable to avoid this. US2003/0152682 (Bayer Polymers LLC) and EP 1 323 356 (Symrise) disclose the use of ferullic acid amides as pungent compounds or heat generating-system for oral hygiene products. Included in this document is the compound trans-rubenamine, but it is not described or even suggested to have an umami taste. EP 2 138 152 (to Henkel) describes mouthwash compositions containing ferulic acid derived amides among other amides or pungent, or cooling compounds. However, none of these documents anticipate, report or suggest that the compounds described therein have organoleptic properties that can be used to impart or reinforce a kokumi or umami taste.

[0005] In New Developments in Umami (Enhancing) Molecules by Winkel et al, Chemistry & Biodiversity, Vol. 5 (2008), p 1195-1203, a review of known umami modifying compounds is given. However, there is no suggestion of the compounds of the present invention.

[0006] Kokumi and umami are now established descriptors in the field of taste and are known to supplement, enhance, or modify the taste and/or aroma of a food without necessarily having a strong characteristic taste or aroma of their own. A desire for kokumi and umami exists for a wide range of foods like soups, sauces, savory snacks, prepared meals, condiments, etc. Moreover, they are often found to complement or enhance foodstuffs which have a savory or salty characteristic and, as a result, may be useful where sodium or salt reduction is desired.

[0007] Umami is one of the five basic tastes sensed by specialized receptor cells present on the human tongue. Umami applies to the sensation of savoriness, and particularly to the detection of glutamates and/or ribotides which are common in meats, cheese and other protein-rich foods. The behavior of umami receptors explains why foods containing monosodium glutamate (MSG) often taste "fuller". However, some consumers are apparently sensitive to MSG and may suffer from headaches or other illnesses upon consuming it. Thus replacement of MSG, at least partially, can be desirable.

[0008] Kokumi has been described variously as "deliciousness", "continuity", "mouthfulness", "mouthfeel" and "thickness". It exists naturally in a variety of foods such as

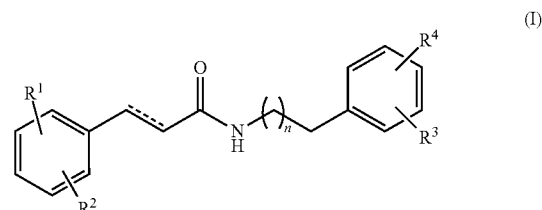
cheese, giving a 'mature' cheese taste; vegetable flavors, particularly tomato; meat, where it gives a fullness and longer lasting taste; mayonnaise & dressings, where it can round out acid notes; fat-reduced food products, where it gives a similar fullness to full-fat products; herbs and spice; and soups, especially miso soup.

[0009] US2006/057268 reports saturated or unsaturated N-alkamide and their use as umami ingredients.

[0010] It would be desirable to provide a flavor or taste enhancing ingredient that has umami or kokumi characteristics. It would be even more desirable to provide a flavor or taste enhancing ingredient that has umami and kokumi characteristics.

SUMMARY

[0011] Provided herein is a taste-modifying composition comprising a mixture of at least a compound according to formula (I)



[0012] in the form of any one of its stereoisomers or a mixture thereof, and wherein

[0013] n is an integer from 0 to 2;

[0014] the dotted line represents a carbon-carbon single or double bond; and

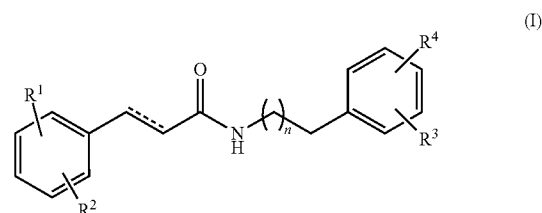
[0015] each of R¹ to R⁴, when taken independently from each other, represents a hydrogen atom or represents a R⁵ or OR⁵ group, R⁵ representing a C₁ to C₅, or even a C₁ to C₃, alkyl group; and optionally one of the groups R¹ to R⁴ represents —OH; and/or when R¹ and R² are taken together, and/or R³ and R⁴ are taken together, represent a OCH₂O group, provided said groups taken together are adjacent substituents of the phenyl group;

as an ingredient in combination with other ingredients to confer, enhance, improve or modify the kokumi or umami taste of a flavored article.

DETAILED DESCRIPTION

[0016] A taste-modifying composition comprising:
a mixture of:

(i) a compound according to formula (I)



in the form of any one of its stereoisomers or a mixture thereof, and wherein

n is an integer from 0 to 2;

the dotted line represents a carbon-carbon single or double bond; and

each of R^1 to R^4 , when taken independently from each other, represents a hydrogen atom or represents a R^5 or OR^5 group, R^5 representing a C_1 to C_5 alkyl group; and optionally one of the groups R_1 to R_4 represents $-OH$; and/or

when R_1 and R_2 are taken together, and/or R_3 and R_4 are taken together, represent a OCH_2O group, provided said groups taken together are adjacent substituents of the phenyl group; and

(ii) a flavor base wherein the flavor base is selected from the group consisting of;

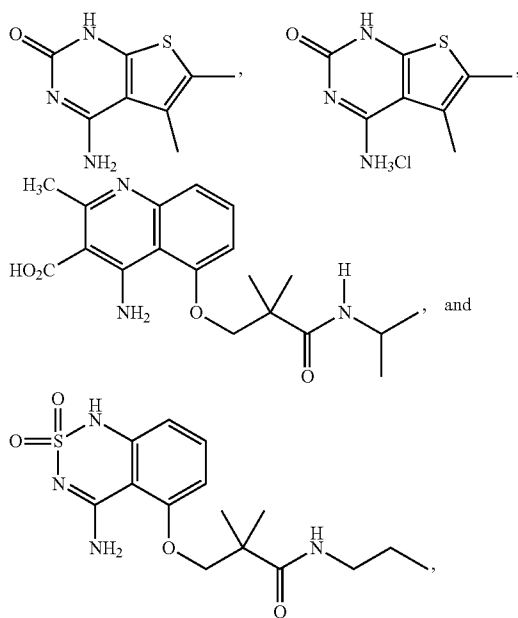
[0017] a) a umami imparting ingredient;

[0018] b) an acid;

[0019] c) a salt;

[0020] d) a sweetness imparting compound; and

[0021] e) a sweet receptor modulator compound selected from the group consisting of:



or one of their salts.

[0022] In another aspect, provided herein is a method to confer, enhance, improve or modify the taste properties or mouthfeel, as indicated above, of a flavored article, which method comprises adding to the article a taste-modifying compound as described above.

[0023] In a particular embodiment, a compound of Formula I one is provided in the taste-modifying composition in an amount of about 0.1 to about 70%.

[0024] In another embodiment, the umami imparting ingredient is provided in the taste-modifying composition in an amount, by weight, of about 5 to about 99%. According to a particular embodiment of the invention, said flavor base does not comprise another umami imparting flavor ingredient, such as MSG (mono sodium glutamate), and ribotides (a blend, e.g. 50-50 w/w, of IMP (inosine monophosphate) and

GMP (guanosine monophosphate)), for example in a MSG/ribotides w/w ratio from 95/5 to 90/10.

[0025] In another embodiment, the acid is provided in the taste-modifying composition in an amount, by weight, of about 0.1 to about 15%.

[0026] In another embodiment, the salt is provided in the taste-modifying composition in an amount, by weight, of about 5 to about 99%.

[0027] In another embodiment, the sweetness imparting compound is provided in an amount, by weight, of about 0.2 to about 99%.

[0028] In another embodiment, the sweet receptor modulator compounds described above is provided in an amount by weight of about 0.2 up to about 99%.

[0029] The above taste-modifying compositions can be used as flavors or taste enhancing ingredients, for instance to impart or reinforce the kokumi or umami taste of a flavor article.

[0030] In the context of the present invention "use of a compound of formula (I)" includes the use of any composition containing compound (I) and which can be advantageously employed in the flavor industry as active ingredient.

[0031] For the sake of clarity, by the expression "any one of its stereoisomers", or the similar, it is meant the normal meaning understood by a person skilled in the art, i.e. that the invention's compound can be a pure enantiomer (if chiral) or diastereomer (e.g. the double bond is in a conformation E or Z).

[0032] For the sake of clarity, by the expression "wherein the dotted line represents carbon-carbon single or double bond", or the similar, it is meant the normal meaning understood by a person skilled in the art, i.e. that the whole bonding (solid and dotted line) between the carbon atoms connected by said dotted line is a carbon-carbon single or double bond.

[0033] One advantage of the present invention is that the compounds confer umami and/or kokumi taste to a product without detrimentally affecting the flavor profile of the product.

[0034] According to a particular embodiment of the invention, said compound (I) is selected from the group of compounds in which

n is 0 or 1;

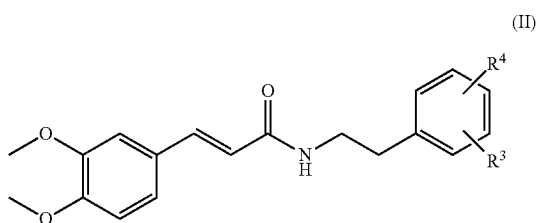
the dotted line represents carbon-carbon single or double bond; and

each of R^1 to R^4 , taken independently from each other, represents a hydrogen atom or represents a R^5 or OR^5 group, R^5 representing a C_1 to C_5 , or even a C_1 to C_3 , alkyl group.

[0035] According to a particular embodiment of the invention, said compound (I) is selected from the group of compounds in which R_1 and R_2 both represent methoxy groups and n is 1.

[0036] According to any one of the above embodiments of the invention, said dotted line represents a carbon-carbon double bond.

[0037] According to a particular embodiment of the invention, said compound (I) is a compound of formula



in the form of any one of its stereoisomers or a mixture thereof, and wherein each of R^3 or R^4 , taken independently from each other, represents a hydrogen atom or represents a R^5 or OR^5 group, R^5 representing a C_1 to C_5 , or even a C_1 to C_3 alkyl group.

[0038] According to any one of the above embodiments of the invention, R^3 represents a hydrogen atom or represents a R^5 or OR^5 group, and R^4 represents a R^5 or OR^5 group, R^5 representing a C_1 to C_5 , or even a C_1 to C_3 , alkyl group.

[0039] According to any one of the above embodiments of the invention, R^3 represents a hydrogen atom or represents a R^5 group, and R^4 represents a R^5 or OR^5 group, R^5 representing a C_1 to C_5 , or even a C_1 to C_3 , alkyl group.

[0040] According to any one of the above embodiments of the invention, R^3 represents a hydrogen atom or represents a R^5 group, and R^4 represents a R^5 , R^5 representing a C_1 to C_5 , or even a C_1 to C_3 , alkyl group.

[0041] According to any one of the above embodiments of the invention, R^5 represents a methyl, ethyl, propyl or isopropyl group.

[0042] The compounds of formula (II) wherein:

R^3 represents a hydrogen atom or represents a C_1 to C_5 , or even a C_{1-3} , alkyl group or a OR^6 group, R^6 representing a C_1 to C_5 , or even a C_{2-3} , alkyl group; and

R^4 represents a C_1 to C_5 , or even a C_{1-3} , alkyl group or a OR^6 group, R^6 representing a C_1 to C_5 , or even a C_{1-3} , alkyl group; are also novel compounds and therefore they represent another aspect of the invention.

[0043] According to any one of the above embodiments of the invention, said novel compounds are those wherein R^3 represents a hydrogen atom or a C_{1-3} , alkyl group and R^4 represents a C_{1-3} , alkyl group or OR^6 group, R^6 representing a C_1 to C_3 alkyl group.

[0044] According to any one of the above embodiments of the invention, said compound (I) or (II) is a C_{19-25} compound, or even a C_{19-22} compound.

[0045] According to any one of the above embodiments of the invention, the non-aromatic carbon-carbon double bond of compound (I) or (II) can be in a configuration Z or E or a mixture thereof. According to any one of the above embodiments of the invention, said compound (I) or (II) is in the form of a mixture of the E and Z stereoisomers, said mixture comprising at least 50% w/w, or at least 80% w/w, of the stereoisomer E, the remaining being essentially the Z stereoisomer.

[0046] According to a particular aspect of the present invention, said compound (I) is selected amongst (E)-3-(3,4-dimethoxyphenyl)-N-(4-methoxyphenethyl)acrylamide (referenced in the Examples as Amide 1), (E)-3-(3,4-dimethoxyphenyl)-N-(3-methoxyphenethyl)acrylamide (referenced in the Examples as Amide 4), (E)-3-(3,4-dimethoxyphenyl)-N-(3-ethoxyphenethyl)acrylamide (referenced in the Examples as Amide 7), (E)-3-(3,4-dimethoxy-

phenyl)-N-(3-propoxyphenethyl)acrylamide (referenced in the Examples as Amide 8), (E)-3-(3,4-dimethoxyphenyl)-N-(4-isopropoxyphenethyl)acrylamide (referenced in the Examples as Amide 9), (E)-3-(3,4-dimethoxyphenyl)-N-(4-ethylphenethyl)acrylamide (referenced in the Examples as Amide 10), (E)-3-(3,4-dimethoxyphenyl)-N-(3,4-dimethylphenethyl)acrylamide (referenced in the Examples as Amide 11), (E)-3-(3,4-dimethoxyphenyl)-N-(4-isopropylphenethyl)acrylamide (referenced in the Examples as Amide 12) or (E)-3-(3,4-dimethoxyphenyl)-N-(3-methylphenethyl)acrylamide (referenced in the Examples as Amide 17).

[0047] The compounds of the invention can be used alone or in mixtures and provide a strong kokumi or umami taste at exceptionally low levels.

[0048] As mentioned above, the invention concerns the use of a compound of formula (I) as a taste-conferring or enhancing ingredient, and in particular to impart or reinforce kokumi or umami taste.

[0049] According to a particular embodiment of the invention, said compound (I) is used to impart or reinforce kokumi or umami taste as well as to enhance the saltiness and/or savory perception of a flavor.

[0050] According to a particular embodiment of the invention, such use is very much appreciated by flavorists to impart or enhance the kokumi or umami taste in savory flavors, such as beef, chicken, pork, and seafood. Surprisingly, in seafood applications such as surimi, or seafood bouillons or snack flavors, compounds according to formula (I) are also found to enhance the perception of sweetness and longevity of the flavor. By contrast, in beef flavors, the compounds according to formula (I) are found to enhance perception of fattiness and tallow notes. Additionally we found that said compounds can increase juiciness in meat based products.

[0051] In another aspect, the invention provides a taste-modifying composition comprising:

[0052] i) as a taste-conferring or modifying ingredient, at least one compound according to formula (I) above;

[0053] ii) at least one ingredient selected from the group consisting of a flavor carrier and a flavor base; and

[0054] iii) optionally at least one flavor adjuvant.

[0055] By "flavor carrier" we mean here a material which is substantially neutral from a flavor point of view, insofar as it does not significantly alter the organoleptic properties of flavoring ingredients. The carrier may be a liquid or a solid.

[0056] Suitable liquid carriers include, for instance, an aqueous system, an emulsifying system, i.e. a solvent and a surfactant system, or a solvent commonly used in flavors. A detailed description of the nature and type of solvents commonly used in flavor cannot be exhaustive. Suitable solvents include, for instance, water, propylene glycol, triacetone, triethyl citrate, benzylic alcohol, ethanol, vegetable oils or terpenes.

[0057] Suitable solid carriers include, for instance, absorbing gums or polymers, or even encapsulating materials. Examples of such materials may comprise wall-forming and plasticizing materials, such as mono, di- or trisaccharides, natural or modified starches, hydrocolloids, cellulose derivatives, polyvinyl acetates, polyvinylalcohols, proteins or pectins, or yet the materials cited in reference texts such as H. Scherz, *Hydrokolloids: Stabilisatoren, Dicksungs- und Gehermittel in Lebensmittel*, Band 2 der Schriftenreihe Lebensmittelchemie, Lebensmittelqualität, Behr's Verlag GmbH & Co., Hamburg, 1996. Encapsulation is a well known process to a person skilled in the art, and may be performed, for instance,

using techniques such as spray-drying, agglomeration, extrusion, coacervation and the like.

[0058] By “flavor base” we mean here a composition comprising at least one flavoring ingredient.

[0059] Said flavoring ingredient is not a compound of formula (I). Moreover, by “flavoring ingredient” it is meant here a compound, which is used in flavoring preparations or compositions to impart a hedonic effect. In other words such an ingredient, to be considered as being a flavoring one, must be recognized by a person skilled in the art as being able to impart or modify in a positive or pleasant way the taste of a composition, and not just as having a taste.

[0060] The nature and type of the flavoring co-ingredients present in the base do not warrant a more detailed description here, the skilled person being able to select them on the basis of its general knowledge and according to intended use or application and the desired organoleptic effect. In general terms, these flavoring co-ingredients belong to chemical classes as varied as alcohols, aldehydes, ketones, esters, ethers, acetates, nitriles, terpenoids, nitrogenous or sulphurous heterocyclic compounds and essential oils, and said perfuming co-ingredients can be of natural or synthetic origin. Many of these co-ingredients are in any case listed in reference texts such as the book by S. Arctander, *Perfume and Flavor Chemicals*, 1969, Montclair, N.J., USA, or its more recent versions, or in other works of a similar nature, as well as in the abundant patent literature in the field of flavor. It is also understood that said co-ingredients may also be compounds known to release in a controlled manner various types of flavoring compounds.

[0061] According to a particular embodiment of the invention, said flavor base comprises another umami imparting flavor ingredient, such as MSG (mono sodium glutamate), and ribotides (a blend, e.g. 50-50 w/w, of IMP (inosine monophosphate) and GMP (guanosine monophosphate)), for example in a MSG/ribotides w/w ratio from 95/5 to 90/10. Or ingredients rich in those compounds mentioned before that are well known to the people skilled in the art.

[0062] Further provided herein is a taste-modifying composition comprising a mixture of a compound of Formula I and a flavor base wherein the mixture is formulated to be added to a foodstuff to provide a flavored article. In another particular embodiment, the taste-modifying composition mixture is provided in the substantial absence of a foodstuff. In further particular embodiment, the taste-modifying composition comprises less than 2%, particularly less than 1%, more particularly less than 0.5%, and more particularly less than 0.1%. In a particular embodiment, the taste-modifying composition mixture is provided in the absence of a foodstuff.

[0063] In another embodiment, the mixture may be a dry powder.

[0064] In another embodiment, a flavored article comprises a compound of Formula I in an amount of from about 1 to about 100 ppm, more particularly from about 10 to about 25 ppm wherein the flavored article further comprises a flavor base wherein the flavor base comprises:

[0065] a) a sweetness imparting compound, in amount from about 0.05 to about 1000 ppm, particularly from about 0.1 to about 500 ppm. In a particular embodiment the sweetness imparting compound is selected from the group consisting of stevia extracts, glycosylated derivatives of stevia extracts (for example, but not limited to, the transglucosylated sweet glycoside mixture of Stevia described in U.S. Pat. No. 7,807,206 and incorporated by reference herein), sugars

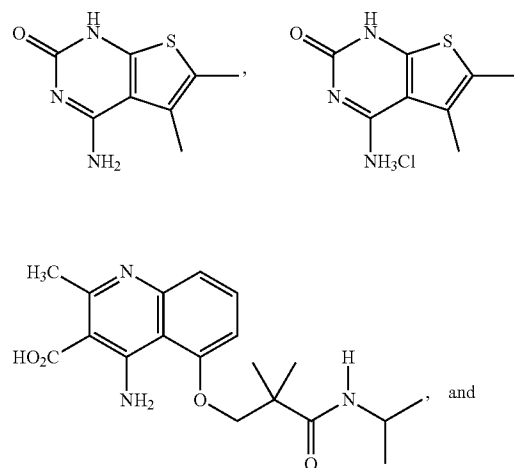
(for example, but not limited to, sucrose, glucose, fructose high fructose corn syrup and corn syrup) sucralose, D-tryptophan, NHDC, polyols (sugar alcohols for example but not limited sorbitol xylitol, and mannitol xylose, arabinose, rhamnose and lactose), stevioside, Rebaudioside A, thaumatin, mogrosides (for example but not limited to those present in Luo Han Guo extract), monellin, neotame, aspartame, potassium acesulfame, saccharine, monoammonium glycyrrhizinate, calcium cyclamate, sodium cyclamate, sodium saccharin, potassium saccharin, ammonium saccharin, and calcium saccharin;

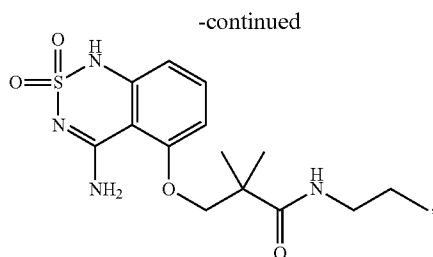
[0066] b) an umami imparting ingredient in an amount from about 1 to about 2000 ppm, more particularly from about 50 to about 200 ppm. In a particular embodiment when the umami imparting ingredient is ribotide, it is not provided at 300 ppm in chicken bouillon. In another embodiment, the umami imparting ingredient is selected from the group consisting of glutamic acid, MSG, ribotides, and ingredients that are sources of glutamic acid, MSG, ribotides, like yeast extracts, hydrolyzed proteins (for example but not limited to vegetable, corn, and wheat gluten), fermented ingredients, mushroom powder, tomato powder, enzymatic modified cheese, cheese powders, fish extracts, fermented fish, oyster sauce, Worcester sauce, and soy sauce;

[0067] c) a salt in an amount from about 100 to about 10,000 ppm. In a particular embodiment the salt is selected from the group consisting of sodium chloride, potassium chloride, sea salt, magnesium chloride, calcium chloride, magnesium sulfate, calcium sulfate and a source rich in a cations and anions of at least one of the above salts;

[0068] d) an acid in an amount from about 1 ppm to about 2000 ppm, more particularly from about 50 to about 200 ppm. In a particular embodiment, the acid is selected from the group consisting of tartaric, citric, succinic, tannic, malic, phosphoric, lactic, acetic, ascorbic, and disodium succinic acids, and sodium lactate.

[0069] e) a compound in an amount from about 0.1 ppm to about 200 ppm, particularly from about 0.1 to about 20 ppm, more particularly from about 1 to about 15 ppm, wherein the compound is selected from the group consisting of:





or one of their salts.

[0070] By “flavor adjuvant” we mean here an ingredient capable of imparting additional added benefit such as a color, a particular light resistance, chemical stability, and so on. A detailed description of the nature and type of adjuvant commonly used in flavoring bases cannot be exhaustive. Nevertheless, such adjuvants are well known to a person skilled in the art, but it has to be mentioned that said ingredients are well known to a person skilled in the art.

[0071] A composition consisting of at least one compound of formula (I) and at least one flavor carrier represents a particular embodiment of the invention as well as a flavoring composition comprising at least one compound of formula (I), at least one flavor carrier, at least one flavor base, and optionally at least one flavor adjuvant.

[0072] In a particular embodiment, more than one compound of formula (I) is used in combination since it is found that a synergistic enhancement of the kokumi or umami taste can be achieved in this way. Moreover, it is found that the combination of ingredients can provide the desired kokumi or umami taste without imparting undesirable flavor notes.

[0073] Moreover, a compound of formula (I) can be advantageously incorporated into flavored articles to positively impart, or modify, the kokumi or umami taste of said articles. Thus, in yet another aspect, the present invention provides a flavored article comprising:

[0074] i) as taste-conferring or modifying ingredient, at least one compound of formula (I), as defined above, optionally present as part of a flavoring composition; and

[0075] ii) a foodstuff base.

[0076] Suitable foodstuff bases, e.g. foods or beverages, can be fried or not, as well as frozen or not, low fat or not, marinated, battered, chilled, dehydrated, instant, canned, reconstituted, retorted or preserved. Typical examples of said foodstuff bases include:

[0077] a seasonings or condiment, such as a stock, a savory cube, a powder mix, a flavored oil, a sauce (e.g. a relish, barbecue sauce, a dressing, a gravy or a sweet and/or sour sauce), a salad dressing or a mayonnaise;

[0078] a meat-based product, such as a poultry, beef or pork based product, a seafood, surimi, or a fish sausage;

[0079] a soup, such as a clear soup, a cream soup, a chicken or beef soup or a tomato or asparagus soup;

[0080] a carbohydrate-based product, such as instant noodles, rice, pasta, potatoes flakes or fried, noodles, pizza, tortillas, wraps;

[0081] a dairy or fat product, such as a spread, a cheese, or regular or low fat margarine, a butter/margarine blend, a butter, a peanut butter, a shortening, a processed or flavored cheese;

[0082] a savory product, such as a snack, a biscuit (e.g. chips or crisps) or an egg product, a potato/tortilla chip, a microwave popcorn, nuts, a pretzel, a rice cake, a rice cracker, etc;

[0083] an imitation products, such as a dairy (e.g., a reformed cheese made from oils, fats and thickeners) or seafood or meat (e.g. a vegetarian meat replacer, veggie burgers) analogue; or

[0084] a pet or animal food.

[0085] Particular foodstuffs in which the compound according to formula (I) finds utility include those having topnotes such as seafood, beef, chicken, vegetables, cheese, fat, tallow and/or marrow are important.

[0086] For the sake of clarity, it has to be mentioned that, by “foodstuff” we mean here an edible product, e.g. a food or a beverage. Therefore, a flavored article according to the invention comprises one or more compounds according to formula (I), as well as optional benefit agents, corresponding to taste and flavor profile of the desired edible product, e.g. a savory cube.

[0087] The nature and type of the constituents of the foodstuffs or beverages do not warrant a more detailed description here, the skilled person being able to select them on the basis of his general knowledge and according to the nature of said product.

[0088] According to any one of the above embodiments of the invention, the taste-modifying composition and the flavored article according to the invention comprise as taste conferring or modifying ingredient a compound of formula (II) wherein R^3 represents a hydrogen atom or represents a R^5 group, and R^4 represents a R^5 or OR^5 group, R^5 representing a C_1 to C_3 alkyl group. According to any one of the above embodiments of the invention, R^5 represents a methyl, ethyl, propyl or iso-propyl group.

[0089] The proportions in which the compounds according to the invention can be incorporated into the various aforementioned articles or compositions vary within a wide range of values. These values are dependent on the nature of the article to be flavored and on the desired organoleptic effect as well as the nature of the co-ingredients in a given base when the compounds according to the invention are mixed with flavoring co-ingredients, solvents or additives commonly used in the art.

[0090] In the case of flavoring compositions, typical concentrations are in the order of 0.05% to 30%, more preferably 0.1% to 20%, most preferably 0.1% to 10%, of the compounds of the invention based on the weight of the flavoring compositions into which they are incorporated. Concentrations lower than these, such as in the order of 0.5 ppm to 300 ppm by weight, more preferably 5 ppm to 75 ppm, most preferably 8 to 50 ppm, can be used when these compounds are incorporated into flavored articles, the percentage being relative to the weight of the article.

[0091] At these levels the taste is typically described as umami-like, lasting, sweet and lingering.

[0092] Additional embodiments of the compositions disclosed herein and the use thereof are also contemplated, wherein the compositions consist of or consist essentially of the recited components.

EXAMPLES

[0093] Embodiments will now be described in further detail by way of the following example, wherein the abbreviations have the usual meaning in the art, the NMR spectral

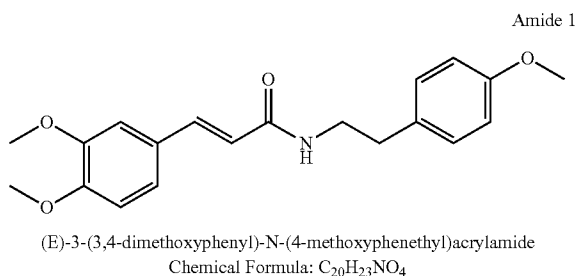
data were recorded in CDCl_3 , with a 400 MHz machine for ^1H , and a 100 or 125 MHz machine for ^{13}C , the chemical displacements, δ , are indicated in ppm with respect to TMS as standard, and the coupling constants, J , are expressed in Hz.

Example 1

Preparation of Compound According to the Invention

[0094] Synthesis of Amides with Ethyl Chloroformate, General Procedure:

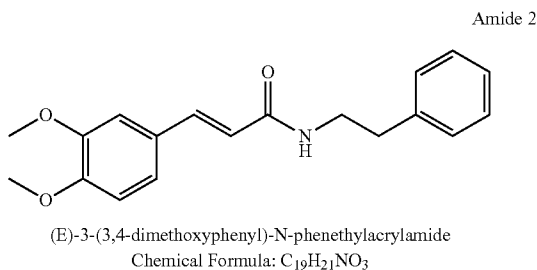
[0095] The acid (E)-3-(3,4-dimethoxyphenyl)acrylic acid (typically 33 mmol) and DIEA (diisopropyl ethyl amine, 2 equiv.) were diluted in 200 mL of EtOAc and 50 mL of dichloromethane. The solution was cooled to 15°C . and ethyl chloroformate (1 molar equiv.) was added drop wise. The reaction was stirred for 1 hour before the starting amine (1 molar equiv., diluted 2-3 times in EtOAc) was added. The reaction was stirred overnight at room temperature. It was washed with aqueous 5% KHSO_4 , brine, aqueous 5% NaHCO_3 , brine, and then dried over Na_2SO_4 and evaporated under high vacuum for 3 hours. The crude product was purified by flash chromatography (silica gel; cyclohexane/EtOAc, 2:8) or by recrystallization from EtOAc. Yields were between 50 and 80% on the purified product.



starting amine: 2-(4-methoxyphenyl)ethanamine

[0096] ^1H NMR: 2.82 (t, $J=7.0$, 2H), 3.61 (~q, $J=7.0$, 5.9, 2H), 3.78 (s, 3H), 3.86 (s, 3H), 3.88 (s, 3H), 5.87 (t, $J=5.9$, 1H), 6.24 (d, $J=15.5$, 1H), 6.81 (d, $J=8.3$, 1H), 6.84 (d, $J=8.6$, 2H), 6.98 (d, $J=2.0$, 1H), 7.05 (dd, $J=8.3$, 2.0, 1H), 7.13 (d, $J=8.6$, 2H), 7.55 (d, $J=15.5$, 1H).

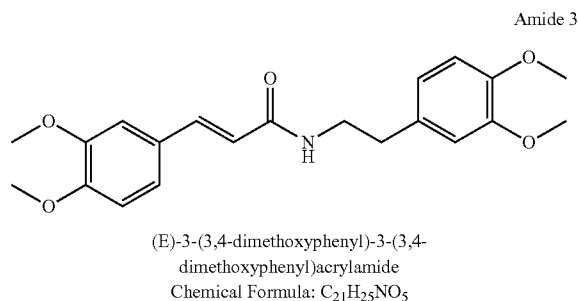
[0097] ^{13}C NMR: 34.8 (t), 41.0 (t), 55.2 (q), 55.8 (q), 55.9 (q), 109.7 (d), 111.1 (d), 114.1 (d), 118.6 (d), 121.9 (d), 127.8 (s), 129.7 (d), 130.9 (s), 140.7 (d), 149.1 (s), 150.5 (s), 158.3 (s), 166.2 (s).



starting amine: 2-phenylethanamine

[0098] ^1H NMR: 2.89 (t, $J=6.8$, 2H), 3.66 (~q, $J=6.8$, 5.5, 2H), 3.87 (s, 3H), 3.89 (s, 3H), 5.72 (t, $J=5.5$, 1H), 6.21 (d, $J=15.5$, 1H), 6.83 (d, $J=8.3$, 1H), 6.99 (d, $J=2.0$, 1H), 7.06 (dd, $J=8.3$, 2.0, 1H), 7.20-7.26 (m, 3H), 7.30-7.34 (m, 2H), 7.56 (d, $J=15.5$, 1H).

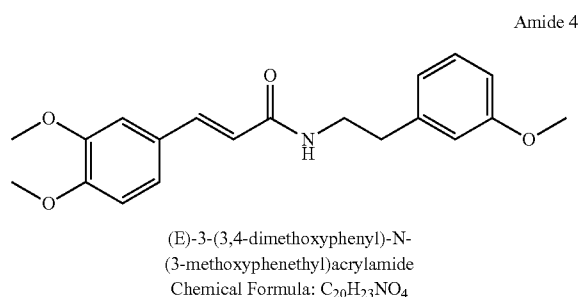
[0099] ^{13}C NMR: 35.7 (t), 40.8 (t), 55.9 (q), 55.9 (q), 109.7 (d), 111.1 (d), 118.5 (d), 121.9 (d), 126.5 (d), 127.8 (s), 128.7 (d), 128.8 (d), 139.0 (s), 140.9 (d), 149.1 (s), 150.6 (s), 166.1 (s).



starting amine: 2-(3,4-dimethoxyphenyl)ethanamine

[0100] ^1H NMR: 2.84 (t, $J=6.9$, 2H), 3.63 (~q, $J=6.9$, 6.0, 2H), 3.86 (s, 6H), 3.87 (s, 3H), 3.89 (s, 3H), 5.79 (t, $J=6.0$, 1H), 6.23 (d, $J=15.5$, 1H), 6.75 (~d, $J=8.0$, 1H), 6.77 (d, $J=2.0$, 1H), 6.81 (d, $J=8.0$, 1H), 6.83 (d, $J=8.0$, 1H), 6.99 (d, $J=2.0$, 1H), 7.06 (dd, $J=8.3$, 2.0, 1H), 7.56 (d, $J=15.5$, 1H).

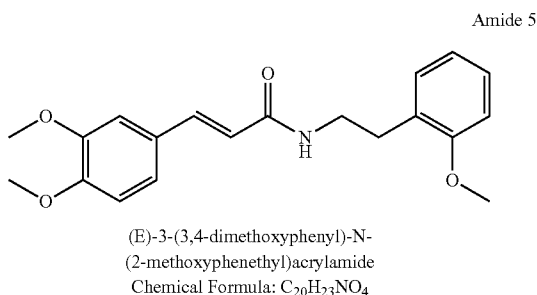
[0101] ^{13}C NMR: 35.2 (t), 40.9 (t), 55.86 (q), 55.88 (q), 55.93 (2 q), 109.6 (d), 111.1 (d), 111.4 (d), 112.0 (d), 118.5 (d), 120.7 (d), 122.0 (d), 127.8 (s), 131.4 (s), 140.9 (d), 147.7 (s), 149.1 (s), 149.1 (s), 150.6 (s), 166.1 (s);



starting amine: 2-(3-methoxyphenyl)ethanamine

[0102] ^1H NMR: 2.86 (t, $J=6.9$, 2H), 3.65 (~q, $J=7.0$, 5.7, 2H), 3.79 (s, 3H), 3.87 (s, 3H), 3.89 (s, 3H), 5.76 (t, $J=5.7$, 1H), 6.22 (d, $J=15.5$, 1H), 6.76-6.82 (m, 3H), 6.83 (d, $J=8.4$, 1H), 6.99 (d, $J=2.0$, 1H), 7.05 (dd, $J=8.4$, 2.0, 1H), 7.23 (dt, $J=7.5$, 1.0, 1H), 7.56 (d, $J=15.5$, 1H).

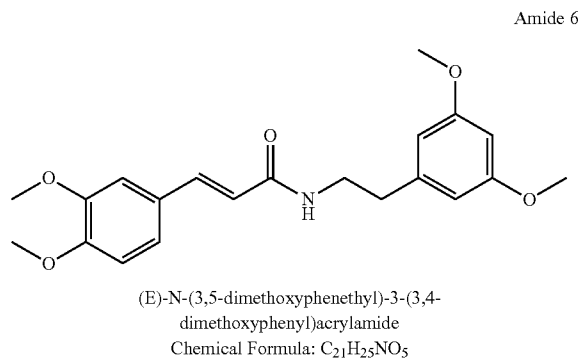
[0103] ^{13}C NMR: 35.7 (t), 40.6 (t), 55.2 (q), 55.8 (q), 55.9 (q), 109.7 (d), 111.1 (d), 111.9 (d), 114.5 (d), 118.6 (d), 121.1 (d), 121.9 (d), 127.8 (s), 129.7 (d), 140.6 (s), 140.8 (d), 149.1 (s), 150.6 (s), 159.8 (s), 166.2 (s).



starting amine: 2-(2-methoxyphenyl)ethanamine

[0104] 1H NMR: 2.90 (t, J=6.8, 2H), 3.62 (~q, J=6.8, 5.6, 2H), 3.84 (s, 3H), 3.87 (s, 3H), 3.88 (s, 3H), 5.91 (t, J=5.6, 1H), 6.22 (d, J=15.5, 1H), 6.82 (d, J=8.3, 1H), 6.87 (~dd, J=8.4, 1.0, 1H), 6.91 (dd, J=7.5, 1.0, 1H), 6.99 (d, J=1.9, 1H), 7.05 (dd, J=8.3, 1.9, 1H), 7.15 (dd, J=7.5, 1.8, 1H), 7.22 (dt, J=7.5, 1.8, 1H), 7.53 (d, J=15.5, 1H).

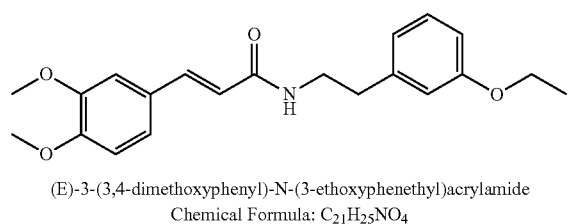
[0105] ^{13}C NMR: 30.3 (t), 39.8 (t), 55.3 (q), 55.8 (q), 55.9 (q), 109.7 (d), 110.4 (d), 111.1 (d), 118.9 (d), 120.7 (d), 121.8 (d), 127.4 (s), 127.9 (d), 127.9 (s), 130.6 (d), 140.4 (d), 149.1 (s), 150.5 (s), 157.6 (s), 166.1 (s).



Starting amine: 2-(3,5-dimethoxyphenyl)ethanamine

[0106] 1H NMR: 2.82 (t, J=6.9, 2H), 3.64 (~q, J=6.9, 5.7, 2H), 3.76 (s, 3H), 3.87 (s, 3H), 3.88 (s, 3H), 5.85 (t, J=5.7, 1H), 6.24 (d, J=15.7, 1H), 6.34 (t, J=2.2, 1H), 6.38 (d, J=2.2, 1H), 6.82 (d, J=8.3, 1H), 6.99 (d, J=2.0, 1H), 7.05 (dd, J=8.3, 2.0, 1H), 7.55 (d, J=15.7, 1H).

[0107] ^{13}C NMR: 36.0 (t), 40.5 (t), 55.3 (q), 55.8 (q), 55.9 (q), 98.4 (d), 106.8 (d), 109.7 (d), 111.1 (d), 118.6 (d), 122.0 (d), 127.8 (s), 140.8 (d), 141.3 (s), 149.1 (s), 150.6 (s), 161.0 (s), 166.2 (s).

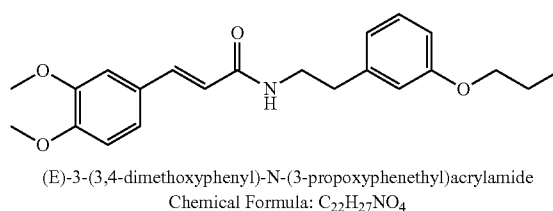


starting amine: 2-(3-ethoxyphenyl)ethanamine

[0108] 1H NMR: 1.40 (t, J=7.0, 3H), 2.85 (t, J=6.9, 2H), 3.65 (~q, J=6.9, 5.6, 2H), 3.88 (s, 3H), 3.89 (s, 3H), 4.02 (q, J=7.0, 2H), 5.70 (t, J=5.6, 1H), 6.21 (d, J=15.4, 1H), 6.76-6.81 (m, 3H), 6.83 (d, J=8.3, 1H), 7.00 (d, J=2.0, 1H), 7.06 (dd, J=8.3, 2.0, 1H), 7.20-7.25 (m, 1H), 7.55 (d, J=15.4, 1H).

[0109] ^{13}C NMR: 14.9 (q), 35.7 (t), 40.6 (t), 55.9 (q), 55.9 (q), 63.4 (t), 109.7 (d), 111.1 (d), 112.4 (d), 115.1 (d), 118.6 (d), 121.0 (d), 122.0 (d), 127.8 (s), 129.7 (d), 140.5 (s), 140.8 (d), 149.1 (s), 150.6 (s), 159.2 (s), 166.1 (s).

Amide 8

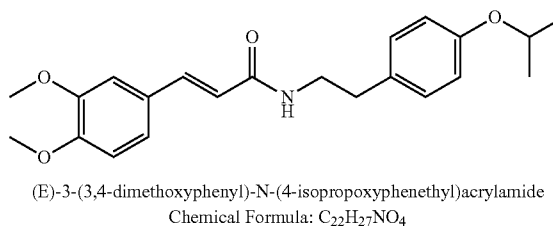


starting amine: 2-(3-propoxyphenyl)ethanamine

[0110] 1H NMR: 1.01 (t, J=7.4, 3H), 1.79 (~hex, J=7.4, 6.5, 2H), 2.85 (t, J=6.9, 2H), 3.65 (~q, J=6.9, 5.7, 2H), 3.87 (s, 3H), 3.88 (s, 3H), 3.90 (t, J=6.5, 2H), 5.70 (t, J=5.7, 1H), 6.22 (d, J=15.5, 1H), 6.76-6.81 (m, 3H), 6.82 (d, J=8.4, 1H), 6.99 (d, J=1.9, 1H), 7.05 (dd, J=8.4, 2.0, 1H), 7.19-7.23 (m, 1H), 7.55 (d, J=15.4, 1H).

[0111] ^{13}C NMR: 10.5 (q), 22.6 (t), 35.7 (t), 40.6 (t), 55.8 (q), 55.9 (q), 69.5 (t), 109.7 (d), 111.1 (d), 112.5 (d), 115.1 (d), 118.6 (d), 120.9 (d), 122.0 (d), 127.8 (s), 129.6 (d), 140.5 (s), 140.8 (d), 149.1 (s), 150.6 (s), 159.4 (s), 166.1 (s).

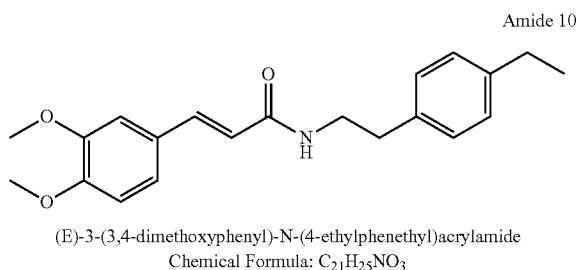
Amide 9



starting amine: 2-(4-isopropoxyphenyl)ethanamine

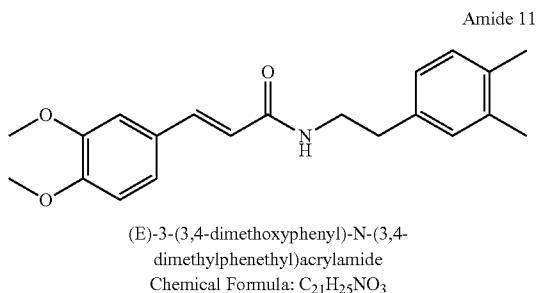
[0112] 1H NMR: 1.32 (d, J=6.1, 6H), 2.81 (t, J=6.9, 2H), 3.61 (~q, J=6.9, 5.8, 2H), 3.87 (s, 3H), 3.88 (s, 3H), 4.51 (hept, J=6.1, 1H), 5.80 (t, J=5.8, 1H), 6.23 (d, J=15.5, 1H), 6.81-6.85 (m, 3H), 6.99 (d, J=2.0, 1H), 7.05 (dd, J=8.4, 2.0, 1H), 7.11 (~d, J=8.6, 2H), 7.55 (d, J=15.5, 1H).

[0113] ^{13}C NMR: 22.1 (q), 34.8 (t), 40.9 (t), 55.8 (q), 55.9 (q), 69.9 (d), 109.7 (d), 111.1 (d), 116.1 (d), 118.6 (d), 121.9 (d), 127.8 (s), 129.7 (d), 130.7 (s), 140.8 (d), 149.1 (s), 150.5 (s), 156.6 (s), 166.1 (s).



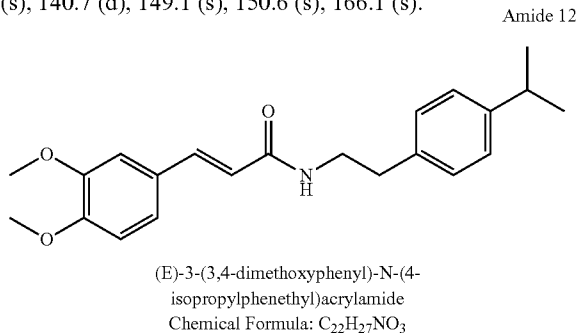
starting amine: 2-(4-ethylphenyl)ethanamine

[0114] 1H NMR: 1.23 (t, $J=7.6$, 3H), 2.63 (q, $J=7.6$, 2H), 2.85 (t, $J=6.8$, 2H), 3.64 (~q, $J=6.8$, 5.6, 2H), 3.87 (s, 3H), 3.89 (s, 3H), 5.73 (t, $J=5.6$, 1H), 6.22 (d, $J=15.6$, 1H), 6.81-6.85 (m, 3H), 6.83 (d, $J=8.4$, 1H), 6.99 (d, $J=2.0$, 1H), 7.06 (dd, $J=8.4$, 2.0, 1H), 7.15 (broad s, 4H), 7.55 (d, $J=15.6$, 1H).
[0115] ^{13}C NMR: 15.6 (q), 28.4 (t), 35.3 (t), 40.8 (t), 55.8 (q), 55.9 (q), 109.7 (d), 111.1 (d), 118.7 (d), 121.9 (d), 127.8 (s), 128.1 (d), 128.7 (d), 136.1 (s), 140.7 (d), 142.4 (s), 149.1 (s), 150.5 (s), 166.1 (s).



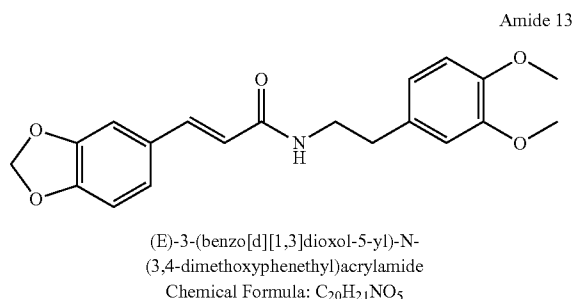
starting amine: 2-(3,4-dimethylphenyl)ethanamine

[0116] 1H NMR: 2.24 (broad s, 6H), 2.82 (t, $J=7.1$, 2H), 3.63 (~q, $J=7.1$, 5.5, 2H), 3.87 (s, 3H), 3.88 (s, 3H), 5.75 (t, $J=5.5$, 1H), 6.22 (d, $J=15.6$, 1H), 6.82 (d, $J=8.4$, 1H), 6.95 (dd, $J=7.7$, 1.8, 1H), 6.98-7.00 (m, 2H), 7.04-7.08 (m, 2H), 7.55 (d, $J=15.6$, 1H).
[0117] ^{13}C NMR: 19.3 (q), 19.8 (q), 35.2 (t), 40.8 (t), 55.9 (q), 55.9 (q), 109.7 (d), 111.1 (d), 118.6 (d), 121.9 (d), 126.1 (d), 127.9 (s), 129.9 (d), 130.1 (d), 134.7 (s), 136.2 (s), 136.8 (s), 140.7 (d), 149.1 (s), 150.6 (s), 166.1 (s).



starting amine: 2-(4-isopropylphenyl)ethanamine

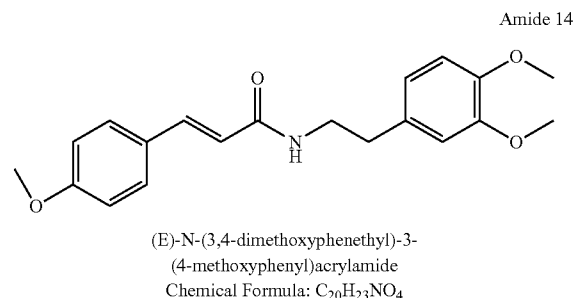
[0118] 1H NMR: 1.25 (t, $J=7.0$, 3H), 2.85 (t, $J=6.9$, 2H), 2.89 (hept, $J=7.0$, 1H), 3.65 (~q, $J=6.9$, 5.4, 2H), 3.88 (s, 3H), 3.89 (s, 3H), 5.71 (t, $J=5.4$, 1H), 6.22 (d, $J=15.6$, 1H), 6.83 (d, $J=8.4$, 1H), 7.00 (d, $J=2.0$, 1H), 7.06 (dd, $J=8.4$, 2.0, 1H), 7.14-7.19 (m, 4H), 7.56 (d, $J=15.6$, 1H).
[0119] ^{13}C NMR: 24.0 (q), 33.7 (d), 35.3 (t), 40.8 (t), 55.9 (q), 55.9 (q), 109.7 (d), 111.1 (d), 118.6 (d), 121.9 (d), 126.7 (d), 127.9 (s), 128.7 (d), 136.2 (s), 140.8 (d), 147.1 (s), 149.1 (s), 150.6 (s), 166.1 (s).



starting amine: 2-(3,4-dimethoxyphenyl)ethanamine

starting acid: (E)-3-(benzo[d][1,3]dioxol-5-yl)acrylic acid

[0120] 1H NMR: 2.83 (t, $J=7.1$, 2H), 3.62 (~q, $J=7.1$, 5.9, 2H), 3.858 (s, 3H), 3.862 (s, 3H), 5.70 (t, $J=5.9$, 1H), 5.98 (s, 2H), 6.16 (d, $J=15.6$, 1H), 6.74-6.83 (m, 4H), 6.96-6.97 (m, 2H), 7.56 (d, $J=15.6$, 1H).
[0121] ^{13}C NMR: 35.2 (t), 40.9 (t), 55.9 (q), 55.9 (q), 101.4 (t), 106.3 (d), 108.5 (d), 111.4 (d), 112.0 (d), 118.6 (d), 120.7 (d), 123.8 (d), 129.2 (s), 131.4 (s), 140.8 (d), 147.7 (s), 148.2 (s), 149.0 (s), 149.1 (s), 166.0 (s).

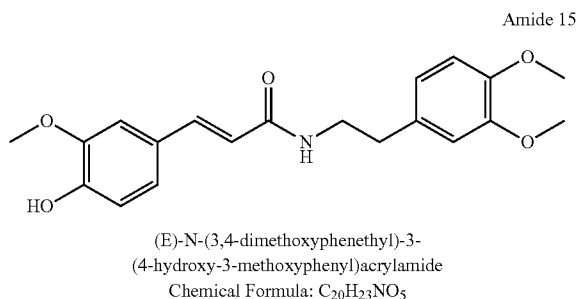


starting amine: 2-(3,4-dimethoxyphenyl)ethanamine

starting acid: (E)-3-(4-methoxyphenyl)acrylic acid

[0122] 1H NMR: 2.83 (t, $J=6.9$, 2H), 3.62 (~q, $J=6.9$, 5.7, 2H), 3.80 (s, 3H), 3.83 (s, 3H), 3.84 (s, 3H), 5.97 (t, $J=5.7$, 1H), 6.25 (d, $J=15.6$, 1H), 6.73-6.81 (m, 3H), 6.84 (d, $J=8.8$, 2H), 7.40 (d, $J=8.8$, 2H), 7.57 (d, $J=15.6$, 1H).

[0123] ^{13}C NMR: 35.3 (t), 41.0 (t), 55.3 (q), 55.8 (q), 55.9 (q), 111.4 (d), 112.0 (d), 114.2 (d), 118.4 (d), 120.7 (d), 127.5 (s), 129.3 (d), 131.5 (s), 140.5 (d), 147.7 (s), 149.0 (s), 160.8 (s), 166.3 (s).



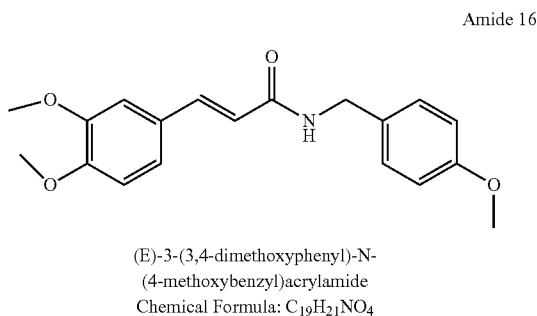
starting amine: 2-(3,4-dimethoxyphenyl)ethanamine

starting acid:
(E)-3-(4-acetoxy-3-methoxyphenyl)acrylic acid

[0124] After the coupling, deprotection step was performed in MeOH/5% aq Na_2CO_3 (1:1).

[0125] ^1H NMR: 2.83 (t, $J=6.9$, 2H), 3.63 (~q, $J=6.9$, 5.7, 2H), 3.86 (s, 3H), 3.87 (s, 3H), 3.90 (s, 3H), 5.63 (t, $J=5.7$, 1H), 6.17 (d, $J=15.4$, 1H), 6.74 (~d, $J=1.9$, 1H), 6.76 (~dd, $J=8.0$, 1.9, 1H), 6.82 (d, $J=8.0$, 1H), 6.89 (d, $J=8.0$, 1H), 6.96 (d, $J=1.9$, 1H), 7.03 (dd, $J=8.2$, 1.9, 1H), 7.52 (d, $J=15.4$, 1H). Exchangeable OH not seen.

[0126] ^{13}C NMR: 35.2 (t), 40.9 (t), 55.9 (q), 56.0 (q), 109.6 (d), 111.4 (d), 112.0 (d), 114.7 (d), 118.0 (d), 120.7 (d), 122.2 (d), 127.3 (s), 131.4 (s), 141.2 (d), 146.7 (s), 147.4 (s), 147.7 (s), 149.1 (s), 166.3 (s).

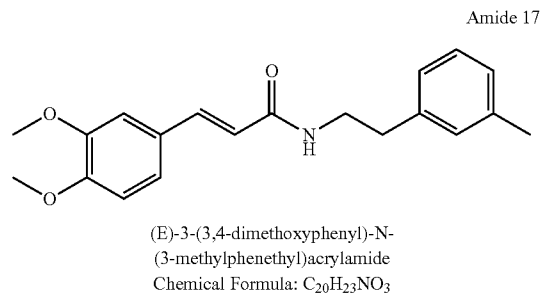


starting amine: (4-methoxyphenyl)methanamine

starting acid: (E)-3-(3,4-dimethoxyphenyl)acrylic acid

[0127] ^1H NMR: 3.79 (s, 3H), 3.87 (s, 3H), 3.89 (s, 3H), 4.49 (d, $J=5.7$, 2H), 5.93 (t, $J=5.7$, 1H), 6.29 (d, $J=15.5$, 1H), 6.83 (d, $J=8.4$, 1H), 6.86 (~d, $J=8.7$, 2H), 7.00 (d, $J=2.0$, 1H), 7.06 (dd, $J=8.4$, 2.0, 1H), 7.24 (~d, $J=8.7$, 2H), 7.59 (d, $J=15.5$, 1H).

[0128] ^{13}C NMR: 43.3 (t), 55.3 (q), 55.8 (q), 55.9 (q), 109.7 (d), 111.1 (d), 114.1 (d), 118.4 (d), 121.9 (d), 127.8 (s), 129.3 (d), 130.4 (s), 141.1 (d), 149.1 (s), 150.6 (s), 159.1 (s), 165.9 (s).



starting amine: 2-(3-methylphenyl)ethanamine

starting acid: (E)-3-(3,4-dimethoxyphenyl)acrylic acid

[0129] ^1H NMR: 2.34 (s, 3H), 2.85 (t, $J=7.1$, 2H), 3.65 (~q, $J=7.1$, 5.4, 2H), 3.88 (s, 3H), 3.89 (s, 3H), 5.67 (t, $J=5.4$, 1H), 6.21 (d, $J=15.5$, 1H), 6.83 (d, $J=8.3$, 1H), 7.00 (d, $J=2.0$, 1H), 7.02-7.07 (m, 4H), 7.21 (~d, $J=7.5$, 1H), 7.55 (d, $J=15.5$, 1H).

[0130] ^{13}C NMR: 21.4 (q), 35.6 (t), 40.7 (t), 55.9 (q), 55.9 (q), 109.7 (d), 111.1 (d), 118.6 (d), 121.9 (d), 125.8 (d), 127.3 (d), 127.8 (s), 128.6 (d), 129.6 (d), 138.3 (s), 138.8 (s), 140.8 (d), 149.1 (s), 150.6 (s), 166.1 (s).

Example 2

Evaluation of the Umami Effect of the Compound According to the Invention (in Water)

[0131] a) Pure Amide in Pure Water

[0132] The amides were evaluated at 20 ppm in mineral water in comparison with 0.05% monosodium glutamate (MSG). The trained panelists (5-10) were giving an umami taste intensity note. The Relative umami intensity (RUI) was calculated as follows:

$$\text{RUI} = (\text{umami intensity of the amide}) / (\text{umami intensity of MSG}) \times 10$$

The following table gives the average of the notes obtained from all panelists.

	Amide N°						
	1	2	3	4	5	6	7
RUI	5.6	3.8	3.3	10.2	3.2	3.7	9.8

	Amide N°						
	8	9	10	11	12	14	17
RUI	9.9	6.5	11.5	13.3	5.9	3.8	12.1

[0133] b) In the Presence of Maltodextrin and MSG

[0134] Amides 1, 3, 4 and 8 were blended and diluted in maltodextrin at 10% w/w.

[0135] Each blend was then added into a water solution containing MSG at 500 ppm in order to achieve a concentration ranging between 20 and 100 ppm of the amides, as indicated in the tables below:

	Sol 1	Sol 2	Sol 3	Sol 4	Sol 5	Sol 6	Sol 7
MSG	500	500	500	500	500	500	500
Amide 1	—	—	—	—	20	—	—
Amide 3	—	20	35	50	—	—	—
Amide 4	—	—	—	—	—	20	—
Amide 8	—	—	—	—	—	—	20

and also:

	Sol 8	Sol 9	Sol 10	Sol 11	Sol 12	Sol 13
MSG	500	500	500	500	500	500
Amide 7	20	—	—	—	—	—
Amide 9	—	20	—	—	—	—
Amide 10	—	—	20	—	—	—
Amide 11	—	—	—	20	—	—
Amide 12	—	—	—	—	20	—
Amide 17	—	—	—	—	—	20

Sol=solution

A panel consisted in 15 to 20 trained panelists evaluating the samples for taste properties on a scale of -5 to 5 (-5 denoted no umami effect and 5 denoted extremely strong umami effect, 0 being the umami intensity of a reference umami solution containing Monosodium Glutamate at 0.05%).

The samples were evaluated with and without nose clip to focus on taste.

	Umami intensity with nose-clip	Umami intensity without nose-clip	Description With nose-clip/without nose-clip
Solution 1	0	0	Umami
Solution 2	0.91	0.76	Umami, mouthfeel, salivating/nutty, woody
Solution 3	0.46	0.65	Umami, mouthfeel, salty/nutty, woody
Solution 4	0.95	0.95	Umami, salty, mouthfeel, salivating, astringent, metallic/nutty, earthy
Solution 5	1.13	1.25	Umami, salty, sweet, mouthfeel, fatty
Solution 6	1.72	1.71	Umami, mouthfeel, salty, sweet/nutty
Solution 7	1.25	1.46	Umami, salty, mouthfeel, salivating, hot, cooling
Solution 8	1.27	1.34	Umami, sweet, salty, astringent, bitter, mouthfeel
Solution 9	0.98	1.16	Umami, sweet
Solution 10	0.88	0.94	Umami, sweet, salty, pungent, bitter
Solution 11	0.8	0.95	Umami, green, herbal, salivating
Solution 12	0.95	1.13	Umami, salty, sweet, herbal, astringent, metallic
Solution 13	1.57	1.47	Umami, salty, pungent, mouthfeel, herbal

Example 3

Evaluation of the Umami Effect of the Compound According to the Invention (in Applications)

[0136] 1) Evaluation of Amides 1 and 3 in a Beef Bouillon A beef stock was prepared containing the following ingredients:

Ingredients in % w/w	
Maltodextrin	52
Onion Powder	1.5
Salt	32.7
White pepper	0.1
Yeast extract	3.8
Palm Oil	7.6
Caramel Color	0.7
Beef flavor	1.5

10 g of beef stock was poured in 500 ml of boiling water. MSG and amides 1 and 3 were added to the beef bouillon at the dosages indicated in Table 1.

TABLE 1

Ingredients in ppm				
	Bouillon 1	Bouillon 2	Bouillon 3	Bouillon 4
MSG	—	700	—	—
Amide 1	—	—	—	25
Amide 3	—	—	50	—

The bouillons were presented to 5 trained panelists on a blind test basis. They were asked to rate the samples for taste properties on a scale of 0 to 10 (0 denoted no umami effect and 10 denoted extremely strong umami effect). The results are reported herein below:

TABLE 2

Averages for each bouillon and descriptors		
	Umami intensity	Comments
Bouillon 1	2.1	Yeasty, oniony, beef fat, flat
Bouillon 2	5.1	More salty, round, umami, oniony, juicy, fatty
Bouillon 3	3.1	Mouthfeel, salty, body
Bouillon 4	3.9	Umami, round

[0137] 2) Evaluation of Amide 1 in a Chicken Bouillon

[0138] A chicken stock was prepared containing the following ingredients:

Ingredients in % w/w	
Chicken meat powder	2.5
Maltodextrin	32.2
Garlic powder	0.5
Palm oil	5
Ground white pepper	0.3
Yeast extract	10
Onion powder	3.25
Toasted onion powder	2
Turmeric	0.25
Salt	35
Chicken fat	5
Chicken flavor	4

10 g of chicken stock was poured in 500 ml of boiling water. MSG and amide 1 were added to the chicken bouillon at the dosages indicated in Table 3.

TABLE 3

Ingredients in ppm			
	Bouillon 1	Bouillon 2	Bouillon 3
MSG	—	500	—
Amide 1	—	—	20

The bouillons were presented to 5 trained panelists on a blind test basis as described above. The results are reported herein below:

TABLE 4

Averages for each bouillon and descriptors		
	Umami intensity	Comments
Bouillon 1	3.5	Flat, salty
Bouillon 2	6.4	Umami, mouthfeel, sweet, pleasant
Bouillon 3	6.3	Umami

[0139] 3) Evaluation of Amides 1 and 4 in a Pork Flavor

[0140] Amides 1 and 4 were evaluated at 20 ppm by 5 trained panelists in a pork flavor on a blind test basis as described above. The results are reported herein below:

TABLE 5

Averages for each bouillon and descriptors		
	Umami intensity	Comments
Pork flavor	4.5	Meaty, pork, animalic, fatty, mouthfeel, balanced, good
Pork flavor + Amide 1	6	More umami, more meaty, pork notes enhanced, liquorice note, slightly cooling, fatty
Pork flavor + Amide 4	7	More umami, rich strong meaty and pork notes, fatty

[0141] 4) Evaluation of Amides 1, 4, 8, 11, 12 in a Chicken Bouillon Containing MSG and Ribotides

A chicken bouillon was prepared containing the following ingredients:

Ingredients in % w/w	
Salt	27
MSG	10
Ribotides	0.03
Sugar	4
Vegetable oil	2
Chicken fat	2
White pepper powder	0.1
Yeast powder	1.5
Soy sauce powder	0.5
Chicken powder	4
Maltodextrin	35.77

-continued

Ingredients in % w/w	
Corn starch	5
Wheat powder	3
Egg powder	4
Chicken flavor	1.1

1 g of chicken bouillon was poured into 100 ml of boiling water. Amides 1, 4, 8, 11, 12 were added to the chicken bouillon at the dosages indicated in Table 6:

TABLE 6

Ingredients in ppm						
	Bouillon					
	1	2	3	4	5	6
Amide 1	—	25	—	—	—	—
Amide 4	—	—	25	—	—	—
Amide 8	—	—	—	8	—	—
Amide 11	—	—	—	—	5	—
Amide 12	—	—	—	—	—	25

The bouillons were presented to 5 trained panelists on a blind test basis as described above. The results are reported herein below:

TABLE 7

Averages for each bouillon and descriptors		
	Umami intensity	Comments
Bouillon 1	5.3	White meat, round, no off notes
Bouillon 2	6.3	Sweet, meaty, balanced, very round, full
Bouillon 3	6.3	Slow build, mouthfeel, sweet, umami, no off note, round, very balanced
Bouillon 4	6.7	Strong umami, sweet, lingering, sweet and umami
Bouillon 5	6.7	White meat, slightly astringent, very full, round, lasting, no off notes
Bouillon 6	6	Mouthfeel, no off note, umami, sweet, very balanced slightly astringent

[0142] 5) Evaluation of Amides 1 and 3 in Marinated Chicken

A marinade was prepared containing the following ingredients:

Ingredients in % w/w	
Water	90
Salt	4
Hamine phosphate	1
Chicken White Meat Flavor	5

MSG, amides 1 and 3 were added to the marinade at the dosages indicated herein below:

	Ingredients in % w/w			
	Marinade 1	Marinade 2	Marinade 3	Marinade 4
Marinade	100	100	100	100
MSG	—	0.3	—	—
Amide 1	—	—	0.05	—
Amide 3	—	—	—	0.05

Marinades were added with chicken meat in plastic bags in the following quantities:

	Ingredients in % w/w			
	Marinated chicken 1	Marinated chicken 2	Marinated chicken 3	Marinated chicken 4
Chicken meat	90	90	90	90
Marinade 1	10	—	—	—
Marinade 2	—	10	—	—
Marinade 3	—	—	10	—
Marinade 4	—	—	—	10

Samples were tumbled under vacuum for 25 minutes, and then cooked in a steam oven until meat temperature reaches 75° C. Samples were then frozen and reheat for 20 minutes at 80° C. in the oven before evaluation.

The marinated chicken samples were presented to 5 trained panelists on a blind test basis as described above. The results are reported herein below:

TABLE 8

Averages for each marinated chicken and descriptors		
	Umami intensity	Comments
Marinated chicken 1	1.3	dry
Marinated chicken 2	4	Strong, clean, pleasant aftertaste, juicy
Marinated chicken 3	4.9	Very similar to MSG, meaty, round, brothy, balanced, sweet, full
Marinated chicken 4	3	Clean, pleasant, strong impact, enhances chicken juicy, sweet

[0143] 6) Evaluation of Amides 1 and 3 in Surimi

Surimi was prepared using the following ingredients in % w/w:

Ingredients in % w/w	
Frozen surimi base	39.8
Salt	1.19
Native Wheat Starch	4.98
Potato Starch	4.98
Sunflower Oil	4.98
Egg White	6.97
Ice	36.6
Crab extract	0.5

The dry ingredients (salt, starches) were first put in a bowl chopper. The ice mix was added until homogenous. The surimi base was then added and mixed for 3 minutes. The oil was added while mixing, followed by the egg white.

MSG and the amides 1 and 3 were added to the surimi preparation at the dosages indicated herein below:

	Surimi 1	Surimi 2	Surimi 3	Surimi 4
MSG	—	5000 ppm	—	—
Amide 1	—	—	50 ppm	—
Amide 3	—	—	—	50 ppm

The 4 surimis were put in cooking bags and cooked for 45 minutes in a steam oven at 90° C. The samples were then quickly cooled down.

The surimi samples were presented to 5 trained panelists on a blind test basis as described above. The results are reported herein below:

TABLE 9

Averages for each surimi and descriptors		
	Umami intensity	Comments
Surimi 1	2.2	Flat, eggy, slightly amine, not really fishy
Surimi 2	5.3	Sweet, umami, round, sweet, salty
Surimi 3	3.2	Slightly sweet, umami, juicy, round, fishy, crab
Surimi 4	3.7	Crab, slightly amine, sweet, fishy, oyster, crab, juicy

Example 4

[0144] Monosodium glutamate (MSG), amide 1, an ingredient (glucosylated *stevia* glycosides from U.S. Pat. No. 7,807,206 (containing Rebaudioside A and stevioside), sea salt, succinic acid, yeast extract, hydrolyzed corn protein, or hydrolyzed wheat gluten) and a blend of the amide with the ingredient were weighed and hot mineral water was added to each sample according to the dosages indicated in each experiments. The samples were stirred in order to ensure the solubilisation of the ingredients.

[0145] Each sample was coded, and tasted in a random order by 5 trained panelists.

[0146] For each sample, the umami intensities were rated on a 1-10 scale (1 denoted no umami effect and 10 denoted extremely strong umami effect). The “liking” was also rated on a 1-10 scale (1 was given if the sample was not liked, and 10 liked very much). The panelists were also asked to describe the samples.

TABLE 10

Amide 1 & glucosylated stevosides			
Samples	Umami	Liking	Panelists' Comments
MSG @ 0.04%	5.8	6.3	Balanced, meaty, up front umami
Amide 1 @20 ppm	4.8	4.8	strong umami, lingering, slow build up
glucosylated stevosides @8 ppm	1.8	2.8	weak
Amide 1 @20 ppm + Rebaudioside A @8 ppm	4.6	5.0	The sweetest, very long lasting, build, umami, clean, the closest to MSG

TABLE 11

Amide 1 with Sea Salt			
Sample	Umami	Liking	Panelists' Comments
MSG @0.04%	5.8	6.8	immediate onset, umami, balanced, clean
Amide 1 @20 ppm	3.3	3.8	umami, clean, lasting
Sea Salt @0.03%	1.0	1.4	astringent, empty, weak.
Amide 1 @20 ppm + Sea Salt @0.03%	4.1	5.0	umami, slow build, lingering, lasting.

TABLE 12

Amide 1 with Succinic Acid (36 ppm)			
Sample	Umami	Liking	Panelists' Comments
MSG @0.04%	4.2	5.8	umami, first impact, meaty, mouthfeel
Amide 1 @20 ppm	3.7	4.0	umami, lasting, builds
Succinic acid @36 ppm	1.0	1.3	weak, astringent,
Amide 1 @20 ppm + Succinic acid @36 ppm	3.6	5.0	lasting, builds, umami up front

TABLE 13

Amide 1 with Yeast Extract (60 ppm)			
Sample	Umami	Liking	Panelists' Comments
MSG @0.04%	5.5	5.8	lasting, umami, round, mouthfeel
Amide 1 @20 ppm	4.5	4.3	lingering, slow build up, strong umami, lasting.
Yeast extract @60 ppm	3.4	2.2	yeasty, weak, watery, umami.
Amide 1 @20 ppm + Yeast extract @60 ppm	5.4	5.0	long lasting, builds, lingering, strong umami, sweet, meaty, yeasty

TABLE 14

Amide 1 with Yeast Extract (175 ppm)			
Sample	Umami	Liking	Panelists' Comments
MSG @0.04%	5.5	6.3	strong umami, balanced meaty good
Amide 1 @20 ppm	4.5	3.0	builds, umami, clean, astringent
Yeast extract @175 ppm	3.3	3.5	yeasty, umami, balanced, meaty
Amide 1 @20 ppm + Yeast extract @175 ppm	6.3	6.0	strong, build, lasting, yeasty, more meaty

TABLE 15

Amide 1 with Yeast Extract (10 ppm)			
Sample	Umami	Liking	Panelists' Comments
MSG @0.04%	4.0	4.8	mild umami, up front, weak, lingers, round, mouthfeel
Amide 1 @10 ppm	2.5	2.5	build, lasting, strong lingering, sl M/F

TABLE 15-continued

Amide 1 with Yeast Extract (10 ppm)			
Sample	Umami	Liking	Panelists' Comments
Yeast extract @60 ppm	1.0	3.8	weak
Amide 1 @10 ppm + Yeast extract @60 ppm	3.8	4.7	builds, lasting, lacks up front, weak mouthfeel, builds slowly, meaty

TABLE 16

Amide 1 with Hydrolyzed Corn Protein (ppm)			
Sample	Umami	Liking	Panelists' Comments
MSG @0.04%	5.4	5.2	umami, round, mouthfeel, meaty
Amide 1 @20 ppm	4.2	3.8	lasting, builds, strong umami, clean
Hydrolyzed corn protein @40 ppm	2.0	1.8	weak
Amide 1 @20 ppm + Hydrolyzed corn protein @40 ppm	7.3	7.5	lasting, very strong umami, and round, clean, meaty

TABLE 17

Amide 1 with Hydrolyzed Corn Protein (320 ppm)			
Sample	Umami	Liking	Panelists' Comments
MSG @0.04%	3.0	3.7	umami, clean, sweet, full, mouthfeel, round
Amide 1 @20 ppm	1.7	3.3	builds slowly
Hydrolyzed corn protein @320 ppm	2.3	3.3	weak, sl umami, umami balanced but weak meaty, mild mouthfeel, round
Amide 1 @20 ppm + Hydrolyzed corn protein @320 ppm	5.0	4.7	Umami, MSG like, strong umami impact, lingering, bit more intense, lasting

TABLE 18

Amide 1 with Hydrolyzed Wheat Gluten (320 ppm)			
Sample	Umami	Liking	Panelist's Comments
MSG @0.04%	5.5	6.3	mild mouthfeel, round, mild umami
Amide 1 @20 ppm	4.0	4.8	lingering umami
Hydrolyzed wheat gluten @100 ppm	2.0	2.8	very weak mouthfeel, sweet little umami
Amide 1 @20 ppm + Hydrolyzed wheat gluten @100 ppm	6.5	5.8	slow builds of mouthfeel, stronger umami, sweet

TABLE 19

Amide 1 with Hydrolyzed Wheat Gluten (100 ppm)			
Sample	Umami	Liking	Panelists' Comments
MSG @0.04%	7.2	7.0	more umami and long lasting, umami

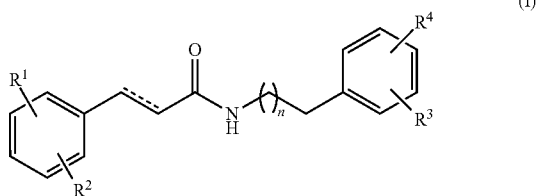
TABLE 19-continued

Amide 1 with Hydrolyzed Wheat Gluten (100 ppm)			
Sample	Umami	Liking	Panelists' Comments
Amide 1 @10 ppm	3.7	4.5	umami
Nature Pep 971481 @100 ppm	4.3	5.0	yeasty
Amide 1 @10 ppm + Nature Pep 971481 @100 ppm	5.3	5.5	yeasty and acidic, more umami lingers

[0147] In some instances, the combinations provide an umami taste improvement better than each component alone. In other instances, the combination is preferred over each alone.

1. A taste-modifying, composition comprising:

(i) a mixture of at least about of a compound according to formula (I)



in the form of any one of its stereoisomers or a mixture thereof, and wherein

n is an integer from 0 to 2;

the dotted line represents a carbon-carbon single or double bond; and

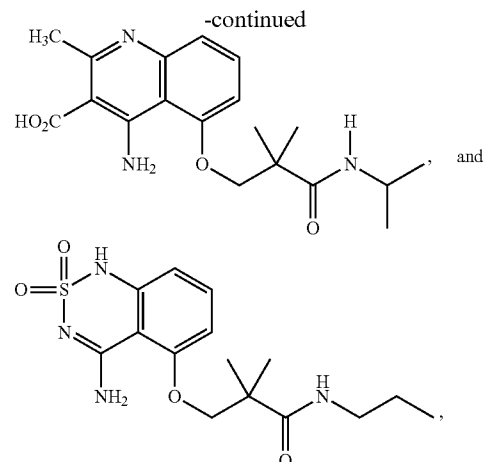
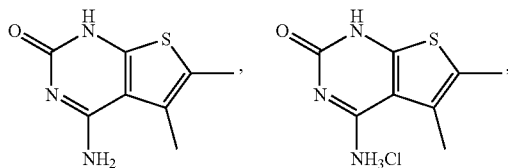
each of R¹ to R⁴, when taken independently from each other, represents a hydrogen atom or represents a R⁵ or OR⁵ group, R⁵ representing a C₁ to C₅ alkyl group; and optionally one of the groups R¹ to R⁴ represents —OH; and/or

when R¹ and R² are taken together, and/or R³ and R⁴ are taken together, represent a OCH₂O group, provided said groups taken together are adjacent substituents of the phenyl group; and

(ii) a flavor base;

wherein the flavor base is selected from the group consisting of;

- an umami imparting ingredient;
- an acid;
- a salt;
- a sweetness imparting compound; and
- a compound selected from the group consisting of:



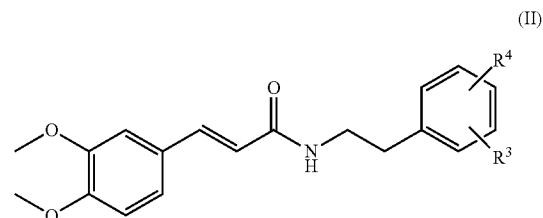
or one of their salts.

2. The composition as recited in claim 1, wherein it is 0 or 1;

the dotted line represents carbon-carbon single or double bond; and

each of R¹ to R⁴, taken independently from each other, represents a hydrogen atom, or represents a R⁵ or OR⁵ group, R⁵ representing a C₁ to C₅ alkyl group.

3. The composition as recited in claim 1, wherein said compound (I) is of formula



in the form of any one of its stereoisomers or a mixture thereof, and wherein each of R³ or R⁴, taken independently from each other, represents a hydrogen atom, or represents a R⁵ or OR⁵ group, R⁵ representing a C₁ to C₅ alkyl group.

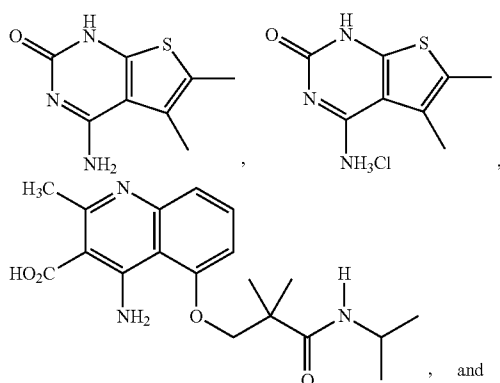
4-6. (canceled)

7. The composition as recited in claim 1, wherein said compound (I) is selected amongst (E)-3-(3,4-dimethoxyphenyl)-N-(4-methoxyphenethyl)acrylamide, (E)-3-(3,4-dimethoxyphenyl)-N-(3-methoxyphenethyl)acrylamide, (E)-3-(3,4-dimethoxyphenyl)-N-(3-ethoxyphenethyl)acrylamide, (E)-3-(3,4-dimethoxyphenyl)-N-(3-propoxyphenethyl)acrylamide, (E)-3-(3,4-dimethoxyphenyl)-N-(4-isopropoxyphenethyl)acrylamide, (E)-3-(3,4-dimethoxyphenyl)-N-(4-ethylphenethyl)acrylamide, (E)-3-(3,4-dimethoxyphenyl)-N-(3,4-dimethylphenethyl)acrylamide, (E)-3-(3,4-dimethoxyphenyl)-N-(4-isopropylphenethyl)acrylamide or (E)-3-(3,4-dimethoxyphenyl)-N-(3-methylphenethyl)acrylamide.

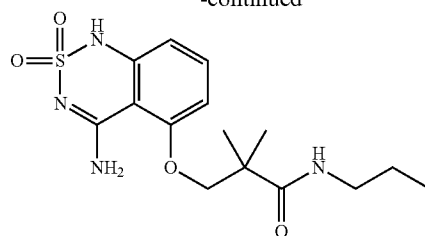
8-10. (canceled)

11. A flavored article comprising:

- i) a composition according to claim **8**, and
- ii) a foodstuff base wherein a compound of Formula I is provided in an amount of from about 1 to about 100 ppm and wherein the flavor base is selected from the group consisting of:
 - a) at least about from 1 to about 2000 ppm of an umami imparting ingredient provided that when the umami imparting ingredient is Ribotide it is not provided in chicken bouillon in an amount of 300 ppm;
 - b) at least about from 1 to about 500 ppm acid;
 - c) at least about from 100 to about 10,000 ppm of a salt; and
 - d) at least about 0.1 to about 1000 ppm of a sweetness imparting compound; and
 - e) at least about 0.1 ppm up to about 200 ppm of a compound selected from the group consisting of:



-continued



or one of their salts.

12. A flavored article according to claim **11**, characterized in that the foodstuff base is a seasonings or condiment, a meat-based products, a soup, a carbohydrate-based product, a dairy or fat product, a savory product, an imitation product or a pet or animal food.

13. A flavored article according to claim **11**, characterized in that the foodstuff base is selected from the group consisting of:

- a) a stock, a savory cube; a powder mix a flavored oil, a sauce, a salad dressing or a mayonnaise;
- b) a poultry, beef or pork based product, a seafood, surimi, or a fish sausage;
- c) a clear soup, a cream soup, a chicken or beef soup or as tomato or asparagus soup;
- d) instant noodles, rice, pasta, potatoes flakes or fried, noodles, pizza, tortillas, wraps;
- e) a spread, a cheese, or regular or low fat margarine, a butter/margarine blend, a butter, a peanut butter, a shortening, a processed or flavored cheese;
- f) a snack, a biscuit (e.g. chips or crisps) or an egg product, a potato tortilla chip a microwave popcorn, nuts, a bretzel, a rice cake, a rice cracker; or
- g) a reformed cheese made from oils, fats and thickeners or a vegetarian meat replacer, a vegetarian burger.

* * * * *