

(51) International Patent Classification:
A23L 1/22 (2006.01)(21) International Application Number:
PCT/EP2012/004889(22) International Filing Date:
27 November 2012 (27.11.2012)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

11009403.4	28 November 2011 (28.11.2011)	EP
61/564,040	28 November 2011 (28.11.2011)	US
12000994.9	15 February 2012 (15.02.2012)	EP
12004805.3	27 June 2012 (27.06.2012)	EP
61/664,879	27 June 2012 (27.06.2012)	US
12004806.1	27 June 2012 (27.06.2012)	EP
61/664,903	27 June 2012 (27.06.2012)	US
PCT/EP2012/004080		
	28 September 2012 (28.09.2012)	EP
13/630,341	28 September 2012 (28.09.2012)	US
13/630,254	28 September 2012 (28.09.2012)	US

(71) Applicant: NUTRINOVA NUTRITION SPECIALTIES
& FOOD INGREDIENTS GMBH [DE/DE]; Industriepark Höchst, 65929 Frankfurt am Main (DE).(72) Inventors: PUTTER, Clements M.; Vensteeg 13, NL-541
1AR Zeeland (NL). WONSCHIK, Johann; Riepenbrik
16, 37647 Brevorde (DE).(74) Agent: LAHRTZ, Fritz; Isenbruck Bosl Horschler LLP,
Prinzregentenstrasse 68, 81675 München (DE).(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY,
BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM,
DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP,
KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD,
ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI,
NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU,
RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ,
TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA,
ZM, ZW.(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,
TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,
EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,
MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
ML, MR, NE, SN, TD, TG).**Published:**— without international search report and to be republished
upon receipt of that report (Rule 48.2(g))

(54) Title: TASTE-MASKING COMPOSITIONS, SWEETENER COMPOSITIONS AND CONSUMABLE PRODUCT COMPOSITIONS CONTAINING THE SAME

(57) Abstract: In Part A, the present invention relates to novel compositions X comprising (1) at least one bitter blocking agent; (2) at least one carbonyl compound; and (3) at least one lactone, in particular to compositions X comprising (i) naringin; (ii) methoxy salicylaldehyde; (iii) syringaldehyde; (iv) massoia lactone; and (v) whiskey lactone; to the use of the compositions X for modifying, masking, reducing and/or suppressing an unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetener, sweetness enhancer or consumable product; and to a process for the preparation of the compositions X. Further, the invention relates to sweetener compositions comprising at least one sweetener and the novel compositions X; to a method of providing sweetener or sweetness enhancer compositions; to methods of modifying, masking, reducing and/or suppressing an unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetener or sweetness enhancer; and to tabletop sweetener compositions comprising the novel compositions X. The invention also relates to consumable product compositions comprising a consumable product and the novel compositions X; to methods of modifying, masking, reducing and/or suppressing an unpleasant off-taste, aftertaste or lingering sweetness of a consumable product composition; and to methods of imparting rich taste to a consumable product. In Part B, the present invention inter alia relates to sweetener composition comprising (i) a sweetener; and (ii) at least one flavoring, wherein the at least one flavoring is suitable for modifying, masking, reducing and/or suppressing an unpleasant off-taste of the sweetener in a consumable product composition formed by adding the sweetener composition to a consumable product; and wherein a weight ratio of the at least one flavoring to the sweetener in the consumable product composition is such that the sweetness of the sweetener is detectable by taste in the consumable product composition and the flavor of the at least one flavoring is not detectable by taste in the consumable product composition. The invention further relates to a sweetness enhancer composition comprising (i) a sweetness enhancer; and (ii) at least one flavoring; wherein the at least one flavoring is suitable for modifying, masking, reducing and/or suppressing an unpleasant off-taste of the sweetness enhancer in a consumable product composition formed by adding the sweetness enhancer composition and a sweetener to a consumable product; and wherein a weight ratio of the at least one flavoring to the sweetness enhancer in the consumable product composition is such that the sweetness enhancer is capable of enhancing a sweetness of the sweetener present in the consumable product composition and the flavor of the at least one flavoring is not detectable by taste in the consumable product composition. The invention further relates inter alia to the respective consumable products.



Taste-Masking Compositions, Sweetener Compositions and Consumable Product Compositions containing the Same

5 Part A

Field of the Invention

The present invention relates to novel compositions X comprising (1) at least one bitter
10 blocking agent; (2) at least one carbonyl compound; and (3) at least one lactone, in
particular to compositions X comprising (i) naringin; (ii) methoxy salicylaldehyde; (iii)
syringaldehyde; (iv) massoia lactone; and (v) whiskey lactone; to the use of the
compositions X for modifying, masking, reducing and/or suppressing an unpleasant off-
taste, aftertaste or lingering sweetness of at least one sweetener, sweetness enhancer or
15 consumable product; and to a process for the preparation of the compositions X. Further,
the invention relates to sweetener compositions comprising at least one sweetener and the
novel compositions X; to a method of providing sweetener or sweetness enhancer
compositions; to methods of modifying, masking, reducing and/or suppressing an
unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetener or
20 sweetness enhancer; and to tabletop sweetener compositions comprising the novel
compositions X. The invention also relates to consumable product compositions
comprising a consumable product and the novel compositions X; to methods of modifying,
masking, reducing and/or suppressing an unpleasant off-taste, aftertaste or lingering
sweetness of a consumable product composition; and to methods of imparting rich taste to
25 a consumable product.

Background of the Invention

Consumable products with a high content of sugar(s), e.g., sucrose (saccharose), glucose,
30 fructose and/or mixtures thereof, are generally afforded much greater preference by
consumers due to their sweetness. However, it is commonly known that a high content of

sugar(s) can greatly increase the blood sugar level, lead to the formation of fatty deposits and ultimately result in health problems such as childhood obesity, type II diabetes, and related illnesses. Therefore, it has long been an aim to reduce the sugar content of consumable products to the absolute minimum necessary. One way to reduce sugar content
5 is to replace at least a portion of the sugar(s) with one or more non-caloric high-intensity sweeteners. These non-caloric sweeteners provide sweetnesses significantly higher than those of conventional sweeteners, e.g., sugars such as sucrose or high-fructose corn syrup (HFCS).

10 However, unlike conventional sugars, many of the non-caloric or low-caloric sweeteners have unpleasant taste features, e.g., off-tastes, aftertastes and/or lingering sweetness. These off-tastes, aftertastes and/or lingering sweetnesses negatively affect the overall flavor of the respective consumable product to which they are added. For example, sucralose, stevioside and cyclamate contribute to negative time-intensity profiles. As another
15 example, acesulfame potassium, saccharin and stevioside, produce a bitter and/or astringent aftertaste. As another example, neotame produces a bitter and metallic off-taste. As another example, glycyrrhizinic acid ammonium salt produces marked additional aroma impression. Also, some sweeteners, e.g., brazzein, monellin, thaumatin, are not particularly stable under heat. Others, e.g., aspartame, are not stable in all applications. As
20 another example, saccharin may have a very long-lasting sweetening effect, e.g., a lingering sweetness.

Steviol glycosides occur naturally in *Stevia spp.* or *Rubus spp.* Examples of these include dulcoside, rebaudiosides A-H, rubusoside, stevioside, suaviosides A, B and G-J. Steviol
25 glycosides are very good sweeteners, but, when used in concentrations necessary for an adequate sweetening effect, steviol glycosides often exhibit a liquorice-like and/or bitter and/or astringent taste impression. Further unpleasant taste impressions may also be observed, e.g., a long-lasting aftertaste or a sweetener like taste profile.

30 In particular, when used in beverages, e.g., sweet, calorie-free or very low calorie drinks, such sweeteners may exhibit unpleasant secondary taste impressions and/or aftertastes and may lower the sensory acceptance. As such, these negative taste features often require taste masking.

Some taste-masking substances are known. Although many conventional taste-masking substances may partially modify, mask, reduce and/or suppress unpleasant taste features of sweeteners or sweetness enhancers, many taste-masking substances are severely limited in their application.

5

For example, US 2004/0142084 A1 describes alkaline metal hydrogen sulphates as masking agents. One disadvantage of these sulphates is that they considerably increase the acid content in the consumable product.

10 Further, US 2002/0177576 A1 describes the suppression of a bitter taste by nucleotides, for example cytidine 5'-monophosphates (CMPs). The disadvantage of using CMPs is that the strongly polar compounds can only be used in strongly polar solvents. Therefore, CMPs can be used to only a very limited degree in many fat-containing consumable products. Furthermore, the availability of CMPs is severely limited because of their expensive
15 chemical synthesis.

Further, US 2010/0112138 A1 describes a beverage, which is sweetened with a non-nutritive sweetener component comprising at least one non-nutritive sweetener having a lingering sweet aftertaste, and which further comprises a bitterant in an amount sufficient
20 to reduce the lingering sweet aftertaste. The bitterant may comprise naringin and/or limonin.

Further, US 2009/0004360 A1 describes sweetener compositions, which include at least one sweetener, a first non-sweetener composition comprising a sucrose equivalence
25 modifier, and a second composition comprising a sweet flavor modifier, which modifies the perception of a sweet flavor. As a sweet flavor modifier, e.g. vanillin, vanillic acid, ethyl vanillin or benzaldehyde may be used.

Further, US 2011/0158919 A1 describes an aroma composition to reduce or suppress
30 undesirable taste impressions of a sweetener, in particular bitter, astringent and/or sweetener like taste and/or long-lasting aftertaste of a sweetener. The aroma composition comprises (i) one or more sweeteners and (ii) ortho-coumaric acid. Optionally, the aroma composition may comprise (iii) one or more specific bitter-masking aroma substances

and/or flavorings and optionally (iv) one or more sweetness intensifying aroma substances and/or sweeteners.

Further, EP 2 204 098 A1 describes the use of lactobionic acid, lactobionic-5-lactone, a salt of lactobionic acid or a mixture thereof as a flavor enhancer. The flavor that is enhanced may be a sweet flavor. Furthermore, the bitter off-taste of otherwise sweet compounds is reduced.

Further, EP 2 220 945 A1 describes an aroma composition to reduce or suppress a bitter or astringent impression in the oral cavity. The aroma composition comprises one or more sweeteners, one or more specific bitter-masking aroma substances and/or flavorings.

Thus, there is a need for further taste-masking compositions that can modify, mask, reduce and/or suppress unpleasant taste features left by sweeteners or sweetness enhancers without demonstrating the disadvantages of known taste-masking substances.

Brief Description of the Figures

Fig. 1 is a bar diagram showing the results of the taste and spit assay of a sweetener composition comprising acesulfame potassium, sucralose and the composition X of the invention with regard to bitter aftertaste.

Fig. 2 is a bar diagram showing the results of the taste and spit assay of a sweetener composition comprising acesulfame potassium, sucralose and the composition X of the invention with regard to sweetness in the aftertaste.

Summary of the Invention

The present invention in one aspect, relates to a composition X comprising the following substances:

- (1) at least one bitter blocking agent;
- (2) at least one carbonyl compound; and
- (3) at least one lactone.

In one embodiment, the at least one carbonyl compound comprises

- (2a) a first carbonyl compound; and
- (2b) a second carbonyl compound.

5 In one embodiment, the at least one lactone comprises

- (3a) a first lactone; and
- (3b) a second lactone.

In one embodiment, the at least one bitter blocking agent (1) has a bitter off-taste.

10

In one embodiment, the at least one bitter blocking agent (1) is selected from the group consisting of:

a compound comprising a flavanonyl moiety, in particular a flavanone, a hydroxyflavanone, a dihydroxyflavanone or a trihydroxyflavanone;

15 a compound comprising a quininyll moiety, in particular quinine, quinine bisulfate, quinine hydrochloride, quinine sulfate, hydroxyquinine;

a compound comprising a purinyll moiety, in particular caffeine or theobromine;

a compound comprising a saccharide acetate moiety, in particular glucose penta-acetate or sucrose octa-acetate; and

20 benzyl diethyl-(2:6-xylyl-carbamoyl-methyl)-ammonium benzoate.

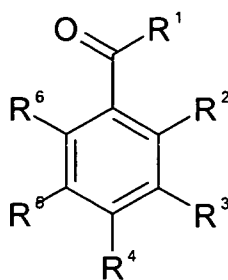
Preferably, the at least one bitter blocking agent (1) is a compound comprising a flavanoyll moiety selected from the group consisting of naringin, naringenin and naringin dihydrochalcone or a naringin containing extract, preferably naringin.

25

In one embodiment, the at least one carbonyl compound (2) contains from 7 to 18 carbon atoms, preferably from 7 to 14 carbon atoms.

In one embodiment, the at least one carbonyl compound (2) has a boiling point of from
30 150°C to 500°C, preferably from 190°C to 400°C.

In one embodiment, the at least one carbonyl compound (2) is a carbonyl compound of the formula (I)



(I)

wherein said carbonyl compound does not contain more than 18 carbon atoms, preferably from 8 to 14 carbon atoms, and

5 wherein

R¹ is hydrogen, hydroxy, C₁-C₈ alkyl or C₂-C₈ alkenyl; and

R², R³, R⁴, R⁵ and R⁶ are identical or different and each is independently of the others hydrogen, hydroxy, C₁-C₈ alkyl, C₁-C₈ alkoxy or C₂-C₈ alkenyl.

10 Preferably, in the carbonyl compound of the formula (I) at least one of R², R³, R⁴, R⁵ and R⁶ is hydroxy or methoxy.

Preferably, the at least one carbonyl compound (2) is selected from the group consisting of a compound comprising a vanillin moiety, in particular vanillin, ethyl vanillin, methyl
15 vanillate, ethyl vanillate, vanillic acid, vanillin isobutyrate, ethyl vanillin isobutyrate, acetovanillone or 5-methoxyvanillin;

a compound comprising a benzaldehyde moiety other than a vanillin moiety, in particular 4-hydroxybenzaldehyde, 2-methoxybenzaldehyde, 3-methoxybenzaldehyde, 4-
methoxybenzaldehyde, 4-ethoxybenzaldehyde, 4-ethylbenzaldehyde, 2-hydroxy-4-
20 methylbenzaldehyde, 2-methoxybenzoic acid, 3,4-dihydroxybenzaldehyde, 4-hydroxy-3,5-dimethoxybenzaldehyde, veratraldehyde, anis aldehyde, salicylaldehyde, 3-methoxy salicylaldehyde or 4-methoxy salicylaldehyde;

a compound comprising a benzoic acid moiety, 3-methoxybenzoic acid, 4-methoxybenzoic acid, 2-hydroxybenzoic acid, 3-hydroxybenzoic acid, 4-hydroxybenzoic acid, ethyl 2-
25 hydroxy-4-methylbenzoate or anisic acid; and

a compound comprising an acetophenone moiety, in particular 2-hydroxyacetophenone, 3-hydroxyacetophenone or 4-hydroxyacetophenone.

Preferably, the at least one carbonyl compound (2) is an aldehyde having at least one aromatic ring structure and having a molecular weight higher than 106 Da, preferably higher than 110, 150, 200 or 400 Da. Preferably, the upper limit of the molecular weight for the aldehyde is 200, 300, 400 or 600 Da.

5

Preferably, the at least one carbonyl compound (2) is selected from the group consisting of 4-methoxy salicylaldehyde and syringaldehyde. In particular, the at least one carbonyl compound (2) comprises syringaldehyde and/or acetoin.

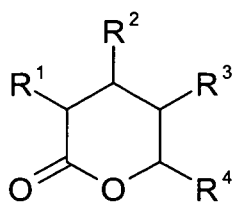
10 In one embodiment, the at least one lactone (3) contains from 6 to 18 carbon atoms, preferably from 8 to 14 carbon atoms.

In one embodiment, the at least one lactone (3) has a boiling point of between 150°C and 500°C, preferably between 190°C and 400°C.

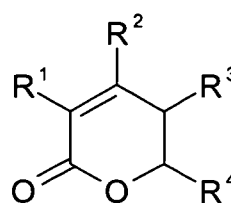
15

In one embodiment, the at least one lactone (3) comprises a saturated or an unsaturated delta-lactone.

In one embodiment, the at least one lactone (3) comprises a delta-lactone of the formulae
20 (II) or (III)



(II)



(III)

wherein said lactone does not contain more than 18 carbon atoms, preferably from 8 to 14 carbon atoms, and

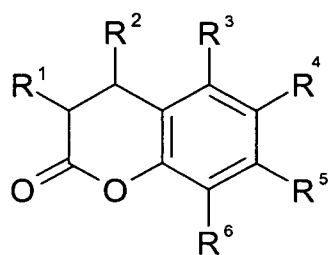
25 wherein

R¹, R², R³ and R⁴ are identical or different and each is independently of the others hydrogen, hydroxy, Ci-Cio alkyl, Ct-Cio alkoxy or C₂-C₁₀ alkenyl.

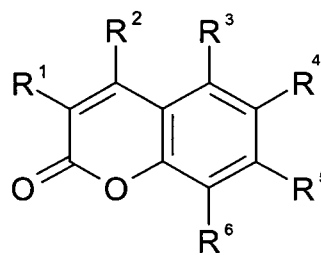
Preferably, the at least one lactone (3) is selected from the group consisting of:

pentano-1,5-lactone, hexano-1,5-lactone, heptano-1,5-lactone, octano-1,5-lactone, nonano-1,5-lactone, decano-1,5-lactone, undecano-1,5-lactone, dodecano-1,5-lactone, tridecano-1,5-lactone, tetradecano-1,5-lactone, pentadecano-1,5-lactone, hexadecano-1,5-lactone, pent-2-eno-1,5-lactone, hex-2-eno-1,5-lactone, hept-2-eno-1,5-lactone, oct-2-eno-1,5-lactone, non-2-eno-1,5-lactone, dec-2-eno-1,5-lactone, undec-2-eno-1,5-lactone, dodec-2-eno-1,5-lactone, tridec-2-eno-1,5-lactone, tetradec-2-eno-1,5-lactone, pentadec-2-eno-1,5-lactone, hexadec-2-eno-1,5-lactone, dec-5-eno-1,5-lactone, dec-6-eno-1,5-lactone, dec-7-eno-1,5-lactone, dec-8-eno-1,5-lactone, undec-5-eno-1,5-lactone, undec-6-eno-1,5-lactone, undec-7-eno-1,5-lactone, undec-8-eno-1,5-lactone, dodec-2-eno-1,5-lactone and nepetalactone.

In one embodiment, the at least one lactone (3) comprises a delta-lactone of the formulae (IV) or (V)



(IV)



(V)

wherein said lactone does not contain more than 18 carbon atoms, preferably from 9 to 14 carbon atoms, and

wherein

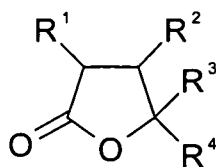
R¹, R², R³, R⁴, R⁵ and R⁶ are identical or different and each is independently of the others hydrogen, hydroxy, C₁-C₆ alkyl, C₁-C₄ alkoxy or C₂-C₆ alkenyl.

Preferably, the at least one lactone (3) is selected from the group consisting of:

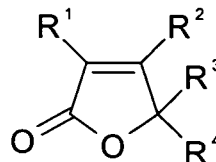
6-methylcoumarin, 3,4-dihydrocoumarin, and 7-ethoxy-4-methylcoumarin.

In one embodiment, the at least one lactone (3) comprises a saturated or an unsaturated gamma-lactone.

In one embodiment, the at least one lactone (3) comprises a gamma-lactone of the formulae (VI) or (VII)



(VI)



(VII)

5 wherein said lactone does not contain more than 18 carbon atoms, preferably from 8 to 14 carbon atoms, and

wherein

R¹, R² and R³ are identical or different and each is independently of the others hydrogen, hydroxy, C₁-C₁₀ alkyl, C₁-C₁₀ alkoxy or C₂-C₁₀ alkenyl; and

10 R⁴ is hydrogen, C₁-C₁₀ alkyl or C₂-C₁₀ alkenyl;

Preferably, the gamma-lactone is selected from the group consisting of:

pentano-1,4-lactone, hexano-1,4-lactone, heptano-1,4-lactone, octano-1,4-lactone, nonano-1,4-lactone, decano-1,4-lactone, undecano-1,4-lactone, dodecano-1,4-lactone, tridecano-1,4-lactone, tetradecano-1,4-lactone, pentadecano-1,4-lactone, hexadecano-1,4-lactone, butyloctano-1,4-lactone, dodec-6-eno-1,4-lactone, dec-7-eno-1,4-lactone, cis-dec-7-eno-1,4-lactone, 2,7-dimethylocta-5(trans),7-dieno-1,4-lactone, hex-2-eno-1,4-lactone, 3-methylnonano-1,4-lactone, 3-methyloctano-1,4-lactone, non-2-eno-1,4-lactone, 2-decen-1,4-lactone, dimethylnon-2-eno-1,4-lactone, 3-methyl gamma-decalactone, 4-methyl-5-hexen-1,4-olide, 4-hydroxyoctanoic acid lactone, 4-hydroxy-3-methyl octanoic acid lactone, 4-hydroxyundecanoic acid lactone and 4-hydroxy-2-hexanoic acid lactone.

In one embodiment, the at least one lactone comprises a delta lactone and a gamma lactone, preferably the first lactone (3a) is a delta-lactone and the second lactone (3b) is a gamma-lactone.

In one embodiment, the invention relates to a composition X comprising:

(1) at least one bitter blocking agent selected from the group consisting of a compound comprising a flavanonyl moiety, in particular a flavanone, a hydroxyflavanone, a dihydroxyflavanone or a trihydroxyflavanone, preferably naringin,

nanngenin and naringin dihydrochalcone or a naringin containing extract, most preferably naringin;

a compound comprising a quininyll moiety, in particular quinine, quinine bisulfate, quinine hydrochloride, quinine sulfate, hydroxyquinine;

5 a compound comprising a purinyl moiety, in particular caffeine or theobromine;

a compound comprising a saccharide acetate moiety, in particular glucose penta-acetate or sucrose octa-acetate; and

benzyl diethyl-(2:6-xylyl-carbamoyl-methyl)-ammonium benzoate;

10 (2) at least one carbonyl compound selected from the group consisting of

a compound comprising a vanillin moiety, in particular vanillin, ethyl vanillin, methyl vanillate, ethyl vanillate, vanillic acid, vanillin isobutyrate, ethyl vanillin isobutyrate, acetovanillone or 5-methoxyvanillin;

a compound comprising a benzaldehyde moiety other than a vanillin moiety, in particular
15 4-hydroxybenzaldehyde, 2-methoxybenzaldehyde, 3-methoxybenzaldehyde, 4-methoxybenzaldehyde, 4-ethoxybenzaldehyde, 4-ethylbenzaldehyde, 2-hydroxy-4-methylbenzaldehyde, 2-methoxybenzoic acid, 3,4-dihydroxybenzaldehyde, 4-hydroxy-3,5-dimethoxybenzaldehyde, veratraldehyde, anis aldehyde, salicylaldehyde, 3-methoxy salicylaldehyde or 4-methoxy salicylaldehyde;

20 a compound comprising a benzoic acid moiety, 3-methoxybenzoic acid, 4-methoxybenzoic acid, 2-hydroxybenzoic acid, 3-hydroxybenzoic acid, 4-hydroxybenzoic acid, ethyl 2-hydroxy-4-methylbenzoate or anisic acid; and

a compound comprising an acetophenone moiety, in particular 2-hydroxyacetophenone, 3-hydroxyacetophenone or 4-hydroxyacetophenone, most particularly 4-methoxy

25 salicylaldehyde and syringaldehyde; and

(3) at least one lactone selected from the group consisting of

pentano-1,5-lactone, hexano-1,5-lactone, heptano-1,5-lactone, octano-1,5-lactone, nonano-1,5-lactone, decano-1,5-lactone, undecano-1,5-lactone, dodecano-1,5-lactone, tridecano-
30 1,5-lactone, tetradecano-1,5-lactone, pentadecano-1,5-lactone, hexadecano-1,5-lactone, pent-2-eno-1,5-lactone, hex-2-eno-1,5-lactone, hept-2-eno-1,5-lactone, oct-2-eno-1,5-lactone, non-2-eno-1,5-lactone, dec-2-eno-1,5-lactone, undec-2-eno-1,5-lactone, dodec-2-eno-1,5-lactone, tridec-2-eno-1,5-lactone, tetradec-2-eno-1,5-lactone, pentadec-2-eno-1,5-lactone, hexadec-2-eno-1,5-lactone, dec-5-eno-1,5-lactone, dec-6-eno-1,5-lactone, dec-7-

eno-1,5-lactone, dec-8-eno-1,5-lactone, undec-5-eno-1,5-lactone, undec-6-eno-1,5-lactone, undec-7-eno-1,5-lactone, undec-8-eno-1,5-lactone, dodec-2-eno-1,5-lactone, nepetalactone pentano-1,4-lactone, hexano-1,4-lactone, heptano-1,4-lactone, octano-1,4-lactone, nonano-1,4-lactone, decano-1,4-lactone, undecano-1,4-lactone, dodecano-1,4-lactone, tridecano-1,4-lactone, tetradecano-1,4-lactone, pentadecano-1,4-lactone, hexadecano-1,4-lactone, butyloctano-1,4-lactone, dodec-6-eno-1,4-lactone, dec-7-eno-1,4-lactone, cis-dec-7-eno-1,4-lactone, 2,7-dimethylocta-5(trans),7-dieno-1,4-lactone, hex-2-eno-1,4-lactone, 3-methylnonano-1,4-lactone, 3-methyloctano-1,4-lactone, non-2-eno-1,4-lactone, 2-decen-1,4-lactone, dimethylnon-2-eno-1,4-lactone, 3-methyl gamma-decalactone, 4-methyl-5-hexen-1,4-olide, 4-hydroxyoctanoic acid lactone, 4-hydroxy-3-methyl octanoic acid lactone, 4-hydroxyundecanoic acid lactone and 4-hydroxy-2-hexanoic acid lactone.

In one embodiment, the invention relates to a composition X comprising

- (1) naringin
- (2) an aldehyde as defined above comprising an aromatic ring and having a molecular weight higher than 106 Da, and
- (3) a lactone selected from the group consisting of a delta lactone and whiskey lactone.

In one embodiment, the at least one bitter blocking agent (1) is present in the composition X in an amount ranging from 15 wt% to 55 wt%.

- In one embodiment, the at least one carbonyl compound (2) is present in the composition X in an amount ranging from 0.5 wt% to 10.0 wt%.

In one embodiment, the at least one lactone (3) is present in the composition X in an amount ranging from 0.06 wt% to 10.0 wt%.

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to the first carbonyl compound (2a) ranges from 50:1 to 200000:1.

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to the second carbonyl compound (2b) ranges from 0.25:1 to 2000:1.

5 In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to the first lactone (3a) ranges from 5:1 to 10000:1.

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to the second lactone (3b) ranges from 5:1 to 4000:1.

10 In one embodiment, the composition X further comprises
(4) at least one additional substance.

In one embodiment, the at least one additional substance (4) is selected from at least one amino acid, maltol, taurine, at least one additional flavoring ingredient, and combinations
15 thereof.

Preferably, the at least one amino acid are one to thirteen amino acids selected from the group consisting of L-alanine, L-leucine, glycine, L-aspartic acid, L-lysine monohydrate, L-threonine, L-isoleucine, L-tyrosine, L-methionine, L-proline, L-serine, L-valine and L-
20 glutamic acid.

Preferably, the at least one amino acid are one to eleven amino acids selected from the group consisting of L-alanine, L-leucine, glycine, L-aspartic acid, L-threonine, L-isoleucine, L-tyrosine, L-proline, L-serine, L-valine and L-glutamic acid.
25

In one embodiment, the composition X does not comprise all 5 of the following substances: naringin, methoxy salicylaldehyde, syringaldehyde, massoia lactone, and whiskey lactone.

30 In a preferred embodiment, the composition X does not comprise methoxy salicylaldehyde, in particular the composition does not comprise, as substance (2), methoxy salicylaldehyde.

The invention, in another aspect, relates to a process for the preparation of a composition X as defined above comprising admixing the substances (1), (2) and (3), preferably the substances (1), (2a), (2b), (3a) and (3b).

- 5 The present invention, in one aspect, relates to a composition X, including but not limited to a taste masking composition, comprising the following substances:

- (I) naringin;
- (II) at least two aldehyde taste improvers; and
- 10 (III) at least two lactone mouthfeel enhancers.

In one embodiment, substance (II) is selected from the group consisting of methoxy salicylaldehyde and syringaldehyde.

- 15 In one embodiment, substance (III) is selected from the group consisting of whiskey lactone and massoia lactone.

In a preferred embodiment, the composition X does not comprise methoxy salicylaldehyde, in particular the composition X does not comprise, as substance (II), methoxy
20 salicylaldehyde.

In one embodiment, the substance (I) (naringin) is present in the composition X in an amount ranging from 15 wt% to 55 wt%.

- 25 In one embodiment, the substance (II) (at least two aldehyde taste improvers) is present in the composition X in an amount ranging from 0.5 wt% to 10.0 wt%.

In one embodiment, the substance (III) (at least two mouthfeel enhancers) is present in the composition X in an amount ranging from 0.06 wt% to 10.0 wt%.

30

In one embodiment, the weight ratio of substance (I) to substances (II) ranges from 0.25:1 to 1980:1.

In one embodiment, the weight ratio of substance (I) to substances (III) ranges from 2.5:1 to 2857:1.

In one embodiment, the composition X further comprises (IV) at least one amino acid.

5

Preferably, the at least one amino acid (IV) are one to thirteen amino acids selected from the group consisting of L-alanine, L-leucine, glycine, L-aspartic acid, L-lysine monohydrate, L-threonine, L-isoleucine, L-tyrosine, L-methionine, L-proline, L-serine, L-valine and L-glutamic acid.

10

The present invention, in another aspect, relates to a composition X comprising the following substances:

- (i) naringin;
- (ii) methoxy salicylaldehyde;
- 15 (iii) syringaldehyde;
- (iv) massoia lactone; and
- (v) whiskey lactone.

Preferably, in the composition X, substance (ii) is 4-methoxy salicylaldehyde.

20

Preferably, in the composition X, substance (iv) is (i?)-5,6-dihydro-6-pentyl-2 *H*-pyran-2-one.

Preferably, in the composition X, substance (v) is a mixture of *cis*-3-*m*ethyl-4-octanolide (m-whiskey lactone) and *trans*-3-methyl-4-octanolide (*trans*-whiskey lactone).

25

Preferably, in the composition X substance (ii) is 4-methoxy salicylaldehyde, substance (iv) is (*R*)-5,6-dihydro-6-pentyl-2 *H*-pyran-2-one and substance (v) is a mixture of *cis*-3-methyl-4-octanolide (m-whiskey lactone) and ~~ta~~ *ns*-3-methyl-4-octanolide (*trans*-whiskey lactone).

30

In a preferred embodiment, the composition X does not comprise methoxy salicylaldehyde, in particular the composition does not comprise, as substance (ii), methoxy salicylaldehyde.

In one embodiment, the substance (i) (naringin) is present in the composition X in an amount ranging from 15 wt% to 55 wt%.

5 In one embodiment, the substance (iii) (syringaldehyde) is present in the composition X in an amount ranging from 0.5 wt% to 10.0 wt%.

In one embodiment, the substance (iv) (massoia lactone) is present in the composition X in an amount ranging from 0.06 wt% to 2.0 wt%.

10 In one embodiment, the substance (v) (whiskey lactone) is present in the composition X in an amount ranging from 0.1 wt% to 5.0 wt%.

In one embodiment, the weight ratio of substance (i) to substance (ii) ranges from 50:1 to 200000:1.

15

In one embodiment, the weight ratio of substance (i) to substance (iii) ranges from 0.25:1 to 2000:1.

In one embodiment, the weight ratio of substance (i) to substance (iv) ranges from 5:1 to 10000:1.

20

In one embodiment, the weight ratio of substance (i) to substance (v) ranges from 5:1 to 4000:1.

25 In another embodiment, the composition X further comprises (vi) at least one additional substance.

Preferably, the at least one additional substance (vi) is selected from amino acids, flavoring ingredients, and combinations thereof.

30

Preferably, the at least one amino acid (vi) are one to thirteen amino acids selected from the group consisting of L-alanine, L-leucine, glycine, L-aspartic acid, L-lysine monohydrate, L-threonine, L-isoleucine, L-tyrosine, L-methionine, L-proline, L-serine, L-valine and L-glutamic acid.

In one embodiment, the weight ratio of substance (i) to substances (vi) ranges from 0.084: 1 to 3356:1.

- 5 The invention, in another aspect, relates to a process for the preparation of a composition X as defined above comprising admixing the substances (i), (ii), (iii), (iv), and (v).

The invention, in another aspect, relates to a sweetener composition, comprising

- (a) at least one sweetener; and
10 (b) the composition X as defined above.

In one embodiment, the at least one sweetener is an artificial or natural sweetener selected from the group consisting of abiziasaponin, abrusosides, in particular abrusoside A, abrusoside B, abrusoside C, abrusoside D, acesulfame potassium, advantame,
15 albiziasaponin, alitame, aspartame, superaspartame, bayunosides, in particular bayunoside 1, bayunoside 2, brazzein, bryoside, bryonoside, bryonodulcoside, carnosifloside, carrelame, curculin, cyanin, chlorogenic acid, cyclamates and its salts, cyclocaryoside I, dihydroquercetin-3-acetate, dihydroflavenol, dulcoside, gaudichaudioside, glycyrrhizin, glycyrrhetinic acid, gypenoside, hematoxylin, hernandulcin, isomogrosides, in particular
20 iso-mogroside V, lugduname, magap, mabinlins, micraculin, mogrosides (lo han guo), in particular mogroside IV and mogroside V, monatin and its derivatives, monellin, mukurozioside, naringin dihydrochalcone (NarDHC), neohesperidin dihydrochalcone (NDHC), neotame, osladin, pentadin, periandrin I-V, perillartine, D-phenylalanine, phlomisiosides, in particular phlomisioside 1, phlomisioside 2, phlomisioside 3, phlomisioside
25 4, phloridzin, phyllodulcin, polpodiosides, polypodoside A, pterocaryosides, rebaudiosides, in particular rebaudioside A, rebaudioside B, rebaudioside C, rebaudioside D, rebaudioside F, rebaudioside G, rebaudioside H), rubusosides, saccharin and its salts and derivatives, scandenoside, selliguanin A, siamenosides, in particular siamenoside I, stevia, steviolbioside, stevioside and other steviol glycosides, strogines, in particular strogin 1,
30 strogin 2, strogin 4, suavioside A, suavioside B, suavioside G, suavioside H, suavioside I, suavioside J, sucralose, sucronate, sucrooctate, talin, telosmoside A₁₅, thaumatin, in particular thaumatin I and II, trans-anethol, trans-cinnamaldehyde, trilobatin and D-tryptophane, including extracts or enriched fractions of the natural sweeteners.

In one embodiment, the at least one sweetener is selected from the group consisting of acesulfame potassium, aspartame, sucralose and thaumatin.

Preferably, the at least one sweetener comprises acesulfame potassium.

5

Preferably, the at least one sweetener comprises acesulfame potassium and thaumatin.

In particularly preferred embodiments, the at least one sweetener comprises acesulfame potassium and sucralose.

10

In one embodiment, the amount of the substances (1), (2) and (3), preferably of (1), (2a), (2b), (3a) and (3b), and of the substances (i), (ii), (iii), (iv) and (v) in the sweetener composition is below their taste threshold concentration.

15 In one embodiment, the sweetener composition comprises from 80 wt% to 99.5 wt% of the at least one sweetener, based on the total weight of the sweetener composition, e.g., from 95.1 wt% to 98.9 wt%, or from 94.2 wt% to 98.1 wt%. The at least one sweetener is described in more detail below.

20 In one embodiment, the sweetener composition comprises from 0.5 wt% to 20 wt% of the composition X as defined above, based on the total weight of the sweetener composition, e.g., from 1.6 wt% to 2.2 wt% or from 0.9 wt% to 1.2 wt%.

In one embodiment, the sweetener composition comprises at least one additional
25 sweetener.

Preferably, the at least one additional sweetener is a sugar alcohol or sugar sweetener selected from the group consisting of erythritol, galactitol, hydrogenated starch syrups, maltitol and sorbitol syrups, inositols, isomalt, lactitol, maltitol, mannitol, xylitol, 30 arabinose, dextrin, dextrose, fructose, high fructose corn syrup, fructooligosaccharides, fructooligosaccharide syrups, galactose, galactooligosaccharides, glucose, glucose and (hydrogenated) starch syrups/hydrolysates, isomaltulose, lactose, hydrolysed lactose, maltose, mannose, rhamnose, ribose, sucrose, tagatose, trehalose, xylose, and combinations thereof.

In one embodiment, the at least one additional sweetener is a caloric sweetener.

In one embodiment, the at least one additional sweetener is a non-caloric sweetener.

5

In one embodiment, the sweetener composition further comprises at least one sweetness enhancer.

10

In one embodiment, the composition X as defined above are present in the sweetener composition in an amount effective to modify, mask, reduce and/or suppress an unpleasant off-taste, aftertaste or lingering sweetness of the at least one sweetener or the sweetness enhancer, wherein the amount is less than a taste threshold concentration associated with the composition.

15

Preferably, the effect of the composition X remains at least as long as the taste of the at least one sweetener or the at least one sweetness enhancer is perceived.

20

In one embodiment, the unpleasant off-taste of the sweetener or the sweetness enhancer is an acidic off-taste, an astringent off-taste, a bitter off-taste, a liquorice off-taste, a metallic off-taste and/or a throat-burning off-taste.

Preferably, the unpleasant aftertaste of the sweetener or the sweetness enhancer is an astringent or bitter aftertaste.

25

In one embodiment, the sweetener composition is a liquid at ambient conditions.

In one embodiment, the sweetener composition is a solid at ambient conditions.

30

In one embodiment, the sweetener composition further comprises an additional component selected from the group consisting of dust control agents, bubble forming agents, surfactants, emulsifiers, salts, fats, gums, hydrocolloids, bulking agents, carriers, fibers, flavoring ingredients, flavor enhancers, flavor stabilizers, acidulants, anti-caking and free-flow agents.

Preferably, the additional component is glycerol.

In one embodiment, the invention relates to a solution, e.g., a taste modifying solution, comprising a solvent and the composition X. Preferably, the solvent is or may include
5 water or another polar solvent. Furthermore, the solvent may be or may include consumable organic solvent and/or a consumable inorganic solvent. Furthermore, the solvent, in particular water, may comprise one or more buffers like Tris/HCl, HEPES and the like.

10 In one embodiment, the composition X is dissolved in the solvent, thus forming the solution. In the solution, the composition X may be present in amounts ranging from 0.01 wppm to 1000 wppm, based on the total weight of the solution, e.g., from 0.05 to 1000 wppm, from 0.1 wppm to 1000 wppm, from 1 wppm to 1000 wppm, from 10 wppm to 1000 wppm, from 0.01 wppm to 500 wppm, from 0.05 wppm to 500 wppm, from 0.1
15 wppm to 500 wppm, from 1 wppm to 500 wppm, from 10 wppm to 500 wppm, from 0.01 wppm to 250 wppm, from 0.05 wppm to 250 wppm, from 0.1 wppm to 250 wppm, from 1 wppm to 250 wppm, or from 10 wppm to 250 wppm.

In one embodiment, the composition X and the components thereof may be present in the
20 amounts (ranges) listed herein with respect to consumable product compositions. For example, if the composition X comprises naringin, the naringin may be present in the solution in a concentration from 0.5 wppm to 50 wppm, e.g. from 1 wppm to 40 wppm, from 2 wppm to 30 wppm, from 3 wppm to 20 wppm or from 4 wppm to 10 wppm.

25 In addition to the composition X and the solvent, the solution may further comprise at least one sweetener and/or at least one sweetness enhancer. In one embodiment, the at least one sweetener and/or sweetness enhancer may be those mentioned herein. In one embodiment, wherein a sweetener is included in the solution, the sweetener is preferably acesulfame potassium.

30

In one embodiment, the solution comprises the composition X and the sweetener. The composition X may be present in the solution in an amount such that, when the solution is added to a consumable product, the flavor of the sweetener (in the consumable product) is

improved, as compared to a similar consumable product comprising the sweetener but not comprising the composition X.

In one embodiment, the solution comprises the composition X and the sweetener and the composition X may be present in the solution in an amount such that, when the solution is added to a consumable product, the composition X is not detectable by taste in the consumable product.

In one embodiment, the solution comprises the composition X and the sweetness enhancer and the sweetness enhancer may be present in the solution in an amount such that, when the solution is added to a consumable product, the sweetness enhancer is capable of enhancing a sweetness of the sweetener present in the consumable product composition. The composition X may be present in an amount such that the flavor of the composition X is not detectable by taste in the consumable product composition but still may be capable to exert its functions as defined herein.

In one embodiment, the solution may further comprise an acidic material, e.g., and edible acid. The acid may be present to maintain a preferred pH level in the solution. In one embodiment, the pH of the solution is less than 8, e.g., less than 7, less than 6, less than 5, less than 4, less than 3, or less than 2. Any suitable acidic material or combination of acidic materials may be used to achieve the desired pH levels. In one embodiment, the acidic material is combined with the other components. The order of the combination of components may vary widely.

In one embodiment, the solution may further comprise at least one preservative. The preservatives may vary widely. Many suitable preservatives are known in the art. In a preferred embodiment, the preservative comprises potassium sorbate.

In one embodiment, the solution may be processed to inactivate microorganisms that may be present in the solution. The processing step may vary widely. Many suitable processing steps are known in the art. For example, the solution may be subjected to UV treatment, microfiltration, pasteurization, and combinations thereof. This listing is merely exemplary and is not meant to limit the scope of potential processing steps.

In one embodiment, the invention relates to a method of modifying, masking, reducing and/or suppressing the unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetener or sweetness enhancer, the method comprising combining the composition X as defined above with the at least one sweetener or sweetness enhancer.

5

Preferably, the method comprises combining an amount of the composition X as defined above effective to modify, mask, reduce and/or suppress an unpleasant off-taste, aftertaste or lingering sweetness of the at least one sweetener or the at least one sweetness enhancer with the at least one sweetener or at least one sweetness enhancer, wherein the amount of the composition X in the sweetener composition is less than a taste threshold concentration associated with the composition X and wherein the effect of the composition X remains at least as long as the taste of the at least one sweetener or the at least one sweetness enhancer is perceived.

15 In the context of the present invention, the term "threshold" concentration preferably means that the respective composition X is present in an amount e.g. in the sweetener composition that if the sweetener composition is added to a consumable product, the composition X is either not recognizable and/or identifiable, but still exerts its respective effects.

20

In one embodiment, the at least one sweetener used in said method is an artificial or natural sweetener selected from the group consisting of abiziasaponin, abrusosides, in particular abrusoside A, abrusoside B, abrusoside C, abrusoside D, acesulfame potassium, advantame, albiziasaponin, alitame, aspartame, superaspartame, bayunosides, in particular bayunoside 1, bayunoside 2, brazzein, bryoside, bryonoside, bryonodulcoside, carnosifloside, carrelame, curculin, cyanin, chlorogenic acid, cyclamates and its salts, cyclocaryoside I, dihydroquercetin-3-acetate, dihydroflavenol, dulcoside, gaudichaudioside, glycyrrhizin, glycyrrhetin acid, gypenoside, hematoxylin, hernandulcin isomogrosides, in particular iso-mogroside V, lugduname, magap, mabinlins, micraculin, 25 mogrosides (lo han guo), in particular mogroside IV and mogroside V, monatin and its derivatives, monellin, mukurozioside, naringin dihydrochalcone (NarDHC), neohesperidin dihydrochalcone (NDHC), neotame, osladin, pentadin, periandrin I-V, perillartine, D-phenylalanine, phlomisides, in particular phlomiside 1, phlomiside 2, phlomiside 3, phlomiside 4, phloridzin, phyllodulcin, polpodiosides, polypodoside A,

30

pterocaryosides, rebaudiosides, in particular rebaudioside A, rebaudioside B, rebaudioside C, rebaudioside D, rebaudioside F, rebaudioside G, rebaudioside H), rubusosides, saccharin and its salts and derivatives, scandenoside, selligueanin A, siamenosides, in particular siamenoside I, stevia, steviolbioside, stevioside and other steviol glycosides, strogines, in particular strogin 1, strogin 2, strogin 4, suavioside A, suavioside B, suavioside G, suavioside H, suavioside I, suavioside J, sucralose, sucronate, sucrooctate, talin, telosmoside A₁₅, thaumatin, in particular thaumatin I and II, trans-anethol, trans-cinnamaldehyde, trilobatin and D-tryptophane, including extracts or enriched fractions of the natural sweeteners.

10

Preferably, the at least one sweetener is selected from the group consisting of acesulfame potassium, aspartame, sucralose and thaumatin.

In another embodiment, the invention relates to a tabletop sweetener composition comprising

15

- (a) at least one sugar sweetener, which is selected from the group consisting of monosaccharides, disaccharides, oligosaccharides and polysaccharides, preferably the at least one sugar sweetener is selected from the group consisting of arabinose, dextrin, dextrose, fructose, high fructose corn syrup, fructooligosaccharides, fructooligosaccharide syrups, galactose, galactooligosaccharides, glucose, glucose and (hydrogenated) starch syrups/hydrolysates, isomaltulose, lactose, hydrolysed lactose, maltose, mannose, rhamnose, ribose, sucrose, stachyose, tagatose, trehalose, xylose, and combinations thereof, most preferably the at least one sugar sweetener is a disaccharide and/or fructose;
- 20 (b) at least one sugar alcohol (or polyol), which is selected from the group consisting of erythritol, galactitol, hydrogenated starch syrups including maltitol and sorbitol syrups, inositols, isomalt, lactitol, maltitol, mannitol, xylitol, and combinations thereof, preferably the at least one sugar alcohol is erythritol;
- (c) at least one artificial or natural sweetener as defined above; and
- 25 (d) a taste-masking amount of a composition X as defined above.

30

Preferably, the at least one artificial or natural sweetener is selected from the group consisting of acesulfame potassium, aspartame, sucralose and thaumatin.

In one embodiment, the tabletop sweetener composition further comprises a taste-improving amount of cellulose.

5 In one embodiment, the tabletop sweetener composition comprises from 40 wt% to 90 wt% sugar alcohol based on the total weight of the tabletop sweetener composition, in particular more than 50% sugar alcohol.

In one embodiment, the tabletop sweetener composition comprises from 27 wt% to 50 wt% sugar sweetener based on the total weight of the tabletop sweetener composition.

10

In one embodiment, the tabletop sweetener composition comprises from 0.5 wt% to 7.0 wt% acesulfame potassium, aspartame, sucralose and/or thaumatin based on the total weight of the tabletop sweetener composition.

15 In one embodiment, the tabletop sweetener composition comprises from 0.5 wt% to 20 wt% of the composition as defined above based on the total weight of the sweetener composition.

20 In one embodiment, the tabletop sweetener composition comprises the composition as defined above in an amount effective to modify, mask, reduce and/or suppress an unpleasant off-taste or aftertaste of acesulfame potassium, aspartame, sucralose and thaumatin wherein the amount is less than a taste threshold concentration associated with the composition and wherein the effect of the composition X preferably remains at least as long as the taste of the sugar sweetener, the sugar alcohol and the at least one sweetener are
25 perceived.

In one aspect, the invention relates to a consumable product composition comprising

- (a) a consumable product; and
- (b) a composition X as defined above.

30

In one aspect, the invention relates to a consumable product composition comprising

- (a) a consumable product; and
- (b) a sweetener composition as defined above.

In one aspect, the invention relates to a consumable product composition comprising

- (a) a consumable product; and
- (b) a tabletop sweetener composition as defined above.

- 5 In one embodiment, the consumable product is selected from water-based consumables, solid dry consumables, dairy products, dairy-derived products and dairy-alternative products.

- 10 Preferably, the consumable product is a water-based consumable product selected from the group consisting of beverage, water, near water drink (optionally), aqueous beverage, enhanced/slightly sweetened water drink, flavored carbonated and still mineral and table water, non-carbonated beverage, carbonated water, still water, soft drink, carbonated soft drink (optionally), non-alcoholic drink, alcoholic drink, beer, wine, liquor, fruit drink, juice drink (optionally), juice, fruit juice, vegetable juice, nectar (optionally), broth drink, coffee,
- 15 tea, black tea, green tea, oolong tea, herbal infusion, cacao (water-based), tea-based drink (optionally), coffee-based drinks, cacao-based drink, dessert, syrup, frozen fruit, frozen fruit juice, water-based ice, fruit ice, sorbet, dressing, salad dressing, jams, marmalades, canned fruit, savoury, delicatessen products like delicatessen salads, sauces, ketchup, mustard, pickles and marinated fish, sauce, soup, and beverage botanical materials (whole
- 20 or ground), or instant powder for reconstitution (coffee beans, ground coffee, instant coffee, cacao beans, cacao powder, instant cacao, tea leaves, instant tea powder).

- Preferably, the consumable product is a solid dry consumable product selected from the group consisting of cereals, baked food products, biscuits, bread, breakfast cereal, cereal
- 25 bar, energy bars/nutritional bars, granola, cakes, rice cakes, cookies, crackers, donuts, muffins, pastries, confectioneries, chewing gum, chocolate products, chocolates, fondant, candy, hard candy, marshmallow, pressed tablets, snack foods, botanical materials (whole or ground), and instant powders for reconstitution.

- 30 Preferably, the consumable product is a dairy product, dairy-derived product and/or dairy-alternative product selected from the group consisting of milk, fluid milk, cultured milk product, cultured and noncultured dairy-based drink, cultured milk product cultured with lactobacillus, yoghurt, yoghurt-based beverage, smoothy, lassi, milk shake, acidified milk, acidified milk beverage, butter milk, kefir, milk-based beverages, milk/juice blend,

fermented milk beverage, icecream, dessert, sour cream, dip, salad dressing, cottage cheese, frozen yoghurt, soy milk, rice milk, soy drink, and rice milk drink.

Particularly preferred, the consumable product is a beverage.

5

In particularly preferred embodiments, the beverage is a near water drink, a tea-based drink, a carbonated soft drink, a juice drink and/or a nectar.

10 Preferably, the consumable product is a dental product selected from the group consisting of toothpaste, dental floss, mouthwash, denture adhesive, enamel whitener, fluoride treatments and oral care gels, preferably toothpaste.

Preferably, the consumable product is a cosmetic product selected from the group consisting of lipstick, lip balm, lip gloss and petroleum jelly.

15

Preferably, the consumable product is a pharmaceutical product selected from the group consisting of over-the-counter and prescription drugs, non-tobacco snuff, tobacco substitutes, chewable medications, cough syrups, throat sprays, throat lozenges, cough drops, antibacterial products, pill coatings, gel caplets, soluble fiber preparations, antacids, 20 tablet cores, rapidly absorbed liquid compositions, stable foam compositions, rapidly disintegrating pharmaceutical dosage forms, beverage concentrates for medicinal purposes, aqueous pharmaceutical suspensions, liquid concentrate compositions, and stabilized sorbic acid solutions, phosphate buffers, saline solutions, emulsion, non-aqueous pharmaceutical solvents, aqueous pharmaceutical carriers, solid pharmaceutical carrier, 25 and pharmaceutical preservatives/additives (antimicrobials, antioxidants, chelating agents, inert gases, flavoring agents, coloring agents).

In one embodiment, the consumable product is an animal feed or animal food.

30 The invention, in another aspect, further relates to a consumable product composition as defined above, wherein the composition X as defined above is present in the consumable product composition in an amount effective to modify, mask, reduce and/or suppress an unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetener, a sweetness enhancer or a consumable product, wherein the amount is less than a taste threshold

concentration associated with the composition X and, wherein, preferably, the effect of the composition X remains at least as long as the taste of the sweetener, the sweetness enhancer or the consumable product are perceived.

- 5 Preferably, the unpleasant off-taste of the sweetener, the sweetness enhancer or the consumable product is an acidic off-taste, an astringent off-taste, a bitter off-taste, a liquorice off-taste, a metallic off-taste or a throat-burning off-taste.

- 10 Preferably, the unpleasant aftertaste of the sweetener, the sweetness enhancer or the consumable product is an astringent or bitter aftertaste.

Preferably, the composition X as defined above is present in an amount effective to impart rich taste to a consumable product.

- 15 In one embodiment, the composition X as defined above is present in the consumable product composition in a concentration from 0.01 wppm to 50 wppm.

In one embodiment, the sweetener composition as defined above is present in the consumable product composition in a concentration from 1 wppm to 900 wppm.

20

In one embodiment, the tabletop sweetener composition as defined above is present in the consumable product composition in a concentration from 0.1 wppm to 80 wppm.

- 25 Preferably, the sweetener composition or the tabletop sweetener composition of the consumable product composition comprises acesulfame potassium.

Preferably, the sweetener composition or the tabletop sweetener composition of the consumable product composition comprises acesulfame potassium and thaumatin.

- 30 In particularly preferred embodiments, the sweetener composition or the tabletop sweetener composition of the consumable product composition comprises acesulfame potassium and sucralose.

In one embodiment, the consumable product composition comprises a beverage and a sweetener composition comprising acesulfame potassium, sucralose and the composition X as defined above.

- 5 In another embodiment, the invention relates to a method of modifying, masking, reducing and/or suppressing an unpleasant off-taste, aftertaste or lingering sweetness of a consumable product composition, comprising the step of adding to a consumable product the composition X as defined above in an amount effective to modify, mask, reduce and/or suppress an unpleasant off-taste, aftertaste or lingering sweetness of a sweetener, a
10 sweetness enhancer or a consumable product, wherein the amount is less than a taste threshold concentration associated with the composition X.

In another embodiment, the invention relates to a method of imparting rich taste to a consumable product, comprising adding to a consumable product the taste masking
15 composition as defined above.

Preferably, in the method described above, the composition X as defined above shall be contained in the consumable product in an amount of 0.01 wppm to 50 wppm.

- 20 In another aspect, the invention relates to the use of a composition X as defined above for modifying, masking, reducing and/or suppressing an unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetener, a sweetness enhancer or a consumable product, wherein the effect of the composition X remains preferably at least as long as the taste of the at least one sweetener, the at least one sweetness enhancer or the consumable
25 product are perceived.

In one embodiment, the unpleasant off-taste of the sweetener, the sweetness enhancer or the consumable product is an acidic off-taste, an astringent off-taste, a bitter off-taste, a liquorice off-taste, a metallic off-taste or a throat-burning off-taste.

30

Preferably, the unpleasant aftertaste of the sweetener, the sweetness enhancer or the consumable product is an astringent or bitter aftertaste.

In another aspect, the invention relates to the use of a composition X as defined above for imparting rich taste to a consumable product.

In another aspect, the invention relates to a method of sweetening a consumable product composition, comprising the step of adding to a consumable product the composition X as defined above to yield a sweetened consumable product composition, wherein the sweetened consumable product has substantially no unpleasant off-taste, aftertaste or lingering sweetness.

Preferably, the sweetened consumable product has a rich taste.

In another aspect, the invention relates to a method of providing a sweetener or sweetness enhancer composition, comprising the step of adding to a sweetener or sweetness enhancer the composition X as defined above to yield a sweetener or sweetness enhancer composition, wherein the sweetener or sweetness enhancer composition has substantially no unpleasant off-taste, aftertaste or lingering sweetness.

Preferably, the method comprises the step of adding to a consumable product the composition X as defined above in an amount effective to modify, mask, reduce or suppress the unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetener, a sweetness enhancer or a consumable product, that is less than the composition X's taste threshold concentration, to yield a sweetened consumable product composition, wherein the sweetened consumable product has substantially no unpleasant off-taste, aftertaste or lingering sweetness.

Detailed Description of the Invention

Novel Taste-Masking Compositions

As indicated above, there is a need for further taste-masking compositions that can modify, mask, reduce and/or suppress unpleasant taste features associated with sweeteners or sweetness enhancers without demonstrating disadvantages, e.g., the disadvantages of known taste-masking substances. In particular, the need exists for taste-masking compositions that add no taste of their own and that do not reduce the sweetening power of

the sweetener or sweetness enhancer. Preferably, the taste-masking compositions provide for reductions in the quantity of sweetener or sweetness enhancer used therewith.

5 The problem underlying the present invention was to provide compositions which are suitable for taste-masking, in particular for modifying, masking, reducing and/or suppressing unpleasant taste features that are associated with sweeteners or sweetness enhancers.

10 The present invention in one aspect, relates to a composition X comprising the following substances:

- (1) at least one bitter blocking agent;
- (2) at least one carbonyl compound; and
- (3) at least one lactone.

15 In one embodiment, the at least one carbonyl compound comprises

- (2a) a first carbonyl compound; and
- (2b) a second carbonyl compound.

In one embodiment, the at least one lactone comprises

- 20
- (3a) a first lactone; and
 - (3b) a second lactone.

In one embodiment, the at least one bitter blocking agent (1) has a bitter off-taste.

25 In one embodiment, the at least one bitter blocking agent (1) is selected from the group consisting of:

- a compound comprising a flavanonyl moiety, in particular a flavanone, a hydroxyflavanone, a dihydroxyflavanone or a trihydroxyflavanone;
- a compound comprising a quininy moiety, in particular quinine, quinine bisulfate, quinine hydrochloride, quinine sulfate, hydroxyquinine;
- 30 a compound comprising a puriny moiety, in particular caffeine or theobromine;
- a compound comprising a saccharide acetate moiety, in particular glucose penta-acetate or sucrose octa-acetate; and
- benzyl diethyl-(2:6-xylyl-carbamoyl-methyl)-ammonium benzoate.

Preferably, the at least one bitter blocking agent (1) is a compound comprising a flavanoyl moiety selected from the group consisting of naringin, naringenin and naringin dihydrochalcone or a naringin containing extract, preferably naringin.

5

The at least one bitter blocking agents (1) are commercially available or can be prepared by the skilled person based on his general knowledge.

The at least one bitter blocking agents (1) may be of synthetic or of natural origin.

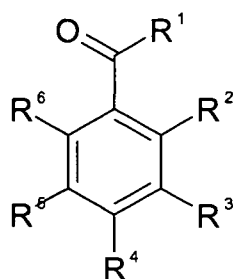
10

In one embodiment, the at least one carbonyl compound (2) contains from 7 to 18 carbon atoms, preferably from 7 to 14 carbon atoms.

In one embodiment, the at least one carbonyl compound (2) has a boiling point of from 150°C to 500°C, preferably from 190°C to 400°C.

15

In one embodiment, the at least one carbonyl compound (2) is a carbonyl compound of the formula (I)



(I)

,

wherein said carbonyl compound does not contain more than 18 carbon atoms, preferably from 8 to 14 carbon atoms, and

20

wherein

R¹ is hydrogen, hydroxy, C₁-C₈ alkyl or C₂-C₈ alkenyl; and

R², R³, R⁴, R⁵ and R⁶ are identical or different and each is independently of the others hydrogen, hydroxy, C₁-C₈ alkyl, Ci-C₈ alkoxy or C₂-C₈ alkenyl.

25

Preferably, in the carbonyl compound of the formula (I) at least one of R², R³, R⁴, R⁵ and R⁶ is hydroxy or methoxy.

Preferably, the at least one carbonyl compound (2) is selected from the group consisting of
5 a compound comprising a vanillin moiety, in particular vanillin, ethyl vanillin, methyl vanillate, ethyl vanillate, vanillic acid, vanillin isobutyrate, ethyl vanillin isobutyrate, acetovanillone or 5-methoxyvanillin;

a compound comprising a benzaldehyde moiety other than a vanillin moiety, in particular
4-hydroxybenzaldehyde, 2-methoxybenzaldehyde, 3-methoxybenzaldehyde, 4-
10 methoxybenzaldehyde, 4-ethoxybenzaldehyde, 4-ethylbenzaldehyde, 2-hydroxy-4-methylbenzaldehyde, 2-methoxybenzoic acid, 3,4-dihydroxybenzaldehyde, 4-hydroxy-3,5-dimethoxybenzaldehyde, veratraldehyde, anis aldehyde, salicylaldehyde, 3-methoxy salicylaldehyde or 4-methoxy salicylaldehyde;

a compound comprising a benzoic acid moiety, 3-methoxybenzoic acid, 4-methoxybenzoic
15 acid, 2-hydroxybenzoic acid, 3-hydroxybenzoic acid, 4-hydroxybenzoic acid, ethyl 2-hydroxy-4-methylbenzoate or anisic acid; and

a compound comprising an acetophenone moiety, in particular 2-hydroxyacetophenone, 3-hydroxyacetophenone or 4-hydroxyacetophenone.

20 Preferably, the at least one carbonyl compound (2) is selected from the group consisting of 4-methoxy salicylaldehyde and syringaldehyde. In particular, the at least one carbonyl compound (2) comprises syringaldehyde and/or acetoin.

The carbonyl compounds of the formula (I) are commercially available or can be prepared
25 by the skilled person based on his general knowledge.

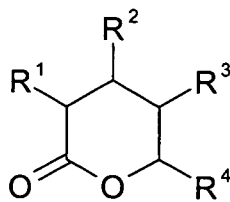
The carbonyl compounds of the formula (I) may be of synthetic or of natural origin.

In one embodiment, the at least one lactone (3) contains from 6 to 18 carbon atoms,
30 preferably from 8 to 14 carbon atoms.

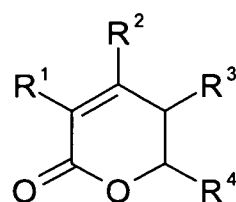
In one embodiment, the at least one lactone (3) has a boiling point of between 150°C and 500°C, preferably between 190°C and 400°C.

In one embodiment, the at least one lactone (3) comprises a saturated or an unsaturated delta-lactone.

In one embodiment, the at least one lactone (3) comprises a delta-lactone of the formulae (II) or (III)



(II)



(III)

wherein said lactone does not contain more than 18 carbon atoms, preferably from 8 to 14 carbon atoms, and

wherein

R^1 , R^2 , R^3 and R^4 are identical or different and each is independently of the others hydrogen, hydroxy, Ct-Cio alkyl, Ci-C₁₀ alkoxy or C₂-Cio alkenyl.

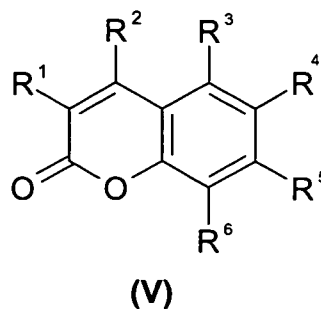
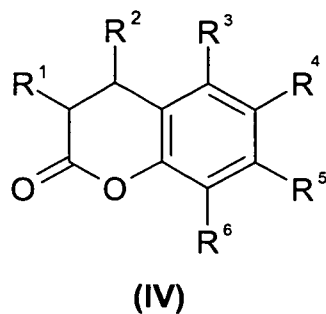
Preferably, the at least one lactone (3) is selected from the group consisting of:

pentano-1,5-lactone, hexano-1,5-lactone, heptano-1,5-lactone, octano-1,5-lactone, nonano-1,5-lactone, decano-1,5-lactone, undecano-1,5-lactone, dodecano-1,5-lactone, tridecano-1,5-lactone, tetradecano-1,5-lactone, pentadecano-1,5-lactone, hexadecano-1,5-lactone, pent-2-eno-1,5-lactone, hex-2-eno-1,5-lactone, hept-2-eno-1,5-lactone, oct-2-eno-1,5-lactone, non-2-eno-1,5-lactone, dec-2-eno-1,5-lactone, undec-2-eno-1,5-lactone, dodec-2-eno-1,5-lactone, tridec-2-eno-1,5-lactone, tetradec-2-eno-1,5-lactone, pentadec-2-eno-1,5-lactone, hexadec-2-eno-1,5-lactone, dec-5-eno-1,5-lactone, dec-6-eno-1,5-lactone, dec-7-eno-1,5-lactone, dec-8-eno-1,5-lactone, undec-5-eno-1,5-lactone, undec-6-eno-1,5-lactone, undec-7-eno-1,5-lactone, undec-8-eno-1,5-lactone, dodec-2-eno-1,5-lactone and nepetalactone.

The delta-lactones of the formulae (II) and (III) are commercially available or can be prepared by the skilled person based on his general knowledge.

The delta-lactones of the formulae (II) and (III) may be of synthetic or of natural origin.

In one embodiment, the at least one lactone (3) comprises a delta-lactone of the formulae (rV) or (V)



wherein said lactone does not contain more than 18 carbon atoms, preferably from 9 to 14 carbon atoms, and

wherein

- 10 R¹, R², R³, R⁴, R⁵ and R⁶ are identical or different and each is independently of the others hydrogen, hydroxy, C₁-C₆ alkyl, C₁-C₄ alkoxy or C₂-C₆ alkenyl.

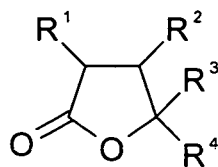
Preferably, the at least one lactone (3) is selected from the group consisting of:
6-methylcoumarin, 3,4-dihydrocoumarin, and 7-ethoxy-4-methylcoumarin.

The delta-lactones of the formulae (IV) and (V) are commercially available or can be prepared by the skilled person based on his general knowledge.

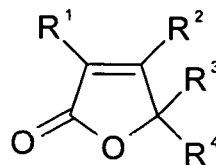
The delta-lactones of the formulae (IV) and (V) may be of synthetic or of natural origin.

In one embodiment, the at least one lactone (3) comprises a saturated or an unsaturated gamma-lactone.

In one embodiment, the at least one lactone (3) comprises a gamma-lactone of the formulae (VI) or (VII)



(vi)



(vii)

wherein said lactone does not contain more than 18 carbon atoms, preferably from 8 to 14 carbon atoms, and

wherein

- 5 R¹, R² and R³ are identical or different and each is independently of the others hydrogen, hydroxy, Ci-Cio alkyl, C₁-C₁₀ alkoxy or C₂-C₁₀ alkenyl; and
R⁴ is hydrogen, C₁-Cio alkyl or C₂-C₁₀ alkenyl;

Preferably, the gamma-lactone is selected from the group consisting of:

- 10 pentano-1,4-lactone, hexano-1,4-lactone, heptano-1,4-lactone, octano-1,4-lactone, nonano-1,4-lactone, decano-1,4-lactone, undecano-1,4-lactone, dodecano-1,4-lactone, tridecano-1,4-lactone, tetradecano-1,4-lactone, pentadecano-1,4-lactone, hexadecano-1,4-lactone, butyloctano-1,4-lactone, dodec-6-eno-1,4-lactone, dec-7-eno-1,4-lactone, cis-dec-7-eno-1,4-lactone, 2,7-dimethylocta-5(trans),7-dieno-1,4-lactone, hex-2-eno-1,4-lactone, 3-
15 methylnonano-1,4-lactone, 3-methyloctano-1,4-lactone, non-2-eno-1,4-lactone, 2-decen-1,4-lactone, dimethylnon-2-eno-1,4-lactone, 3-methyl gamma-decalactone, 4-methyl-5-hexen-1,4-olide, 4-hydroxyoctanoic acid lactone, 4-hydroxy-3-methyl octanoic acid lactone, 4-hydroxyundecanoic acid lactone and 4-hydroxy-2-hexanoic acid lactone.

- 20 In one embodiment, the at least one lactone comprises a delta lactone and a gamma lactone, preferably the first lactone (3a) is a delta-lactone and the second lactone (3b) is a gamma-lactone.

- 25 The gamma-lactones of the formulae (VI) and (VII) are commercially available or can be prepared by the skilled person based on his general knowledge.

In a preferred embodiment, the composition X does not comprise methoxy salicylaldehyde, in particular the composition X does not comprise, as substance (2), methoxy salicylaldehyde.

The gamma-lactones of the formulae (VI) and (VII) may be of synthetic or of natural origin.

As used herein, the term "Ci-Cs-alkyl" means a straight-chain or branched alkyl group with 1 to 8 carbon atoms, preferably a straight-chain or branched alkyl group with 1 to 6 carbon atoms and particularly preferred a straight-chain or branched alkyl group with 1 to 4 carbon atoms. Examples of straight-chain and branched Q-Cs-alkyl groups include, but are not limited to, methyl, ethyl, propyl, isopropyl, butyl, isobutyl, tert.-butyl, the isomeric pentyls, the isomeric hexyls, the isomeric heptyls, the isomeric octyls, preferably methyl and ethyl and most preferred methyl.

As used herein, the term "CrQo-alkyl" means a straight-chain or branched alkyl group with 1 to 10 carbon atoms, preferably a straight-chain or branched alkyl group with 1 to 6 carbon atoms and particularly preferred a straight-chain or branched alkyl group with 1 to 4 carbon atoms. Examples of straight-chain and branched Ci-C₁₀-alkyl groups include, but are not limited to, methyl, ethyl, propyl, isopropyl, butyl, isobutyl, tert.-butyl, the isomeric pentyls, the isomeric hexyls, the isomeric heptyls, the isomeric octyls, preferably methyl and ethyl and most preferred methyl.

As used herein, the term "d-Q-alkoxy" means the group R'O-, wherein R' is Q-Cs-alkyl and has the meanings defined above. Examples of Ci-C₈-alkoxy groups include, but are not limited to, methoxy, ethoxy, n-propoxy, isopropoxy, n-butoxy, isobutoxy, sec.-butoxy and tert.-butoxy, preferably methoxy and ethoxy.

As used herein, the term "CrCio-alkoxy" means the group R'O-, wherein R' is C₁-Cio-alkyl and has the meanings defined above. Examples of C₁-C₁₀-alkoxy groups include, but are not limited to, methoxy, ethoxy, n-propoxy, isopropoxy, n-butoxy, isobutoxy, sec.-butoxy and tert.-butoxy, preferably methoxy and ethoxy.

As used herein, the term "C₂-C₈-alkenyl" alone or in combination means a straight-chain or branched hydrocarbon residue comprising an olefinic bond and 1 to 8, preferably 1 to 6, more preferably 1 to 4, carbon atoms. Examples of alkenyl groups include, but are not limited to, ethenyl, 1-propenyl, 2-propenyl, isopropenyl, 1-butenyl, 2-butenyl, 3-butenyl and isobutenyl. A preferred example is 2-propenyl.

As used herein, in Part A, the term "as defined above" relates to the definitions of Part A.

As used herein, in Part A, the term "as defined below" relates to the definitions of Part A.

5

In one embodiment, the at least one bitter blocking agent (1) is present in the composition X in an amount ranging from 15 wt% to 55 wt%.

10

In one embodiment, the at least one carbonyl compound (2) is present in the composition X in an amount ranging from 0.5 wt% to 10.0 wt%.

In one embodiment, the at least one lactone (3) is present in the composition X in an amount ranging from 0.06 wt% to 10.0 wt%.

15

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to the first carbonyl compound (2a) ranges from 50:1 to 200000:1.

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to the second carbonyl compound (2b) ranges from 0.25:1 to 2000:1.

20

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to the first lactone (3a) ranges from 5:1 to 10000:1.

25

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to the second lactone (3b) ranges from 5:1 to 4000:1.

In one embodiment, the composition X further comprises
(4) at least one additional substance.

30

In one embodiment, the at least one additional substance (4) is selected from at least one amino acid, taurine, maltol, at least one additional flavoring ingredient, and combinations thereof.

Preferably, the at least one amino acid are one to thirteen amino acids selected from the group consisting of L-alanine, L-leucine, glycine, L-aspartic acid, L-lysine monohydrate, L-threonine, L-isoleucine, L-tyrosine, L-methionine, L-proline, L-serine, L-valine and L-glutamic acid.

5

Preferably, the at least one amino acid are one to eleven amino acids selected from the group consisting of L-alanine, L-leucine, glycine, L-aspartic acid, L-threonine, L-isoleucine, L-tyrosine, L-proline, L-serine, L-valine and L-glutamic acid.

10 Preferably, the composition X comprises all of the above thirteen or all of the above eleven amino acids.

In a preferred embodiment, the composition X does not comprise the substance methoxy salicylaldehyde.

15

In one embodiment, the composition X does not comprise all 5 of the following substances: naringin, methoxy salicylaldehyde, syringaldehyde, massoia lactone, and whiskey lactone.

20 In one embodiment, the composition X comprises

(1) at least one bitter blocking agent selected from the group consisting of a compound comprising a flavanonyl moiety, in particular a flavanone, a hydroxyflavanone, a dihydroxyflavanone or a trihydroxyflavanone, preferably naringin, naringenin and naringin dihydrochalcone or a naringin containing extract, most preferably
25 naringin;

a compound comprising a quininy moiety, in particular quinine, quinine bisulfate, quinine hydrochloride, quinine sulfate, hydroxyquinine;

a compound comprising a puriny moiety, in particular caffeine or theobromine;

a compound comprising a saccharide acetate moiety, in particular glucose penta-acetate or
30 sucrose octa-acetate; and

benzyl diethyl-(2:6-xylyl-carbamoyl-methyl)-ammonium benzoate;

(2) at least one carbonyl compound selected from the group consisting of

a compound comprising a vanillin moiety, in particular vanillin, ethyl vanillin, methyl vanillate, ethyl vanillate, vanillic acid, vanillin isobutyrate, ethyl vanillin isobutyrate, acetovanillone or 5-methoxyvanillin;

a compound comprising a benzaldehyde moiety other than a vanillin moiety, in particular
 5 4-hydroxybenzaldehyde, 2-methoxybenzaldehyde, 3-methoxybenzaldehyde, 4-methoxybenzaldehyde, 4-ethoxybenzaldehyde, 4-ethylbenzaldehyde, 2-hydroxy-4-methylbenzaldehyde, 2-methoxybenzoic acid, 3,4-dihydroxybenzaldehyde, 4-hydroxy-3,5-dimethoxybenzaldehyde, veratraldehyde, anis aldehyde, salicylaldehyde, 3-methoxy salicylaldehyde or 4-methoxy salicylaldehyde;

10 a compound comprising a benzoic acid moiety, 3-methoxybenzoic acid, 4-methoxybenzoic acid, 2-hydroxybenzoic acid, 3-hydroxybenzoic acid, 4-hydroxybenzoic acid, ethyl 2-hydroxy-4-methylbenzoate or anisic acid; and

a compound comprising an acetophenone moiety, in particular 2-hydroxyacetophenone, 3-hydroxyacetophenone or 4-hydroxyacetophenone, most particularly 4-methoxy
 15 salicylaldehyde and syringaldehyde; and

(3) at least one lactone selected from the group consisting of

pentano-1,5-lactone, hexano-1,5-lactone, heptano-1,5-lactone, octano-1,5-lactone, nonano-1,5-lactone, decano-1,5-lactone, undecano-1,5-lactone, dodecano-1,5-lactone, tridecano-
 20 1,5-lactone, tetradecano-1,5-lactone, pentadecano-1,5-lactone, hexadecano-1,5-lactone, pent-2-eno-1,5-lactone, hex-2-eno-1,5-lactone, hept-2-eno-1,5-lactone, oct-2-eno-1,5-lactone, non-2-eno-1,5-lactone, dec-2-eno-1,5-lactone, undec-2-eno-1,5-lactone, dodec-2-eno-1,5-lactone, tridec-2-eno-1,5-lactone, tetradec-2-eno-1,5-lactone, pentadec-2-eno-1,5-lactone, hexadec-2-eno-1,5-lactone, dec-5-eno-1,5-lactone, dec-6-eno-1,5-lactone, dec-7-
 25 eno-1,5-lactone, dec-8-eno-1,5-lactone, undec-5-eno-1,5-lactone, undec-6-eno-1,5-lactone, undec-7-eno-1,5-lactone, undec-8-eno-1,5-lactone, dodec-2-eno-1,5-lactone, nepetalactone pentano-1,4-lactone, hexano-1,4-lactone, heptano-1,4-lactone, octano-1,4-lactone, nonano-1,4-lactone, decano-1,4-lactone, undecano-1,4-lactone, dodecano-1,4-lactone, tridecano-1,4-lactone, tetradecano-1,4-lactone, pentadecano-1,4-lactone, hexadecano-1,4-lactone,
 30 butyloctano-1,4-lactone, dodec-6-eno-1,4-lactone, dec-7-eno-1,4-lactone, cis-dec-7-eno-1,4-lactone, 2,7-dimethylocta-5(trans),7-dieno-1,4-lactone, hex-2-eno-1,4-lactone, 3-methylnonano-1,4-lactone, 3-methyloctano-1,4-lactone, non-2-eno-1,4-lactone, 2-decen-1,4-lactone, dimethylnon-2-eno-1,4-lactone, 3-methyl gamma-decalactone, 4-methyl-5-

hexen-1,4-olide, 4-hydroxyoctanoic acid lactone, 4-hydroxy-3-methyl octanoic acid lactone, 4-hydroxyundecanoic acid lactone and 4-hydroxy-2-hexanoic acid lactone.

In one embodiment, the composition X comprises the following substances:

- 5 (1) naringin, preferably of natural origin;
- (2a) syringaldehyde;
- (2b) diacetyl (optionally);
- (2c) acetoin;
- (3a) massoia lactone; preferably of natural origin; y
- 10 (3b) whiskey lactone;
- (3c) delta dodecalactone;
- (3d) delta undecalactone;
- (3e) delta decalactone;
- (3f) delta tetradecalactone;
- 15 (4a) L-alanine;
- (4b) L-leucine;
- (4c) glycine;
- (4d) L-aspartic acid;
- (4e) L-threonine;
- 20 (4f) L-isoleucine;
- (4g) L-tyrosine;
- (4h) L-proline;
- (4i) L-serine;
- (4j) L-valine;
- 25 (4k) L-glutamic acid;
- (4l) taurine;
- (4m) maltol;
- (4n) maltodextrine MD14; and
- (4o) arabicgum (spraygum).

30

In one embodiment, the composition X comprises the following substances:

- (2) naringin, preferably of natural origin;
- (2a) syringaldehyde;
- (2b) diacetyl (optionally);

- (2c) acetoin;
- (3a) massoia lactone; preferably of natural origin;
- (3b) whiskey lactone;
- (3c) delta dodecalactone;
- 5 (3d) delta undecalactone;
- (3e) delta decalactone;
- (3f) delta tetradecalactone;
- (4a) L-alanine;
- (4b) L-leucine;
- 10 (4c) glycine;
- (4d) L-aspartic acid;
- (4e) L-threonine;
- (4f) L-isoleucine;
- (4g) L-tyrosine;
- 15 (4h) L-proline;
- (4i) L-serine;
- (4j) L-valine;
- (4k) L-glutamic acid;
- (4l) taurine;
- 20 (4m) maltol;
- (4n) maltodextrine MD14; and
- (4o) arabicgum (spraygum).

In a preferred embodiment, the composition X comprises the following substances:

- 25 (1) naringin, preferably of natural origin;
- (2a) syringaldehyde;
- (2c) acetoin;
- (3a) massoia lactone; preferably of natural origin;
- (3b) whiskey lactone;
- 30 (3c) delta dodecalactone;
- (3d) delta undecalactone;
- (3e) delta decalactone;
- (3f) delta tetradecalactone;
- (4a) alanine, e.g., L-alanine;

- (4b) leucine, e.g., L-leucine;
- (4c) glycine;
- (4d) aspartic acid, e.g., L-aspartic acid;
- (4e) threonine, e.g., L-threonine;
- 5 (4f) isoleucine, e.g., L-isoleucine;
- (4g) tyrosine, e.g., L-tyrosine;
- (4h) proline, e.g., L-proline;
- (4i) serine, e.g., L-serine;
- (4j) valine, e.g., L-valine;
- 10 (4k) glutamic acid, e.g., L-glutamic acid;
- (4l) taurine;
- (4m) maltol;
- (4n) maltodextrine MD14; and
- (4o) arabicgum (spraygum).

15

In one embodiment, the composition X comprises the following substances:

- (1) naringin, preferably of natural origin;
- (2a) syringaldehyde;
- (2b) diacetyl (optionally);
- 20 (2c) acetoin;
- (2d) methoxy salicylaldehyde (optionally);
- (3a) massoia lactone; preferably of natural origin;
- (3b) whiskey lactone;
- (3c) delta dodecalactone;
- 25 (3d) delta undecalactone;
- (3e) delta decalactone;
- (3f) delta tetradecalactone;
- (4a) L-alanine;
- (4b) L-leucine;
- 30 (4c) glycine;
- (4d) L-aspartic acid;
- (4e) L-threonine;
- (4f) L-isoleucine;
- (4g) L-tyrosine;

- (4h) L-proline;
 - (4i) L-serine;
 - (4j) L-valine;
 - (4k) L-glutamic acid;
 - 5 (4l) taurine;
 - (4m) maltol;
 - (4n) maltodextrine MD14; and
 - (4o) arabicgum (spraygum).
- 10 In one embodiment, the composition X comprises the following substances:
- (1) naringin, preferably of natural origin;
 - (2a) methoxy salicylaldehyde (optionally);
 - (2b) syringaldehyde;
 - (2c) acetoin;
 - 15 (2d) diacetyl (optionally);
 - (3a) massoia lactone; preferably of natural origin;
 - (3b) whiskey lactone;
 - (3c) delta dodecalactone;
 - (3d) delta undecalactone;
 - 20 (3e) delta decalactone;
 - (4a) L-alanine;
 - (4b) L-leucine;
 - (4c) glycine;
 - (4d) L-aspartic acid;
 - 25 (4e) L-lysine monohydrate (optionally);
 - (4f) L-threonine;
 - (4g) L-isoleucine;
 - (4h) L-tyrosine;
 - (4i) L-methionine (optionally);
 - 30 (4j) L-proline;
 - (4k) L-serine;
 - (4l) L-valine;
 - (4m) L-glutamic acid; and
 - (4n) maltol.

In one embodiment, the composition X comprises the following substances:

- (1) naringin, preferably of natural origin;
- (2a) acetoin; preferably of natural origin;
- 5 (2b) diacetyl; preferably of natural origin (optionally);
- (3a) massoia lactone; preferably of natural origin;
- (3b) delta dodecalactone; preferably of natural origin;
- (3c) delta decalactone; preferably of natural origin
- (4a) L-valine; preferably of natural origin;
- 10 (4b) maltol; preferably of natural origin;
- (4c) maltodextrine MD 14; and
- (4d) arabicgum (spraygum).

All substances mentioned above are commercially available.

15

The invention, in another aspect, relates to a process for the preparation of a composition X as defined above comprising admixing the substances (1), (2) and (3), preferably the substances (1), (2a), (2b), (3a) and (3b).

- 20 The present invention, in one aspect, relates to a composition X, including but not limited to a composition X, comprising the following substances:

- (I) naringin;
- (II) at least two aldehyde taste improvers; and
- (III) at least two lactone mouthfeel enhancers.

25

In one embodiment, substance (II) is selected from the group consisting of methoxy salicylaldehyde and syringaldehyde as defined below.

- 30 In one embodiment, substance (III) is selected from the group consisting of whiskey lactone and massoia lactone as defined below.

In a preferred embodiment, the composition X does not comprise methoxy salicylaldehyde, in particular the composition does not comprise, as substance (II), methoxy salicylaldehyde.

In one embodiment, the substance (I) (naringin) is present in the composition X in an amount ranging from 15 wt% to 55 wt%.

- 5 In one embodiment, the substance (II) (at least two aldehyde taste improvers) is present in the composition X in an amount ranging from 0.5 wt% to 10.0 wt%.

In one embodiment, the substance (III) (at least two mouthfeel enhancers) is present in the composition X in an amount ranging from 0.06 wt% to 10.0 wt%.

10

In one embodiment, the weight ratio of substance (I) to substances (II) ranges from 0.25:1 to 1980:1, e.g. from 1:1 to 1000:1, from 10:1 to 100:1, from 40:1 to 80:1, wherein the ratio represents the weight ratio of the total weight of substance (I) to the total weight of substances (II).

15

In one embodiment, the weight ratio of substance (I) to substance (III) ranges from 2.5:1 to 2857:1, e.g. from 10:1 to 1500:1, from 20:1 to 500:1, from 50:1 to 100:1, wherein the ratio represents the weight ratio of the total weight of substance (I) to the total weight of substances (3).

20

In one embodiment the composition X further comprises (IV) at least one amino acid.

Preferably, the at least one amino acid (IV) are one to thirteen amino acids selected from the group consisting of L-alanine, L-leucine, glycine, L-aspartic acid, L-lysine
25 monohydrate, L-threonine, L-isoleucine, L-tyrosine, L-methionine, L-proline, L-serine, L-valine and L-glutamic acid.

In one embodiment, the weight ratio of substance (I) to substances (IV) ranges from 0.084:1 to 3356:1.

30

In a further aspect, the present invention relates a composition X comprising substances (2) and (3) as defined above and herein. Preferably, said composition X does not comprise at least one bitter blocking agent (1) as defined above, more preferably said composition X

according to this aspect of the present invention does not comprise naringin. Preferably, said composition X consists of substances (2) and (3) as defined above.

In one aspect, the invention provides a composition X, comprising the following substances:

- (i) naringin;
- (ii) methoxy salicylaldehyde;
- (iii) syringaldehyde;
- (iv) massoia lactone; and
- 10 (v) whiskey lactone.

Naringin as used herein, e.g. as substance (i) in the composition X is a known compound. Exemplary names for naringin are 7-[[2-0-(6-deoxy- α -L-mannopyranosyl)- β -D-glucopyranosyl]]oxy]-2,3-dihydro-5-hydroxy-2-(4-hydroxyphenyl)-4H-1-benzopyran-4-
15 one (IUPAC name), naringoside, 4',5,7-trihydroxyflavanone-7-rhamnoglucoside and 4,5,7-trihydroxyflavanone-7-rutinoside. This listing of names is not meant to limit the scope of the invention. Preferably naringin with the CAS registry number 10236-47-2 is used in the present invention. Naringin is commercially available and may be of synthetic or of natural origin. When naturally occurring naringin is employed as substance (i),
20 naringin is preferably used in its pure form. In one embodiment, naringin extracted from *Citrus paradisi* may be used. In another embodiment, naringin may be used in the form of naringin containing extracts or naringin enriched (fractions of) extracts.

Methoxy salicylaldehyde as used herein, e.g. as substance (ii) in the composition X is a
25 known compound, and can in particular be 2-methoxy salicylaldehyde, 3-methoxy salicylaldehyde or 4-methoxy salicylaldehyde. Preferably 4-methoxy salicylaldehyde, in particular with the CAS registry number 673-22-3 is used in the present invention. An exemplary synonym for the name 4-methoxy salicylaldehyde is 2-hydroxy-4-methoxy-benzaldehyde. 4-Methoxy salicylaldehyde is commercially available and may be of
30 synthetic or of natural origin. When naturally occurring 4-methoxy salicylaldehyde is employed as substance (ii), 4-methoxy salicylaldehyde is preferably used in its pure form. In one embodiment 4-methoxy salicylaldehyde may be used in the form of 4-methoxy salicylaldehyde containing extracts or 4-methoxy salicylaldehyde enriched (fractions of) extracts. Preferably, 4-methoxy salicylaldehyde is of synthetic origin.

Syringaldehyde as used herein, e.g. as substance (iii) in the composition X is a known compound. Preferably syringaldehyde with the CAS registry number 134-96-3 is used in the present invention. Exemplary synonyms for syringaldehyde are syringic aldehyde, 4-hydroxy-3,5-dimethoxybenzaldehyde (IUPAC name), 3,5-dimethoxy-4-hydroxybenzene carbonal, gallaldehyde 3,5-dimethyl ether and 4-hydroxy-3,5-dimethoxybenzaldehyde. This listing of names is not meant to limit the scope of the invention. The syringaldehyde is commercially available and may be of synthetic or of natural origin. When naturally occurring syringaldehyde is employed as substance (iii), syringaldehyde is preferably used in its pure form. In one embodiment syringaldehyde may be used in the form of syringaldehyde containing extracts or syringaldehyde enriched (fractions of) extracts. Preferably, syringaldehyde is of synthetic origin.

Massoia lactone as used herein, e.g. as substance (iv) in the composition X is a known compound. Massoia lactone, in one embodiment, comprises alkyl lactones derived from the bark of the Massoia tree (*Cryptocaria massoia*) which may be found throughout Malaysia. In other embodiments, the compounds may be found as a component of cane sugar molasses, cured tobacco and the essential oil of Sweet Osmanthus (*Osmanthus fragrans*). Exemplary synonyms for the massoia lactone are (R)-5,6-dihydro-6-pentyl-2 H-pyran-2-one, (R)-5-hydroxy-2-decenoic acid lactone, cocolactone, 5-pentylpent-2-en-5-olide, C-10 massoia lactone and C-12 massoia lactone. This listing of names is not meant to limit the scope of the invention. Preferably, C-10 massoia lactone and/or C-12 massoia lactone are used, with C-10 massoia lactone being particularly preferred. As used herein, "massoia lactone" may mean any possible enantiomers, e.g., the R- and the S-enantiomers, mixtures and racemates thereof. Preferably the C-10 massoia lactone (i?)-5,6-dihydro-6-pentyl-2 H-pyran-2-one with the CAS registry number 51154-96-2 is used in the present invention. The massoia lactone is commercially available and may be of synthetic or of natural origin. When naturally occurring massoia lactone is employed as substance (iv), massoia lactone is preferably used in its pure form. In one embodiment, massoia lactone may be used in the form of massoia lactone containing extracts or massoia lactone enriched (fractions of) extracts. Preferably, massoia lactone is of synthetic origin.

Whiskey lactone as used herein, e.g. as substance (v) in the composition X is a known compound. Exemplary names for whiskey lactone are (4R,5R)-5-butyl-4-

memyldmydrofiiran-2(3*H*)-one (IPUAC name), (4*S*,5*S*)-5-butyl-4-methylmydrofuran-
 2(3*H*)-one (IUPAC name), *cis*-3-methyl-4-octanolide, *trans*-3-methyl-4-octanolide,
 (3*S*,4*S*)-4-butyl-3-methylbutan-4-olide, (3*i*?,4*i*?)-(-)-4-butyl-3-methylbutan-4-olide
 quercus lactone; *cis*- β -methyl- γ -octalactone, *trans*- β -methyl-7-octalactone. This listing of
 5 names is not meant to limit the scope of the invention. As used herein, "whiskey lactone"
 may mean any possible enantiomers, e.g., the *R*- and the *S*-enantiomers, mixtures and
 racemates thereof. Preferably whiskey lactone with the CAS registry numbers 252009-40-
 8, 121644-12-0, 39212-23-2 or 147254-32-8 is used in the present invention. Particularly
 preferred, a mixture of *cis*-3-methyl-4-octanolide (*cis*-whiskey lactone) and *trans*-3-
 10 methyl-4-octanolide (*trans*-whiskey lactone), with the CAS registry number 39212-23-2 or
 147254-32-8 is used in the present invention. The whiskey lactone is commercially
 available and may be of synthetic or of natural origin. When naturally occurring whiskey
 lactone is employed as substance (v), whiskey lactone is preferably used in its pure form.
 In one embodiment, whiskey lactone may be used in the form of whiskey lactone
 15 containing extracts or whiskey lactone enriched (fractions of) extracts. Preferably, whiskey
 lactone is of synthetic origin.

In one embodiment, substance (ii) is 4-methoxy salicylaldehyde.

20 In one embodiment, substance (iv) is (*R*)-5,6-dihydro-6-pentyl-2*H*-pyran-2-one, i.e. (*R*)-
 C-10-massolia lactone.

In one embodiment, substance (v) is a mixture of *cis*-3-methyl-4-octanolide (*cis*-whiskey
 lactone) and *trans*-3-methyl-4-octanolide (*trans*-whiskey lactone).

25

In a particularly preferred embodiment the invention relates to a composition X comprising the following substances:

- (i) naringin;
- (ii) 4-methoxy salicylaldehyde;
- 30 (iii) syringaldehyde;
- (iv) (?)-5,6-dihydro-6-pentyl-2*H*-pyran-2-one; and
- (v) a mixture of *cis*- and *trans*-whiskey lactone.

In the most preferred embodiment, the invention relates to a composition X comprising the following substances:

- (i) naringin;
- (iii) syringaldehyde;
- 5 (iv) (*R*)-5,6-dihydro-6-pentyl-2*H*-pyran-2-one; and
- (v) a mixture of cis- and trans-whiskey lactone.

It has now been surprisingly and unexpectedly found that the compositions X as defined above are useful for taste-masking, in particular for modifying, masking, reducing and/or
10 suppressing unpleasant taste features, in particular an unpleasant off-taste, aftertaste or lingering sweetness, left by sweeteners or sweetness enhancers in the oral cavity and/or for imparting rich taste to a consumable product. Surprisingly, the effect of the composition X remains as long as the taste of the at least one sweetener or the at least one sweetness enhancer is perceived. In one embodiment, the effect of the composition X does not
15 remain any longer than the taste of the at least one sweetener or the at least one sweetness enhancer is perceived, i.e., the composition X does not have a lingering effect.

As used herein, the term "taste-masking" as it relates to the composition X as defined above means that the composition X as defined above imparts an unexpected improvement
20 in a taste profile, e.g., for example the taste profile of a sweetener composition, tabletop sweetener composition and/or a consumable product composition. Preferably, taste-masking is perceived as a modification, masking, reduction and/or suppression of an unpleasant off-taste, aftertaste or lingering sweetness in the oral cavity that may be left by sweeteners or sweetness enhancers. Taste-masking may also be perceived as imparting rich
25 taste to a consumable product. In some instances, for example, the taste-masking may be perceived as a reduction or masking of the bitterness of a sweetener composition or of a beverage or foodstuff containing the sweetener composition. In other instances, the taste-masking may also be perceived as an enhancement in the sweetness of a sweetener composition or of a beverage or foodstuff containing the sweetener composition. The taste-
30 masking may also be a combination of both bitterness reduction and sweetness enhancement.

In some embodiments, the at least one additional substance(s) are selected from the group consisting of tannic acid, decanoic acid, propanoic acid, phenylethylacetate,

phenylethylalcohol, cinnamic alcohol, boronia absolute, guaicwood, e.g., guiacwood oil, onone, e.g., alpha onone and/or beta onone, damascenone, e.g., beta damascenone, indole, and combinations thereof. Preferably, at least one of these additional substances is of natural origin. In one embodiment, all of these additional substances are of natural origin.

5 In one embodiment, at least one of these additional substances is of artificial origin, e.g., synthesized. These additional substances are commercially available.

As used herein, the term "modifying" as it relates to the composition X as defined above means that consumption thereof creates a new perception of taste, off-taste, aftertaste or
10 lingering sweetness of a sweetener composition or a consumable product in the oral cavity.

As used herein, the term "masking" as it relates to the composition X as defined above means that consumption thereof masks a perception of a taste, off-taste, aftertaste or lingering sweetness of a sweetener composition or a consumable product in the oral cavity.

15 As used herein, the term "reducing" as it relates to the composition X as defined above means that consumption thereof reduces a perception a taste, off-taste, aftertaste or lingering sweetness of a sweetener composition or a consumable product in the oral cavity.

20 As used herein, the term "suppressing" as it relates to the composition X as defined above means that consumption thereof suppresses a perception of a taste, off-taste, aftertaste or lingering sweetness of a sweetener composition or a consumable product in the oral cavity.

As used herein, the term "off-taste" means any taste of a sweetener, a sweetness enhancer
25 or a consumable product, e.g., a food or beverage, that is perceived in the oral cavity on or after consumption thereof and that can stay there for a few minutes. Off-tastes include but are not limited to acidic, astringent, bitter, liquorice, metallic or throat-burning. In one embodiment, the off-taste is a metallic off-taste provided by neotame.

30 As used herein, the term "aftertaste" means any taste of a sweetener, a sweetness enhancer or a consumable product, e.g., a food or beverage, that is perceived in the oral cavity after the sweetener, the sweetness enhancer or the consumable product is removed from the oral cavity, e.g., by swallowing or disgorging. The aftertaste may remain in the oral cavity for example, for a few minutes or a few hours. Unpleasant aftertastes include but are not

limited to bitter and/or astringent aftertastes. In one embodiment, the aftertaste is provided by acesulfame potassium, saccharin and stevioside.

As used herein, the term "lingering sweetness" means a very long-lasting sweetening effect of a sweetener, a sweetness enhancer or a consumable product, e.g., a food or beverage, that is perceived in the oral cavity after the sweetener, the sweetness enhancer or the consumable product is removed from the oral cavity by swallowing or disgorging. The lingering sweetness may remain in the oral cavity for example, for a few minutes or a few hours.

As used herein, the term "rich taste" means an impression of creaminess, milk fattiness and/or sweetness of a consumable product that is perceived in the oral cavity on or after consumption of a consumable product.

As used herein, the term "sweetener(s)" includes all artificial and natural sweeteners, sugar alcohols (or polyols) and sugar sweeteners (or carbohydrates). Artificial and natural sweeteners include but are not limited to abiziasaponin, abrusosides, in particular abrusoside A, abrusoside B, abrusoside C, abrusoside D, acesulfame potassium, advantame, albiziasaponin, alitame, aspartame, superaspartame, bayunosides, in particular bayunoside 1, bayunoside 2, brazzein, bryoside, bryonoside, bryonodulcoside, carnosifloside, carrelame, curculin, cyanin, chlorogenic acid, cyclamates and its salts, cyclocaryoside I, dihydroquercetin-3-acetate, dihydroflavenol, dulcoside, gaudichaudioside, glycyrrhizin, glycyrrhetin acid, gypenoside, hematoxylin, hernandulcin, isomogrosides, in particular iso-mogroside V, lugduname, magap, mabinlins, micraculin, mogrosides (lo han guo), in particular mogroside IV and mogroside V, monatin and its derivatives, monellin, mukurozioside, naringin dihydrochalcone (NarDHC), neohesperidin dihydrochalcone (NDHC), neotame, osladin, pentadin, periandrin I-V, perillartine, D-phenylalanine, phlomisosides, in particular phlomisoside 1, phlomisoside 2, phlomisoside 3, phlomisoside 4, phloridzin, phyllodulcin, polpodiosides, polypodoside A, pterocaryosides, rebaudiosides, in particular rebaudioside A, rebaudioside B, rebaudioside C, rebaudioside D, rebaudioside F, rebaudioside G, rebaudioside H), rubusosides, saccharin and its salts and derivatives, scandenoside, selliguanin A, siamenosides, in particular siamenoside I, stevia, steviolbioside, stevioside and other steviol glycosides, strogines, in particular strogin 1, strogin 2, strogin 4, suavioside A, suavioside B,

suavioside G, suavioside H, suavioside I, suavioside J, sucralose, sucronate, sucrooctate, talin, telosmoside Al_5 , thaumatin, in particular thaumatin I and II, trans-anethol, trans-cinnamaldehyde, trilobatin and D-tryptophane, including extracts or enriched fractions of the natural sweeteners. Sugar alcohols (or polyols) include but are not limited to erythritol, galactitol, hydrogenated starch syrups including maltitol and sorbitol syrups, inositols, isomalt, lactitol, maltitol, mannitol, xylitol, and combinations thereof. Sugar sweeteners (or carbohydrates) include monosaccharides, disaccharides, oligosaccharides and polysaccharides such as but not limited to arabinose, dextrin, dextrose, fructose, high fructose corn syrup, fructooligosaccharides, fructooligosaccharide syrups, galactose, galactooligosaccharides, glucose, glucose and (hydrogenated) starch syrups/hydrolysates, isomaltulose, lactose, hydrolysed lactose, maltose, mannose, rhamnose, ribose, sucrose, stachyose, tagatose, trehalose, xylose, and combinations thereof. The sweeteners are known substances and are for example those described by H. Mitchell (H. Mitchell, "Sweeteners and Sugar Alternatives in Food Technology", Backwell Publishing Ltd, 2006,) and in WO 2009/023975 A2, each of which is incorporated herein by reference in its entirety. The above-identified sweeteners are known in the art and are commercially available.

Suitable hydrogenated starch hydrolysates include, but are not limited to, those disclosed in U.S. patent no. 4,279,931, which is hereby incorporated by reference, and various hydrogenated glucose syrups and/or powders which contain sorbitol, maltitol, hydrogenated disaccharides, hydrogenated higher polysaccharides, or combination thereof. Hydrogenated starch hydrolysates are primarily prepared by the controlled catalytic hydrogenation of corn syrups. The resulting hydrogenated starch hydrolysates are mixtures of monomelic, dimeric, and polymeric saccharides. The hydrogenated starch hydrolysates are known in the art and are commercially available.

As used herein, the term "sweetness enhancer(s)" means any compound capable of enhancing or intensifying the perception of sweet taste of sweetener compositions or sweetened compositions. The term "sweetness enhancer" is synonymous to the terms "sweet taste potentiator," "sweetness potentiator," and "sweetness intensifier".

As shown in the Examples, the inventors have now surprisingly and unexpectedly found that the compositions X as defined above are useful for taste-masking, in particular for

modifying, masking, reducing and/or suppressing an unpleasant taste features, in particular an unpleasant off-taste, aftertaste or lingering sweetness left by sweeteners or sweetness enhancers. Preferably, the effect of the composition X remains at least as long as the taste of the at least one sweetener, the at least one sweetness enhancer or the consumable product are perceived.

Further, as shown in the Comparative Examples, the inventors have now surprisingly and unexpectedly found that the compositions X as defined above reduce the aftertaste of one or more sweeteners, improve the fullness of sweetener compositions, and/or improve the creaminess of sweetener compositions in comparison with compositions comprising only the bitter blocking agent naringin. Thus, the comparisons of the compositions X of the invention with the compositions of the Comparative Examples, e.g., those comprising only the bitter blocking agent naringin, show that the compositions X of the invention impart an unexpected improvement in the taste profile of one or more sweeteners

Furthermore, it has been found that the compositions X are useful for imparting rich taste to a consumable product.

Thus, in one aspect, the invention relates to the use of a composition X as defined above for modifying, masking, reducing and/or suppressing an unpleasant taste feature, in particular an unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetener, a sweetness enhancer or a consumable product.

In one embodiment, the unpleasant off-taste of the sweetener, the sweetness enhancer or a consumable product is an acidic off-taste, an astringent off-taste, a bitter off-taste, a liquorice off-taste, a metallic off-taste or a throat-burning off-taste.

In one embodiment, the unpleasant aftertaste of the sweetener, the sweetness enhancer or the consumable product is an astringent or bitter aftertaste.

In another embodiment, the invention relates to the use of a composition X as defined above for imparting rich taste to a consumable product.

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to the first carbonyl compound (2a) ranges from 50:1 to 200000:1, e.g. from 100:1 to 150000:1, from 500:1 to 100000:1, from 1000:1 to 50000:1, from 10000:1 to 40000:1, wherein the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of the first carbonyl compound (2a).

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to the second carbonyl compound (2b) ranges from 0.25:1 to 2000:1, e.g. from 1:1 to 1:1000:1, from 10:1 to 500:1, from 20:1 to 250:1, wherein the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of the second carbonyl compound (2b).

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to the first lactone (3a) ranges from 5:1 to 10000:1, e.g. from 10:1 to 5000:1, from 50:1 to 2000:1, from 100:1 to 1000:1, from 200:1 to 500:1, wherein the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of the first lactone (3a).

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to the second lactone (3b) ranges from 5:1 to 4000:1, e.g. from 10:1 to 2000:1, from 20:1 to 1000:1, from 30:1 to 500:1, from 40:1 to 200:1, wherein the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of the second lactone (3b).

In one embodiment, the substance (1) (e.g. naringin) is present in the composition X in an amount ranging from 15 wt% to 55 wt%, e.g. from 30 wt% to 40 wt%, from 28 wt% to 44 wt%, from 25 wt% to 48 wt% or from 20 wt% to 50 wt%.

In one embodiment, the substance (2a) (e.g. syringaldehyde) is present in the composition X in an amount ranging from 0.5 wt% to 10.0 wt%, e.g. from 0.5 wt% to 8.0 wt%, from 0.5 wt% to 5.0 wt%, from 1.0 wt% to 3.0 wt, from 0.9 wt% to 3.5 wt%, from 0.8 wt% to 4 wt% or from 0.7 wt% to 4.5 wt%.

In one embodiment, the substance (3a) (e.g. massoia lactone) is present in the composition X in an amount ranging from 0.06 wt% to 2.0 wt%, e.g. from 0.06 wt% to 1.5 wt%, from 0.06 wt% to 1.0 wt%, from 0.1 wt% to 0.3 wt%, from 0.09 wt% to 0.4 wt%, from 0.08 wt% to 0.5 wt% or from 0.07 wt% to 0.6 wt%.

5

In one embodiment, the substance (3b) (e.g. whiskey lactone) is present in the composition X in an amount ranging from 0.1 wt% to 5.0 wt%, e.g. from 0.1 wt% to 4.0 wt%, from 0.1 wt% to 3.0 wt%, from 0.1 wt% to 2.0 wt%, from 0.1 wt% to 1.5 wt%, from 0.2 wt% to 1.1 wt%, from 0.3 wt% to 1.2 wt%, from 0.4 wt% to 1.3 wt% or from 0.5 wt% to 1.4 wt%.

10

In one embodiment, the substance (3c) (e.g. delta dodecalactone) is present in the composition X in an amount ranging from 0.1 wt% to 5.0 wt%, e.g. from 0.1 wt% to 4.0 wt%, from 0.1 wt% to 3.0 wt%, from 0.1 wt% to 2.0 wt%, from 0.1 wt% to 1.5 wt%, from 0.7 wt% to 1.1 wt%, from 0.6 wt% to 1.2 wt%, from 0.5 wt% to 1.3 wt% or from 0.4 wt% to 1.4 wt%.

15

In one embodiment, the substance (3d) (e.g. delta undecalactone) is present in the composition X in an amount ranging from 0.1 wt% to 5.0 wt%, e.g. from 0.1 wt% to 4.0 wt%, from 0.1 wt% to 3.0 wt%, from 0.1 wt% to 2.0 wt%, from 0.1 wt% to 1.5 wt%, from 0.7 wt% to 1.1 wt%, from 0.6 wt% to 1.2 wt%, from 0.5 wt% to 1.3 wt% or from 0.4 wt% to 1.4 wt%.

20

In one embodiment, the substance (3e) (e.g. delta decalactone) is present in the composition X in an amount ranging from 0.05 wt% to 0.20 wt%, e.g. from 0.05 wt% to 0.18 wt%, from 0.05 wt% to 0.16 wt%, from 0.05 wt% to 0.14 wt%, from 0.09 wt% to 0.11 wt%, from 0.08 wt% to 0.12 wt%, from 0.07 wt% to 0.13 wt% or from 0.06 wt% to 0.14 wt%.

25

In one embodiment, the substance (3d) (e.g. delta tetradecalactone) is present in the composition X in an amount ranging from 0.1 wt% to 5.0 wt%, e.g. from 0.1 wt% to 4.0 wt%, from 0.1 wt% to 3.0 wt%, from 0.1 wt% to 2.0 wt%, from 0.1 wt% to 1.5 wt%, from 0.7 wt% to 1.1 wt%, from 0.6 wt% to 1.2 wt%, from 0.5 wt% to 1.3 wt% or from 0.4 wt% to 1.4 wt%.

30

In one embodiment, the weight ratio of substance (i) (naringin) to substance (ii) (methoxy salicylaldehyde) ranges from 50:1 to 200000:1, e.g. from 100:1 to 150000:1, from 500:1 to 100000:1, from 1000:1 to 50000:1, from 10000:1 to 40000:1, wherein the ratio represents the weight ratio of the total weight of substance (i) to the total weight of substance (ii).

5

In one embodiment, the weight ratio of substance (i) (naringin) to substance (iii) (syringaldehyde) ranges from 0.25:1 to 2000:1, e.g. from 1:1 to 1:1000:1, from 1:1 to 50:1, from 5:1 to 30:1, from 10:1 to 500:1, from 20:1 to 250:1, wherein the ratio represents the weight ratio of the total weight of substance (i) to the total weight of substance (iii).

10

In one embodiment, the weight ratio of substance (i) (naringin) to substance (iv) (massoia lactone) ranges from 5:1 to 10000:1, e.g. from 10:1 to 5000:1, from 50:1 to 2000:1, from 100:1 to 1000:1, from 100:1 to 200:1, from 200:1 to 500:1, wherein the ratio represents the weight ratio of the total weight of substance (i) to the total weight of substance (iv).

15

In one embodiment, the weight ratio of substance (i)(naringin) to substance (v)(whiskey lactone) ranges from 5:1 to 4000:1, e.g. from 10:1 to 2000:1, from 20:1 to 1000:1, from 30:1 to 500:1, from 40:1 to 200:1, wherein the ratio represents the weight ratio of the total weight of substance (i) to the total weight of substance (v).

20

In one embodiment, the composition X, e.g. composition X comprising the substances (1), (2) and (3), further comprises at least one additional substance (4).

Preferably, the additional substance (4) is selected from amino acids and flavoring ingredients, and combinations thereof.

25

In one embodiment, the composition X, e.g. composition X comprising the substances (i) to (v), further comprises at least one additional substance (vi).

Preferably, the additional substance (vi) is selected from amino acids and flavoring ingredients, and combinations thereof.

30

As used herein, the term "amino acids" may include any natural amino acids, artificial amino acid derivatives and physiologically acceptable salts and hydrates thereof. The

natural amino acids may be chosen from the 22 standard amino acids selected from the group consisting of alanine, arginine, asparagine, aspartic acid, cysteine, glutamic acid, glutamine, glycine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, proline, serine, threonine, tryptophan, tyrosine, valine, selenocysteine and pyrrolysine and
5 physiologically acceptable salts and hydrates thereof. As used herein, the term "amino acid" means any possible isomers, comprising L- and D-amino acids, *R*- and *S*-enantiomers, mixtures and racemates thereof, preferably L-amino acids. The above-identified amino acids are known in the art and are commercially available.

10 Preferably, the at least one amino acid are one to thirteen amino acids selected from the group consisting of L-alanine, L-leucine, glycine, L-aspartic acid, L-lysine monohydrate, L-threonine, L-isoleucine, L-tyrosine, L-methionine, L-proline, L-serine, L-valine and L-glutamic acid.

15 Preferably, the at least one amino acid are one to eleven amino acids selected from the group consisting of L-alanine, L-leucine, glycine, L-aspartic acid, L-threonine, L-isoleucine, L-tyrosine, L-proline, L-serine, L-valine, taurine, and L-glutamic acid.

In one embodiment, the substance (4a) (e.g. alanine) is present in the composition X in an
20 amount ranging from 0.05 wt% to 0.15 wt%, e.g. from 0.09 wt% to 0.11 wt%, from 0.08 wt% to 0.12 wt%, from 0.07 wt% to 0.13 wt% or from 0.06 wt% to 0.14 wt%.

In one embodiment, the substance (4b) (e.g. leucine) is present in the composition X in an
25 amount ranging from 0.01 wt% to 0.15 wt%, e.g. from 0.05 wt% to 0.07 wt%, from 0.04 wt% to 0.08 wt%, from 0.03 wt% to 0.09 wt% or from 0.02 wt% to 0.1 wt%.

In one embodiment, the substance (4c) (e.g. glycine) is present in the composition X in an
amount ranging from 0.04 wt% to 0.24 wt%, e.g. from 0.14 wt% to 0.16 wt%, from 0.10 wt% to 0.18 wt%, from 0.08 wt% to 0.2 wt% or from 0.06 wt% to 0.22 wt%.

30

In one embodiment, the substance (4d) (e.g. aspartic acid) is present in the composition X in an amount ranging from 0.05 wt% to 0.50 wt%, e.g. from 0.25 wt% to 0.30 wt%, from 0.20 wt% to 0.35 wt%, from 0.15 wt% to 0.40 wt% or from 0.10 wt% to 0.45 wt%.

In one embodiment, the substance (4e) (e.g. threonine) is present in the composition X in an amount ranging from 0.03 wt% to 0.30 wt%, e.g. from 0.11 wt% to 0.28 wt%, from 0.09 wt% to 0.26 wt%, from 0.07 wt% to 0.24 wt% or from 0.05 wt% to 0.22 wt%.

- 5 In one embodiment, the substance (4f) (e.g. isoleucine) is present in the composition X in an amount ranging from 0.01 wt% to 0.4 wt%, e.g. from 0.05 wt% to 0.2 wt%, from 0.04 wt% to 0.1 wt%, from 0.03 wt% to 0.09 wt% or from 0.02 wt% to 0.08 wt%.

- 10 In one embodiment, the substance (4g) (e.g. tyrosine) is present in the composition X in an amount ranging from 0.05 wt% to 0.15 wt%, e.g. from 0.09 wt% to 0.11 wt%, from 0.08 wt% to 0.12 wt%, from 0.07 wt% to 0.13 wt% or from 0.06 wt% to 0.14 wt%.

- 15 In one embodiment, the substance (4h) (e.g. proline) is present in the composition X in an amount ranging from 0.04 wt% to 0.24 wt%, e.g. from 0.14 wt% to 0.16 wt%, from 0.10 wt% to 0.18 wt%, from 0.08 wt% to 0.2 wt% or from 0.06 wt% to 0.22 wt%.

- 20 In one embodiment, the substance (4i) (e.g. serine) is present in the composition X in an amount ranging from 0.45 wt% to 0.80 wt%, e.g. from 0.64 wt% to 0.70 wt%, from 0.60 wt% to 0.75 wt%, from 0.55 wt% to 0.80 wt% or from 0.50 wt% to 0.85 wt%.

- In one embodiment, the substance (4j) (e.g. valine) is present in the composition X in an amount ranging from 0.01 wt% to 0.09 wt%, e.g. from 0.04 wt% to 0.06 wt%, from 0.045 wt% to 0.065 wt%, from 0.03 wt% to 0.07 wt% or from 0.02 wt% to 0.08 wt%.

- 25 In one embodiment, the substance (4k) (e.g. glutamic acid) is present in the composition X in an amount ranging 0.20 wt% to 0.80 wt%, e.g. from 0.25 wt% to 0.70 wt%, from 0.30 wt% to 0.75 wt%, from 0.35 wt% to 0.80 wt% or from 0.40 wt% to 0.85 wt%.

- 30 In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to substances (4) ranges from 0.084:1 to 3356:1, e.g. from 0.1:1 to 3000:1, from 0.5:1 to 2000:1, from 1:1 to 1000:1, from 2:1 to 500:1, from 3:1 to 100:1, wherein the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of substance (4).

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to L-alanine ranges from 1:1 to 40000:1, e.g. from 10:1 to 20000:1, from 100:1 to 10000:1, from 100:1 to 500:1, from 200:1 to 5000:1, from 200:1 to 400:1, from 500:1 to 3000:1, the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of L-alanine.

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to L-leucine ranges from 1.7:1 to 67000:1, e.g. from 10:1 to 50000:1, from 100:1 to 10000:1, from 100:1 to 1000:1, from 200:1 to 5000:1, from 200:1 to 800:1, from 500:1 to 3000:1, wherein the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of L-leucine.

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to glycine ranges from 2.1:1 to 84000:1, e.g. from 10:1 to 50000:1, from 10:1 to 500:1, from 100:1 to 10000:1, from 100:1 to 300:1, from 200:1 to 5000:1, from 500:1 to 3000:1, wherein the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of glycine.

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to L-aspartic acid ranges from 1:1 to 41700:1, e.g. from 10:1 to 30000:1, from 10:1 to 30:1, from 50:1 to 300:1, from 100:1 to 10000:1, from 200:1 to 5000:1, from 500:1 to 3000:1, wherein the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of L-aspartic acid.

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to L-lysine monohydrate ranges from 6:1 to 25000:1, e.g. from 10:1 to 20000:1, from 100:1 to 15000:1, from 1000:1 to 10000:1, from 2000:1 to 8000:1, wherein the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of L-lysine monohydrate.

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to L-threonine ranges from 6:1 to 25000:1, e.g. from 10:1 to 20000:1, from 100:1 to 15000:1, from 50:1 to 500:1, from 100:1 to 500:1, from 1000:1 to 10000:1, from 2000:1 to 8000:1,

wherein the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of L- threonine.

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to L-
5 isoleucine ranges from 1.5:1 to 63000:1, e.g. from 10:1 to 50000:1, from 100:1 to 10000:1, from 100:1 to 1000:1, from 200:1 to 5000:1, from 200:1 to 800:1, from 500:1 to 3000:1, wherein the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of L-isoleucine.

10 In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to L-tyrosine ranges from 1:1 to 41700:1, e.g. from 10:1 to 30000:1, from 100:1 to 10000:1, from 100:1 to 500:1, from 200:1 to 5000:1, from 200:1 to 400:1, from 500:1 to 3000:1, wherein the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of L-tyrosine.

15 In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to L-methionine ranges from 10:1 to 50000:1, e.g. from 100:1 to 40000:1, from 1000:1 to 30000:1, from 2000:1 to 20000:1, from 3000:1 to 18000:1, from 5000:1 to 15000:1, wherein the ratio represents the weight ratio of the total weight of the at least one bitter
20 blocking agent (1) to the total weight of L-methionine.

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to L-proline ranges from 3:1 to 125000:1, e.g. from 10:1 to 100000:1, from 100:1 to 50000:1, from 100:1 to 500:1, from 10:1 to 500:1, from 500:1 to 20000:1, from 1000:1 to 10000:1,
25 from 2000:1 to 8000:1, wherein the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of L-proline.

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to L-serine ranges from 0.4:1 to 14000:1, e.g. from 10:1 to 10000:1, from 1:1 to 500:1, from 1:1 to
30 200:1, from 100:1 to 5000:1, from 200:1 to 4000:1, from 300:1 to 3000:1, most preferably, wherein the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of L-serine.

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to L-valine (vi) ranges from 2.1:1 to 84000:1, e.g. from 10:1 to 50000:1, from 100:1 to 10000:1, from 100:1 to 1000:1 from 200:1 to 5000:1, from 200:1 to 1000:1, from 500:1 to 3000:1, wherein the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of L-valine.

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to L-glutamic acid ranges from 5:1 to 10000:1, e.g. from 1:1 to 500:1, from 10:1 to 500:1, from 10:1 to 5000:1, from 10:1 to 100:1, from 50:1 to 4000:1, from 100:1 to 3000:1, most preferably the weight ratio is 255:1, wherein the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of L-glutamic acid.

In one embodiment, the weight ratio of substance (i) (naringin) to substances (vi) ranges from 0.084:1 to 3356:1, e.g. from 0.1:1 to 3000:1, from 0.5:1 to 2000:1, from 1:1 to 1000:1, from 2:1 to 500:1, from 3:1 to 100:1, wherein the ratio represents the weight ratio of the total weight of substance (i) to the total weight of substance (vi).

In one embodiment, the weight ratio of substance (i)(naringin) to L-alanine (vi) ranges from 1:1 to 40000:1, e.g. from 10:1 to 20000:1, from 100:1 to 10000:1, from 100:1 to 500:1, from 200:1 to 5000:1, from 200:1 to 400:1, from 500:1 to 3000:1, the ratio represents the weight ratio of the total weight of substance (i) to the total weight of L-alanine (vi).

In one embodiment, the weight ratio of substance (i)(naringin) to L-leucine (vi) ranges from 1.7:1 to 67000:1, e.g. from 10:1 to 50000:1, from 100:1 to 10000:1, from 100:1 to 1000:1, from 200:1 to 5000:1, from 200:1 to 800:1, from 500:1 to 3000:1, wherein the ratio represents the weight ratio of the total weight of substance (i) to the total weight of L-leucine (vi).

In one embodiment, the weight ratio of substance (i)(naringin) to glycine (vi) ranges from 2.1:1 to 84000:1, e.g. from 10:1 to 50000:1, from 10:1 to 500:1, from 100:1 to 10000:1, from 100:1 to 300:1, from 200:1 to 5000:1, from 500:1 to 3000:1, wherein the ratio

represents the weight ratio of the total weight of substance (i) to the total weight of glycine (vi).

In one embodiment, the weight ratio of substance (i)(naringin) to L-aspartic acid (vi) ranges from 1:1 to 41700:1, e.g. from 10:1 to 30000:1, from 10:1 to 30:1, from 50:1 to 300:1, from 100:1 to 10000:1, from 200:1 to 5000:1, from 500:1 to 3000:1, wherein the ratio represents the weight ratio of the total weight of substance (i) to the total weight of L-aspartic acid (vi).

In one embodiment, the weight ratio of substance (i)(naringin) to L-lysine monohydrate (vi) ranges from 6:1 to 25000:1, e.g. from 10:1 to 20000:1, from 100:1 to 15000:1, from 1000:1 to 10000:1, from 2000:1 to 8000:1, wherein the ratio represents the weight ratio of the total weight of substance (i) to the total weight of L-lysine monohydrate (vi).

In one embodiment, the weight ratio of substance (i)(naringin) to L-threonine (vi) ranges from 6:1 to 25000:1, e.g. from 10:1 to 20000:1, from 100:1 to 15000:1, from 50:1 to 500:1, from 100:1 to 500:1, from 1000:1 to 10000:1, from 2000:1 to 8000:1, wherein the ratio represents the weight ratio of the total weight of substance (i) to the total weight of L-threonine.

In one embodiment, the weight ratio of substance (i)(naringin) to L-isoleucine (vi) ranges from 1.5:1 to 63000:1, e.g. from 10:1 to 50000:1, from 100:1 to 10000:1, from 100:1 to 1000:1, from 200:1 to 5000:1, from 200:1 to 800:1, from 500:1 to 3000:1, wherein the ratio represents the weight ratio of the total weight of substance (i) to the total weight of L-isoleucine (vi).

In one embodiment, the weight ratio of substance (i)(naringin) to L-tyrosine (vi) ranges from 1:1 to 41700:1, e.g. from 10:1 to 30000:1, from 100:1 to 10000:1, from 100:1 to 500:1, from 200:1 to 5000:1, from 200:1 to 400:1, from 500:1 to 3000:1, wherein the ratio represents the weight ratio of the total weight of substance (i) to the total weight of L-tyrosine (vi).

In one embodiment, the weight ratio of substance (i)(naringin) to L-methionine (vi) ranges from 10:1 to 50000:1, e.g. from 100:1 to 40000:1, from 1000:1 to 30000:1, from 2000:1 to

20000:1, from 3000:1 to 18000:1, from 5000:1 to 15000:1, wherein the ratio represents the weight ratio of the total weight of substance (i) to the total weight of L-methionine (vi).

In one embodiment, the weight ratio of substance (i)(naringin) to L-proline (vi) ranges
5 from 3:1 to 125000:1, e.g. from 10:1 to 100000:1, from 100:1 to 50000:1, from 100:1 to 500:1, from 10:1 to 500:1, from 500:1 to 20000:1, from 1000:1 to 10000:1, from 2000:1 to 8000:1, wherein the ratio represents the weight ratio of the total weight of substance (i) to the total weight of L-proline (vi).

10 In one embodiment, the weight ratio of substance (i)(naringin) to L-serine (vi) ranges from 0.4:1 to 14000:1, e.g. from 10:1 to 10000:1, from 1:1 to 500:1, from 1:1 to 200:1, from 100:1 to 5000:1, from 200:1 to 4000:1, from 300:1 to 3000:1, most preferably, wherein the ratio represents the weight ratio of the total weight of substance (i) to the total weight of L-serine (vi).

15

In one embodiment, the weight ratio of substance (i)(naringin) to L-valine (vi) ranges
from 2.1:1 to 84000:1, e.g. from 10:1 to 50000:1, from 100:1 to 10000:1, from 100:1
to 1000:1 from 200:1 to 5000:1, from 200:1 to 1000:1, from 500:1 to 3000:1, wherein the
ratio represents the weight ratio of the total weight of substance (i) to the total weight of L-
20 valine (vi).

In one embodiment, the weight ratio of substance (i) (naringin) to L-glutamic acid (vi)
ranges from 5:1 to 10000:1, e.g. from 1:1 to 500:1, from 10:1 to 500:1, from 10:1 to
5000:1, from 10:1 to 100:1, from 50:1 to 4000:1, from 100:1 to 3000:1, most preferably
25 the weight ratio is 255:1, wherein the ratio represents the weight ratio of the total weight of
substance (i) to the total weight of L-glutamic acid (vi).

As used herein, the term "salt(s)" as it relates to the amino acids means the physiologically
acceptable acid addition salts and base salts of the amino acids. Suitable acid addition salts
30 are formed from acids which form non-toxic salts. Examples include but are not limited to
the acetate, aspartate, benzoate, besylate, bicarbonate, carbonate, bisulphate, sulphate,
borate, camsylate, citrate, edisylate, esylate, formate, fumarate, gluceptate, gluconate,
glucuronate, hexafluorophosphate, hibenzate, hydrochloride/chloride, hydrobromide,
bromide, hydroiodide, iodide, isethionate, lactate, malate, maleate, malonate, mesylate,

methysulphate, naphthylate, nicotinate, nitrate, orotate, oxalate, palmitate, pamoate, phosphate, hydrogen phosphate, dihydrogen phosphate, sacharate, stearate, succinate, tartrate, tosylate and trifluoroacetate salts. Suitable base salts are formed from bases which form non-toxic salts. Examples include but are not limited to the aluminium, arginine, benzathine, calcium, choline, diethylamine, diolamine, glycine, lysine, magnesium, meglumine, olamine, potassium, sodium, tromethamine and zinc salts.

As used herein, the term "hydrate(s)" as it relates to amino acids means an amino acid that includes water. "Hydrate(s)" are formed by the addition of water or its elements. In one embodiment, an amino acid may form crystals that incorporate water into the crystalline structure without chemical alteration.

As used herein, the term "flavoring ingredients" may include those flavor ingredients known in the art, such as natural and artificial flavors. These flavoring ingredients may be chosen from synthetic flavor oils and flavoring ingredient aromatics and/or oils, oleoresins and extracts derived from plants, leaves, flowers, fruits, and so forth, and combinations thereof. Nonlimiting representative flavor oils include spearmint oil, cinnamon oil, oil of wintergreen (methyl salicylate), peppermint oil, Japanese mint oil, clove oil, bay oil, anise oil, eucalyptus oil, thyme oil, cedar leaf oil, oil of nutmeg, allspice, oil of sage, mace, oil of bitter almonds, and cassia oil. Also useful flavoring ingredients are artificial, natural and synthetic fruit flavors such as vanilla, and citrus oils including lemon, orange, lime, grapefruit, yazu, sudachi, and fruit essences including apple, pear, peach, grape, blueberry, strawberry, raspberry, cherry, plum, pineapple, watermelon, apricot, banana, melon, apricot, ume, cherry, raspberry, blackberry, tropical fruit, mango, mangosteen, pomegranate, papaya and so forth. Other potential flavors include a milk flavor, a butter flavor, a cheese flavor, a cream flavor, and a yogurt flavor; a vanilla flavor; tea or coffee flavors, such as a green tea flavor, a oolong tea flavor, a tea flavor, a cocoa flavor, a chocolate flavor, and a coffee flavor; mint flavors, such as a peppermint flavor, a spearmint flavor, and a Japanese mint flavor; spicy flavors, such as an asafetida flavor, an ajowan flavor, an anise flavor, an angelica flavor, a fennel flavor, an allspice flavor, a cinnamon flavor, a camomile flavor, a mustard flavor, a cardamom flavor, a caraway flavor, a cumin flavor, a clove flavor, a pepper flavor, a coriander flavor, a saffron flavor, a savory flavor, a Zanthoxyli Fructus flavor, a perilla flavor, a juniper berry flavor, a ginger flavor, a star anise flavor, a horseradish flavor, a thyme flavor, a tarragon flavor, a dill flavor, a

capsicum flavor, a nutmeg flavor, a basil flavor, a marjoram flavor, a rosemary flavor, a bayleaf flavor, and a wasabi (Japanese horseradish) flavor; alcoholic flavors, such as a wine flavor, a whisky flavor, a brandy flavor, a rum flavor, a gin flavor, and a liqueur flavor; floral flavors; and vegetable flavors, such as an onion flavor, a garlic flavor, a cabbage flavor, a carrot flavor, a celery flavor, mushroom flavor, and a tomato flavor. These flavoring ingredients may be used in liquid or solid form and may be used individually or in admixture. Commonly used flavors include mints such as peppermint, menthol, spearmint, artificial vanilla, cinnamon derivatives, and various fruit flavors, whether employed individually or in admixture. Flavors may also provide breath freshening properties, particularly the mint flavors when used in combination with cooling agents.

Other useful flavoring ingredients include aldehydes and esters such as cinnamyl acetate, cinnamaldehyde, citral diethylacetal, dihydrocarvyl acetate, eugenyl formate, p-methylamisol, and so forth may be used. Generally any flavoring ingredient or food additive such as those described in Chemicals Used in Food Processing, publication 1274, pages 63-258, by the National Academy of Sciences, may be used. This publication is incorporated herein by reference.

Further examples of aldehyde flavoring ingredients include but are not limited to acetaldehyde (apple), benzaldehyde (cherry, almond), anisic aldehyde (licorice, anise), cinnamic aldehyde (cinnamon), citral, i.e., alpha-citral (lemon, lime), neral, i.e., beta-citral (lemon, lime), decanal (orange, lemon), ethyl vanillin (vanilla, cream), heliotrope, i.e., piperonal (vanilla, cream), vanillin (vanilla, cream), alpha-amyl cinnamaldehyde (spicy fruity flavors), butyraldehyde (butter, cheese), valeraldehyde (butter, cheese), citronellal (modifies, many types), decanal (citrus fruits), aldehyde C-8 (citrus fruits), aldehyde C-9 (citrus fruits), aldehyde C-12 (citrus fruits), 2-ethyl butyraldehyde (berry fruits), hexenal, i.e., trans-2 (berry fruits), tolyl aldehyde (cherry, almond), veratraldehyde (vanilla), 2,6-dimethyl-5-heptenal, i.e., melonal (melon), 2,6-dimethyloctanal (green fruit), and 2-dodecenal (citrus, mandarin), cherry, grape, strawberry shortcake, and mixtures thereof. These listings of flavoring ingredients are merely exemplary and are not meant to limit either the term "flavoring ingredient" or the scope of the invention generally.

In some embodiments, the flavoring ingredient may be employed in either liquid form and/or dried form. When employed in the latter form, suitable drying means such as spray drying the oil may be used. Alternatively, the flavoring ingredient may be absorbed onto water soluble materials, such as cellulose, starch, sugar, maltodextrin, gum arabic and so forth or may be encapsulated. The actual techniques for preparing such dried forms are well-known.

In some embodiments, the flavoring ingredients may be used in many distinct physical forms well-known in the art to provide an initial burst of flavor and/or a prolonged sensation of flavor. Without being limited thereto, such physical forms include free forms, such as spray dried, powdered, beaded forms, encapsulated forms, and mixtures thereof.

The above-identified flavoring ingredients are known in the art and are commercially available.

Methods of Making a Composition X of the Invention

In one aspect, the present invention relates to a method of making the composition X as defined above comprising the step of admixing the substances (1), (2), and (3).

In one aspect, the present invention relates to a method of making the composition X as defined above comprising the step of admixing the substances (i), (ii), (iii), (iv), and (v), preferably the step of admixing the substances (i), (iii), (iv), and (v).

In one aspect, the present invention relates to a method of making the composition X as defined above comprising the step of admixing the substances (I), (II), and (III).

In one embodiment, the method further comprises the step of combining the composition X of the invention with at least one additional substance, wherein the additional substance is preferably selected from amino acids and flavoring ingredients, and combinations thereof.

Sweetener Compositions

It has now been found that sweetener compositions comprising the composition X as

defined above are useful in 1) reducing the quantity of standard sugar such as sucrose that may be present in a consumable product; and/or in 2) replacing standard sugar such as sucrose that may be present in a consumable product.

- 5 In another aspect, the invention relates to a sweetener composition comprising
- (a) at least one sweetener; and
 - (b) a composition X as defined above.

As used herein, the term "composition X as defined above" includes any and all
10 compositions X as well as their preferred embodiments and specific combinations of substances described above and/or herein.

In one embodiment, the sweetener composition comprises at least one artificial or natural sweetener that, once consumed, is capable of leaving an unpleasant off-taste, aftertaste or
15 lingering sweetness in the oral cavity.

Exemplary artificial or natural sweeteners include but are not limited to abiziasaponin, abrusosides, in particular abrusoside A, abrusoside B, abrusoside C, abrusoside D, acesulfame potassium, advantame, albiziasaponin, alitame, aspartame, superaspartame,-
20 bayunosides, in particular bayunoside 1, bayunoside 2, brazzein, bryoside, bryonoside, bryonodulcoside, camosifloside, carrelame, curculin, cyanin, chlorogenic acid, cyclamates and its salts, cyclocaryoside I, dihydroquercetin-3-acetate, dihydroflavenol, dulcoside, gaudichaudioside, glycyrrhizin, glycyrrhetin acid, gypenoside, hematoxylin, hernandulcin, isomogrosides, in particular iso-mogroside V, lugduname, magap, mabinlins, micraculin,
25 mogrosides (lo han guo), in particular mogroside IV and mogroside V, monatin and its derivatives, monellin, mukurozioside, naringin dihydrochalcone (NarDHC), neohesperidin dihydrochalcone (NDHC), neotame, osladin, pentadin, periandrin I-V, perillartine, D-phenylalanine, phlomisides, in particular phlomiside 1, phlomiside 2, phlomiside 3, phlomiside 4, phloridzin, phyllodulcin, polpodiosides, polypodoside A,
30 pterocaryosides, rebaudiosides, in particular rebaudioside A, rebaudioside B, rebaudioside C, rebaudioside D, rebaudioside F, rebaudioside G, rebaudioside H), rubusosides, saccharin and its salts and derivatives, scandenoside, selliguanin A, siamenosides, in particular siamenoside I, stevia, steviolbioside, stevioside and other steviol glycosides, strogines, in particular strogin 1, strogin 2, strogin 4, suavioside A, suavioside B,

suavioside G, suavioside H, suavioside I, suavioside J, sucralose, sucronate, sucrooctate, talin, telosmoside A₁₅, thaumatin, in particular thaumatin I and II, trans-anethol, trans-cinnamaldehyde, trilobatin and D-tryptophane, including extracts or enriched fractions of the natural sweeteners. The above-identified sweeteners are known in the art and are commercially available.

Extracts or enriched fractions of natural sweeteners may include extracts with more than 10 wt%, preferably with more than 50 wt% and more preferably with more than 90 wt% of the sweetener concerned in relation to the dry mass of the fraction.

In one embodiment, the sweetener is selected from the group consisting of extracts and corresponding enriched fractions of: *Thaumatococcus* extracts (sweet prayers plant), extracts of *Stevia* ssp. (in particular *Stevia rebaudiana*), swingle extract (*Mormordica* or *Siratia grosvenorii*, Luo-Han-Guo), extracts of *Glycerryzia* ssp. (in particular *Glycerhyzia glabra*), extracts of *Rubus* ssp. (in particular *Rubus suavissimus*), citrus extracts, extracts of *Lippia dulcis*, Buddha tea extracts (*Hydrangea dulcis* and other phyllodulcin-containing *Hydrangea* ssp.).

Preferably, the at least one sweetener is selected from the group consisting of acesulfame potassium, aspartame, sucralose and thaumatin.

Preferably, the at least one sweetener comprises the sweetener acesulfame potassium.

Preferably, the at least one sweetener comprises a first and a second sweetener.

Preferably, the at least one sweetener comprises the sweeteners acesulfame potassium and thaumatin.

In one particularly preferred embodiment, the at least one sweetener comprises the sweeteners acesulfame potassium and sucralose.

In one particularly preferred embodiment, the amount of the substances (1), (2) and (3), preferably of (1), (2a), (2b), (3a) and (3b), of the substances (i), if appropriate (ii), (iii), (iv)

and (v) and of the substances (I), (II) and (III), respectively, in the sweetener composition is below their taste threshold concentration.

5 In another embodiment, the sweetener composition further comprises at least one additional sweetener.

Exemplary additional sweeteners include but are not limited to sugar alcohols or sugar sweeteners selected from the group consisting of erythritol, galactitol, hydrogenated starch
10 syrups, maltitol and sorbitol syrups, inositols, isomalt, lactitol, maltitol, mannitol, xylitol, arabinose, dextrin, dextrose, fructose, high fructose corn syrup, fructooligosaccharides, fructooligosaccharide syrups, galactose, galactooligosaccharides, glucose, glucose and (hydrogenated) starch syrups/hydrolysates, isomaltulose, lactose, hydrolysed lactose, maltose, mannose, rhamnose, ribose, sucrose, tagatose, trehalose, xylose, and combinations thereof. The above-identified sweeteners are known in the art and are commercially
15 available.

Preferably, the at least one additional sweetener is sucrose.

20 The at least one additional sweetener may be a caloric sweetener and/or a non-caloric sweetener.

In one embodiment, the inventive sweetener compositions further comprise at least one sweetness enhancer, e.g., at least two or at least three. Suitable sweetness enhancers are well known in the art. In one embodiment, the at least one sweetness enhancer may be
25 selected from the group consisting of terpenes (such as sesquiterpenes, diterpenes, and triterpenes), flavonoids, amino acids, proteins, polyols, other known natural sweeteners (such as cinnamaldehydes, selliguelains and hematoxylin), secodammarane glycosides, and analogues thereof.

30 Exemplary sweetness enhancers include stevioside, steviolbioside, rebaudioside A, rebaudioside B, rebaudioside C, rebaudioside D, rebaudioside F, dulcoside A, rubusoside; hernandulcin; pine rosin diterpenoid; mukurozioside; baiyunoside; phlomiside, such as phlomiside I and phlomiside II; glycyrrhizic acid; perianthins, such as perianthin I, perianthin II, perianthin III, and perianthin IV; osladin; polypodiosides, such as

polypodoside A and polypodoside B; mogrosides, such as mogroside IV and mogroside V; abrusoside A and abrusoside B; cyclocariosides, such as cyclocarioside A and cyclocarioside B; pterocaryoside A and pterocaryoside B; flavonoids, such as phyllodulcin, phloridzin, neoastilbin, and dihydroquercetin acetate; amino acids, such as glycine and monatin; proteins, such as thaumatin (thaumatin I, thaumatin II, thaumatin III, and thaumatin IV), monellin, mabinlins (mabinlin I and mabinlin II), brazzein, miraculin, and curculin; polyols such as erythritol; cinnamaldehyde; selliguesins, such as selliguesin A and selliguesin B; hematoxylin; and mixtures thereof.

Additional exemplary sweetness enhancers include pine rosin diterpenoids; phloridizin; neoastilbin; dihydroquercetin acetate; glycine; erythritol; cinnamaldehyde; selliguesin A; selliguesin B; hematoxylin; rebaudioside A; rebaudioside B; rebaudioside C; rebaudioside D; rebaudioside E; dulcoside A; steviolbioside; rubusoside; stevia; stevioside; steviol 13 O- β -D-glycoside; mogroside V; Luo Han Guo; siamenside; siamenside I; monatin and salts thereof (monatin SS, RR, RS, SR); curculin; glycyrrhizic acid and its salts; thaumatin I; thaumatin II; thaumatin III; thaumatin IV; monellin; mabinlin I; mabinlin II; brazzein; hernandulcin; phyllodulcin; glycyphyllin; phloridzin; trilobatin; baiyunoside; osladin; polypodoside A; polypodoside B; pterocaryoside A; pterocaryoside B; mukurozioside; mukurozioside lib; phlomiside I; phlomiside II; periandrin I; periandrin II; periandrin III; periandrin VI; periandrin V; cyclocarioside A; cyclocarioside B; suavioside A; suavioside B; suavioside G; suavioside H; suavioside I; suavioside J; labdane glycosides; baiyunoside; gaudichaudioside A; mogroside IV; iso-mogroside; bryodulcoside; bryobioside; bryoside; bryonoside; carnosifloside V; carnosifloside VI; scandenoside R6; 11-oxomogroside V; abrusoside A; abrusoside B; abrusoside C; abrusoside D; abrusoside E; gypenoside XX; glycyrrhizin; apioglycyrrhizin; araboglycyrrhizin; pentadin; perillaldehyde; rebaudioside F; steviol; 13-[(2-O-(3-O-a-D-glucopyranosyl)- β -D-glucopyranosyl-3-O- β -D-glucopyranosyl)- β -D-glucopyranosyl]oxy]kaur-16-en-18-oic acid β -D-glucopyranosyl ester; 13-[(2-O- β -D-glucopyranosyl-3-O-(4-O-a-D-glucopyranosyl)- β -D-glucopyranosyl)- β -D-glucopyranosyl]oxy] kaur-16-en-18-oic acid β -D-glucopyranosyl ester; 13-[(3-O- β -D-glucopyranosyl)- β -D-glucopyranosyl]oxy]kaur-16-en-18-oic acid β -D-glucopyranosyl ester; 13-hydroxy-kaur-16-en-18-oic acid β -D-glucopyranosyl ester; 13-methyl-16-oxo-17-norkauran-18-oic acid β -D-glucopyranosyl ester; 13-[(2-O- β -D-glucopyranosyl-3-O- β -D-glucopyranosyl)- β -D-glucopyranosyl]oxy] kaur-15-en-18-oic acid β -D-glucopyranosyl ester; 13-[(2-O^a-D-glucopyranosyl-3-O^a-D-

glucopyranosyl - β -D-glucopyranosyl)oxy] kaur- 15-en-18-oic acid; 13-[(2-0- β -D-glucopyranosyl-3-0- β -D-glucopyranosyl)- β -D-glucopyranosyl]oxy]-17-hydroxy-kaur-15-en-18-oic acid β -D-glucopyranosyl ester; 13-[(2-0- β -D-glucopyranosyl-3-0- β -D-glucopyranosyl)- β -D-glucopyranosyl]oxy]-16-hydroxy kauran-18-oic acid β -D-glucopyranosyl ester; 13-[(2-0- β -D-glucopyranosyl-3-0- β -D-glucopyranosyl)- β -D-glucopyranosyl]oxy]-16-hydroxy kauran-18-oic acid; isosteviol; mogroside IA; mogroside IE; mogroside 11-A; mogroside 11-E; mogroside III; mogroside V; isomogroside V; 11-Oxomogroside; mogrol; 11-oxomogrol; 11-oxomogroside IA; 1-[13-hydroxykaur-16-en-18-oate] β -D-glucopyranuronic acid; 13-[(2-0- β -D-glucopyranosyl)- β -D-glucopyranosyl]oxy]-17-hydroxy-kaur-15-en-18-oic acid β -D-glucopyranosyl ester; 13-[(2-0- β -D-glucopyranosyl)- β -D-glucopyranosyl]oxy] kaur-16-en-18-oic acid-(2-0- β -D-glucopyranosyl)- β -D-glucopyranosyl)ester (rebaudioside E); 13-[(2-0-a-L-rhamnopyranosyl-3-0- β -D-glucopyranosyl)- β -D-glucopyranosyl]oxy] kaur-16-en-18-oic acid-(2-0- β -D-glucopyranosyl)- β -D-glucopyranosyl) ester; 13-[(2-0- β -D-glucopyranosyl)- β -D-glucopyranosyl]oxy]-kaur-16-en-18-oic acid-(2-0-a-L-rhamnopyranosyl)- β -D-glucopyranosyl) ester; 13-[(2-0- β -D-glucopyranosyl)- β -D-glucopyranosyl]oxy]-17-oxo-kaur-15-en-oic acid β -D-glucopyranosyl ester; 13-[(2-0-(6-0- β -D-glucopyranosyl)- β -D-glucopyranosyl)- β -D-glucopyranosyl]oxy] kaur-16-en-18-oic acid β -D-glucopyranosyl ester; 13-[(2-0- β -D-glucopyranosyl-3-0- β -D-fructofuranosyl)- β -D-glucopyranosyl]oxy] kaur-16-en-18-oic acid β -D-glucopyranosyl ester; 13-[(20- β -D-glucopyranosyl)- β -D-glucopyranosyl]oxy] kaur-16-en-18-oic acid-(6-0- β -D-xylopyranosyl)- β -D-glucopyranosyl) ester; 13-[(2-0- β -D-glucopyranosyl)- β -D-glucopyranosyl]oxy] kaur-16-en-18-oic acid-(4-0-(2-0-a-D-glucopyranosyl)-a-D-glucopyranosyl)- β -D-glucopyranosyl) ester; 13-[(2-0- β -D-glucopyranosyl-3-0- β -D-glucopyranosyl)- β -D-glucopyranosyl]oxy] kaur-16-en-18-oic acid-(2-0-6-deoxy- β -D-glucopyranosyl)- β -D-glucopyranosyl) ester; 13-[(2-0- β -D-glucopyranosyl)- β -D-glucopyranosyl]oxy] kaur-15-en-18-oic acid β -D-glucopyranosyl ester; 13-[(2-0- β -D-glucopyranosyl-3-0- β -D-xylopyranosyl)- β -D-glucopyranosyl]oxy] kaur-16-en-18-oic acid β -D-glucopyranosyl ester; 13-[(2-0- β -D-glucopyranosyl)- β -D-glucopyranosyl]oxy] kaur-16-en-18-oic acid β -D-glucopyranosyl ester; 13-[(3-0- β -D-glucopyranosyl)- β -D-glucopyranosyl]oxy] kaur-16-en-18-oic acid β -D-glucopyranosyl ester; 13-[(2-0-6-deoxy- β -D-glucopyranosyl-3-0- β -D-glucopyranosyl)- β -D-glucopyranosyl]oxy] kaur-16-en-18-oic acid β -D-glucopyranosyl ester; 13-[(2-0-6-deoxy β -D-glucopyranosyl)- β -D-

glucopyranosyl)oxy] kaur-16-en-18-oic acid β -D-glucopyranosyl ester; and mixtures thereof.

Additional exemplary sweetness enhancers include rebaudioside C, rebaudioside F,
5 rebaudioside D, 13- [(2-0 - β -D-glucopyranosyl-3-0-p-D-glucopyranosyl 1- β -D-
glucopyranosyl)oxy]- 17-hydroxy-kaur-15-en-18-oic acid β -D-glucopyranosyl ester, 13-
[(2-0-(3-0 - β -D-glucopyranosyl)-**P**-D-glucopyranosyl-3-0 - β -D-glucopyranosyl- β -D-
glucopyranosyl)oxy] kaur-16-en-18-oic acid β -D-glucopyranosyl ester, and Rubusoside.
Further for example, the at least one sweetness enhancer is chosen from rebaudioside A,
10 stevioside, rebaudioside D, rebaudioside E, mogroside V, mogroside IV, brazzein, and
monatin.

In one embodiment, the composition X as defined above is present in the sweetener
composition in an amount effective to modify, mask, reduce and/or suppress an unpleasant
15 off-taste, aftertaste or lingering sweetness of the at least one sweetener or the sweetness
enhancer, wherein the amount is less than a taste threshold concentration associated with
the composition X.

Preferably, the effect of the composition X remains at least as long as the taste of the at
20 least one sweetener or the at least one sweetness enhancer is perceived.

As used herein, the term "taste threshold concentration associated with the composition X"
means the minimum concentration at which a person can still taste the composition X as
defined above by the human sense of taste, in particular in an aqueous solution. In some
25 embodiments, the taste threshold concentration may vary from person to person.

Based on the description of the composition X as defined above and on the specific ranges
as defined above a person skilled in the art will be able to select the amount effective to
modify, mask, reduce and/or suppress an unpleasant off-taste, aftertaste or lingering
30 sweetness of the at least one sweetener or the sweetness enhancer, wherein the amount is
less than a taste threshold concentration associated with the composition X.

In a preferred embodiment, in the sweetener composition as defined above, the composition as defined above is present in an amount effective to modify, mask, reduce and/or suppress an unpleasant bitter and/or astringent aftertaste of acesulfame potassium.

- 5 In one embodiment, the sweetener composition comprises from 0.1 wt% to 20 wt% of the composition X as defined above based on the total weight of the sweetener composition, e.g. from 0.5 wt% to 20 wt%, from 3 wt% to 18 wt% or from 4 wt% to 16 wt%, from 0.55 wt % to 18 wt%, from 0.60 wt % to 16 wt %, from 0.65 wt % to 14 wt%, from 0.70 wt% to 12 wt%, from 0.75 wt% to 10 wt%, from 0.80 wt% to 8 wt %, from 0.80 wt% to 7 wt %, 10 from 0.80 to 6 wt%, from 0.80 to 5 wt %, from 0.85 wt% to 4 wt %, from 0.85 wt% to 3 wt%, from 0.85 wt% to 2.5 wt %, from 0.85 to 2.3 wt%, from 0.90 wt% to 2.2 wt %, 1.6 wt% to 2.2 wt% from 0.90 wt% to 2.1 wt%, from 1.0 wt% to 1.15 wt%, from 0.9 wt% to 1.2 wt%, from 0.90 to 2.0 wt%, or from 0.90 to 1.8 wt %.
- 15 In a preferred embodiment, the sweetener composition comprises at least 0.1 wt% of the composition X as defined above based on the total weight of the sweetener composition, e.g., 0.2 wt%, 0.3 wt%, 0.4 wt%, 0.5 wt%, 0.6 wt%, 0.7 wt%, 0.8 wt%, 0.9 wt%, 1.0 wt%, 1.1 wt%, 1.1 1 wt%, 1.2 wt%, 1.3 wt%, 1.4 wt%, 1.5 wt%, 1.6 wt%, 1.7 wt%, 1.8 wt%, 1.9 wt%, 1.96 wt%, 2.0 wt%, 2.1 wt%, 2.2 wt%, 2.3 wt%, 2.4 wt%, 2.5 wt%, 2.6 wt%, 2.7 20 wt%, 2.8 wt%, 2.9 wt% or 3.0 wt%.

In one embodiment, the sweetener composition comprises from 80 wt% to 99.5 wt% of the at least one sweetener based on the total weight of the sweetener composition, e.g. from 82 wt% to 99.5 wt%, from 84 wt% to 99.4 wt% , from 94 wt% to 99.5 wt%, from 86 wt% to 25 99.3 wt%, from 88 wt% to 99.2 wt%, from 86 wt% to 99.1 wt%, from 88 wt% to 99.0 wt%, from 90 wt% to 98.9 wt%, from 92 wt% to 98.9 wt%, from 93 wt % to 98.9 wt%, from 93 wt% to 99 wt%, from 94.2 wt% to 98.1 wt%, from 94 wt% to 99.1 wt%, from 85.1 wt% to 98.9 wt%, from 94 wt% to 99.5 wt%, from 94 wt% to 98.9 wt%, from 94 wt% to 98.4 wt%, from 95 wt% to 98.9 wt%, from 82 wt% to 96 wt%, from 84 wt% to 94 wt% or 30 from 86 wt% to 92 wt%.

In one embodiment, the sweetener composition comprises from 35 wt% to 99.9 wt% of acesulfame potassium based on the total weight of the sweetener composition, e.g. from 45 wt% to 99.9 wt%, from 50 wt% to 99.5 wt% , from 60 wt% to 99.5 wt%, from 70 wt% to

99.5 wt%, from 75 wt% to 99.0 wt%, from 70 wt% to 96 wt%, from 75 wt% to 95 wt%, from 76 wt% to 96 wt%, from 81 wt% to 91 wt%, from 80 wt % to 86 wt%, or from 83 wt% to 89 wt%.

- 5 In one embodiment, the sweetener composition comprises from 1 wt% to 50 wt% of sucralose based on the total weight of the sweetener composition, e.g. from 1 wt% to 40 wt%, from 3 wt% to 40 wt% , from 5 wt% to 35 wt%, from 5 wt% to 30 wt%, from 5 wt% to 15 wt%, from 5 wt% to 17 wt%, from 12 wt% to 25 wt%, from 15 wt% to 22 wt%, or from 9 wt% to 15 wt%.

10

In a preferred embodiment, the sweetener composition comprises from 77.0 wt% to 87.0 wt% acesulfame potassium. In one embodiment, the sweetener composition further comprises from 11.0 wt% to 19.0 wt% sucralose. In one embodiment, the sweetener composition further comprises 0.9 wt% to 2.2 wt% of the composition X as defined above.

- 15 In one embodiment the sweetener composition may further comprise from 0.0 wt% to 5.0 wt% glycerol. The above weight percentages may be based on the total weight of the sweetener composition.

- In a preferred embodiment, the sweetener composition comprises from 35 wt% to 99.9 wt% of acesulfame potassium based on the total weight of the sweetener composition, e.g. from 45 wt% to 99.9 wt%, from 50 wt% to 99.5 wt% , from 60 wt% to 99.5 wt%, from 70 wt% to 99.5 wt%, from 75 wt% to 99.0 wt%, from 70 wt% to 96 wt%, from 75 wt% to 95 wt%, from 77 wt% to 93 wt%, from 80 wt% to 90 wt%, from 82 wt % to 88 wt%, or from 83 wt% to 87 wt%. In one embodiment, the sweetener composition further comprises from 20 1 wt% to 50 wt% of sucralose based on the total weight of the sweetener composition, e.g. from 1 wt% to 40 wt%, from 3 wt% to 40 wt% , from 5 wt% to 35 wt%, from 5 wt% to 30 wt%, from 12 wt% to 25 wt%, or from 15 wt% to 22 wt%. In one embodiment, the sweetener composition further comprises from 0.1 wt% to 20 wt% of the composition X as defined above, e.g. from 0.5 wt% to 20 wt%, from 0.55 wt % to 18 wt%, from 0.60 wt % 25 to 16 wt %, from 0.65 wt % to 14 wt%, from 0.70 wt% to 12 wt%, from 0.75 wt% to 10 wt%, from 0.80 wt% to 8 wt %, from 0.80 wt% to 7 wt %, from 0.80 to 6 wt%, from 0.80 to 5 wt %, from 0.85 wt% to 4 wt %, from 0.85 wt% to 3 wt%, from 0.85 wt% to 2.5 wt %, from 0.85 to 2.3 wt%, from 0.90 wt% to 2.2 wt %, 1.6 wt% to 2.2 wt% from 0.90 wt% to 30

2.1 wt%, from 1.0 wt% to 1.15 wt%, from 0.9 wt% to 1.2 wt%, from 0.90 to 2.0 wt%, or from 0.90 to 1.8 wt %.

In a preferred embodiment, the sweetener composition comprises from 45 wt% to 99.9 wt% of acesulfame potassium based on the total weight of the sweetener composition, e.g. from 60 wt% to 99.5 wt%, from 70 wt% to 99.5 wt%, from 75 wt% to 95 wt%, from 77 wt% to 93 wt%, from 80 wt% to 90 wt%, from 81 wt% to 89 wt%, or from 83 wt% to 89 wt%. In one embodiment, the sweetener composition further comprises from 1 wt% to 40 wt% of sucralose based on the total weight of the sweetener composition, e.g. from 3 wt% to 40 wt% , from 3 wt% to 35 wt%, from 3 wt% to 30 wt%, from 3 wt% to 25 wt%, from 5 wt% to 20 wt%, from 7 wt% to 17 wt%, from 9 wt% to 15 wt%, or from 10 wt% to 14 wt%. In one embodiment, the sweetener composition further comprises from 0.1 wt% to 20 wt% of the composition X as defined above, e.g. from 0.1 wt % to 18 wt%, from 0.1 wt % to 15 wt %, from 0.1 wt % to 10 wt%, from 0.1 wt% to 8 wt%, from 0.1 wt% to 5 wt%, from 0.1 wt% to 3 wt %, from 0.3 wt% to 8 wt %, from 0.3 to 5 wt%, from 0.3 to 3 wt %, from 0.5 wt% to 8 wt %, from 0.5 wt% to 5 wt%, from 0.5 wt% to 3 wt %, from 0.75 to 8 wt%, from 0.75 wt% to 5 wt %, 0.75 wt% to 3 wt%, from 1 wt% to 8 wt%, from 1 wt% to 5 wt%, from 1 wt% to 3 wt%, from 1.5 to 3 wt%, or from 1.5 to 2.5 wt %.

In a particularly preferred embodiment, the sweetener composition comprises from 82.0 wt% to 87.0 wt% acesulfame potassium, e.g., from 83.0 wt% to 86.4 wt% or from 83.5 wt% to 85.9 wt%. In one embodiment, the sweetener composition further comprises from 11.0 wt% to 12.0 wt% sucralose, e.g., from 11.2 wt% to 11.7 wt% or from 11.4 wt% to 11.6 wt%. In one embodiment, the sweetener composition further comprises 1.6 wt% to 2.2 wt% of the composition X, e.g., from 1.8 wt% to 2.0 wt% or from 1.85 wt.% to 1.89 wt %. In one embodiment the sweetener composition may comprise from 0.0 wt% to 5.0 wt% glycerol, e.g., from 0 wt.% to 4.0 wt.% or from 0.1 to 4.0 wt.%. The above weight percentages may be based on the total weight of the sweetener composition. Such embodiments are designated herein as "sweetener composition 1." These sweetener compositions 1, in one embodiment, are suitable for use in reducing the quantity of standard sugar such as sucrose that may be present in a consumable product.

In a particularly preferred embodiment, the sweetener composition comprises from 77.0 wt% to 82.0 wt% acesulfame potassium, e.g., from 77.4 wt% to 80.5 wt% or from 78 wt%

to 80 wt%. In one embodiment, the sweetener composition further comprises from 17 wt% to 19 wt% sucralose, e.g., from 17.7 wt% to 18.4 wt% or from 17.8 wt% to 18.3 wt%. In one embodiment, the sweetener composition further comprises 0.9 wt% to 1.2 wt% of the composition X, e.g., from 1.0 wt% to 1.1 wt% or from 1.0 wt% to 1.05 wt%. In one
5 embodiment the sweetener composition may comprise from 0.0 wt% to 5.0 wt% glycerol, e.g., from 0 wt% to 4.0 wt% or from 0.1 to 4.0 wt%. The above weight percentages may be based on the total weight of the sweetener composition. Such embodiments are designated herein as "sweetener composition 2." The preferred sweetener composition 2, in one embodiment, is suitable for reducing the quantity of standard sugar such as sucrose
10 that may be present in a consumable product or for replacing or substantially replacing standard sugar such as sucrose that may be present in a consumable product.

In one embodiment, the at least one sweetness enhancer is present in an amount at or below the sweetness detection threshold level of the at least one sweetness enhancer. In
15 some embodiments, the at least one sweetness enhancer is present in an amount below the sweetness detection threshold level of the at least one sweetness enhancer. The sweetness detection threshold level can be specific for a particular compound. However, generally, in some embodiments, the at least one sweetness enhancer is present in an amount ranging from 0.5 wppm to 3000 wppm, e.g., from 0.5 wppm to 1000 wppm, from 1 wppm to 300
20 wppm; from 0.1 wppm to 75 wppm.

As used herein, the terms "sweetness threshold," "sweetness recognition threshold," and "sweetness detection threshold" mean the level at which the lowest known concentration of a certain sweet compound is perceivable by the human sense of taste and it can vary from
25 person to person. For example, a typical sweetness threshold level for sucrose in water can be 0.5%. Further, for example, the at least one sweetness enhancer to be used can be assayed in water at least 25% lower and at least 25% higher than the sucrose detection level of 0.5% in water to determine the sweetness threshold level. A person skilled in the art will be able to select the concentration of the at least one sweetness enhancer so that it
30 may impart an enhanced sweetness to a composition comprising at least one sweetener. For example, a person skilled in the art may select a concentration for the at least one sweetness enhancer so that the at least one sweetness enhancer does not impart any perceptible sweetness to a composition that does not comprise at least one sweetener.

In some embodiments, the compounds listed above as sweeteners may also function as sweetness enhancers. Generally speaking, some sweeteners may also function as sweetness enhancers and *vice versa*. The sweetness enhancer(s) may be present in the sweetener composition in the amounts discussed above with respect to the first sweetener.

5

In one embodiment of the invention, the sweetener composition of the invention is liquid at ambient conditions. In another embodiment of the invention, the sweetener composition of the invention is solid at ambient conditions.

- 10 The sweetener composition or the consumable product composition of the present invention may contain further additives known to those skilled in the art. These additives include but are not limited to dust control agents, bubble forming agents, surfactants, emulsifiers, slats, fats, gums, hydrocolloids, bulking agents, carriers, fibers, flavoring ingredients, flavor enhancers, flavor stabilizers, acidulants, anti-caking and free-flow
- 15 agents. Such additives are for example described by H. Mitchell (H. Mitchell, "Sweeteners and Sugar Alternatives in Food Technology", Backwell Publishing Ltd, 2006, which is incorporated herein by reference in its entirety).

Preferably, the additional component is glycerol.

20

- In one embodiment, the sweetener composition has a sweetness level that is at least 190 greater than the sweetness level of natural sugar, e.g., granulated sugar. In one embodiment, the sweetener composition has a sweetness level ranging from 190 to 300 times the sweetness level of natural sugar, e.g., from 210 to 280 times the sweetness of
- 25 natural sugar. Preferably, a 1 g portion of the sweetener composition is 190 to 300 times sweeter than a 1 gram portion of granulated sugar.

- Preferably, a 1 gram portion of the sweetener composition provides sweetness comparable to one to three teaspoons of granulated sugar, preferably comparable to two teaspoons of
- 30 granulated sugar. Preferably, one gram of the sweetener composition contains less calories and carbohydrates than 1 gram of granulated sugar, e.g., less than 0.5 grams of granulated sugar.

For example, the compositions may contain sweetness comparable to that of granulated

sugar (sucrose), and therefore can be used "spoon-for-spoon" or "cup-for-cup" in place of sugar.

The form of the sweetener composition may vary widely. For example in one
5 embodiment, the sweetener composition may be a fine, white powder. In one embodiment the sweetener composition is a fine white-yellow powder.

In one embodiment the sweetener composition has a solubility, e.g., at 20°C, of from 230 g/l to 310 g/l, e.g., from 250 g/l to 290 g/l, preferably being about 270 g/l. In one
10 embodiment, the sweetener composition is stable at a pH ranging from 3.0 to 7.5. In one embodiment, the sweetener composition is pasteurization stable and/or UHT stable.

The sweetener composition may take any suitable form including, but not limited to, an amorphous solid, a crystal, a powder, a tablet, a liquid, a cube, a glaze or coating, a
15 granulated product, an encapsulated form around to or coated on to carriers/particles, wet or dried, or combinations thereof. In a preferred embodiment, the sweetener composition is a liquid at ambient conditions. In another embodiment, the sweetener composition is a solid at ambient conditions.

In one embodiment, the sweetener composition can be provided in pre-portioned packets or ready-to-use formulations, which include the sweetener composition. For example, in
20 one embodiment in which a sweetener other than sucrose is employed, a single serving packet formulation (usually a 1 gram portion) can provide sweetness comparable to that contained in two teaspoons of granulated sugar (sucrose). It is known in the art that a
25 "teaspoon" of sucrose contains approximately 4 grams of sucrose.

In another embodiment in which a sweetener other than sucrose is used, a volume of a ready-to-use formulation can provide sweetness comparable to the same volume of granulated sugar. Preferably, a single serving packet of the composition comprising the
30 compound of formula (I) as defined above or a derivative or a stereoisomer or a salt or a hydrate thereof (e.g., 1 gram) can provide sweetness comparable to 0.9 to 9.0 grams of granulated sugar (sucrose). In another embodiment, 1 gram of the sweetener composition contains less calories and carbohydrates than 1 gram of granulated sugar.

Unless otherwise stated, all measurement numbers are presumed to have the word "about" in front of them if the word "about" is not expressly used. As used herein, the term "about" encompasses the range of experimental error that occurs in any measurement.

5 As used herein, the phrase "sweetness comparable" means that an experienced sensory evaluator, on average, will determine that the sweetness presented in a first composition X is within a range of 80% to 120% of the sweetness presented in a second composition X. The phrase "a sweetness comparable" relates to a determination ascertained by four or more experienced sensor evaluators in a sweetness matching test (designated hereinafter as
10 "taste and spit assay"). Thus, for instance, 100 mg/ml of a sweetener composition provides "sweetness comparable" to 100 mg/ml of sucrose if the sweetener composition has a sweetness falling within the range of sweetness presented in 80-120 mg/ml of sucrose.

The sweetness properties of the sweetener composition, in some embodiments, can be
15 identified by an *in vitro* in cell based assay as described in EP 1 865 316 B1, which is incorporated herein by reference, or by field effector transistor technology of e.g. Alpha MOS.

The taste of the sweetener composition with regard to sweetness and/or sweetness
20 enhancing properties and/or other tastes, in other embodiments, may be assessed *in vivo* by using a panel of trained sensory evaluators experienced in the sweet taste estimation procedure, e.g. in a taste and spit assay.

The taste-masking properties of the composition X as defined above, e.g., if the
25 composition X as defined above is useful for modifying, masking, reducing and/or suppressing an unpleasant off-taste, aftertaste or lingering sweetness of the at least one sweetener and/or the sweetness enhancer in the sweetener composition may also be assessed using a taste and spit assay.

30 A taste and spit assay may also be used for assessing whether the effect of the composition X remains at least as long as the taste of the at least one sweetener or the at least one sweetness enhancer is perceived. A taste and spit assay may also be used in the analyses of other taste-related determinations and/or assessments.

In these cases, panelists are asked to take a sample of the liquid to be assessed, e.g. the sweetener composition comprising a composition X as defined above, into the mouth and after some time allowed for taste perception to spit the sample out completely. Subsequently, the panelists are asked to rinse their mouth well with water or black tea to
5 reduce any potential carry over effects. The tasting of a sample can be repeated if required.

In a first descriptive test (qualitative assessment of the sweetener composition comprising the composition X as defined above for sweetness, off-taste, aftertaste and/or lingering
10 sweetness) the panelists are asked to taste the quality of single samples (maximum 3 subsequent samples). The individuals of the taste panel are asked to answer the following questions with regard to the quality of taste: 1) does the sample taste sweet?, 2) is there another taste detectable (e.g. bitter, sour, salty, umami etc.)?, 3) is there any off- or aftertaste or lingering sweetness?, 4) is there anything else remarkable in the perception of the sample (e.g. rich taste)?

15 In a second test (qualitative assessment for taste masking properties of the composition X as defined above) the panelists are asked to answer questions in a pairwise comparison test to determine the taste-masking properties of the composition X as defined above. In this test the taste of the sweetener composition comprising the composition X as defined above
20 is pairwise compared to the taste of the respective sweetener composition without the composition X as defined above. Again the panelists are given samples. Two samples are prepared for direct comparison regarding sweetness, off-taste, aftertaste and lingering sweetness.

25 One sample contains the sweetener composition without the composition X as defined above in a solvent. The other sample contains the sweetener composition comprising the composition X as defined above. Designation of the samples with A and B is randomized and is decoded after the taste procedure. The questions to be answered are: 1) does one sample taste sweeter than the other?, 2) if so, which one?, 3) are there any other differences
30 in the taste between the two samples? The result of the taste and spit assay is a qualitative evaluation of the differences between the two samples.

Methods of Making a Sweetener Composition X

In another aspect, the present invention relates to a method of providing a sweetener or sweetness enhancer composition, comprising the step of adding to a sweetener or sweetness enhancer the composition as defined above to yield a sweetener or sweetness enhancer composition. As a result, the sweetener or sweetness enhancer composition has substantially no unpleasant off-taste, aftertaste or lingering sweetness.

In one embodiment the invention relates to a method of providing a sweetener composition, comprising the step of adding to acesulfame potassium and sucralose the composition X as defined above to yield a sweetener composition. In a preferred embodiment, glycerol may be added to the sweetener composition.

In another aspect, the invention relates to a method of modifying, masking, reducing and/or suppressing the unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetener or sweetness enhancer. The method comprises combining the composition X as defined above with the at least one sweetener or sweetness enhancer.

Preferably, the at least one sweetener (and/or sweetness enhancer) is selected from the group consisting of artificial and natural sweeteners as defined above. More preferably, the at least one sweetener is selected from the group consisting of acesulfame potassium, aspartame, sucralose and thaumatin. Most preferably the at least one sweetener is acesulfame potassium.

Tabletop Sweetener Compositions

In another aspect, the present invention relates to tabletop sweetener compositions comprising the composition X as defined above and to methods of manufacturing such tabletop sweetener compositions.

As used herein, the term "tabletop sweetener," refers to sweetener compositions that comprise at least one sweetener, and optionally, at least one sweetness enhancer, which can be used in the preparation of various food items and/or as an additive to food items. As one example, the tabletop sweetener may be used in the preparation of baked goods or other

sweetened foods. As another example, the tabletop sweetener may be used to season, sweeten, or otherwise customize a prepared food item, e.g., beverages, fruit, or yoghurt. In a preferred aspect, the tabletop sweetener is in a crystalline, granulated, or powder form. In various aspects, the tabletop sweetener will comprise one or more sweeteners and/or one or more sweetness enhancers. In one embodiment, the tabletop sweetener may comprise either or both a caloric sweetener and/or substantially non-caloric sweeteners, and, if appropriate, one or more sweetness enhancers. Typical examples of caloric sweeteners that may be used in tabletop sweeteners include sucrose, fructose, and glucose. Common tabletop forms of these caloric sweeteners include cane sugar, bee sugar, and the like. In recent decades, substantially non-caloric sweeteners have gained popularity. In many instances, these sweeteners can be used as substitutes for caloric sweeteners and are often referred to as "sugar substitutes."

In many instances, sugar substitutes provide a greater sweetening effect than comparable amounts of caloric sweeteners, such as sucrose or fructose. Therefore, smaller amounts of sugar substitutes are required to achieve sweetness comparable to that of an amount of sugar. Sugar substitutes, however, typically have a taste profile that differs from sucrose or fructose. Such differences include, but are not limited to, increased astringency, bitterness, various aftertastes, delayed onset of sweetness, and different mouthfeel. Therefore, sugar substitutes are often formulated with other materials that can provide bulk and can enhance the taste profile to be more similar to that of sucrose or fructose. Thus, sugar substitutes have been formulated to create a tabletop sweetener formulation that has a bulk and a taste profile that is comparable to sucrose or fructose. Nevertheless, consumers can still distinguish the low-calorie sweetener formulations from caloric tabletop sweeteners. Therefore, if low-calorie tabletop sweeteners are to replace caloric tabletop sweeteners, formulations of low-calorie sweeteners must be continuously improved to meet consumer demand.

Thus, there is a need for new tabletop sweetener formulations which are low in calories (or have no calories) containing novel taste-masking compositions, which can modify, mask, reduce and/or suppress an unpleasant off-taste, aftertaste or lingering sweetness in the oral cavity left by sweeteners or sweetness enhancers not having the disadvantages of known taste-masking substances. In particular, there is a great interest in new tabletop sweetener formulations comprising compositions having no taste of their own, which do not reduce

the sweetening power of the sweetener or sweetness enhancer contained in the tabletop sweetener and in the best case even allow the quantity of sweetener or sweetness enhancer to be reduced. In particular, several or all unpleasant taste impressions including but not limited to bitter, astringent off-taste or aftertaste and/or lingering sweetness should be improved, i.e. reduced or suppressed.

Thus, in another aspect, the invention relates to a tabletop sweetener composition comprising

- (a) at least one sugar sweetener, which is selected from the group consisting of monosaccharides, disaccharides, oligosaccharides and polysaccharides, preferably the at least one sugar sweetener is selected from the group consisting of arabinose, dextrin, dextrose, fructose, high fructose corn syrup, fructooligosaccharides, fructooligosaccharide syrups, galactose, galactooligosaccharides, glucose, glucose and (hydrogenated) starch syrups/hydrolysates, isomaltulose, lactose, hydrolysed lactose, maltose, mannose, rhamnose, ribose, sucrose, stachyose, tagatose, trehalose, xylose, and combinations thereof, most preferably the at least one sugar sweetener is a disaccharide and/or fructose;
- (b) at least one sugar alcohol (or polyol), which is selected from the group consisting of erythritol, galactitol, hydrogenated starch syrups including maltitol and sorbitol syrups, inositols, isomalt, lactitol, maltitol, mannitol, xylitol, and combinations thereof, preferably the at least one sugar alcohol is erythritol;
- (c) at least one artificial or natural sweetener as defined above; and
- (d) a taste-masking amount of the composition X as defined above.

Preferably, the at least one artificial or natural sweetener is selected from the group consisting of acesulfame potassium, aspartame, sucralose and thaumatin.

As used herein, a "taste-masking amount" of the composition X as defined above means an amount of the composition X as defined above that imparts an unexpected improvement in the taste profile of e.g. tabletop sweetener compositions. As mentioned above, in some instances, for example, the taste-masking may be perceived as a reduction or masking of the bitterness of the sweetener composition, the tabletop sweetener composition or of the beverage or foodstuff containing the sweetener composition. In other instances, for example, the taste masking may also be perceived as an enhancement in the sweetness of

the sweetener composition, the tabletop sweetener composition or of the beverage or foodstuff containing the sweetener composition. The taste masking may also be a combination of both bitterness reduction and sweetness enhancement.

- 5 In one embodiment, the tabletop sweetener composition comprises from 0.5 wt% to 20 wt% of the composition X as defined above based on the total weight of the tabletop sweetener composition, e.g. from 3 wt% to 18 wt% or from 4 wt% to 16 wt% of the composition X as defined above based on the total weight of the sweetener composition.
- 10 In one embodiment, the tabletop sweetener composition as defined above comprises the composition X as defined above in a taste-masking amount effective to modify, mask, reduce and/or suppress an unpleasant off-taste or aftertaste of the at least one artificial or natural sweetener, wherein the taste-masking amount is less than a taste threshold concentration associated with the composition X.
- 15 In a preferred embodiment, the tabletop sweetener composition as defined above comprises the composition X as defined above in an amount effective to modify, mask, reduce and/or suppress an unpleasant off-taste or aftertaste of acesulfame potassium, aspartame, sucralose or thaumatin wherein the amount is less than a taste threshold concentration
- 20 associated with the composition X.

Preferably, the effect of the composition X remains at least as long as the taste of the sugar sweetener, the sugar alcohol and the at least one sweetener are perceived.

- 25 In one embodiment, the tabletop sweetener composition as defined above further comprises a taste-improving amount of cellulose.

In some embodiments, the tabletop sweetener composition comprises a disaccharide and contains no fructose. In other embodiments, the tabletop sweetener composition comprises

30 fructose and does not contain disaccharide. In other embodiments, the tabletop sweetener compositions comprise both a disaccharide and fructose.

As used herein, the terms "sugar sweetener(s)" or "carbohydrate(s)" refer to monosaccharides, disaccharides, oligosaccharides and polysaccharides such as but not

limited to arabinose, dextrin, dextrose, fructose, high fructose corn syrup, fructooligosaccharides, fructooligosaccharide syrups, galactose, galactooligosaccharides, glucose, glucose and (hydrogenated) starch syrups/hydrolysates, isomaltulose, lactose, hydrolysed lactose, maltose, mannose, rhamnose, ribose, sucrose, stachyose, tagatose, trehalose, xylose, and combinations thereof.

As used herein, the term "disaccharide" refers to any sugar having two monosaccharide units. The monosaccharide units may exist as either ketones or aldehydes, and may have either a cyclic or acyclic structure. When a monosaccharide exists as a cyclic structure, the monosaccharide may exist as a hemiacetal or hemiketal, among other forms. Moreover, when a monosaccharide exists as a cyclic structure, either anomer is included within this definition. Illustrative monosaccharides include trioses, tetroses, pentoses, hexoses, heptoses, octoses, and nonoses. In forming a disaccharide, the monosaccharide units may bond to form either reducing disaccharides or non-reducing disaccharides.

As used herein, the terms "sugar alcohol(s)" or "polyol(s)" refer to sugar alcohols such as but not limited to erythritol, galactitol, hydrogenated starch syrups including maltitol and sorbitol syrups, inositols, isomalt, lactitol, maltitol, mannitol, xylitol, and combinations thereof.

As used herein, the term "erythritol" refers to a sugar alcohol well known to the skilled person. Erythritol, in either food grade or reagent grade is readily available through commercial sources.

As used herein, the term "cellulose" refers to any cellulosic material known to the skilled person. In typical embodiments, the cellulose includes polysaccharides having linear chains of at least several hundred beta-linked D-glucose units. When obtained from commercial sources, for example, the cellulose may exist as a powder. Further, in typical embodiments, the cellulose is insoluble or substantially insoluble in water; yet, in an application like tabletop sweeteners, when incorporated in such an application, it preferably will not detract substantially from the overall product dissolution. Chemically modified celluloses can be employed in the compositions as defined above provided the modifications do not result in water soluble material. The cellulose may have any particle size (or particle size distribution) that is suitable for use in a sweetener composition. For

example, in some embodiments, the size of the cellulose particles may range from 1 micron to 400 microns, e.g., from 3 microns to 300 microns, from 5 microns to 200 microns, or from 6 microns to 100 microns. In some embodiments, the insoluble cellulose is a cellulose that if used in amounts exceeding 1% in an aqueous medium can lead to significant viscosity change.

In some embodiments, a "taste-improving amount" of cellulose is used. This "taste-improving amount" refers to an amount of cellulose that imparts an unexpected improvement in the taste profile of sweetener compositions. In some instances, for example, the taste improvement may be perceived as an enhancement in the sweetness of the sweetener composition or of the beverage or foodstuff containing the sweetener composition. In other instances, for example, the taste improvement may be perceived as a reduction or masking of the bitterness of the sweetener composition or of the beverage or foodstuff containing the sweetener composition. The taste improvement may also be a combination of both sweetness enhancement and bitterness reduction. In some embodiments of the sweetener compositions, the taste-improving amount of cellulose ranges from 0.4 wt% to 3.0 wt%, e.g., from 0.7 wt% to 2.0 wt%, of cellulose, based on the total weight of the sweetener composition. In some embodiments, the sweetener composition contains 1 wt% cellulose, based on the total weight of the sweetener composition.

In one embodiment, the disaccharide includes, but is not limited to, disaccharides containing glucose, fructose, and galactose. In another embodiment, the disaccharide includes, but is not limited to, sucrose, lactose, maltose, trehalose, and isomaltulose. In another embodiment, the disaccharide is isomaltulose.

In a preferred embodiment, the disaccharide is selected from the group consisting of sucrose, lactose, maltose, trehalose, and isomaltulose.

Sweetener compositions may contain varying amounts of at least one sugar sweetener, in particular of a disaccharide and/or fructose, of at least one sugar alcohol, in particular of erythritol, of the artificial or natural sweetener as defined above, and of cellulose. The desired amount of artificial or natural sweetener as defined above may vary depending on, among other factors, the desired use of the tabletop sweetener composition, the presence or

absence of other components in the tabletop sweetener composition, the identity of any sugar sweetener, in particular of a disaccharide, if present, and the presence or absence of fructose.

- 5 In some embodiments, the tabletop sweetener composition contains from 40 wt% to 90 wt% sugar alcohol, in particular erythritol, based on the total weight of the sweetener composition, e.g., from 50 wt% to 60 wt%, from 55 wt% to 65 wt%, from 57 wt% to 63 wt%, or from 60 wt% to 62 wt%. In a preferred embodiment, the sweetener composition contains more than 50 wt% sugar alcohol, in particular erythritol, based on the total weight
10 of the sweetener composition.

- In some embodiments, the tabletop sweetener composition contains from 27 wt% to 50 wt% sugar sweetener, in particular disaccharide, based on the total weight of the sweetener composition, e.g., from 35 wt% to 45 wt%, from 30 wt% to 40 wt%, from 30 wt% to 38
15 wt%, from 32 wt% to 36 wt%, or from 33 wt% to 35 wt%. In some such embodiments, the sweetener composition contains 41 wt% of sugar sweetener, in particular disaccharide, based on the total weight of the sweetener composition. In still other embodiments, the tabletop sweetener composition contains 33-34 wt% of sugar sweetener, in particular disaccharide, based on the total weight of the sweetener composition. In a preferred
20 embodiment, the sugar sweetener is isomaltulose.

- In some embodiments, the sweetener composition contains from 0.5 wt% to 7.0 wt% of the artificial or natural sweetener as defined above, based on the total weight of the sweetener composition, e.g., from 0.7 wt% to 5.0 wt%, or from 1.0 wt% to 2.5 wt%. The amount of
25 the artificial or natural sweetener as defined above used may in certain situations depend on the purity of the material. In one embodiment, the tabletop sweetener composition as defined above comprises from 0.5 wt% to 7.0 wt% acesulfame potassium, aspartame, sucralose or thaumatin.

- 30 In another embodiment, tabletop sweetener compositions as defined above contain (a) from 38 wt% to 43 wt% of isomaltulose; (b) from 50 wt% to 60 wt% erythritol; (c) from 0.75 wt% to 1.75 wt% the artificial or natural sweetener as defined above; and (d) from 4 wt% to 16 wt% composition as defined above; based on the total weight of the tabletop sweetener composition.

In another embodiment, tabletop sweetener compositions of the invention contain (a) from 30 wt% to 38 wt% of isomaltulose; (b) from 55 wt% to 65 wt% erythritol; (c) from 0.75 wt% to 1.75 wt% the artificial or natural sweetener as defined above; and (d) from 4 wt%
5 to 16 wt% composition X as defined above based on the total weight of the tabletop sweetener composition.

Tabletop sweetener compositions of the invention may also contain amounts of other ingredients in addition to the sugar sweeteners such as disaccharide and/or fructose, the
10 sugar alcohol such as erythritol, the artificial or natural sweetener as defined above and cellulose. Such additional ingredients include, but are not limited to, sweetness modifiers, mouthfeel enhancers, flavoring ingredients (e.g., vanilla flavoring), and the like. Honey and/or evaporated cane juice may be used in place of or in combination with the sugar alcohol, in particular in place of or in combination with erythritol. Natural flavors and
15 other ingredients are preferred when the product is to be labeled as "all-natural."

In another embodiment, the tabletop sweetener composition comprises less than 2 wt% of a sweetness modifier, e.g., less than 1 wt%. In terms of ranges, the tabletop sweetener composition may, for example, comprise between 0.01 wt% and 2 wt% sweetness
20 modifier, in particular between 0.1 wt% and 1.5 wt% sweetness modifier.

In another embodiment, the tabletop sweetener composition comprises less than 1 wt% of a mouthfeel enhancer, e.g., less than 0.5wt%. In terms of ranges, the tabletop sweetener composition may, for example, comprise between 0.01 wt% and 1 wt% mouthfeel
25 enhancer, in particular between 0.1 wt% and 0.5 wt% mouthfeel enhancer.

In another embodiment, the tabletop sweetener composition comprises less than 1 wt% of a flavoring ingredient, e.g., less than 0.5wt%. In terms of ranges, the tabletop sweetener composition may, for example, comprise between 0.01 wt% and 1 wt% flavoring
30 ingredient, in particular between 0.1 wt% and 0.5 wt% flavoring ingredient.

In some embodiments, sweetener compositions of the invention provide at least one, if not more than one, of the following desirable characteristics: (a) fewer calories per gram than standard table sugar; (b) fewer calories than an amount of standard table sugar perceived as

providing comparable sweetness; and (c) lower glycemic index than that of standard table sugar. In some embodiments, the sweetener composition has less than 5 calories/gram, or less than 3 calories/gram, or less than 1 calorie/gram. As used herein, the term "calorie" refers to the unit of energy commonly appearing on the packaging of food and/or beverage items sold in the United States. The term, as such, does not refer to 1 cal. of energy, but rather corresponds to approximately 1 kcal. of energy. In a typical tabletop sweetener application, for example, the sweetener composition can be packaged in a form where it provides a similar sweetness to 7 grams of sucrose, preferably 5 g of sucrose, while providing less than 5 calories.

In another embodiment, tabletop sweetener compositions of the invention contain a plurality of sweetener particles, wherein such particles contain one or more of the ingredients present in the tabletop sweetener composition. In some embodiments, the tabletop sweetener composition substantially comprises sweetener particles. In such embodiments, the tabletop sweetener composition contains at least 80 wt% sweetener particles, or at least 85 wt% sweetener particles, or at least 90 wt% sweetener particles, based on the total weight of the tabletop sweetener composition.

Sweetener particles, when present in the tabletop sweetener composition, can have any size suitable for use of the composition as a sweetener. In some embodiments, the average size of the sweetener particles is between 50 microns and 1250 microns, e.g., between 100 microns and 1000 microns. Screening to eliminate particles of undesired sizes can be carried out during the manufacturing process. Thus, in some embodiments, the particle sizes, after screening to eliminate undesired large particles which may be as large as 1500 μm , may vary up to 16 mesh, e.g., up to 14 mesh, or up to 12 mesh, based on the standard United States sieve scale. Further, smaller particle sizes, e.g., 50 mesh, 100 mesh, or 150 mesh, or particles having sizes less than 1 μm , e.g., less than 0.5 μm , may be present with the larger particles. Screening to eliminate particles having sizes less than, for example, 100 mesh or 150 mesh can be carried out if desired.

Sweetener particles in the tabletop sweetener composition may or may not have uniform composition. Preferably, the tabletop sweetener compositions of the invention comprise the artificial or natural sweetener as defined above and an effective amount of the composition X as defined above where the composition is a mixture of particles. More specifically, the

mixture comprises (a) particles having an erythritol core and (b) particles having a disaccharide core and the artificial or natural sweetener as defined above and the composition X as defined above, as well as other components, are predominantly coated on the particles. These coatings on the cores can be either a continuous phase or a discontinuous phase, i.e., where the different coating components form discrete regions in the core coatings.

Thus, in another aspect, the invention relates to a tabletop sweetener composition comprising:

- (a) a plurality of first sweetener particles, where the first sweetener particles have (i) a sugar alcohol core, in particular an erythritol core, (ii) a first sugar alcohol core-coating layer, in particular a first erythritol core-coating layer comprising the artificial or natural sweetener as defined above and the composition X as defined above, and (iii) a second sugar alcohol core-coating layer, in particular a second erythritol core-coating layer comprising a sugar sweetener, in particular a disaccharide carbohydrate, where the second sugar alcohol core-coating layer, in particular the second erythritol core-coating layer is disposed over the first sugar alcohol core-coating layer, in particular over the erythritol core-coating layer; and
- (b) a plurality of second sweetener particles, where the second sweetener particle has (i) a sugar sweetener core, in particular a disaccharide core, (ii) a first sugar sweetener core-coating layer, in particular a first disaccharide core-coating layer comprising the artificial or natural sweetener as defined above and the composition X as defined above, and (iii) a second sugar sweetener core-coating layer, in particular a second disaccharide core-coating layer comprising a sugar sweetener, in particular a disaccharide carbohydrate, where the second sugar sweetener core-coating layer, in particular the second disaccharide core-coating layer, is disposed over the first sugar sweetener core-coating layer, in particular over the disaccharide core-coating layer.

In such embodiments, the core-coating layers may or may not have uniform compositions, and may or may not substantially coat the underlying core or layer. In some embodiments, the first sugar alcohol core-coating layer, in particular the first erythritol core-coating layer and/or the first sugar sweetener core-coating layer, in particular the first disaccharide core-

coating layer have discrete regions of the artificial or natural sweetener as defined above and the composition X as defined above.

5 In another embodiment, the tabletop sweetener composition comprises a mixture of the plurality of first sweetener particles and the plurality of second sweetener particles.

In another embodiment of the tabletop sweetener composition, the sugar sweetener core, in particular the disaccharide core contains isomaltulose. Further, in some embodiments, the second sugar alcohol core-coating layer in particular the second erythritol core-coating layer and/or the second sugar sweetener core-coating layer in particular the disaccharide core-coating layer contain isomaltulose.

15 These tabletop sweetener compositions may also contain flavoring ingredients (e.g., vanilla flavor), mouthfeel enhancers, and/or sweetness modifiers. When one or more of these are present, the first sugar alcohol core-coating layer, in particular the first erythritol core-coating layer and/or the sugar sweetener core-coating layer in particular the disaccharide core-coating layer may contain one or more of flavoring ingredients (e.g., vanilla flavor), mouthfeel enhancers, and/or sweetness modifiers. Moreover, as used herein, the term "layer" may or may not refer to a material that entirely surrounds the underlying material.

20 Thus, a "layer" may be non-uniform in composition and may provide only discontinuous coverage of the underlying material. Moreover, when one layer covers another, the boundary between the layers may or may not be discrete; thus, the boundary between layers may be continuous or semi-continuous.

25 In the sweetener compositions described herein, the tabletop sweetener compositions may or may not contain other particles in addition to the plurality of first sweetener particles and the plurality of second sweetener particles. The first sweetener particles and the second sweetener particles may have any particle size that is suitable for use of the composition X as a sweetener.

30

In some embodiments, the average size of the first sweetener particles and second sweetener particles is between 50 microns and 1250 microns, e.g., between 100 microns and 1000 microns. In some embodiments, the particle sizes of the first sweetener particles and the second sweetener particles, after screening to eliminate undesired large particles

which may be as large as 1500 μm , will vary up to 16 mesh, e.g., up to 14 mesh, or up to 12 mesh, based on the standard United States sieve scale. Further, smaller particle sizes, e.g., 50 mesh, 100 mesh, or 150 mesh, or particles having sizes less than 1 μm , e.g., less than 0.5 μm , will be present with the larger particles. In some embodiments, the tabletop
5 sweetener composition comprises a mixture of the plurality of first sweetener particles and the second sweetener particles. Such a mixture may or may not contain other types of particles.

The layers in the sweetener composition particles are generally not distinct, i.e., there is no
10 clear demarcation between the first layer and the second layer. For example, in one embodiment, the first layer contains the artificial or natural sweetener as defined above, optional flavoring components, etc., all encased in sugar sweetener, in particular encased in disaccharide; and the second layer will be predominantly sugar sweetener, in particular disaccharide with some of the other components. The relative quantities of the various
15 components in the layers, and whether there are layers in the particles, can be modified as necessary by adjusting when during the manufacturing process the components are added.

In some embodiments of the invention, the tabletop sweetener composition comprises the artificial or natural sweetener as defined above and a taste-masking amount of the
20 composition X as defined above as a mixture, where the mixture comprises (a) particles having a sugar alcohol core, in particular an erythritol core and (b) particles having a sugar sweetener core, in particular a disaccharide core. In some such embodiments, the disaccharide core comprises isomaltulose. Further, in some such embodiments, the sugar alcohol core, in particular the erythritol core and/or the sugar sweetener core, in particular
25 the disaccharide core further comprise coating layers having discrete regions of the artificial or natural sweetener as defined above and the composition X as defined above. When such coating layers are present, the coating layers may or may not substantially coat the underlying core material. These particles may have any particle size that is suitable for use of the composition X as a sweetener. In some embodiments, the average size of the
30 particles is between 50 microns and 1250 microns, e.g., between 100 microns and 1000 microns. In some embodiments, the particle sizes of the particles range from 16 mesh, or from 14 mesh, or from 12 mesh to 100 mesh, based on the standard United States sieve scale.

Sweetener compositions of the invention may have any dissolution rate in water that is suitable for their use as sweeteners. In some embodiments, the sweetener composition can have a dissolution rate in water at 10°C of between 100 seconds and 200 seconds, e.g., between 125 seconds and 175 seconds, or between 140 seconds and 160 seconds, based on the dissolution of 2 grams of the sweetener composition in 240 ml of water. In some
5 embodiments, the sweetener composition can have a dissolution rate in water at 45°C of between 50 seconds and 150 seconds, e.g., between 75 seconds and 125 seconds, or between 85 seconds and 110 seconds, based on the dissolution of 2 grams of the sweetener composition in 240 ml of water. In some embodiments, the dissolution rate of the
10 sweetener composition is 150 seconds at 10°C and 96 seconds at 45°C, based on the dissolution of 2 grams of the sweetener composition in 240 ml of stirred water.

In another embodiment, the invention relates to single-serving packets.

15 In another embodiment, the invention relates to tabletop sweeteners comprising the artificial or natural sweetener as defined above. Preferably, the tabletop sweetener is a tabletop tablet sweetener, tabletop "spoon to spoon" sweetener, tabletop "sachet" sweetener, tabletop liquid sweetener. The tabletop sweeteners, in addition to the artificial or natural sweetener as defined above may contain further substances including but not
20 limited to binding agents, citric acid, cyclamate, lactose, carboxymethylcellulose, leucin, maltodextrin, isomalt, NHDC, potassium hydroxide (in aqueous solution), dextrose, other bulking agents, sodium cyclamate, sodium hydrogen carbonate, sodium saccharin and tartaric acid.

25 In another embodiment, the invention relates to a package containing a predetermined amount, e.g., from 0.8 grams to 3.5 grams, of a solid tabletop sweetener composition, where the predetermined amount of the solid tabletop sweetener composition has a sweetness equivalent to four times (by weight) the predetermined amount of sucrose, and where the solid sweetener composition comprises:

30

- (a) from 38 wt% to 43 wt% of isomaltulose;
 - (b) from 50 wt% to 60 wt% erythritol;
 - (c) from 0.75 wt% to 1.75 wt% of the artificial or natural sweetener as defined above;
- and

(d) from 4 wt% to 16 wt% the composition X as defined above.

In another embodiment, the invention relates to a package containing a predetermined amount, e.g., from 0.8 grams to 3.5 grams, of a solid sweetener composition, where the
5 predetermined amount of the solid sweetener composition has a sweetness equivalent to four times (by weight) the predetermined amount of sucrose, and where the solid sweetener composition comprises:

- (a) from 30 wt% to 38 wt% of isomaltulose;
- 10 (b) from 55 wt% to 65 wt% erythritol;
- (c) from 0.75 wt% to 1.75 wt% of the artificial or natural sweetener as defined above;
and
- (d) from 4 wt% to 16 wt% the composition X as defined above.

15 In the tabletop sweetener packages containing a predetermined amount of the solid tabletop sweetener composition, the predetermined amount may be 1 gram and may have a sweetness equivalent to 4 grams of sucrose, or the predetermined amount may be 2 grams and may have a sweetness equivalent to 8 grams of sucrose.

20 The tabletop sweetener packages may contain a formulation for a ready-to-use sweetener or tabletop sweetener compositions in the form of cubes for use, for example, in restaurants. The cubes weigh approximately 8 grams and are of equivalent size to a standard cube of granulate sugar, which is 2.2cm x 2.2 cm x 1 cm.

25 Tabletop sweetener compositions of the invention may have any bulk density that is suitable for their use as sweeteners. In some embodiments, the bulk density of the sweetener composition ranges from 0.5 g/cm³ to 1.0 g/cm³, or from 0.7 g/cm³ to 0.8 g/cm³. In some embodiments, the bulk density of the sweetener composition is 0.76 g/cm³.

30 In another aspect, the invention relates to a method of making a tabletop sweetener composition, comprising the steps of:

- a) providing a fluid-bed coating apparatus;

- b) introducing dry sugar sweetener, in particular disaccharide and/or fructose; dry sugar alcohol, in particular erythritol; dry artificial or natural sweetener as defined above; and dry composition X as defined above powder to the fluid-bed coating apparatus;
- c) charging a substantially all of the dry ingredients in the fluid-bed coating apparatus;
- 5 d) spraying a coating solution into the fluid-bed coating apparatus to form coated sweetener particles; and
- e) drying the coated sweetener particles.

10 In another aspect, the invention relates to a method of making a tabletop sweetener composition, comprising the steps of:

- a) providing a fluid-bed coating apparatus;
- b) introducing dry sugar sweetener, in particular disaccharide carbohydrate and/or fructose; dry sugar alcohol, in particular erythritol; and dry artificial or natural
- 15 sweetener as defined above to the fluid-bed coating apparatus;
- c) charging a substantially all of the dry ingredients in the fluid-bed coating apparatus;
- d) spraying a coating solution into the fluid-bed coating apparatus to form coated sweetener particles;
- e) during the spraying step, introducing dry composition X as defined above powder to
- 20 the fluid-bed coating apparatus; and
- f) drying the coated sweetener particles.

25 The methods of the invention described above may be carried out as described in WO 2010/025158 A1, which is incorporated herein by reference in its entirety.

Consumables containing a Composition X of the Invention, a Sweetener Composition of the Invention or a Tabletop Sweetener Composition of the Invention

30 The compositions X of the invention as defined above or a sweetener composition of the invention as defined above can be added to any consumable products including but not limited to beverages, dental products, cosmetic products, pharmaceutical products and animal feed or animal food, in particular to beverages. The tabletop sweetener compositions of the invention as described above can be added to any consumable

products, which are produced in a household or on a small scale. Such consumable products may contain an amount of natural sugar.

Thus, in another aspect, the invention relates to a consumable product composition comprising

- (a) a consumable product; and
- (b) a composition X as defined above.

Thus, in another aspect, the invention relates to a consumable product composition comprising

- (a) a consumable product; and
- (b) a sweetener composition as defined above.

Thus, in another aspect, the invention relates to a consumable product composition comprising

- (a) a consumable product; and
- (b) a tabletop sweetener composition as defined above.

The invention, in another aspect, further relates to a consumable product composition as defined above, wherein the composition X as defined above is present in the consumable product composition in an amount effective to modify, mask, reduce and/or suppress an unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetener, a sweetness enhancer or a consumable product, wherein the amount is less than a taste threshold concentration associated with the composition X.

Preferably, the effect of the composition X remains as long as the taste of the sweetener, the sweetness enhancer or the consumable product are perceived.

Preferably, the unpleasant off-taste of the sweetener, the sweetness enhancer or the consumable product is an acidic off-taste, an astringent off-taste, a bitter off-taste, a liquorice off-taste, a metallic off-taste or a throat-burning off-taste.

Preferably, the unpleasant aftertaste of the sweetener, the sweetness enhancer or the consumable product is an astringent or bitter aftertaste.

Preferably, the composition X as defined above is present in an amount effective to impart rich taste to a consumable product.

- 5 As used herein, the unit "wppm" refers to weight parts per million and means 1 milligram per kilogram.

In one embodiment, the composition X as defined above is present in the consumable product composition in a concentration from 0.01 wppm to 50 wppm, e.g. from 0.05 wppm
10 to 40 wppm, from 0.1 wppm to 30 wppm, from 0.15 wppm to 20 wppm, from 0.2 wppm to 10 wppm, from 0.3 wppm to 9 wppm, from 0.4 wppm to 8 wppm, from 0.5 wppm to 7 wppm, from 0.6 wppm to 6 wppm.

In a preferred embodiment, the consumable product composition comprises the sweetener
15 composition 1. The composition X as defined above is present in the consumable product composition in a concentration from 1.00 wppm to 8 wppm, e.g. from 1.80 wppm to 6 wppm, e.g., from 2.1 wppm to 5.3 wppm, from 2.5 wppm to 5.3 wppm, from 1.7 wppm to 4.4 wppm, from 2.0 to 4.4 wppm, or from 2.4 wppm to 6 wppm.

20 In a preferred embodiment, the consumable product composition comprises the sweetener composition 2. The composition X as defined above is present in the consumable product composition in a concentration from 0.3 wppm to 8 wppm, e.g. from 0.5 wppm to 6 wppm, from 0.7 wppm to 1.7 wppm, from 2.5 wppm to 4.4 wppm, from 3.4 wppm to 4.9 wppm, from 2.2 wppm to 3.8 wppm, from 0.6 to 1.4 wppm, from 2.1 wppm to 3.6 wppm, from 2.7
25 wppm to 4 wppm, from 1.8 wppm to 3.1 wppm, from 0.8 wppm to 1.8 wppm, from 2.7 wppm to 4.8 wppm, from 3.7 to 5.3 wppm, from 2.4 wppm to 4.1 wppm.

In one embodiment, the at least one bitter blocking agent (1) is present in the consumable product composition in a concentration from 0.5 wppm to 50 wppm, e.g. from 1 wppm to
30 40 wppm, from 2 wppm to 30 wppm, from 3 wppm to 20 wppm or from 4 wppm to 10 wppm.

In one embodiment, the first carbonyl compound (2a) is present in the consumable product composition in a concentration from 0.0001 wppm to 0.001 wppm, e.g. from 0.00015

wppm to 0.0009 wppm, from 0.0002 wppm to 0.0007 wppm or from 0.00021 wppm to 0.0005 wppm.

5 In one embodiment, the second carbonyl compound (2b) is present in the consumable product composition in a concentration from 0.01 wppm to 2 wppm, e.g. from 0.03 wppm to 1.8 wppm, from 0.05 wppm to 1.6 wppm or from 0.07 wppm to 1.3 wppm.

10 In one embodiment, the first lactone (3a) is present in the consumable product composition in a concentration from 0.002 wppm to 0.1 wppm, e.g. from 0.004 wppm to 0.08 wppm, from 0.006 wppm to 0.06 wppm or from 0.008 wppm to 0.04 wppm.

15 In one embodiment, the second lactone (3b) is present in the consumable product composition in a concentration from 0.005 wppm to 0.1 wppm, e.g. from 0.006 wppm to 0.09 wppm, from 0.007 wppm to 0.08 wppm or from 0.008 wppm to 0.07 wppm.

20 In one embodiment, substance (i) (naringin) is present in the consumable product composition in a concentration from 0.5 wppm to 50 wppm, e.g. from 1 wppm to 40 wppm, from 2 wppm to 30 wppm, from 3 wppm to 20 wppm or from 4 wppm to 10 wppm.

25 In one embodiment, substance (ii) (4-methoxy salicylaldehyde) is present in the consumable product composition in a concentration from 0.0001 wppm to 0.001 wppm, e.g. from 0.00015 wppm to 0.0009 wppm, from 0.0002 wppm to 0.0007 wppm or from 0.00021 wppm to 0.0005 wppm.

30 In one embodiment, substance (iii) (syringaldehyde) is present in the consumable product composition in a concentration from 0.01 wppm to 2 wppm, e.g. from 0.03 wppm to 1.8 wppm, from 0.05 wppm to 1.6 wppm or from 0.07 wppm to 1.3 wppm.

In one embodiment, substance (iv) (massoia lactone) is present in the consumable product composition in a concentration from 0.002 wppm to 0.1 wppm, e.g. from 0.004 wppm to 0.08 wppm, from 0.006 wppm to 0.06 wppm or from 0.008 wppm to 0.04 wppm.

In one embodiment, substance (v) (whiskey lactone) is present in the consumable product composition in a concentration from 0.005 wppm to 0.1 wppm, e.g. from 0.006 wppm to 0.09 wppm, from 0.007 wppm to 0.08 wppm or from 0.008 wppm to 0.07 wppm.

- 5 In one embodiment, substance (4a) (e.g. L-alanine) is present in the consumable product composition in a concentration from 0.0005 wppm to 0.5 wppm, e.g. from 0.001 wppm to 0.01 wppm, from 0.003 wppm to 0.009 wppm or from 0.004 wppm to 0.008 wppm.

- 10 In one embodiment, substance (4b) (e.g. L-leucine) is present in the consumable product composition in a concentration from 0.0003 wppm to 0.3 wppm, e.g. from 0.0005 wppm to 0.01 wppm, from 0.0007 wppm to 0.009 wppm or from 0.0009 wppm to 0.008 wppm.

- 15 In one embodiment, substance (4c) (e.g. glycine) is present in the consumable product composition in a concentration from 0.00024 wppm to 0.24 wppm, e.g. from 0.0005 wppm to 0.01 wppm, from 0.0007 wppm to 0.009 wppm or from 0.0009 wppm to 0.008 wppm.

- 20 In one embodiment, substance (4d) (e.g. L-aspartic acid) is present in the consumable product composition in a concentration from 0.00048 wppm to 0.48 wppm, e.g. from 0.0005 wppm to 0.01 wppm, from 0.0007 wppm to 0.009 wppm or from 0.0009 wppm to 0.008 wppm.

- 25 In one embodiment, L-lysine monohydrate is present in the consumable product composition in a concentration from 0.00008 wppm to 0.08 wppm, e.g. from 0.0001 wppm to 0.008 wppm, from 0.0003 wppm to 0.006 wppm or from 0.0004 wppm to 0.004 wppm.

- In one embodiment, substance (4e) (e.g. L-threonine) is present in the consumable product composition in a concentration from 0.00008 wppm to 0.08 wppm, e.g. from 0.0001 wppm to 0.008 wppm, from 0.0003 wppm to 0.006 wppm or from 0.0004 wppm to 0.004 wppm.

- 30 In one embodiment, substance (4f) (e.g. L-isoleucine) is present in the consumable product composition in a concentration from 0.00032 wppm to 0.32 wppm, e.g. from 0.0005 wppm to 0.01 wppm, from 0.0007 wppm to 0.009 wppm or from 0.0009 wppm to 0.008 wppm.

In one embodiment, substance (4g) (e.g. L-tyrosine) is present in the consumable product

composition in a concentration from 0.00048 wppm to 0.48 wppm, e.g. from 0.0005 wppm to 0.01 wppm, from 0.0007 wppm to 0.009 wppm or from 0.0009 wppm to 0.008 wppm.

5 In one embodiment, L-methionine is present in the consumable product composition in a concentration from 0.00004 wppm to 0.04 wppm, e.g. from 0.00006 wppm to 0.008 wppm, from 0.00008 wppm to 0.006 wppm or from 0.0001 wppm to 0.004 wppm.

10 In one embodiment, substance (4h) (e.g. L-proline) is present in the consumable product composition in a concentration from 0.00016 wppm to 0.16 wppm, e.g. from 0.0002 wppm to 0.01 wppm, from 0.0007 wppm to 0.009 wppm or from 0.0009 wppm to 0.008 wppm.

15 In one embodiment, substance (4i) (e.g. L-serine) is present in the consumable product composition in a concentration from 0.00104 wppm to 1.04 wppm, e.g. from 0.002 wppm to 0.08 wppm, from 0.006 wppm to 0.06 wppm or from 0.008 wppm to 0.04 wppm.

In one embodiment, substance (4j) (e.g. L-valine) is present in the consumable product composition in a concentration from 0.00024 wppm to 0.24 wppm, e.g. from 0.0005 wppm to 0.01 wppm, from 0.0007 wppm to 0.009 wppm or from 0.0009 to 0.008 wppm.

20 In one embodiment, substance (4k) (e.g. L-glutamic acid) is present in the consumable product composition in a concentration from 0.002 wppm to 0.1 wppm, e.g. from 0.004 wppm to 0.08 wppm, from 0.006 wppm to 0.06 wppm or from 0.008 wppm to 0.04 wppm.

25 Preferably, the sweetener composition of the invention and the tabletop sweetener composition of the invention are present in the consumable in an amount effective to increase a sweetness level of the consumable.

30 In one embodiment, the sweetener composition as defined as defined above is present in the consumable product composition in a concentration from 0.1 wppm to 900 wppm, e.g. from 10 wppm to 850 wppm, from 50 wppm to 800 wppm, from 100 wppm to 750 wppm, from 60 wppm to 500 wppm, from 70 wppm to 400 wppm, from 110 wppm to 270 wppm, from 130 wppm to 270 wppm, from 70 wppm to 150 wppm, from 230 wppm to 400 wppm, from 310 wppm to 440 wppm or from 200 wppm to 340 wppm.

In one embodiment, the tabletop sweetener composition as defined above is present in the consumable product composition in a concentration from 0.1 wppm to 80 wppm, e.g. from 0.2 wppm to 50 wppm, from 0.5 wppm to 10 wppm or from 1 wppm to 5 wppm.

- 5 Preferably, the sweetener composition or the tabletop sweetener composition of the consumable product composition comprises acesulfame potassium.

In one embodiment, acesulfame potassium is present in the consumable product composition in a concentration from 0.1 wppm to 900 wppm, e.g. from 10 wppm to 850
10 wppm, from 50 to 800 wppm or from 100 to 750 wppm.

Preferably, the sweetener composition or the tabletop sweetener composition of the consumable product composition comprises acesulfame potassium and sucralose.

- 15 In one embodiment, sucralose is present in the consumable product composition in a concentration from 0.1 wppm to 900 wppm, e.g. from 10 wppm to 850 wppm, from 50 wppm to 800 wppm or from 100 wppm to 750 wppm.

Preferably, the sweetener composition or the tabletop sweetener composition of the
20 consumable product composition comprises acesulfame potassium and thaumatin.

The following consumable products and their ingredients are suitable for use in embodiments of the present invention.

- 25 Consumable products include all food products, including but not limited to cereal products, rice products, tapioca products, sago products, baker's products, biscuit products, pastry products, bread products, confectionery products, desert products, gums, chewing
30 gums, chocolates, ices, honey products, treacle products, yeast products, baking-powder, salt and spice products, savoury products, mustard products, vinegar products, sauces (condiments), tobacco products, cigars, cigarettes, processed foods, cooked fruits and vegetable products, meat and meat products, jellies, jams, fruit sauces, egg products, milk and dairy products, yoghurts, cheese products, butter and butter substitute products, milk substitute products, soy products, edible oils and fat products, pharmaceuticals, beverages, carbonated beverages, alcoholic drinks, beers, soft drinks, mineral and aerated waters and

other non-alcoholic drinks, fruit drinks, fruit juices, coffee, artificial coffee, tea, cocoa, including forms requiring reconstitution, food extracts, plant extracts, meat extracts, condiments, sweeteners, nutraceuticals, gelatins, pharmaceutical and non-pharmaceutical gums, tablets, lozenges, drops, emulsions, elixirs, syrups and other preparations for making
5 beverages, and combinations thereof.

As used herein, the term "non-alcoholic drinks" includes, but is not limited to all non-alcoholic drinks mentioned in the Directive 2003/15/EC of 22 December 2003 and in the Directive 94/35/EC of 30 June 2004, which are incorporated herein by reference, on
10 sweeteners for use in foodstuffs. Examples include, but are not limited to water-based, flavored drinks, energy-reduced or with no added sugar, milk- and milk-derivative-based or fruit-juice-based drinks, energy-reduced or with no added sugar, "Gaseosa": non-alcoholic water[^]based drink with added carbon dioxide, sweeteners and flavorings.

15 Consumable products include without limitation, water-based consumable products, solid dry consumable products, dairy products, dairy-derived products and dairy-alternative products.

In one embodiment, the consumable product is a water-based consumable product selected
20 from the group consisting of beverage, water, near water drink (optionally), aqueous beverage, enhanced/slightly sweetened water drink, flavored carbonated and still mineral and table water, non-carbonated beverage, carbonated water, still water, soft drink, carbonated soft drink (optionally), non-alcoholic drink, alcoholic drink, beer, wine, liquor, fruit drink, juice drink (optionally), juice, fruit juice, vegetable juice, nectar (optionally),
25 broth drink, coffee, tea, black tea, green tea, oolong tea, herbal infusion, cocoa (water-based), tea-based drink (optionally), coffee-based drinks, cacao-based drink, dessert, syrup, frozen fruit, frozen fruit juice, water-based ice, fruit ice, sorbet, dressing, salad dressing, jams, marmalades, canned fruit, savoury, delicatessen products like delicatessen salads, sauces, ketchup, mustard, pickles and marinated fish, sauce, soup, and beverage botanical
30 materials (whole or ground), or instant powder for reconstitution (coffee beans, ground coffee, instant coffee, cacao beans, cacao powder, instant cacao, tea leaves, instant tea powder).

Near water drinks as used herein, are drinks comprising lower sensory attributes in terms of sweetness, acidity, flavor, color compared to other categories. Near water drinks are containing the major traditionally used ingredients known in the beverage industry but at lower dosage to achieve a character closer to water.

5

In another embodiment, the consumable product is a solid dry consumable product selected from the group consisting of cereals, baked food products, biscuits, bread, breakfast cereal, cereal bar, energy bars/nutritional bars, granola, cakes, rice cakes, cookies, crackers, donuts, muffins, pastries, confectioneries, chewing gum, chocolate products, chocolates, fondant, candy, hard candy, marshmallow, pressed tablets, snack foods, botanical materials (whole or ground), and instant powders for reconstitution.

In another embodiment, the consumable product is a dairy product, dairy-derived product and/or dairy-alternative product selected from the group consisting of milk, fluid milk, cultured milk product, cultured and noncultured dairy-based drink, cultured milk product cultured with lactobacillus, yoghurt, yoghurt-based beverage, smoothy, lassi, milk shake, acidified milk, acidified milk beverage, butter milk, kefir, milk-based beverages, milk/juice blend, fermented milk beverage, icecream, dessert, sour cream, dip, salad dressing, cottage cheese, frozen yoghurt, soy milk, rice milk, soy drink, and rice milk drink.

20

In a preferred embodiment, the consumable product is a beverage.

In a particularly preferred embodiment, the beverage is a near water drink, a tea-based drink, a carbonated soft drink, a juice drink or nectar.

25

In a particularly preferred embodiment, the consumable product is a tea-based drink comprising the sweetener composition 1, and the composition X as defined above is present in the tea-based drink in a concentration from 1.50 wppm to 6.0 wppm, e.g. from 1.76 wppm to 5.94 wppm, from 2.15 wppm to 5.27 wppm, or from 2.42 wppm to 4.32 wppm.

30

In a preferred embodiment, the consumable product composition is a tea-based drink and the sweetener composition 1 as defined above is present in the consumable product

composition in a concentration from 110 wppm to 270 wppm, e.g., from 130 wppm to 250 wppm.

In a particularly preferred embodiment, the consumable product is a carbonated soft drink comprising the sweetener composition 1, and the composition X as defined above is present in the carbonated soft drink in a concentration from 1.50 wppm to 6.0 wppm, e.g. from 2.08 wppm to 5.94 wppm, from 2.54 wppm to 5.27 wppm, 2.08 wppm to 4.32 wppm, or from 2.86 wppm to 5.94 wppm.

In a preferred embodiment, the consumable product composition is a carbonated soft drink and the sweetener composition 1 as defined above is present in the consumable product composition in a concentration from 130 wppm to 270 wppm, e.g., from 150 wppm to 250 wppm.

In a particularly preferred embodiment, the consumable product is a juice drink comprising the sweetener composition 1, and the composition X as defined above is present in the juice drink in a concentration from 1.50 wppm to 6.0 wppm, e.g. from 2.08 wppm to 5.94 wppm, from 2.54 wppm to 5.27 wppm, 2.08 wppm to 4.32 wppm, or from 2.86 wppm to 5.94 wppm.

In a preferred embodiment, the consumable product composition is a juice drink and the sweetener composition 1 as defined above is present in the consumable product composition in a concentration from 130 wppm to 270 wppm, e.g., from 150 wppm to 250 wppm.

In a particularly preferred embodiment, the consumable product is a near water drink comprising the sweetener composition 2, and the composition X as defined above is present in the near water drink in a concentration from 0.50 wppm to 6.0 wppm, e.g. from 0.63 wppm to 1.80 wppm, from 0.77 wppm to 1.65 wppm, from 0.63 wppm to 1.35 wppm, or from 0.84 wppm to 1.80wppm.

In a preferred embodiment, the consumable product composition is a near water drink and the sweetener composition 1 as defined above is present in the consumable product

composition in a concentration from 70 wppm to 150 wppm, e.g., from 80 wppm to 140 wppm.

5 In a particularly preferred embodiment, the consumable product is a tea-based drink comprising the sweetener composition 2, and the composition X as defined above is present in the tea-based drink in a concentration from 0.50 wppm to 6.0 wppm, e.g. from 2.07 wppm to 4.80 wppm, from 2.53 wppm to 4.40 wppm, from 2.07 wppm to 3.6 wppm, or from 2.76 wppm to 4.8 wppm.

10 In a preferred embodiment, the consumable product composition is a tea drink and the sweetener composition 1 as defined above is present in the consumable product composition in a concentration from 230 wppm to 400 wppm, e.g., from 250 wppm to 480 wppm.

15 In a particularly preferred embodiment, the consumable product is a carbonated soft drink comprising the sweetener composition 2, and the composition X as defined above is present in the carbonated soft drink in a concentration from 0.50 wppm to 6.0 wppm, e.g. from 2.79 wppm to 5.28 wppm, from 3.41 wppm to 4.84 wppm, from 2.79 wppm to 3.96 wppm, or from 3.72 wppm to 5.28wppm.

20 In a preferred embodiment, the consumable product composition is a carbonated soft drink and the sweetener composition 1 as defined above is present in the consumable product composition in a concentration from 310 wppm to 440 wppm, e.g., from 330 wppm to 420 wppm.

25 In a particularly preferred embodiment, the consumable product is a juice drink comprising the sweetener composition 2, and the composition X as defined above is present in the juice drink in a concentration from 0.50 wppm to 6.0 wppm, e.g. from 2.79 wppm to 5.28 wppm, from 3.41 wppm to 4.84 wppm, from 2.79 wppm to 3.96 wppm, or from 3.72
30 wppm to 5.28 wppm.

In a preferred embodiment, the consumable product composition is a juice drink and the sweetener composition 1 as defined above is present in the consumable product

composition in a concentration from 310 wppm to 440 wppm, e.g., from 330 wppm to 420 wppm.

In a particularly preferred embodiment, the consumable product is nectar comprising the
 5 sweetener composition 2, and the composition X as defined above is present in the nectar
 in a concentration from 0.50 wppm to 6.0 wppm, e.g. from 1.80 wppm to 4.08 wppm, from
 2.2 wppm to 3.74 wppm, from 1.8 wppm to 3.06 wppm, or from 2.40 wppm to 4.08 wppm.

In a preferred embodiment, the consumable product composition is nectar and the
 10 sweetener composition 1 as defined above is present in the consumable product
 composition in a concentration from 200 wppm to 340 wppm, e.g., from 220 wppm to 320
 wppm.

In one embodiment, the consumable product composition is characterized by the dosage of
 15 the sweetener composition therein. For example, the consumable product composition
 may comprise from 0.07 to 0.44 g/l of the sweetener composition, e.g., from 0.11 g/l to
 0.27 g/l, from 0.13 g/l to 0.27 g/l, from 0.07 to 0.15 g/l, from 0.23 g/l to 0.4 g/l, from 0.31
 g/l to 0.44 g/l, or from 0.2 g/l to 0.34 g/l.

20 The sweetener compositions may be employed in near water drinks, tea-based drinks,
 carbonated soft drinks, juice drinks and nectars. Some exemplary embodiments are shown
 in the table below.

<i>Exemplary consumable product compositions</i>	<i>Sugar standard dosage</i>		<i><u>Examples:</u> Sugar reduction with Sweetener composition 1</i>		<i><u>Examples:</u> Sugar replacement with sweetener composition 2</i>
			<i>sugar dosage</i>	<i>dosage: sweetener composition 1</i>	<i>dosage: sweetener composition 2</i>
calorie reduced and low caloric Beverages/ Drinks	<i>low</i>	<i>high</i>			
near water drinks	20g/l	40g/l			0,07-0,15g/l
tea drinks	60g/l	90g/l	40g/l	0,11-0,27g/l	0,23-0,40g/l

<i>Exemplary consumable product compositions</i>	<i>Sugar standard dosage</i>		<i><u>Examples:</u> Sugar reduction with Sweetener composition 1</i>		<i><u>Examples:</u> Sugar replacement with sweetener composition 2</i>
carbonated softdrinks	75g/l	100g/l	50g/l	0,13-0,27g/l	0,31-0,44g/l
juice drinks	75g/l	100g/l	50g/l	0,13-0,27g/l	0,31-0,44g/l
nectars	50g/l	80g/l			0,20-0,34g/l

In one embodiment, the consumable product composition comprises a beverage; and a sweetener composition comprising acesulfame potassium, sucralose and the composition X as defined above.

5

Preferably, the consumable product is a carbonated drink and the invention relates to a carbonated drink comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention.

- 10 Preferably, the consumable product is a non-carbonated drink and the invention relates to a non-carbonated drink comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention.

- 15 In another embodiment, the consumable products are alcoholic beverages and the invention relates to alcoholic beverages comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention, preferably to shandy beer, wine cooler, wildberry cooler (e.g., 5% alcohol), strawberry daiquiri cooler (e.g., 5% alcohol), margarita cooler (e.g., 5% alcohol) and raspberry cooler. In addition, the alcoholic beverages may contain further substances including but not limited to acesulfame potassium, aspartame, beer, color, citric acid monohydrate, cyclamate, fruit juice (e.g. peach, pineapple), lemon flavor, margarita flavor, rum flavor, sucrose, vodka, wildberry
20 flavor, wine and water.

In another embodiment, the consumable products are fruit juices and the invention relates to fruit juices comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention, preferably to functional fruit drinks (e.g., 30 % fruit juice content), fruit nectar, fruit juice drinks, no sugar added fruit beverages (e.g., 5 % juice, 5 kiwi-strawberry flavored) and ruby red grapefruit and tangerine juice drinks (from concentrate). In addition, the fruit juices may contain further substances including but not limited to acesulfame potassium, aspartame, anthocyanine, ascorbic acid, carotinoids, citric acid (e.g., anhydrous), cyclamate, luteine, fruit concentrate, fruit juice concentrate, flavor, fruit, grapefruit pulp cells, grapefruit flavor, kiwi juice concentrate, kiwi-strawberry flavor, 10 malic acid, pectin, ruby red grapefruit concentrate, strawberry juice concentrate, tangerine juice concentrate, tangerine flavor, grape extract, vegetable extract (e.g., pumpkin, carrot, aronia, blackcurrant, hibiscus etc.) and water.

In another embodiment, the consumable product is ice tea and the invention relates to ice 15 tea comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention, preferably to ice tea and sugar free ice tea mix. In addition, the ice tea may contain further substances including but not limited to base with lemon flavor, base with tea component, citric acid, cyclamate, flavor, instant tea, lemon juice, maltodextrin, malic acid (e.g., powdered), saccharin, sucralose, sucrose, tea and tea extract.

20

In another embodiment, the consumable products are soft drinks without sugar and the invention relates to soft drinks without sugar comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention, preferably to soft drinks Cola flavored, fruit nectars, fruit juice drinks, soft drinks, soft drinks lemon lime flavored, 25 diet sparkling waters (e.g., peach flavored) and sugar free liquid beverages. In addition, the soft drinks without sugar may contain further substances including but not limited to acesulfame potassium, alitame, aspartame, bilberry flavor, citric acid monohydrate, caffeine, cola flavor, cyclamate, peach flavor, potassium citrate, sodium-cyclamate, grape color, grape flavor, sodium benzoate, sodium citrate, sodium-saccharin, ethylmaltol, flavor, 30 lemon-lime flavor, maltol, neotame, NHDC, passion fruit flavor, pectin, phosphoric acid (85%), saccharin, sucralose and water.

In another embodiment, the consumable products are soft drinks with sugar and the invention relates to soft drinks with sugar comprising a sweetener composition of the

invention or a tabletop sweetener composition of the invention. In addition, the soft drinks with sugar may contain further substances including but not limited to acesulfame potassium, aspartame, citric acid monohydrate, concentrate, caffeine, flavor, fructose, glucose, glucose syrup, high fructose con syrup (HFCS, e.g., HFCS having total solids: approx. 77 %, fructose: 55 % and glucose: 41 %), neotame, orangeade base, phosphoric acid (e.g., 85%), sodium-cyclamate, sucrose and water.

In another embodiment, the consumable products are sports drinks and the invention relates to sports drinks comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention, preferably to isotonic energy drinks and whey drinks. In addition, the sports drinks may contain further substances including but not limited to acesulfame potassium, aspartame, ascorbic acid, concentrate, caffeine, citric acid, flavor, glucose (e.g., anhydrous), herbs, minerals, neohesperidine-DC, natural extracts, sucralose, taurine, vitamins, water and whey powder.

In another embodiment, the consumable products are dry powder beverages and the invention relates to dry powder beverages comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention. In addition, the dry powder beverages may contain further substances including but not limited to acesulfame potassium, aspartame, apple flavor, ascorbic acid, citric acid, cherry flavor, malic acid, orange flavor, raspberry flavor, sodium chloride, trisodium citrate, tricalcium phosphate, titanium dioxide and xanthan gum.

In another embodiment, the consumable product is ice coffee and the invention relates to ice coffee comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention. In addition, the ice coffee may contain further substances including but not limited to acesulfame potassium, aspartame, coffee extract, ethylmaltol, flavor and neohesperidine-DC.

In another embodiment, the consumable products are instant cake fillings and the invention relates to instant cake fillings comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention. In addition, the cake fillings may contain further substances including but not limited to milk, isomalt, oligofructose, modified starch, flavors and colors. In another embodiment, the cake fillings may contain further

substances including but not limited to raspberries, strawberry puree, polydextrose, isomalt, sorbitol, glycerin, fructose, pectin, locust bean gum, calcium chloride, sodium bicarbonate, citric acid and water.

- 5 In another embodiment, the consumable products are biscuits and the invention relates to biscuits comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention. In addition, the biscuits may contain further substances including but not limited to isomalt, powdered isomalt, granulated isomalt, polydextrose, shortening, water, sodium bicarbonate, ammonium bicarbonate, skimmed milk powder, 10 salt, flour, cake flour, flavor, inulin, wheat fiber, shortening, ground raisins, raisin paste, salt, oatrim gel, liquid whole eggs, liquid egg whites, powdered egg whites, egg yolk, vanilla, butter flavor, vanilla flavor, chocolate flavor, cocoa, high fructose corn syrup (HFCS), methocel, baking soda, cinnamon, sodium acid pyrophosphate, margarine spread, margarine, emulsifier, molasses, mono- and diglycerides, powdered cellulose, ground 15 hazelnuts, hazelnuts, sorbitol, oat fiber, vital wheat gluten, chocolate chips, maltitol and fat replacer.

- In another embodiment, the consumable products are cakes and the invention relates to cakes comprising a sweetener composition of the invention or a tabletop sweetener 20 composition of the invention. In addition, the cakes may contain further substances including but not limited to baking powder, baking soda, blueberry flavor, all purpose flour, cake flour, diacetyl 4X, dextrose, dried butter flavor, flour, cellulose, crystalline fructose, emulsifier, egg whites solid, eggs, dried egg white, fat replacers such as inulin, isomalt, lecithin, milk, non fat dry milk, modified starch, maltodextrin, oligofructose, 25 potato fiber, polydextrose, salt, shortening, crystalline sorbitol, sodium aluminium phosphate, sucrose, butter flavor, chocolate flavor, (dried) vanilla flavor, water, wheat fiber, xanthan gum and vegetable oil.

- In another embodiment, the consumable products are bakery products other than cakes and 30 the invention relates to bakery products other than cakes comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention, preferably to light hot fudge toppings, tartlets with strawberry fillings, sugar free maple flavored syrups, sugar free dark chocolate coatings, sugar free chocolate syrups, reduced-calorie chocolate syrups, no sugar added caramel corn, light chocolate frostings, light

caramel toppings and light apple tart. In addition, the bakery products may contain further substances including but not limited to acesulfame potassium, aspartame, baking powder, baking soda, disodium phosphate, maple flavor, caramel flavor, caramel color, flour, carrageenan, cocoa powder, cocoa butter, (microcrystalline) cellulose, citric acid, calcium chloride, crystalline fructose, fructose, chocolate liquor, eggs, dried egg white, fudge flavor, isomalt, lecithin, non fat dry milk, hydrogenated starch hydrolysate, margarine, modified starch, maltisorb, maltodextrin, nonfat dry milk, oligofructose, potassium sorbate, pectin, potato fiber, hydrogenated potato starch, polydextrose, skimmed milk powder, shortening, (crystalline) sorbitol, sodium benzoate, salt, sorbitol, potassium sorbate, (powdered) sucrose, butter flavor, chocolate flavor, vanillin, (dried) vanilla flavor, water, wheat fiber and xanthan gum.

In another embodiment, the consumable products are confectionary products and the invention relates to confectionary products comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention, preferably to all confectionary products mentioned in the Directive 2003/15/EC of 22 December 2003 and in the Directive 94/35/EC of 30 June 2004 on sweeteners for use in foodstuffs, each of which are incorporated herein by reference. Examples include, but are not limited to, confectionaries (with or without added sugar), cocoa- or dried-fruit-based confectionaries, energy-reduced or with not added sugar, starch-based confectionaries, energy-reduced or with not added sugar, cornets and wafers for ice-cream, with not added sugar, *Essoblaten*, cocoa-, milk-, dried-fruit- or fat-based sandwich spreads, energy-reduced or with not added sugar, breakfast cereals, e.g., with a fiber content of more than 15%, and containing at least 20% bran, energy-reduced or sugar-reduced, breath-freshening micro-sweets with or without added sugar, strongly flavored freshening throat pastilles with or without added sugar, chewing gum with or without added sugar, energy-reduced tablet form confectioneries, cider and perry, drinks consisting of a mixture of a non-alcoholic drink and beer, cider, perry, spirits or wine, spirit drinks containing less than 15% alcohol by volume, alcohol-free beer or beer with an alcohol content not exceeding 1,2% vol., "biere de table/Tafelbier/table beer" (original wort content less than 6%), except for "obergariges Einfachbier", beers with a minimum acidity of 30 milli-equivalents expressed as NaOH, brown beers of the "oud bruin" type, energy-reduced beer, edible ices, energy-reduced or sugar-reduced canned or bottled fruit, energy-reduced or with or without added sugar, energy-reduced jams, jellies and marmalades, energy-reduced fruit and vegetable

preparations, sweet-sour preserves of fruit and vegetables, *Feinkostsalat*, sweet-sour preserves and semi-preserves of fish and marinades of fish, crustaceans and mollusks, energy-reduced soups, sauces, mustard, fine bakery products for special nutritional uses, foods intended for use in energy-restricted diets for weight reduction as referred to in

5 Directive 1996/8/EC, dietary foods for special medical purposes as defined in Directive 1999/21/EC, food supplements as defined in Directive 2002/46/EC supplied in a liquid form, food supplements as defined in Directive 2002/46/EC supplied in a solid form, food supplements as defined in Directive 2002/46/EC, based on vitamins and/or mineral elements and supplied in a syrup-type or chewable form. These Directives are incorporated

10 herein by reference. Particularly preferred confectionary products are sugar free hard candy, reduced calorie no sugar added hard candy, hard candies, sugar free milk chocolate, milk chocolate, sugar free gummy bear, reduced calorie no sugar added gummy bear, sugar free dark chocolate, reduced calorie no sugar added hard candy, reduced calorie no sugar added caramel, reduced calorie caramel, raspberry jellies, jellies, plain bitter chocolate,

15 toffees, sugar-free rice cake, sugar free peppermint breathmint, sugar free orange chewy candy and sugar free jelly beans. In addition, the confectionary products may contain further substances including but not limited to butter fat, (caramel) flavor, citric acid (monohydrate), cherry flavor, chocolate liquor, cocoa butter, cocoa mass, color, corn syrup, (microcrystalline) cellulose, disodium phosphate, egg Albumen-dried, evaporated

20 milk, gelatin, glycerol monostearate, gum Arabic, hydrogenated starch hydrolysate, hydrogenated fat, isomalt, lecithin, lemon oil, maltitol (syrup, powdered and/or granular), medium-grain brown rice, Korean black rice, maltol, mocha paste, neohesperidine-DC, orange flavor, pectin, peppermint flavor, polydextrose, raspberry puree, raspberry puree, salt, sodium caseinate, sorbitol (powder), starch, sucrose, vanillin, vegetable fat, whole

25 milk powder, skimmed milk powder, water and xylitol.

US Patent Nos. 6,627,233; 5,698,181; 5,688,491; 5,451,404; and 5,009,893 are hereby incorporated by reference in their entireties, including, but not limited to, the flavorings, sweeteners, sweetness enhancers, additional flavoring ingredients, solutions, consumables,

30 consumable compositions, and formulations that are disclosed therein."

In another embodiment, the consumable products are delicacies sauces and the invention relates to delicacies sauces comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention, preferably to sugar reduced ketchup with

sugar, no added sugar Ketchup and tomato ketchup. In addition, the delicacies sauces may contain further substances including but not limited to citric acid, modified starch, mustard, onions, pectin, polydextrose, saccharine sodium, salt, spices, sucralose, sugar, thickener, tomato concentrate and vinegar.

5

In another embodiment, the consumable products are cereals and the invention relates to cereals comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention.

- 10 In another embodiment, the consumable products are dairy products and the invention relates to dairy products comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention, preferably to fruit quarks, whipped creams, (vanilla flavored skim) milk drinks and yoghurt drinks. In addition, the dairy products may contain further substances including but not limited to acesulfame potassium, aspartame,
- 15 blackcurrant, blackberry, blueberry, cyclamate, flavor, fruit preparation, fruit juice concentrate, fructose, gelatin, inulin, oat, orange juice, pectin, raspberry, redcurrant, stabilizer, wheat fiber, water, quarks, yoghurt, whipped cream and whey.

- In another embodiment, the consumable products are desserts and the invention relates to
- 20 desserts comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention, preferably to jellied red fruit cocktails, strawberry sorbet, (fat-free/sugar-free) instant pudding chocolate flavors, instant desserts, vanilla puddings, vanilla pudding - powder mixtures and litchee gelees. In addition, the desserts may contain further substances including but not limited to acesulfame potassium, aspartame,
- 25 blackberries, brandy, citric acid, caramel color, color, cyclamate, chocolate flavor, cocoa powder, corn starch, disodium phosphate, emulsifier, fructose, granulated sugar, white soft sugar, agar powder, ingestible dextrin, mannan, maltodextrin, mono- and diglycerides, inulin, polydextrose, lemon juice, maltodextrin, milk modified food starch, polydextrose, raspberries, redcurrant juice, salt, soy lecithin, strawberries, strawberry puree, tetrasodium
- 30 pyrophosphate, litchee flavor, vanilla flavor, wheat starch, water and xanthan gum.

As used herein, the term "desserts" includes, but is not limited to all desserts mentioned in the Directive 2003/15/EC of 22 December 2003 and in the Directive 94/35/EC of 30 June 2004 on sweeteners for use in foodstuffs. These Directives are incorporated herein by

reference. Examples include, but are not limited to water-based flavored desserts, energy-reduced or with not added sugar, milk- and milk-derivative-paste preparations, energy-reduced or with no added sugar, fruit-and-vegetable-based desserts, energy-reduced or with no added sugar, egg-based desserts, energy-reduced or with no added sugar, cereal-based
5 desserts, energy-reduced or with no added sugar, breakfast cereals or cereal-based products, energy-reduced or with no added sugar, fat-based desserts, energy-reduced or with no added sugar, edible ices, energy-reduced or with no added sugar, jams, jellies, marmalades and crystallized fruit, energy-reduced or with no added sugar, fruit preparations, energy-reduced or with no added sugar, and "snacks", certain flavors of
10 ready-to-eat, prepacked, dry, savoury starch products and coated nuts.

In another embodiment, the consumable product is water-based ice and the invention relates to water-based ice comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention, preferably to "ice-pops" and no sugar
15 added strawberry sorbet. In addition, the water-based ice may contain further substances including but not limited to acesulfame potassium, aspartame, citric acid, color, fruit concentrate, flavor, isomalt, lemon juice, polydextrose, strawberry puree, sorbitol, thickener and water.

20 In another embodiment, the consumable product is ice cream and the invention relates to ice cream comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention. In addition, the ice-cream may contain further substances including but not limited to color, emulsifier, flavor, isomalt, milk fat, fat replacer, skim milk powder, polydextrose and lactitol.

25

In another embodiment, the consumable product is yoghurt and the invention relates to yoghurt comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention. In addition, the yoghurt may contain further substances including but not limited to acesulfame potassium, alitame, aspartame, citric acid
30 monohydrate, tri-calcium-dicitrate, cyclamate, Na-cyclamate, fruit preparation, high fructose corn syrup (HFCS), inulin, fructose, fructose syrup, oligofructose syrup, neohesperidine-DC, pectin-solution, saccharin, starch, strawberries, strawberry-flavor, sucralose, water and (low fat, preferably between 0,1 % to 1,5 % fat) yoghurt.

In another embodiment, the consumable products are jams and the invention relates to jams comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention. In addition, the jams may contain further substances including but not limited to gelling agent, isomalt, maltitol, pectin, sorbitol and strawberries.

5

In another embodiment, the consumable product is chewing-gum and the invention relates to chewing-gum comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention.

10 The amount of the sweetener composition in the consumable of the invention is dependent on the concentration of the natural and or artificial sweeteners contained therein as well as on the presence of further auxiliary substances such as carbon dioxide, flavors (e.g. spices, natural extract or oils), colors, acidulants (e.g. phosphoric acid and citric acid), preservatives, potassium, sodium.

15

In another embodiment, the consumable product is a dental product and the invention relates to a dental product comprising a sweetener composition of the invention. Dental products include, but are not limited to toothpaste, dental floss, mouthwash, denture adhesive, enamel whitener, fluoride treatments and oral care gels. These products are also
20 known in the art.

In a preferred embodiment the consumable product is toothpaste and the invention relates to toothpaste comprising a sweetener composition of the invention. In addition, the toothpaste may contain further substances including but not limited to abrasive silica,
25 dicalcium phosphate dehydrate, hydrated silica (thickener), ethyl alcohol, peppermint flavor, mint flavor, potassium sorbate, sodium lauryl sulphate, sodium carboxymethylcellulose, sodium monofluorophosphate, sodium monofluorophosphate, sorbitol solution, tetrasodium phosphate and titanium dioxide.

30 In another embodiment, the consumable product is a cosmetic product and the invention relates to a cosmetic product comprising a sweetener composition of the invention. Cosmetic products include but are not limited to lipstick, lip balm, lip gloss, and petroleum jelly. These products are also known in the art.

In another embodiment, the consumable product is a pharmaceutical product and the invention relates to a pharmaceutical product comprising a sweetener composition of the invention. Pharmaceutical products include but are not limited to over-the-counter and prescription drugs including but not limited to non-tobacco snuff, tobacco substitutes, chewable medications, cough syrups, throat sprays, throat lozenges, cough drops, antibacterial products, pill coatings, gel caplets, soluble fiber preparations, antacids, tablet cores, rapidly absorbed liquid compositions, stable foam compositions, rapidly disintegrating pharmaceutical dosage forms, beverage concentrates for medicinal purposes, aqueous pharmaceutical suspensions, liquid concentrate compositions, and stabilized sorbic acid solutions, phosphate buffers, saline solutions, emulsion, non-aqueous pharmaceutical solvents, aqueous pharmaceutical carriers, solid pharmaceutical carrier, and pharmaceutical preservatives/additives (antimicrobials, antioxidants, chelating agents, inert gases, flavoring agents, coloring agents).

In another embodiment, the consumable product is animal feed or animal food and the invention relates to animal feed or animal food comprising a sweetener composition of the invention.

A conventional beverage may comprise from 20 g/l to 100 g/l standard sugar such as e.g. sucrose and this standard sugar may achieve a first level sweetness. It has now been found that by using the inventive sweetener composition to replace at least a portion of this standard sugar, the amount of standard sugar in a beverage can be reduced or eliminated maintaining the same sweetness level.

A conventional tea drink may comprise from 60 g/l to 90 g/l standard sugar such as e.g. sucrose. It has now been found that by using the inventive sweetener composition, e.g., sweetener composition 1, the amount of sugar in the tea drink may be reduced by at least 20%, e.g. at least 30%, at least 40%, or at least 55%. In one embodiment wherein the beverage is a tea drink, the tea drink comprises from 20 g/l to 60 g/l, e.g. from 30 g/l to 50 g/l, 35 g/l to 45 g/l standard sugar. In one embodiment the tea drink comprises the sweetener composition 1 in an amount ranging from 0.1 g/l to 0.27 g/l. e.g., from 0.14 g/l to 0.24 g/l. As a result, the inventive tea drink comprises less standard sugar than a conventional tea drink while maintaining the same sweetness.

A conventional carbonated soft drink may comprise from 75 g/l to 100 g/l standard sugar such as e.g. sucrose. It has now been found that by using the inventive sweetener composition, e.g., sweetener composition 1, the amount of sugar in the carbonated soft drink may be reduced by at least 20%, e.g. at least 30%, at least 40%, or at least 50%. In one embodiment wherein the beverage is a carbonated soft drink, the carbonated soft drink comprises from 25 g/l to 75 g/l, e.g. from 30 g/l to 70 g/l, 40 g/l to 60 g/l standard sugar. In one embodiment the carbonated soft drink comprises the sweetener composition 1 in an amount ranging from 0.13 g/l to 0.27 g/l, e.g., from 0.16 g/l to 0,24 g/l. As a result, the inventive carbonated soft drink comprises less standard sugar than a conventional carbonated soft drink while maintaining the same sweetness.

A conventional juice drink may comprise from 75 g/l to 100 g/l standard sugar such as e.g. sucrose. It has now been found that by using the inventive sweetener composition, e.g., sweetener composition 1, the sugar dosage may be reduced by at least 20%, e.g. at least 30%, at least 40%, or at least 50%. In one embodiment wherein the beverage is a juice drink, the juice drink comprises from 25 g/l to 75 g/l, e.g. from 30 g/l to 70 g/l, 40 g/l to 60 g/l standard sugar. In one embodiment the juice drink comprises the sweetener composition 1 in an amount ranging from 0.13 g/l to 0.27 g/l, e.g., from 0.16 g/l to 0,24 g/l.. As a result, the inventive juice drink comprises less standard sugar than a conventional carbonated soft drink while maintaining the same sweetness.

A conventional near water drink may comprise from 20 g/l to 40 g/l standard sugar such as e.g. sucrose. It has now been found that by using the inventive sweetener composition, e.g., sweetener composition 2, the sugar dosage may be eliminated or substantially eliminated. In one embodiment wherein the beverage is a near water drink, the near water drink comprises 0 g/l standard sugar. In one embodiment, the near water drink comprises the sweetener composition 2 in an amount ranging from 0.07 g/l to 0.15 g/l, e.g., from 0.09 g/l to 0.14 g/l. As a result, the inventive near water drink comprises little or no standard sugar and still maintains the sweetness similar to that of a sugar-sweetened near water drink.

A conventional tea drink may comprise from 60 g/l to 90 g/l standard sugar such as e.g. sucrose. It has now been found that by using the inventive sweetener composition, e.g., sweetener composition 2, the sugar dosage may be eliminated or substantially eliminated. In one embodiment wherein the beverage is a tea drink, the tea drink comprises little or no

standard sugar. In one embodiment the tea drink comprises the sweetener composition 2 in an amount ranging from 0.23 g/l to 0.40 g/l, e.g., from 0.26 g/l to 0.37 g/l. As a result, the inventive tea drink comprises little or no standard sugar and still maintains the sweetness similar to that of a sugar-sweetened tea drink.

5

A conventional carbonated soft drink may comprise from 75 g/l to 100 g/l standard sugar such as e.g. sucrose. It has now been found that by using the inventive sweetener composition, e.g., sweetener composition 2, the sugar dosage may be eliminated or substantially eliminated. In one embodiment wherein the beverage is a carbonated soft drink, the carbonated soft drink comprises 0 g/l standard sugar. In one embodiment the carbonated soft drink comprises the sweetener composition 2 in an amount ranging from 0.31 g/l to 0.44 g/l, e.g., from 0.34 g/l to 0.41 g/l. As a result, the inventive carbonated soft drink comprises little or no standard sugar and still maintains the sweetness similar to that of a sugar-sweetened carbonated soft drink.

10

15

A conventional juice drink may comprise from 75 g/l to 100 g/l standard sugar such as e.g. sucrose. It has now been found that by using the inventive sweetener composition, e.g., sweetener composition 2, the sugar dosage may be eliminated or substantially eliminated. In one embodiment wherein the beverage is a juice drink, the juice drink comprises 0 g/l standard sugar. In one embodiment the juice drink comprises the sweetener composition 2 in an amount ranging from 0.31 g/l to 0.44 g/l, e.g., from 0.28 g/l to 0.41 g/l. As a result, the inventive juice drink comprises little or no standard sugar and still maintains the sweetness similar to that of a sugar-sweetened juice drink.

20

25

A conventional nectar may comprise from 50 g/l to 80 g/l standard sugar such as e.g. sucrose. It has now been found that by using the inventive sweetener composition, e.g., sweetener composition 2, the sugar dosage may be eliminated or substantially eliminated. In one embodiment wherein the beverage is a nectar and, nectar comprises 0 g/l standard sugar. In one embodiment the nectar comprises the sweetener composition 2 in an amount ranging from 0.20 g/l to 0.34 g/l, e.g., from 0.17 g/l to 0.31 g/l. As a result, the inventive nectar comprises little or no standard sugar and still maintains the sweetness similar to that of a sugar-sweetened nectar.

30

In one embodiment, the consumable product composition comprises

- (a) a beverage; and
- (b) a sweetener composition comprising acesulfame potassium and a composition X comprising the following substances:
 - (i) naringin;
 - 5 (ii) 4-methoxy salicylaldehyde;
 - (iii) syringaldehyde;
 - (iv) (i?)-5,6-dihydro-6-pentyl-2*H*-pyran-2-one; and
 - (v) a mixture of cis- and trans-whiskey lactone.

10 In one embodiment, the consumable product composition comprises

- (a) a beverage; and
- (b) a sweetener composition comprising acesulfame potassium and a composition X comprising the following substances:
 - (i) naringin;
 - 15 (iii) syringaldehyde;
 - (iv) (i?)-5,6-dihydro-6-pentyl-2*H*-pyran-2-one; and
 - (v) a mixture of cis- and trans-whiskey lactone.

In one embodiment, the consumable product composition comprises

- 20 (a) a beverage; and
- (b) a sweetener composition comprising acesulfame potassium and a composition X comprising the following substances:
 - (1) naringin, preferably of natural origin;
 - (2a) syringaldehyde;
 - 25 (2b) acetoin;
 - (3a) massoia lactone; preferably of natural origin;
 - (3b) whiskey lactone;
 - (3c) delta dodecalactone;
 - (3d) delta undecalactone;
 - 30 (3e) delta decalactone;
 - (3f) delta tetradecalactone;
 - (4a) L-alanine;
 - (4b) L-leucine;
 - (4c) glycine;

- (4d) L-aspartic acid;
- (4e) L-threonine;
- (4f) L-isoleucine;
- (4g) L-tyrosine;
- 5 (4h) L-proline;
- (4i) L-serine;
- (4j) L-valine;
- (4k) L-glutamic acid;
- (4l) taurine;
- 10 (4m) maltol;
- (4n) maltodextrine MD14; and
- (4o) arabicgum (spraygum).

In one embodiment, the consumable product composition comprises

- 15 (a) a beverage; and
- (b) a sweetener composition comprising acesulfame potassium and a composition X comprising the following substances:
 - (1) naringin, preferably of natural origin;
 - (2a) syringaldehyde;
 - 20 (2b) diacetyl;
 - (2c) acetoin;
 - (3a) massoia lactone; preferably of natural origin;
 - (3b) whiskey lactone;
 - (3c) delta dodecalactone;
 - 25 (3d) delta undecalactone;
 - (3e) delta decalactone;
 - (3f) delta tetradecalactone;
 - (4a) L-alanine;
 - (4b) L-leucine;
 - 30 (4c) glycine;
 - (4d) L-aspartic acid;
 - (4e) L-threonine;
 - (4f) L-isoleucine;
 - (4g) L-tyrosine;

- (4h) L-proline;
 - (4i) L-serine;
 - (4j) L-valine;
 - (4k) L-glutamic acid;
 - 5 (4l) taurine;
 - (4m) maltol;
 - (4n) maltodextrine MD14; and
 - (4o) arabicgum (spraygum).
- 10 In one embodiment, the consumable product composition comprises
- (a) a beverage; and
 - (b) a sweetener composition comprising acesulfame potassium and a composition X comprising the following substances:
 - (1) naringin, preferably of natural origin;
 - 15 (2a) syringaldehyde;
 - (2b) diacetyl;
 - (2c) acetoin;
 - (2d) methoxy salicylaldehyde;
 - (3a) massoia lactone; preferably of natural origin;
 - 20 (3b) whiskey lactone;
 - (3c) delta dodecalactone;
 - (3d) delta undecalactone;
 - (3e) delta decalactone;
 - (3f) delta tetradecalactone;
 - 25 (4a) L-alanine;
 - (4b) L-leucine;
 - (4c) glycine;
 - (4d) L-aspartic acid;
 - (4e) L-threonine;
 - 30 (4f) L-isoleucine;
 - (4g) L-tyrosine;
 - (4h) L-proline;
 - (4i) L-serine;
 - (4j) L-valine;

- (4k) L-glutamic acid;
- (4l) taurine;
- (4m) maltol;
- (4n) maltodextrine MD 14; and
- 5 (4o) arabicgum (spraygum).

In one embodiment, the consumable product composition comprises

- (a) a beverage; and
 - (b) a sweetener composition comprising acesulfame potassium and a composition X
- 10 comprising the following substances:
- (i) naringin, preferably of natural origin;
 - (2a) syringaldehyde;
 - (2b) acetoin;
 - (3a) massoia lactone; preferably of natural origin;
 - 15 (3b) whiskey lactone;
 - (3c) delta dodecalactone;
 - (3d) delta undecalactone;
 - (3e) delta decalactone;
 - (3f) delta tetradecalactone;
 - 20 (4a) L-alanine;
 - (4b) L-leucine;
 - (4c) glycine;
 - (4d) L-aspartic acid;
 - (4e) L-threonine;
 - 25 (4f) L-isoleucine;
 - (4g) L-tyrosine;
 - (4h) L-proline;
 - (4i) L-serine;
 - (4j) L-valine;
 - 30 (4k) L-glutamic acid;
 - (4l) taurine;
 - (4m) maltol;
 - (4n) maltodextrine MD14; and
 - (4o) arabicgum (spraygum).

In one embodiment, the consumable product composition comprises

- (a) a beverage; and
- (b) a sweetener composition comprising acesulfame potassium and a composition X
5 comprising the following substances:
 - (1) naringin, preferably of natural origin;
 - (2a) syringaldehyde;
 - (2b) acetoin;
 - (2c) diacetyl;
 - 10 (3a) massoia lactone; preferably of natural origin;
 - (3b) whiskey lactone;
 - (3c) delta dodecalactone;
 - (3d) delta undecalactone;
 - (3e) delta decalactone;
 - 15 (4a) L-alanine;
 - (4b) L-leucine;
 - (4c) glycine;
 - (4d) L-aspartic acid;
 - (4e) L-lysine monohydrate;
 - 20 (4f) L-threonine;
 - (4g) L-isoleucine;
 - (4h) L-tyrosine;
 - (4i) L-methionine;
 - (4j) L-proline;
 - 25 (4k) L-serine;
 - (4l) L-valine;
 - (4m) L-glutamic acid; and
 - (4n) maltol.

30 In one embodiment, the consumable product composition comprises

- (a) a beverage; and
- (b) a sweetener composition comprising acesulfame potassium and a composition X
comprising the following substances:
 - (1) naringin, preferably of natural origin;

- (2a) methoxysalicylaldehyde;
 - (2b) syringaldehyde;
 - (2c) acetoin;
 - (2d) diacetyl;
 - 5 (3a) massoia lactone; preferably of natural origin;
 - (3b) whiskey lactone;
 - (3c) delta dodecalactone;
 - (3d) delta undecalactone;
 - (3e) delta decalactone;
 - 10 (4a) L-alanine;
 - (4b) L-leucine;
 - (4c) glycine;
 - (4d) L-aspartic acid;
 - (4e) L-lysine monohydrate;
 - 15 (4f) L-threonine;
 - (4g) L-isoleucine;
 - (4h) L-tyrosine;
 - (4i) L-methionine;
 - (4j) L-proline;
 - 20 (4k) L-serine;
 - (4l) L-valine;
 - (4m) L-glutamic acid; and
 - (4n) maltol.
- 25 In one embodiment, the consumable product composition comprises
- (a) a beverage; and
 - (b) a sweetener composition comprising acesulfame potassium and a composition X comprising the following substances:
- (1) naringin, preferably of natural origin;
 - 30 (2a) acetoin; preferably of natural origin;
 - (2b) diacetyl; preferably of natural origin;
 - (3a) massoia lactone; preferably of natural origin;
 - (3b) delta dodecalactone; preferably of natural origin;
 - (3c) delta decalactone; preferably of natural origin;

- (4a) L-valine; preferably of natural origin;
- (4b) maltol; preferably of natural origin;
- (4c) maltodextrine MD 14; and
- (4d) arabicgum (spraygum).

5

In one embodiment, the consumable product composition comprises

- (a) a beverage; and
- (b) a sweetener composition comprising acesulfame potassium and a composition X comprising the following substances:

10

- (1) naringin, preferably of natural origin;
- (2a) acetoin; preferably of natural origin;
- (3a) massoia lactone; preferably of natural origin;
- (3b) delta dodecalactone; preferably of natural origin;
- (3c) delta decalactone; preferably of natural origin;

15

- (4a) L-valine; preferably of natural origin;
- (4b) maltol; preferably of natural origin;
- (4c) maltodextrine MD 14; and
- (4d) arabicgum (spraygum).

20 In another aspect, the invention relates to a method of sweetening a consumable product composition, comprising the step of adding to a consumable product the composition X as defined above to yield a sweetened consumable product composition, wherein the sweetened consumable product has substantially no unpleasant off-taste, aftertaste or lingering sweetness.

25

Preferably, the effect of the composition X remains at least as long as the taste of the consumable product is perceived.

Preferably, the sweetened consumable product has a rich taste.

30

In another aspect, the invention relates to a method of providing a sweetener or sweetness enhancer composition, comprising the step of adding to a sweetener or sweetness enhancer the composition X as defined above to yield a sweetener or sweetness enhancer

composition, wherein the sweetener or sweetness enhancer composition has substantially no unpleasant off-taste, aftertaste or lingering sweetness.

While the invention has been described in detail, modifications within the spirit and scope of the invention will be readily apparent to those of skill in the art. In view of the foregoing discussion, relevant knowledge in the art and references discussed above in connection with the Background and Detailed Description, the disclosures of which are all incorporated herein by reference. In addition, it should be understood that aspects of the invention and portions of various embodiments and various features recited below and/or in the appended claims may be combined or interchanged either in whole or in part. In the foregoing descriptions of the various embodiments, those embodiments which refer to another embodiment may be appropriately combined with other embodiments as will be appreciated by one of skill in the art.

Furthermore, those of ordinary skill in the art will appreciate that the foregoing description is by way of example only, and is not intended to limit the invention.

Part B

Field of the Invention

The present invention relates to sweetener compositions, sweetness enhancer compositions, tabletop sweeteners and consumable product composition comprising at least one flavoring which is suitable for modifying, masking, reducing and/or suppressing an unpleasant off-taste of the sweetener or sweetness enhancer in a consumable product composition formed by adding the sweetener composition to a consumable product. The present invention also relates to methods for modifying, masking, reducing and/or suppressing an unpleasant off-taste of the sweetener or sweetness enhancer in a consumable product composition as well as to methods for identifying flavorings suitable in this context.

Background of the Invention

Consumable products with a high content of sugar(s), e.g., sucrose (saccharose), glucose,

fructose and/or mixtures thereof, are generally afforded much greater preference by consumers due to their sweetness. However, it is commonly known that a high content of sugar(s) can greatly increase the blood sugar level, lead to the formation of fatty deposits and ultimately result in health problems such as childhood obesity, type II diabetes, and related illnesses. Therefore, it has long been an aim to reduce the sugar content of consumable products to the absolute minimum necessary. One way to reduce sugar content is to replace at least a portion of the sugar(s) with one or more non-caloric high-intensity sweeteners. These non-caloric sweeteners provide sweetnesses significantly higher than those of conventional sweeteners, e.g., sugars such as sucrose or high-fructose corn syrup (HFCS).

However, unlike conventional sugars, many of the non-caloric or low-caloric sweeteners have unpleasant taste features, e.g., off-tastes, aftertastes and/or lingering sweetness. These off-tastes, aftertastes and/or lingering sweetnesses negatively affect the overall flavor of the respective consumable product to which they are added. For example, sucralose, stevioside and cyclamate contribute to negative time-intensity profiles. As another example, acesulfame potassium, saccharin and stevioside, produce a bitter and/or astringent aftertaste. As another example, neotame produces a bitter and metallic off-taste. As another example, glycyrrhizinic acid ammonium salt produces marked additional aroma impression. Also, some sweeteners, e.g., brazzein, monellin, thaumatin, are not particularly stable under heat. Others, e.g., aspartame, are not stable in all applications. As another example, saccharin may have a very long-lasting sweetening effect, e.g., a lingering sweetness.

Steviol glycosides occur naturally in *Stevia spp.* or *Rubus spp.* Examples of these include dulcoside, rebaudiosides A-H, rubusoside, stevioside, suaviosides A, B and G-J. Steviol glycosides are very good sweeteners, but, when used in concentrations necessary for an adequate sweetening effect, steviol glycosides often exhibit a liquorice-like and/or bitter and/or astringent taste impression. Further unpleasant taste impressions may also be observed, e.g., a long-lasting aftertaste or a sweetener like taste profile.

In particular, when used in beverages, e.g., sweet, calorie-free or very low calorie drinks, such sweeteners may exhibit unpleasant secondary taste impressions and/or aftertastes and

may lower the sensory acceptance. As such, these negative taste features often require taste masking.

5 Some taste-masking substances are known. Although many conventional taste-masking substances may partially modify, mask, reduce and/or suppress unpleasant taste features of sweeteners or sweetness enhancers, many taste-masking substances are severely limited in their application.

10 For example, US 2004/0142084 A1 describes alkaline metal hydrogen sulphates as masking agents. One disadvantage of these sulphates is that they considerably increase the acid content in the consumable product.

15 Further, US 2002/0177576 A1 describes the suppression of a bitter taste by nucleotides, for example cytidine 5'-monophosphates (CMPs). The disadvantage of using CMPs is that the strongly polar compounds can only be used in strongly polar solvents. Therefore, CMPs can be used to only a very limited degree in many fat-containing consumable products. Furthermore, the availability of CMPs is severely limited because of their expensive chemical synthesis.

20 Thus, there is a need for further taste-masking compositions that can modify, mask, reduce and/or suppress unpleasant taste features left by sweeteners or sweetness enhancers without demonstrating the disadvantages of known taste-masking substances.

Brief Description of the Figures

25

Fig. 1 is a bar diagram showing the results of the taste and spit assay of a sweetener composition comprising acesulfame potassium, sucralose and the composition X of the invention with regard to bitter aftertaste.

30 **Fig. 2** is a bar diagram showing the results of the taste and spit assay of a sweetener composition comprising acesulfame potassium, sucralose and the composition X of the invention with regard to sweetness in the aftertaste.

Summary of the Invention

In one aspect, the present invention relates to a sweetener composition comprising:

(i) a sweetener; and

5 (ii) at least one flavoring;

wherein the at least one flavoring is suitable for modifying, masking, reducing and/or suppressing an unpleasant off-taste of the sweetener in a consumable product composition formed by adding the sweetener composition to a consumable product; and

10 wherein a weight ratio of the at least one flavoring to the sweetener in the consumable product composition is such that the sweetness of the sweetener is detectable by taste in the consumable product composition and the flavor of the at least one flavoring is not detectable by taste in the consumable product composition.

15 In a further aspect, the present invention relates to a sweetness enhancer composition comprising:

(i) a sweetness enhancer; and

(ii) at least one flavoring;

20 wherein the at least one flavoring is suitable for modifying, masking, reducing and/or suppressing an unpleasant off-taste of the sweetness enhancer in a consumable product composition formed by adding the sweetness enhancer composition and a sweetener to a consumable product; and

25 wherein a weight ratio of the at least one flavoring to the sweetness enhancer in the consumable product composition is such that the sweetness enhancer is capable of enhancing a sweetness of the sweetener present in the consumable product composition and the flavor of the at least one flavoring is not detectable by taste in the consumable product composition.

In a further aspect, the present invention relates to a consumable product composition comprising:

30 (i) a sweetener; and

(ii) at least one flavoring; and

(iii) a consumable product

wherein the at least one flavoring is suitable for modifying, masking, reducing and/or suppressing an unpleasant off-taste of the sweetener in the consumable product composition; and

5 wherein the sweetener is present in an amount such that the sweetness of the sweetener is detectable by taste in the consumable product composition, and

wherein the at least one flavoring is present in an amount such that the flavor of the at least one flavoring is not detectable by taste in the consumable product composition.

10 In a further aspect, the present invention relates to a consumable product composition comprising:

- (i) a sweetness enhancer;
- (ii) a sweetener;
- (iii) at least one flavoring having a flavor; and
- (iv) a consumable product

15 wherein the at least one flavoring is suitable for modifying, masking, reducing and/or suppressing an unpleasant off-taste of the sweetness enhancer in the consumable product composition; and

20 wherein the sweetness enhancer is present in the consumable product composition in an amount such that the sweetness enhancer is capable of enhancing a sweetness of the sweetener present in the consumable product composition, and

wherein the at least one flavoring is present in an amount such that the flavor of the at least one flavoring is not detectable by taste in the consumable product composition.

25 In one embodiment, the sweetener composition, the sweetness enhancer composition and the consumable product compositions defined above do not comprise methoxy salicylaldehyde.

30 In a further aspect, the present invention relates to a method of modifying, masking, reducing and/or suppressing an unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetener/sweetness enhancer composition, the method comprising the step of adding to a consumable product composition the sweetener or sweetness enhancer composition of the invention.

In a further aspect, the present invention relates to a method of modifying, masking,

reducing and/or suppressing an unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetener/sweetness enhancer composition, the method comprising the steps of:

(i) diluting at least one flavoring with a diluent to form a diluted composition to determine a flavor threshold level at which the flavor of the flavoring is not detectable by taste in the diluted composition, and

(ii) adding the at least one flavoring at a level at or below the flavor threshold level to consumable product composition comprising at least one sweetener and optionally at least one sweetness enhancer;

wherein the at least one flavoring, when present in the consumable product composition at or below the flavor threshold level, is capable of modifying, masking, reducing and/or suppressing the unpleasant off-taste of the sweetener and / or the sweetness enhancer in the consumable product composition.

In a further aspect, the present invention relates to the use of at least one flavoring for modifying, masking, reducing and/or suppressing an unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetener in a consumable product composition comprising the sweetener and a consumable product,

wherein the at least one flavoring is suitable for modifying, masking, reducing and/or suppressing an unpleasant off-taste, aftertaste or lingering sweetness of the at least one sweetener in the consumable product composition; and

wherein the sweetener is present in the consumable product composition such that the sweetness of the sweetener is detectable by taste in the consumable product composition and the flavor of the at least one flavoring is not detectable by taste in the consumable product composition.

In a further aspect, the present invention relates to the use of at least one flavoring for modifying, masking, reducing and/or suppressing an unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetness enhancer in a consumable product composition comprising the sweetness enhancer, a sweetener, and a consumable product,

wherein the at least one flavoring is suitable for modifying, masking, reducing and/or suppressing an unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetness enhancer in the consumable product composition; and

wherein the sweetness enhancer is present in the consumable product composition such that the sweetness enhancer is capable of enhancing a sweetness of the sweetener

present in the consumable product composition and the flavor of the at least one flavoring is not detectable by taste in the consumable product composition.

In one embodiment, in the methods or uses described above, the at least one flavoring does
5 not comprise methoxy salicylaldehyde.

In one embodiment, the at least one flavoring is selected from the group consisting of:

a compound comprising a flavanonyl moiety, in particular a flavanone, a hydroxyflavanone, a dihydroxyflavanone or a trihydroxyflavanone;

10 a compound comprising a quininyll moiety, in particular quinine, quinine bisulfate, quinine hydrochloride, quinine sulfate, hydroxyquinine;

a compound comprising a purinyll moiety, in particular caffeine or theobromine;

a compound comprising a saccharide acetate moiety, in particular glucose penta-acetate or sucrose octa-acetate; and

15 benzyl diethyl-(2:6-xylyl-carbamoyl-methyl)-ammonium benzoate.

In one embodiment, the at least one flavoring is selected from the group consisting of naringin, naringenin and naringin dihydrochalcone or a naringin containing extract, preferably naringin.

20

In one embodiment, the at least one flavoring is selected from the group consisting of:

at least one carbonyl compound selected from the group consisting of a compound comprising a vanillin moiety, in particular vanillin, ethyl vanillin, methyl vanillate, ethyl vanillate, vanillic acid, vanillin isobutyrate, ethyl vanillin isobutyrate, acetovanillone or 5-methoxyvanillin;

25

a compound comprising a benzaldehyde moiety other than a vanillin moiety, in particular 4-hydroxybenzaldehyde, 2-methoxybenzaldehyde, 3-methoxybenzaldehyde, 4-methoxybenzaldehyde, 4-ethoxybenzaldehyde, 4-ethylbenzaldehyde, 2-hydroxy-4-methylbenzaldehyde, 2-methoxybenzoic acid, 3,4-dihydroxybenzaldehyde, 4-hydroxy-3,5-dimethoxybenzaldehyde, veratraldehyde, anis aldehyde, salicylaldehyde, 3-methoxy
30 salicylaldehyde or 4-methoxy salicylaldehyde;

a compound comprising a benzoic acid moiety, 3-methoxybenzoic acid, 4-methoxybenzoic acid, 2-hydroxybenzoic acid, 3-hydroxybenzoic acid, 4-hydroxybenzoic acid, ethyl 2-hydroxy-4-methylbenzoate or anisic acid; and

a compound comprising an acetophenone moiety, in particular 2-hydroxyacetophenone, 3-hydroxyacetophenone or 4-hydroxyacetophenone, most particularly 4-methoxy salicylaldehyde and syringaldehyde.

at least one lactone selected from the group consisting of:

- 5 pentano-1,5-lactone, hexano-1,5-lactone, heptano-1,5-lactone, octano-1,5-lactone, nonano-1,5-lactone, decano-1,5-lactone, undecano-1,5-lactone, dodecano-1,5-lactone, tridecano-1,5-lactone, tetradecano-1,5-lactone, pentadecano-1,5-lactone, hexadecano-1,5-lactone, pent-2-eno-1,5-lactone, hex-2-eno-1,5-lactone, hept-2-eno-1,5-lactone, oct-2-eno-1,5-lactone, non-2-eno-1,5-lactone, dec-2-eno-1,5-lactone, undec-2-eno-1,5-lactone, 10 dodec-2-eno-1,5-lactone, tridec-2-eno-1,5-lactone, tetradec-2-eno-1,5-lactone, pentadec-2-eno-1,5-lactone, hexadec-2-eno-1,5-lactone, dec-5-eno-1,5-lactone, dec-6-eno-1,5-lactone, dec-7-eno-1,5-lactone, dec-8-eno-1,5-lactone, undec-5-eno-1,5-lactone, undec-6-eno-1,5-lactone, undec-7-eno-1,5-lactone, undec-8-eno-1,5-lactone, dodec-2-eno-1,5-lactone, nepetalactone
- 15 pentano-1,4-lactone, hexano-1,4-lactone, heptano-1,4-lactone, octano-1,4-lactone, nonano-1,4-lactone, decano-1,4-lactone, undecano-1,4-lactone, dodecano-1,4-lactone, tridecano-1,4-lactone, tetradecano-1,4-lactone, pentadecano-1,4-lactone, hexadecano-1,4-lactone, butyloctano-1,4-lactone, dodec-6-eno-1,4-lactone, dec-7-eno-1,4-lactone, cis-dec-7-eno-1,4-lactone, 2,7-dimethylocta-5(trans),7-dieno-1,4-lactone, hex-2-eno-1,4-lactone, 20 3-methylnonano-1,4-lactone, 3-methyloctano-1,4-lactone, non-2-eno-1,4-lactone, 2-decen-1,4-lactone, dimethylnon-2-eno-1,4-lactone, 3-methyl gamma-decalactone, 4-methyl-5-hexen-1,4-olide, 4-hydroxyoctanoic acid lactone, 4-hydroxy-3-methyl octanoic acid lactone, 4-hydroxyundecanoic acid lactone and 4-hydroxy-2-hexanoic acid lactone.
- 25 In one embodiment, the sweetener composition, the sweetness enhancer composition, or the consumable product composition further comprises at least one additional substance selected from the group consisting of amino acids, flavoring ingredients, and combinations thereof.
- 30 In one embodiment, the amino acids are selected from the group consisting of L-alanine, L-leucine, glycine, L-aspartic acid, L-lysine monohydrate, L-threonine, L-isoleucine, L-tyrosine, L-methionine, L-proline, L-serine, L-valine and L-glutamic acid.

In one embodiment, the at least one flavoring is present in an amount ranging from 0.5

wt% to 20.0 wt%, preferably from 1.6 wt% to 2.2 wt%, more preferably from 0.9 wt% to 1.2 wt%, based on the total weight of the sweetener composition.

5 In one embodiment, the sweetener is present in an amount ranging from 94.0 wt% to 99.5 wt%, preferably from 94.0 wt% to 98.4 wt%, based on the total weight of the sweetener composition.

10 In one embodiment, the sweetener comprises acesulfame potassium and sucralose and the acesulfame potassium is present in an amount ranging from 82.0 wt% to 87.0 wt% and the sucralose is present in an amount ranging from 11.0 wt% to 12.0 wt%, based on the total weight of the sweetener composition.

15 In one embodiment, the sweetener comprises acesulfame potassium and sucralose and the acesulfame potassium is present in an amount ranging from 77.0 wt% to 82.0 wt% and the sucralose is present in an amount ranging from 17.0 wt% to 19.0 wt%, based on the total weight of the sweetener composition.

20 In one embodiment, the sweetener and/or the sweetness enhancer is selected from the group consisting of abiziasaponin, abrusosides, in particular abrusoside A, abrusoside B, abrusoside C, abrusoside D, acesulfame potassium, advantame, albiziasaponin, alitame, aspartame, superaspartame, bayunosides, in particular bayunoside 1, bayunoside 2, brazzein, bryoside, bryonoside, bryonodulcoside, carnosifloside, carrelame, curculin, cyanin, chlorogenic acid, cyclamates and its salts, cyclocaryoside I, dihydroquercetin-3-acetate, dihydroflavenol, dulcoside, gaudichaudioside, glycyrrhizin, glycyrrhetin acid, 25 gypenoside, hematoxylin, hernandulcin, isomogrosides, in particular iso-mogroside V, lugduname, magap, mabinlins, micraculin, mogrosides (lo han guo), in particular mogroside IV and mogroside V, monatin and its derivatives, monellin, mukurozioside, naringin dihydrochalcone (NarDHC), neohesperidin dihydrochalcone (NDHC), neotame, osladin, pentadin, periandrin I-V, perillartine, D-phenylalanine, phlomisosides, in 30 particular phlomisoside 1, phlomisoside 2, phlomisoside 3, phlomisoside 4, phloridzin, phyllodulcin, polpodiosides, polypodoside A, pterocaryosides, rebaudiosides, in particular rebaudioside A, rebaudioside B, rebaudioside C, rebaudioside D, rebaudioside F, rebaudioside G, rebaudioside H), rubusosides, saccharin and its salts and derivatives, scandenoside, selliguanin A, siamenosides, in particular siamenoside I, stevia,

steviolbioside, stevioside and other steviol glycosides, strogines, in particular strogin 1, strogin 2, strogin 4, suavioside A, suavioside B, suavioside G, suavioside H, suavioside I, suavioside J, sucralose, sucronate, sucrooctate, talin, telosmoside A₁₅, thaumatin, in particular thaumatin I and II, trans-anethol, trans-cinnamaldehyde, trilobatin and D-tryptophane, including extracts or enriched fractions of the natural sweeteners.

In one embodiment, the at least one sweetener is selected from the group consisting of acesulfame potassium, aspartame, sucralose and thaumatin.

10 Preferably, the at least one sweetener comprises acesulfame potassium.

Preferably, the at least one sweetener comprises acesulfame potassium and thaumatin.

In particularly preferred embodiments, the at least one sweetener comprises acesulfame potassium and sucralose.

In one embodiment, the sweetener and/or the sweetness enhancer comprises acesulfame potassium.

20 In one embodiment, the sweetener composition comprises from 80 wt% to 99.5 wt% of the at least one sweetener, based on the total weight of the sweetener composition, e.g., from 95.1 wt% to 98.9 wt%, or from 94.2 wt% to 98.1 wt%. The at least one sweetener is described in more detail below.

25 In one embodiment, the sweetener composition comprises from 0.5 wt% to 20 wt% of the composition X as defined above, based on the total weight of the sweetener composition, e.g., from 1.6 wt% to 2.2 wt% or from 0.9 wt% to 1.2 wt%.

In one embodiment, the sweetener composition comprises at least one additional sweetener.

Preferably, the at least one additional sweetener is a sugar alcohol or sugar sweetener selected from the group consisting of erythritol, galactitol, hydrogenated starch syrups, maltitol and sorbitol syrups, inositols, isomalt, lactitol, maltitol, mannitol, xylitol,

arabinose, dextrin, dextrose, fructose, high fructose corn syrup, fructooligosaccharides, fructooligosaccharide syrups, galactose, galactooligosaccharides, glucose, glucose and (hydrogenated) starch syrups/hydrolysates, isomaltulose, lactose, hydrolysed lactose, maltose, mannose, rhamnose, ribose, sucrose, tagatose, trehalose, xylose, and combinations thereof.

In one embodiment, the at least one additional sweetener is a caloric sweetener.

In one embodiment, the at least one additional sweetener is a non-caloric sweetener.

In one embodiment, the sweetener composition further comprises at least one sweetness enhancer.

Preferably, the effect of the flavoring remains at least as long as the taste of the at least one sweetener or the at least one sweetness enhancer is perceived.

In one embodiment, the unpleasant off-taste of the sweetener or the sweetness enhancer is an acidic off-taste, an astringent off-taste, a bitter off-taste, a liquorice off-taste, a metallic off-taste and/or a throat-burning off-taste.

Preferably, the unpleasant aftertaste of the sweetener or the sweetness enhancer is an astringent or bitter aftertaste.

In one embodiment, the sweetener composition is a liquid at ambient conditions.

In one embodiment, the sweetener composition is a solid at ambient conditions.

In one embodiment, the sweetener composition further comprises an additional component selected from the group consisting of dust control agents, bubble forming agents, surfactants, emulsifiers, salts, fats, gums, hydrocolloids, bulking agents, carriers, fibers, flavoring ingredients, flavor enhancers, flavor stabilizers, acidulants, anti-caking and free-flow agents.

Preferably, the additional component is glycerol.

In one embodiment, the invention relates to a solution, e.g., a taste modifying solution, comprising a solvent, a sweetener (at least one sweetener), and at least one flavoring, wherein the flavoring has the features as defined in the context of the present invention. In one embodiment, the at least one flavoring (and the sweetener) are dissolved in the solvent, thus forming the solution. In the solution, the at least one flavoring may be present in amounts ranging from 0.01 wppm to 1000 wppm, based on the total weight of the solution, e.g., from 0.05 to 1000 wppm, from 0.1 wppm to 1000 wppm, from 1 wppm to 1000 wppm, from 10 wppm to 1000 wppm, from 0.01 wppm to 500 wppm, from 0.05 wppm to 500 wppm, from 0.1 wppm to 500 wppm, from 1 wppm to 500 wppm, from 10 wppm to 500 wppm, from 0.01 wppm to 250 wppm, from 0.05 wppm to 250 wppm, from 0.1 wppm to 250 wppm, from 1 wppm to 250 wppm, or from 10 wppm to 250 wppm.

In one embodiment, the at least one flavoring may be present in the amounts (ranges) listed herein with respect to consumable product compositions. For example, if the at least one flavoring comprises naringin, the naringin may be present in the solution in a concentration from 0.5 wppm to 50 wppm, e.g. from 1 wppm to 40 wppm, from 2 wppm to 30 wppm, from 3 wppm to 20 wppm or from 4 wppm to 10 wppm.

The solvent may vary widely and the solvent may include one or more solvents. For example, the solvent may be or may comprise a consumable organic solvent, a consumable inorganic solvent and/or consumable polar solvent. Preferably, the solvent is water. Furthermore, the solvent, in particular water, may comprise one or more buffers like Tris/HCl, HEPES and the like.

In addition to the at least one sweetener, the at least one flavoring, and the solvent, the solution may further comprise at least one sweetness enhancer. In one embodiment, the at least one sweetener and/or sweetness enhancer may be those mentioned herein. In one embodiment, wherein a sweetener is included in the solution, the sweetener is preferably acesulfame potassium.

In one embodiment, the solution comprises the at least one flavoring and the sweetener. The at least one sweetener may be present in the solution in an amount such that, when the solution is added to a consumable product, the flavor of the sweetener (in the consumable product) is improved, as compared to a similar consumable product comprising the sweetener but not comprising the at least one flavoring.

In one embodiment, the solution comprises the at least one flavoring and the sweetener and

the at least one flavoring may be present in the solution in an amount such that, when the solution is added to a consumable product, the at least one flavoring is not detectable by taste in the consumable product. In one embodiment, the sweetener is present in an amount such that the sweetness of the sweetener is detectable by taste in the consumable product composition.

In one embodiment, the solution comprises the sweetener, the at least one flavoring, the solvent, and the sweetness enhancer. The sweetness enhancer may be present in the solution in an amount such that, when the solution is added to a consumable product, the sweetness enhancer is capable of enhancing a sweetness of the sweetener present in the consumable product composition. The at least one flavoring may be present in an amount such that the flavor of the at least one flavoring is not detectable by taste in the consumable product composition.

In one embodiment, the solution may further comprise and acidic material, e.g., and edible acid. The acid may be present to maintain a preferred pH level in the solution. In one embodiment, the pH of the solution is less than 8, e.g., less than 7, less than 6, less than 5, less than 4, less than 3, or less than 2. Any suitable acidic material or combination of acidic materials may be used to achieve the desired pH levels. In one embodiment, the acidic material is combined with the other components. The order of the combination of components may vary widely.

In one embodiment, the solution may further comprise at least one preservative. The preservatives may vary widely. Many suitable preservatives are known in the art. In a preferred embodiment, the preservative comprises potassium sorbate.

In one embodiment, the solution may be processed to inactivate microorganisms that may be present in the solution. The processing step may vary widely. Many suitable processing steps are known in the art. For example, the solution may be subjected to UV treatment, microfiltration, pasteurization, and combinations thereof. This listing is merely exemplary and is not meant to limit the scope of potential processing steps.

In one embodiment, the at least one flavoring is part of a composition comprising:

at least one non-volatile flavoring; and

at least one volatile flavoring.

In one embodiment, a weight ratio of the at least one non-volatile flavoring to the at least one volatile flavoring ranges from 2:1 to 100:1, preferably from 6:1 to 40:1.

- 5 In one embodiment, the at least one non-volatile flavoring has a boiling point ranging from 150°C to 500°C, preferably from 190°C to 400°C.

In one embodiment, the at least one volatile flavoring has a boiling point less than 150°C.

- 10 In one embodiment, the at least one non-volatile flavoring is selected from the group consisting of:

a compound comprising a flavanonyl moiety, in particular a flavanone, a hydroxyflavanone, a dihydroxyflavanone or a trihydroxyflavanone;

- 15 a compound comprising a quininyll moiety, in particular quinine, quinine bisulfate, quinine hydrochloride, quinine sulfate, hydroxyquinine;

a compound comprising a purinyll moiety, in particular caffeine or theobromine;

a compound comprising a saccharide acetate moiety, in particular glucose penta-acetate or sucrose octa-acetate; and

benzyl diethyl-(2:6-xylyl-carbamoyl-methyl)-ammonium benzoate.

20

In one embodiment, the at least one non-volatile flavoring is selected from the group consisting of naringin, naringenin and naringin dihydrochalcone or a naringin containing extract, preferably naringin.

- 25 In one embodiment, the at least one volatile flavoring is selected from the group consisting of:

at least one carbonyl compound selected from the group consisting of:

- 30 a compound comprising a vanillin moiety, in particular vanillin, ethyl vanillin, methyl vanillate, ethyl vanillate, vanillic acid, vanillin isobutyrate, ethyl vanillin isobutyrate, acetovanillone or 5-methoxyvanillin;

a compound comprising a benzaldehyde moiety other than a vanillin moiety, in particular 4-hydroxybenzaldehyde, 2-methoxybenzaldehyde, 3-methoxybenzaldehyde, 4-methoxybenzaldehyde, 4-ethoxybenzaldehyde, 4-ethylbenzaldehyde, 2-hydroxy-4-methylbenzaldehyde, 2-methoxybenzoic acid, 3,4-dihydroxybenzaldehyde, 4-hydroxy-3,5-

dimethoxybenzaldehyde, veratraldehyde, anis aldehyde, salicylaldehyde, 3-methoxy salicylaldehyde or 4-methoxy salicylaldehyde;

a compound comprising a benzoic acid moiety, 3-methoxybenzoic acid, 4-methoxybenzoic acid, 2-hydroxybenzoic acid, 3-hydroxybenzoic acid, 4-hydroxybenzoic acid, ethyl 2-hydroxy-4-methylbenzoate or anisic acid; and

a compound comprising an acetophenone moiety, in particular 2-hydroxyacetophenone, 3-hydroxyacetophenone or 4-hydroxyacetophenone, most particularly 4-methoxy salicylaldehyde and syringaldehyde.

at least one lactone selected from the group consisting of:

pentano-1,5-lactone, hexano-1,5-lactone, heptano-1,5-lactone, octano-1,5-lactone, nonano-1,5-lactone, decano-1,5-lactone, undecano-1,5-lactone, dodecano-1,5-lactone, tridecano-1,5-lactone, tetradecano-1,5-lactone, pentadecano-1,5-lactone, hexadecano-1,5-lactone, pent-2-eno-1,5-lactone, hex-2-eno-1,5-lactone, hept-2-eno-1,5-lactone, oct-2-eno-1,5-lactone, non-2-eno-1,5-lactone, dec-2-eno-1,5-lactone, undec-2-eno-1,5-lactone, dodec-2-eno-1,5-lactone, tridec-2-eno-1,5-lactone, tetradec-2-eno-1,5-lactone, pentadec-2-eno-1,5-lactone, hexadec-2-eno-1,5-lactone, dec-5-eno-1,5-lactone, dec-6-eno-1,5-lactone, dec-7-eno-1,5-lactone, dec-8-eno-1,5-lactone, undec-5-eno-1,5-lactone, undec-6-eno-1,5-lactone, undec-7-eno-1,5-lactone, undec-8-eno-1,5-lactone, dodec-2-eno-1,5-lactone, nepetalactone

pentano-1,4-lactone, hexano-1,4-lactone, heptano-1,4-lactone, octano-1,4-lactone, nonano-1,4-lactone, decano-1,4-lactone, undecano-1,4-lactone, dodecano-1,4-lactone, tridecano-1,4-lactone, tetradecano-1,4-lactone, pentadecano-1,4-lactone, hexadecano-1,4-lactone, butyloctano-1,4-lactone, dodec-6-eno-1,4-lactone, dec-7-eno-1,4-lactone, cis-dec-7-eno-1,4-lactone, 2,7-dimethylocta-5(trans),7-dieno-1,4-lactone, hex-2-eno-1,4-lactone, 3-methylnonano-1,4-lactone, 3-methyloctano-1,4-lactone, non-2-eno-1,4-lactone, 2-decen-1,4-lactone, dimethylnon-2-eno-1,4-lactone, 3-methyl gamma-decalactone, 4-methyl-5-hexen-1,4-olide, 4-hydroxyoctanoic acid lactone, 4-hydroxy-3-methyl octanoic acid lactone, 4-hydroxyundecanoic acid lactone and 4-hydroxy-2-hexanoic acid lactone.

In a preferred embodiment, the at least one flavoring is part of a composition comprising:

- (1) at least one bitter blocking agent;
- (2) at least one carbonyl compound; and
- (3) (c) at least one lactone.

In one embodiment, the at least one carbonyl compound comprises

- (2a) a first carbonyl compound; and
- (2b) a second carbonyl compound.

5 In one embodiment, the at least one lactone comprises

- (3a) a first lactone; and
- (3b) a second lactone.

In one embodiment, the at least one bitter blocking agent (1) has a bitter off-taste.

10

In one embodiment, the at least one bitter blocking agent (1) is selected from the group consisting of:

a compound comprising a flavanonyl moiety, in particular a flavanone, a hydroxyflavanone, a dihydroxyflavanone or a trihydroxyflavanone;

15 a compound comprising a quininy moiety, in particular quinine, quinine bisulfate, quinine hydrochloride, quinine sulfate, hydroxyquinine;

a compound comprising a puriny moiety, in particular caffeine or theobromine;

a compound comprising a saccharide acetate moiety, in particular glucose penta-acetate or sucrose octa-acetate; and

20 benzyl diethyl-(2:6-xylyl-carbamoyl-methyl)-ammonium benzoate.

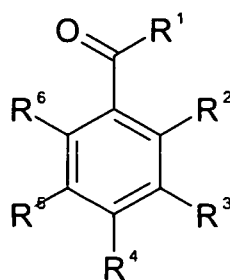
Preferably, the at least one bitter blocking agent (1) is a compound comprising a flavanoyl moiety selected from the group consisting of naringin, naringenin and naringin dihydrochalcone or a naringin containing extract, preferably naringin.

25

In one embodiment, the at least one carbonyl compound (2) contains from 7 to 18 carbon atoms, preferably from 7 to 14 carbon atoms.

In one embodiment, the at least one carbonyl compound (2) has a boiling point of from
30 150°C to 500°C, preferably from 190°C to 400°C.

In one embodiment, the at least one carbonyl compound (2) is a carbonyl compound of the formula (I)



(I) ,

wherein said carbonyl compound does not contain more than 18 carbon atoms, preferably from 8 to 14 carbon atoms, and

5 wherein

R¹ is hydrogen, hydroxy, C₁-C₈ alkyl or C₂-C₈ alkenyl; and

R², R³, R⁴, R⁵ and R⁶ are identical or different and each is independently of the others hydrogen, hydroxy, C₁-C_z alkyl, C₁-C₈ alkoxy or C₂-C₈ alkenyl.

10 Preferably, in the carbonyl compound of the formula (I) at least one of R², R³, R⁴, R⁵ and R⁶ is hydroxy or methoxy.

Preferably, the at least one carbonyl compound (2) is selected from the group consisting of a compound comprising a vanillin moiety, in particular vanillin, ethyl vanillin, methyl
15 vanillate, ethyl vanillate, vanillic acid, vanillin isobutyrate, ethyl vanillin isobutyrate, acetovanillone or 5-methoxyvanillin;

a compound comprising a benzaldehyde moiety other than a vanillin moiety, in particular 4-hydroxybenzaldehyde, 2-methoxybenzaldehyde, 3-methoxybenzaldehyde, 4-methoxybenzaldehyde, 4-ethoxybenzaldehyde, 4-ethylbenzaldehyde, 2-hydroxy-4-methylbenzaldehyde, 2-methoxybenzoic acid, 3,4-dihydroxybenzaldehyde, 4-hydroxy-3,5-dimethoxybenzaldehyde, veratraldehyde, anis aldehyde, salicylaldehyde, 3-methoxy
20 salicylaldehyde or 4-methoxy salicylaldehyde;

a compound comprising a benzoic acid moiety, 3-methoxybenzoic acid, 4-methoxybenzoic acid, 2-hydroxybenzoic acid, 3-hydroxybenzoic acid, 4-hydroxybenzoic acid, ethyl 2-hydroxy-4-methylbenzoate or anisic acid; and
25

a compound comprising an acetophenone moiety, in particular 2-hydroxyacetophenone, 3-hydroxyacetophenone or 4-hydroxyacetophenone.

Preferably, the at least one carbonyl compound (2) is selected from the group consisting of 4-methoxy salicylaldehyde and syringaldehyde. In particular, the at least one carbonyl compound (2) comprises syringaldehyde and/or acetoin.

- 5 In a preferred embodiment, the composition X does not comprise methoxy salicylaldehyde, in particular the composition X does not comprise, as at least one carbonyl compound (2), methoxy salicylaldehyde.

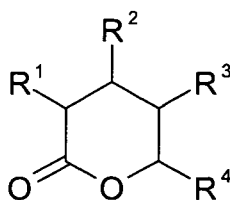
In one embodiment, the at least one lactone (3) contains from 6 to 18 carbon atoms, preferably from 8 to 14 carbon atoms.

10

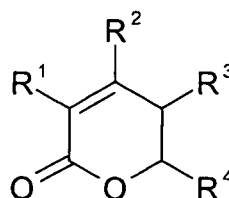
In one embodiment, the at least one lactone (3) has a boiling point of between 150°C and 500°C, preferably between 190°C and 400°C.

15 In one embodiment, the at least one lactone (3) comprises a saturated or an unsaturated delta-lactone.

In one embodiment, the at least one lactone (3) comprises a delta-lactone of the formulae (II) or (III)



(II)



(III)

20

wherein said lactone does not contain more than 18 carbon atoms, preferably from 8 to 14 carbon atoms, and

wherein

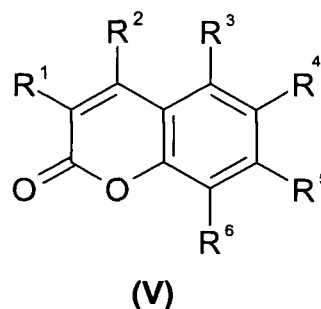
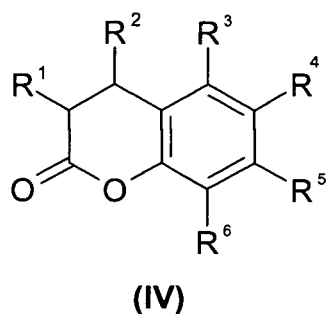
25 R¹, R², R³ and R⁴ are identical or different and each is independently of the others hydrogen, hydroxy, Ci-C₁₀ alkyl, Ci-C₁₀ alkoxy or C₂-C₁₀ alkenyl.

Preferably, the at least one lactone (3) is selected from the group consisting of:

pentano-1,5-lactone, hexano-1,5-lactone, heptano-1,5-lactone, octano-1,5-lactone, nonano-1,5-lactone, decano-1,5-lactone, undecano-1,5-lactone, dodecano-1,5-lactone, tridecano-

1,5-lactone, tetradecano-1,5-lactone, pentadecano-1,5-lactone, hexadecano-1,5-lactone, pent-2-eno-1,5-lactone, hex-2-eno-1,5-lactone, hept-2-eno-1,5-lactone, oct-2-eno-1,5-lactone, non-2-eno-1,5-lactone, dec-2-eno-1,5-lactone, undec-2-eno-1,5-lactone, dodec-2-eno-1,5-lactone, tridec-2-eno-1,5-lactone, tetradec-2-eno-1,5-lactone, pentadec-2-eno-1,5-lactone, hexadec-2-eno-1,5-lactone, dec-5-eno-1,5-lactone, dec-6-eno-1,5-lactone, dec-7-eno-1,5-lactone, dec-8-eno-1,5-lactone, undec-5-eno-1,5-lactone, undec-6-eno-1,5-lactone, undec-7-eno-1,5-lactone, undec-8-eno-1,5-lactone, dodec-2-eno-1,5-lactone and nepetalactone.

- 10 In one embodiment, the at least one lactone (3) comprises a delta-lactone of the formulae (IV) or (V)



- 15 wherein said lactone does not contain more than 18 carbon atoms, preferably from 9 to 14 carbon atoms, and
wherein

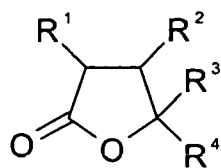
R¹, R², R³, R⁴, R⁵ and R⁶ are identical or different and each is independently of the others hydrogen, hydroxy, C₁-C₆ alkyl, C₁-C₄ alkoxy or C₂-C₆ alkenyl.

20

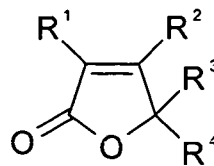
Preferably, the at least one lactone (3) is selected from the group consisting of:
6-methylcoumarin, 3,4-dihydrocoumarin, and 7-ethoxy-4-methylcoumarin.

- In one embodiment, the at least one lactone (3) comprises a saturated or an unsaturated
25 gamma-lactone.

In one embodiment, the at least one lactone (3) comprises a gamma-lactone of the formulae (VI) or (VII)



(VI)



(VII)

wherein said lactone does not contain more than 18 carbon atoms, preferably from 8 to 14 carbon atoms, and

wherein

- 5 R¹, R² and R³ are identical or different and each is independently of the others hydrogen, hydroxy, C₁-C₁₀ alkyl, C[∧]C₁₀ alkoxy or C₂-C₁₀ alkenyl; and
R⁴ is hydrogen, C₁-C₁₀ alkyl or C₂-C₁₀ alkenyl;

Preferably, the gamma-lactone is selected from the group consisting of:

- 10 pentano-1,4-lactone, hexano-1,4-lactone, heptano-1,4-lactone, octano-1,4-lactone, nonano-1,4-lactone, decano-1,4-lactone, undecano-1,4-lactone, dodecano-1,4-lactone, tridecano-1,4-lactone, tetradecano-1,4-lactone, pentadecano-1,4-lactone, hexadecano-1,4-lactone, butyloctano-1,4-lactone, dodec-6-eno-1,4-lactone, dec-7-eno-1,4-lactone, cis-dec-7-eno-1,4-lactone, 2,7-dimethylocta-5(trans),7-dieno-1,4-lactone, hex-2-eno-1,4-lactone, 3-
15 methylnonano-1,4-lactone, 3-methyloctano-1,4-lactone, non-2-eno-1,4-lactone, 2-decen-1,4-lactone, dimethylnon-2-eno-1,4-lactone, 3-methyl gamma-decalactone, 4-methyl-5-hexen-1,4-olide, 4-hydroxyoctanoic acid lactone, 4-hydroxy-3-methyl octanoic acid lactone, 4-hydroxyundecanoic acid lactone and 4-hydroxy-2-hexanoic acid lactone.

- 20 In one embodiment, the at least one lactone comprises a delta lactone and a gamma lactone, preferably the first lactone (3a) is a delta-lactone and the second lactone (3b) is a gamma-lactone.

In one embodiment, the composition X comprises:

- 25 (1) at least one bitter blocking agent selected from the group consisting of
a compound comprising a flavanonyl moiety, in particular a flavanone, a hydroxyflavanone, a dihydroxyflavanone or a trihydroxyflavanone, preferably naringin, naringenin and naringin dihydrochalcone or a naringin containing extract, most preferably naringin;

a compound comprising a quininy moiety, in particular quinine, quinine bisulfate, quinine hydrochloride, quinine sulfate, hydroxyquinine;

a compound comprising a puriny moiety, in particular caffeine or theobromine;

5 a compound comprising a saccharide acetate moiety, in particular glucose penta-acetate or sucrose octa-acetate; and
benzyl diethyl-(2:6-xylyl-carbamoyl-methyl)-ammonium benzoate;

(2) at least one carbonyl compound selected from the group consisting of

10 a compound comprising a vanillin moiety, in particular vanillin, ethyl vanillin, methyl vanillate, ethyl vanillate, vanillic acid, vanillin isobutyrate, ethyl vanillin isobutyrate, acetovanillone or 5-methoxyvanillin;

a compound comprising a benzaldehyde moiety other than a vanillin moiety, in particular 4-hydroxybenzaldehyde, 2-methoxybenzaldehyde, 3-methoxybenzaldehyde, 4-methoxybenzaldehyde, 4-ethoxybenzaldehyde, 4-ethylbenzaldehyde, 2-hydroxy-4-methylbenzaldehyde, 2-methoxybenzoic acid, 3,4-dihydroxybenzaldehyde, 4-hydroxy-3,5-dimethoxybenzaldehyde, veratraldehyde, anis aldehyde, salicylaldehyde, 3-methoxy salicylaldehyde or 4-methoxy salicylaldehyde;

15 a compound comprising a benzoic acid moiety, 3-methoxybenzoic acid, 4-methoxybenzoic acid, 2-hydroxybenzoic acid, 3-hydroxybenzoic acid, 4-hydroxybenzoic acid, ethyl 2-hydroxy-4-methylbenzoate or anisic acid; and

20 a compound comprising an acetophenone moiety, in particular 2-hydroxyacetophenone, 3-hydroxyacetophenone or 4-hydroxyacetophenone, most particularly 4-methoxy salicylaldehyde and syringaldehyde; and

25 (3) at least one lactone selected from the group consisting of

pentano-1,5-lactone, hexano-1,5-lactone, heptano-1,5-lactone, octano-1,5-lactone, nonano-1,5-lactone, decano-1,5-lactone, undecano-1,5-lactone, dodecano-1,5-lactone, tridecano-1,5-lactone, tetradecano-1,5-lactone, pentadecano-1,5-lactone, hexadecano-1,5-lactone, pent-2-eno-1,5-lactone, hex-2-eno-1,5-lactone, hept-2-eno-1,5-lactone, oct-2-eno-1,5-lactone, non-2-eno-1,5-lactone, dec-2-eno-1,5-lactone, undec-2-eno-1,5-lactone, dodec-2-eno-1,5-lactone, tridec-2-eno-1,5-lactone, tetradec-2-eno-1,5-lactone, pentadec-2-eno-1,5-lactone, hexadec-2-eno-1,5-lactone, dec-5-eno-1,5-lactone, dec-6-eno-1,5-lactone, dec-7-eno-1,5-lactone, dec-8-eno-1,5-lactone, undec-5-eno-1,5-lactone, undec-6-eno-1,5-lactone, undec-7-eno-1,5-lactone, undec-8-eno-1,5-lactone, dodec-2-eno-1,5-lactone, nepetalactone

pentano-1,4-lactone, hexano-1,4-lactone, heptano-1,4-lactone, octano-1,4-lactone, nonano-1,4-lactone, decano-1,4-lactone, undecano-1,4-lactone, dodecano-1,4-lactone, tridecano-1,4-lactone, tetradecano-1,4-lactone, pentadecano-1,4-lactone, hexadecano-1,4-lactone, butyloctano-1,4-lactone, dodec-6-eno-1,4-lactone, dec-7-eno-1,4-lactone, cis-dec-7-eno-1,4-lactone, 2,7-dimethylocta-5(trans),7-dieno-1,4-lactone, hex-2-eno-1,4-lactone, 3-methylnonano-1,4-lactone, 3-methyloctano-1,4-lactone, non-2-eno-1,4-lactone, 2-decen-1,4-lactone, dimethylnon-2-eno-1,4-lactone, 3-methyl gamma-decalactone, 4-methyl-5-hexen-1,4-olide, 4-hydroxyoctanoic acid lactone, 4-hydroxy-3-methyl octanoic acid lactone, 4-hydroxyundecanoic acid lactone and 4-hydroxy-2-hexanoic acid lactone.

10

In one embodiment, the composition X comprises

(1) naringin

(2) an aldehyde having at least one aromatic ring structure and having a molecular weight higher than 106 Da, preferably higher than 110, 150, 200 or 400 Da, with preferably an upper limit of the molecular weight for the aldehyde of 200, 300, 400 or 600 Da, and

(3) a lactone selected from the group consisting of a delta lactone and whiskey lactone.

In one embodiment, the at least one bitter blocking agent (1) is present in the composition X in an amount ranging from 15 wt% to 55 wt%.

In one embodiment, the at least one carbonyl compound (2) is present in the composition X in an amount ranging from 0.5 wt% to 10.0 wt%.

In one embodiment, the at least one lactone (3) is present in the composition X in an amount ranging from 0.06 wt% to 10.0 wt%.

30

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to the first carbonyl compound (2a) ranges from 50:1 to 200000:1.

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to the second carbonyl compound (2b) ranges from 0.25:1 to 2000:1.

5 In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to the first lactone (3a) ranges from 5:1 to 10000:1.

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to the second lactone (3b) ranges from 5:1 to 4000:1.

10 In one embodiment, the composition X further comprises
(4) at least one additional substance.

In one embodiment, the at least one additional substance (4) is selected from at least one amino acid, maltol, taurine, at least one additional flavoring ingredient, and combinations
15 thereof.

Preferably, the at least one amino acid are one to thirteen amino acids selected from the group consisting of L-alanine, L-leucine, glycine, L-aspartic acid, L-lysine monohydrate, L-threonine, L-isoleucine, L-tyrosine, L-methionine, L-proline, L-serine, L-valine and L-
20 glutamic acid.

Preferably, the at least one amino acid are one to eleven amino acids selected from the group consisting of L-alanine, L-leucine, glycine, L-aspartic acid, L-threonine, L-isoleucine, L-tyrosine, L-proline, L-serine, L-valine and L-glutamic acid.
25

Preferably, the composition X comprises all of the above thirteen or all of the above eleven amino acids.

In one embodiment, the composition X does not comprise all 5 of the following substances: naringin, methoxy salicylaldehyde, syringaldehyde, massoia lactone, and
30 whiskey lactone.

The composition X as defined above may be available by a method comprising admixing the substances (1), (2) and (3), preferably the substances (1), (2a), (2b), (3a) and (3b).

In one embodiment, the at least one flavoring is part of a composition X, including but not limited to a taste masking composition, comprising the following substances:

- (I) naringin;
- (II) at least two aldehyde taste improvers; and
- 5 (III) at least two lactone mouthfeel enhancers.

In one embodiment, substance (II) is selected from the group consisting of methoxy salicylaldehyde and syringaldehyde.

- 10 In one embodiment, substance (III) is selected from the group consisting of whiskey lactone and massoia lactone.

- In a preferred embodiment, the composition X does not comprise methoxy salicylaldehyde, in particular the composition X does not comprise, as substance(II), methoxy
15 salicylaldehyde.

In one embodiment, the substance (I) (naringin) is present in the composition X in an amount ranging from 15 wt% to 55 wt%.

- 20 In one embodiment, the substance (II) (at least two aldehyde taste improvers) is present in the composition X in an amount ranging from 0.5 wt% to 10.0 wt%.

In one embodiment, the substance (III) (at least two mouthfeel enhancers) is present in the composition X in an amount ranging from 0.06 wt% to 10.0 wt%.

25

In one embodiment, the weight ratio of substance (I) to substances (II) ranges from 0.25:1 to 1980:1.

- In one embodiment, the weight ratio of substance (I) to substances (III) ranges from 2.5:1
30 to 2857:1.

In one embodiment the composition X further comprises (IV) at least one amino acid.

Preferably, the at least one amino acid (IV) are one to thirteen amino acids selected from the group consisting of L-alanine, L-leucine, glycine, L-aspartic acid, L-lysine monohydrate, L-threonine, L-isoleucine, L-tyrosine, L-methionine, L-proline, L-serine, L-valine and L-glutamic acid.

5

In one embodiment, the at least one flavoring is part of a composition X comprising the following substances:

- (vi) naringin;
- (vii) methoxy salicylaldehyde;
- 10 (viii) syringaldehyde;
- (ix) massoia lactone; and
- (x) whiskey lactone.

Preferably, in the composition X, substance (ii) is 4-methoxy salicylaldehyde.

15

Preferably, in the composition X, substance (iv) is (i?)-5,6-dihydro-6-pentyl-2*H*-pyran-2-one.

Preferably, in the composition X, substance (v) is a mixture of *cis*-3-methyl-4-octanolide
20 (*cis*-whiskey lactone) and *trans*-3-methyl-4-octanolide (*trans*-whiskey lactone).

Preferably, in the composition X substance (ii) is 4-methoxy salicylaldehyde, substance (iv) is (/?)-5,6-dihydro-6-pentyl-2*H*-pyran-2-one and substance (v) is a mixture of *cis*-3-methyl-4-octanolide (*cis*-whiskey lactone) and *trans*-3-methyl-4-octanolide (*ta ns*-whiskey
25 lactone).

In a preferred embodiment, the composition X does not comprise methoxy salicylaldehyde, in particular the composition X does not comprise, as substance (ii), methoxy salicylaldehyde.

30

In one embodiment, the substance (i) (naringin) is present in the composition X in an amount ranging from 15 wt% to 55 wt%.

In one embodiment, the substance (iii) (syringaldehyde) is present in the composition X in an amount ranging from 0.5 wt% to 10.0 wt%.

5 In one embodiment, the substance (iv) (massoia lactone) is present in the composition X in an amount ranging from 0.06 wt% to 2.0 wt%.

In one embodiment, the substance (v) (whiskey lactone) is present in the composition X in an amount ranging from 0.1 wt% to 5.0 wt%.

10

In one embodiment, the weight ratio of substance (i) to substance (ii) ranges from 50:1 to 200000:1.

15 In one embodiment, the weight ratio of substance (i) to substance (iii) ranges from 0.25:1 to 2000:1.

In one embodiment, the weight ratio of substance (i) to substance (iv) ranges from 5:1 to 10000:1.

20 In one embodiment, the weight ratio of substance (i) to substance (v) ranges from 5:1 to 4000:1.

In another embodiment, the composition X further comprises (vi) at least one additional substance.

25

Preferably, the at least one additional substance (vi) is selected from amino acids, flavoring ingredients, and combinations thereof.

30 Preferably, the at least one amino acid (vi) are one to thirteen amino acids selected from the group consisting of L-alanine, L-leucine, glycine, L-aspartic acid, L-lysine monohydrate, L-threonine, L-isoleucine, L-tyrosine, L-methionine, L-proline, L-serine, L-valine and L-glutamic acid.

In one embodiment, the weight ratio of substance (i) to substances (vi) ranges from 0.084: 1 to 3356:1.

The composition X as defined above may be available by a process comprising admixing
5 the substances (i), (ii), (iii), (iv), and (v).

In another embodiment, the invention relates to a tabletop sweetener composition comprising

- 10 (c) at least one sugar sweetener, which is selected from the group consisting of monosaccharides, disaccharides, oligosaccharides and polysaccharides, preferably the at least one sugar sweetener is selected from the group consisting of arabinose, dextrin, dextrose, fructose, high fructose corn syrup, fructooligosaccharides, fructooligosaccharide syrups, galactose, galactooligosaccharides, glucose, glucose and (hydrogenated) starch syrups/hydrolysates, isomaltulose, lactose, hydrolysed
15 lactose, maltose, mannose, rhamnose, ribose, sucrose, stachyose, tagatose, trehalose, xylose, and combinations thereof, most preferably the at least one sugar sweetener is a disaccharide and/or fructose;
 - (d) at least one sugar alcohol (or polyol), which is selected from the group consisting of erythritol, galactitol, hydrogenated starch syrups including maltitol and sorbitol
20 syrups, inositols, isomalt, lactitol, maltitol, mannitol, xylitol, and combinations thereof, preferably the at least one sugar alcohol is erythritol; and
 - (c) at least one sweetener composition or at least one sweetnes enhancer composition of the invention.
- 25 Preferably, the at least one sweetener in the sweetener composition is selected from the group consisting of acesulfame potassium, aspartame, sucralose and thaumatin.

In one embodiment, the tabletop sweetener composition further comprises a taste-improving amount of cellulose.

30

In one embodiment, the tabletop sweetener composition comprises from 40 wt% to 90 wt% sugar alcohol based on the total weight of the tabletop sweetener composition, in particular more than 50% sugar alcohol.

In one embodiment, the tabletop sweetener composition comprises from 27 wt% to 50 wt% sugar sweetener based on the total weight of the tabletop sweetener composition.

5 In one embodiment, the tabletop sweetener composition comprises from 0.5 wt% to 7.0 wt% acesulfame potassium, aspartame, sucralose and/or thaumatin based on the total weight of the tabletop sweetener composition.

10 In one embodiment, the tabletop sweetener composition comprises from 0.5 wt% to 20 wt% of the composition as defined above based on the total weight of the sweetener composition.

The consumable product composition of the invention may also comprise a tabletop sweetener as defined above.

15 In one embodiment, the consumable product is selected from water-based consumables, solid dry consumables, dairy products, dairy-derived products and dairy-alternative products.

20 Preferably, the consumable product is a water-based consumable product selected from the group consisting of beverage, water, near water drink (optionally), aqueous beverage, enhanced/slightly sweetened water drink, flavored carbonated and still mineral and table water, non-carbonated beverage, carbonated water, still water, soft drink, carbonated soft drink (optionally), non-alcoholic drink, alcoholic drink, beer, wine, liquor, fruit drink, juice drink (optionally), juice, fruit juice, vegetable juice, nectar (optionally), broth drink, coffee, 25 tea, black tea, green tea, oolong tea, herbal infusion, cacao (water-based), tea-based drink (optionally), coffee-based drinks, cacao-based drink, dessert, syrup, frozen fruit, frozen fruit juice, water-based ice, fruit ice, sorbet, dressing, salad dressing, jams, marmalades, canned fruit, savoury, delicatessen products like delicatessen salads, sauces, ketchup, mustard, pickles and marinated fish, sauce, soup, and beverage botanical materials (whole 30 or ground), or instant powder for reconstitution (coffee beans, ground coffee, instant coffee, cacao beans, cacao powder, instant cacao, tea leaves, instant tea powder).

Preferably, the consumable product is a solid dry consumable product selected from the group consisting of cereals, baked food products, biscuits, bread, breakfast cereal, cereal

bar, energy bars/nutritional bars, granola, cakes, rice cakes, cookies, crackers, donuts, muffins, pastries, confectioneries, chewing gum, chocolate products, chocolates, fondant, candy, hard candy, marshmallow, pressed tablets, snack foods, botanical materials (whole or ground), and instant powders for reconstitution.

5

Preferably, the consumable product is a dairy product, dairy-derived product and/or dairy-alternative product selected from the group consisting of milk, fluid milk, cultured milk product, cultured and noncultured dairy-based drink, cultured milk product cultured with lactobacillus, yoghurt, yoghurt-based beverage, smoothy, lassi, milk shake, acidified milk, acidified milk beverage, butter milk, kefir, milk-based beverages, milk/juice blend, fermented milk beverage, icecream, dessert, sour cream, dip, salad dressing, cottage cheese, frozen yoghurt, soy milk, rice milk, soy drink, and rice milk drink.

10

Particularly preferred, the consumable product is a beverage.

15

In particularly preferred embodiments, the beverage is a near water drink, a tea-based drink, a carbonated soft drink, a juice drink and/or a nectar.

Preferably, the consumable product is a dental product selected from the group consisting of toothpaste, dental floss, mouthwash, denture adhesive, enamel whitener, fluoride treatments and oral care gels, preferably toothpaste.

20

Preferably, the consumable product is a cosmetic product selected from the group consisting of lipstick, lip balm, lip gloss and petroleum jelly.

25

Preferably, the consumable product is a pharmaceutical product selected from the group consisting of over-the-counter and prescription drugs, non-tobacco snuff, tobacco substitutes, chewable medications, cough syrups, throat sprays, throat lozenges, cough drops, antibacterial products, pill coatings, gel caplets, soluble fiber preparations, antacids, tablet cores, rapidly absorbed liquid compositions, stable foam compositions, rapidly disintegrating pharmaceutical dosage forms, beverage concentrates for medicinal purposes, aqueous pharmaceutical suspensions, liquid concentrate compositions, and stabilized sorbic acid solutions, phosphate buffers, saline solutions, emulsion, non-aqueous pharmaceutical solvents, aqueous pharmaceutical carriers, solid pharmaceutical carrier,

30

and pharmaceutical preservatives/additives (antimicrobials, antioxidants, chelating agents, inert gases, flavoring agents, coloring agents).

In one embodiment, the consumable product is an animal feed or animal food.

5

Preferably, the flavoring, more preferably the composition X as defined above is present in an amount effective to impart rich taste to a consumable product.

10

In one embodiment, the flavoring, preferably the composition X as defined above is present in the consumable product composition in a concentration from 0.01 wppm to 50 wppm.

15

In one embodiment, the sweetener composition as defined above is present in the consumable product composition in a concentration from 1 wppm to 900 wppm.

In one embodiment, the tabletop sweetener composition as defined above is present in the consumable product composition in a concentration from 0.1 wppm to 80 wppm.

20

Preferably, the sweetener composition or the tabletop sweetener composition of the consumable product composition comprises acesulfame potassium.

Preferably, the sweetener composition or the tabletop sweetener composition of the consumable product composition comprises acesulfame potassium and thaumatin.

25

In particularly preferred embodiments, the sweetener composition or the tabletop sweetener composition of the consumable product composition comprises acesulfame potassium and sucralose.

30

In one embodiment, the consumable product composition comprises a beverage and a sweetener composition comprising acesulfame potassium, sucralose and the composition X as defined above.

In another embodiment, the invention relates to a method of imparting rich taste to a consumable product, comprising adding to a consumable product the taste masking

composition as defined above.

Preferably, in the method described above, the composition X as defined above shall be contained in the consumable product in an amount of 0.01 wppm to 50 wppm.

5

In another aspect, the invention relates to a method of sweetening a consumable product composition, comprising the step of adding to a consumable product the sweetener composition or sweetness enhancer composition as defined above to yield a sweetened consumable product composition, wherein the sweetened consumable product has
10 substantially no unpleasant off-taste, aftertaste or lingering sweetness.

Preferably, the sweetened consumable product has a rich taste.

In another aspect, the invention relates to a method of providing a sweetener or sweetness
15 enhancer composition, comprising the step of adding to a sweetener or sweetness enhancer the flavoring as defined above to yield a sweetener or sweetness enhancer composition, wherein the sweetener or sweetness enhancer composition has substantially no unpleasant off-taste, aftertaste or lingering sweetness when used in a consumable product.

20 The present invention also comprises a method comprising the step of adding to a consumable product the flavoring as defined above in an amount effective to modify, mask, reduce or suppress the unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetener or a sweetness enhancer in the consumable product, that is less than the flavorings's taste threshold concentration, to yield a sweetened consumable product
25 composition, wherein the sweetened consumable product has substantially no unpleasant off-taste, aftertaste or lingering sweetness.

In another aspect, the present invention relates to a method of modifying, masking, reducing and/or suppressing an unpleasant off-taste, aftertaste or lingering sweetness of at
30 least one sweetener/sweetness enhancer composition, the method comprising the steps of:

(i) selecting at least one flavoring,

(ii) diluting the at least one flavoring with a diluent to form a diluted composition to determine a flavor threshold level at which the flavor of the flavoring is not detectable by taste in the diluted composition,

(iii) adding at least one flavoring at a level at or below the flavor threshold level to a sweetener/sweetness enhancer to form a sweetener composition; and

(iv) determining whether the at least one flavoring, when present in the sweetener composition at or below the flavor threshold level, is capable of modifying, masking,
5 reducing and/or suppressing the unpleasant off-taste, aftertaste or lingering sweetness of the sweetener/sweetness enhancer in the sweetener composition.

In another aspect, the present invention relates to a method of identifying a flavoring being capable of modifying, masking, reducing and/or suppressing an unpleasant off-taste,
10 aftertaste or lingering sweetness of at least one sweetener/sweetness enhancer, the method comprising the steps of:

(i) selecting at least one flavoring,

(ii) diluting the at least one flavoring with a diluent to form a diluted composition to determine a flavor threshold level at which the flavor of the flavoring is not detectable by
15 taste in the diluted composition, and

(iii) adding at least one flavoring at a level at or below the flavor threshold level to a sweetener/sweetness enhancer to form a sweetener composition; and

(iv) determining whether the at least one flavoring, when present in the sweetener composition at or below the flavor threshold level, is capable of modifying, masking,
20 reducing and/or suppressing the unpleasant off-taste, aftertaste or lingering sweetness of the sweetener/sweetness enhancer in the sweetener composition.

In one embodiment, said methods of the invention further comprise the step of adding the at least one flavoring to a sweetener composition when the at least one flavoring is
25 determined to be capable of modifying, masking, reducing and/or suppressing the unpleasant off-taste of the sweetener/sweetness enhancer in the sweetener composition.

In one embodiment, said methods of the invention further comprise the step of adding the at least one flavoring to a consumable product to form a consumable product composition
30 when the at least one flavoring is determined to be capable of modifying, masking, reducing and/or suppressing the unpleasant off-taste of the sweetener/sweetness enhancer in the consumable product composition.

In one embodiment, said methods of the invention further comprise the step of refraining

from using the at least one flavoring when the at least one flavoring is determined to be incapable of modifying, masking, reducing and/or suppressing the unpleasant off-taste of the sweetener/sweetness enhancer in the sweetener composition.

- 5 In one embodiment, the unpleasant off-taste of the sweetener, the sweetness enhancer or the consumable product is an acidic off-taste, an astringent off-taste, a bitter off-taste, a liquorice off-taste, a metallic off-taste or a throat-burning off-taste.

- 10 In one embodiment, the unpleasant aftertaste of the sweetener, the sweetness enhancer or the consumable product is an astringent or bitter aftertaste.

Detailed Description of the Invention

Novel Taste-Masking Compositions

15

As indicated above, there is a need for improved compositions, e.g., comprising flavorings, that can modify, mask, reduce and/or suppress unpleasant taste features associated with sweeteners or sweetness enhancers without demonstrating disadvantages, e.g., the disadvantages of known taste-masking substances. In particular, the need exists for improved compositions that do not add the taste of the flavoring to the end product composition and that do not reduce the sweetening power of the sweetener or sweetness enhancer also contained in the end product composition.

20 The need also exists for the use of flavoring(s), in specific amounts, levels, and/or concentrations such that the taste of the flavoring is not detectable by taste, but the sweetness and/or sweetness enhancement of a sweetener and/or sweetness enhancer that may be employed therewith may be improved. Preferably, the taste-masking compositions provide for reductions in the quantity of sweetener or sweetness enhancer used therewith.

30 One problem underlying the present invention was to provide compositions which are suitable for taste-masking, in particular for modifying, masking, reducing and/or suppressing unpleasant taste features that are associated with sweeteners or sweetness enhancers.

Another problem addressed by the present invention relates to the determination or identification of flavorings that are capable of modifying, masking, reducing and/or suppressing the unpleasant off-taste of at least one sweetener/sweetness enhancer. Another problem addressed by the present invention is the provision and determination of flavor threshold levels for such flavorings. The use of the flavorings at these flavor threshold levels levels is also addressed.

The present invention, in one aspect, relates to a sweetener composition comprising a sweetener and at least one flavoring. The sweetener has a sweetness associated therewith and the flavoring has a flavor associated therewith. In embodiments where multiple flavorings are employed, each flavoring has a respective flavor associated therewith. Similarly, in embodiments where multiple sweeteners are employed, each sweetener has a respective flavor associated therewith.

In the context of the present invention, the at least one additional flavoring is suitable for modifying, masking, reducing and/or suppressing an unpleasant off-taste of a sweetener. The sweetener (and the flavoring) may be present in a consumable product composition formed by adding the sweetener composition to a consumable product. Consequently, the flavoring is present in an amount that is suitable for modifying, masking, reducing and/or suppressing the unpleasant off-taste. Specific examples of such amounts are discussed, in detail, herein. As disclosed herein, the weight ratio of the at least one flavoring to the sweetener in the consumable product composition is such that the sweetness of the sweetener is detectable, e.g., by taste, in the consumable product composition and the flavor of the at least one flavoring is not detectable, e.g., by taste, in the consumable product composition.

The detectability of the sweetness of the sweetener and/or of the flavor of the flavoring may be determined in many ways. In one embodiment, detectability may be assessed in terms of taste or recognition of taste. For example, in a consumable product, the presence and sweetness, e.g., sweet taste, of a sweetener may be noticeable and/or identifiable by a trained taster or tasting panel. In these cases, the sweetness of the sweetener may be recognized as a sweet taste in the consumable product composition. In some cases, this sweet taste may be determined by first tasting the sweetener individually. For example, a taster may taste a solution of acesulfame potassium in a water solution. When the

sweetener, e.g., the acesulfame potassium, is utilized in a consumable product composition, a similar taste (perhaps diluted to a degree) may be recognizable or identifiable by a taster. As such, the sweetener would be considered detectable in the consumer product.

5

In principle, the flavor of the flavoring, like the sweetness of the sweetener, may be recognizable or identifiable in a consumable product composition. As such, the flavor of the flavoring would be considered to be detectable. For example, a flavoring, when diluted in a water solution and tasted, may have an off-taste, e.g., a bitter taste, (individually and not in combination with another component). If this bitter taste is recognized or identified in the resultant consumable product composition, that flavor of the flavoring would be considered to be detectable.

The inventors have now found that, in some embodiments, the flavoring may actually be present in the consumable product composition, however, due to the use of the inventive combinations, ratio ranges, and/or concentration ranges, is determined to be "not detectable," e.g., by taste. In such a case, even though the flavoring was present in the consumable product, the flavor of the flavoring could not be identified or recognized by a taster or a tasting panel. For example, a sweetener having a sweetness and a flavoring having a flavor, e.g., bitter, may be utilized in a consumable product composition. If the consumable product composition is tasted by a taster and only sweetness is detectable, i.e., no bitterness is identified, then the bitter flavor of the flavoring would be considered to be not detectable, even though the flavoring may actually be present in trace amounts as may be determined by non-taste-related methods, e.g., mass spectroscopy. In one embodiment, if the individual flavor of the flavoring is not noticeable or identifiable, e.g., by a taster, in the consumable product composition, then the flavor may be considered to be not detectable.

Consequently, in accordance with the above, according to the present invention the term "not detectable" means that the respective flavoring either cannot be identified or cannot be recognized by taste. Consequently, the term "non-detectable" also includes the situation that the presence of the flavoring can be detected, but the concentration is still too low to allow an identification of the flavoring.

The skilled person will appreciate that the term "not detectable", therefore, preferably corresponds to a given threshold of the respective flavoring.

In a preferred embodiment, the concentration of the not detectable flavoring in the context
5 of the present invention is such that it is lower than the respective threshold level where the transition between detectable and non-detectable occurs, but still is capable of modifying, masking, reducing and/or suppressing the unpleasant off-taste.

In addition to the individual effects of the sweeteners and flavorings on the consumable
10 product composition, the inventors have now found that some flavorings may not only be considered non-detectable when present in the consumable product composition, but these flavorings may additionally positively affect the sweetness of the sweetener employed therewith. For example, the flavorings of the present invention may improve/increase the sweetness of the sweetener or may provide a rounder or creamier overall sweetness. This
15 result is surprising and unexpected because the improvements in sweetness are wholly unrelated to the individual flavor of the flavoring. Here, the improvement in sweetness is unrelated to the individual flavor of the flavoring. As such, the flavor of the flavoring is not detectable, while the (improved) sweetness of the sweetener is detectable. As one example, the use of a flavoring that individually has a bitter flavor with a sweetener would
20 provide a consumable product composition having a creamier sweetness. There would be no expectation that a bitter tasting flavorant: 1) would not be detectable in the consumable product composition; and 2) would add desirable qualities to a sweetener, e.g., creaminess and/or roundness, which are entirely unrelated to bitter flavor. In one embodiment the positive improvements in the taste of the sweetness are considered to be different from and
25 unrelated to the individual flavor of the flavoring.

In one embodiment, the consumable product composition (that comprises the sweetener/sweetness enhancer and the at least one flavoring) has a resultant overall flavor
30 detectably different from a total flavor of a similar consumable product composition that does not comprise the at least one flavoring. For example, the consumable product of the present invention may have an enhanced, rounder, or creamier sweetness and may have little or no bitterness as compared to a similar consumable product that does not contain the inventive flavorings.

In one aspect, the present invention relates to a sweetness enhancer composition comprising a sweetness enhancer and the at least one flavoring with the features as defined above. The at least one flavoring is suitable for modifying, masking, reducing and/or suppressing an unpleasant off-taste of the sweetness enhancer in a consumable product composition formed by adding the sweetness enhancer composition and a sweetener to a consumable product. The sweetness enhancer is capable of enhancing the sweetness of the sweetener, each of which may be present in the consumable product composition. As disclosed herein, the flavoring is present in an amount that is suitable for modifying, masking, reducing and/or suppressing the unpleasant off-taste of the sweetness enhancer.

As disclosed herein, the weight ratio of the at least one flavoring to the sweetness enhancer in the consumable product composition is such that the sweetness enhancer is capable of enhancing a sweetness of the sweetener present in the consumable product composition and the flavor of the at least one flavoring is not detectable, e.g., by taste, in the consumable product composition. The detectability/non-detectability of the flavoring is determined in a manner similar to that discussed above. The ratio of the at least one flavoring to the sweetness enhancer allows the sweetness enhancer to be present in an amount sufficient to enhance the sweetness of the sweetener while allowing the flavoring to positively affect the sweetener without adding detectable flavor to the respective composition.

The present invention, in one aspect, relates to a consumable product composition comprising the inventive sweetener composition and a consumable product. As noted above, the at least one flavoring is suitable for modifying, masking, reducing and/or suppressing an unpleasant off-taste of the sweetener in the consumable product composition. Also as noted above, the sweetener is present in an amount such that the sweetness of the sweetener is detectable, e.g., by taste, in the consumable product composition and the at least one flavoring is present in an amount such that the flavor of the at least one flavoring is not detectable, e.g., by taste, in the consumable product composition.

The present invention, in one aspect, relates to a consumable product composition comprising the inventive sweetness enhancer composition, a sweetener, and a consumable product with the features as defined above. As noted above, the at least one flavoring is

suitable for modifying, masking, reducing and/or suppressing an unpleasant off-taste of the sweetness enhancer in the consumable product composition. Also, as noted above, in this context the sweetness enhancer is present in the consumable product composition in an amount such that the sweetness enhancer is capable of enhancing a sweetness of the sweetener present in the consumable product composition and the at least one flavoring is present in an amount such that the flavor of the at least one flavoring is not detectable, e.g., by taste, in the consumable product composition.

In one embodiment, the sweetener composition, the sweetness enhancer composition and the consumable product compositions defined above do not comprise methoxy salicylaldehyde.

In one aspect, the present invention relates to a method of identifying a flavoring being capable of modifying, masking, reducing and/or suppressing an unpleasant off-taste of at least one sweetener/sweetness enhancer. The method also provides a flavor threshold level, which can be used in the production of the consumable product composition. The flavor threshold level may be employed to provide for the detectability (or non-detectability) of the flavoring in the consumable product composition.

The method comprises the step of selecting at least one flavoring. The flavorings may be as discussed herein. The method may further comprise the step of diluting the at least one flavoring with a diluent to form a diluted composition to determine a flavor threshold level at which the flavor of the flavoring is not detectable, e.g., by taste, in the diluted composition. In order to make this determination, the diluted composition may be sampled, e.g., tasted, at various stages of dilution. As the diluted composition becomes more dilute, the flavor of the flavorant will become less recognizable or identifiable. The flavor threshold level is the point at which the flavor of the flavoring is no longer recognized or identified by a taster or taste panel. The method further comprises the step of adding at least one flavoring to a sweetener and/or sweetness enhancer to form a sweetener composition. The sweeteners and/or sweetness enhancers are discussed above. The sweeteners and/or sweetness enhancers may have an unpleasant off-taste associated therewith, as discussed above. Preferably, the flavoring is added to the sweetener and/or the sweetness enhancer at a level at or below the flavor threshold level.

The method further comprises the step of determining whether the at least one flavoring, when present in the sweetener composition at or below the flavor threshold level, is capable of modifying, masking, reducing and/or suppressing the unpleasant off-taste of the sweetener/sweetness enhancer in the sweetener composition. This determination may be made by employing suitable methods known in the art. For example the determination may be made by utilizing a taster or a taste panel. The taster may sample the prepared sweetener composition and make a determination as to whether the off-taste has been modified, masked, reduced, and/or suppressed. If so, then the particular flavoring is capable of modifying, masking, reducing, and/or suppressing unpleasant off-tastes. Preferably, the flavor of the flavoring is not detectable, e.g., by taste, in the sweetener composition, the sweetness enhancer composition, and/or the consumable product composition. If the particular flavoring does not modify, mask, reduce, and/or suppress the off-taste, then the flavoring may not be a suitable flavoring.

The invention, in another aspect, relates to a method of modifying, masking, reducing and/or suppressing an unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetener/sweetness enhancer composition. The method comprises the above-mentioned steps of:

(i) selecting at least one flavoring,

(ii) diluting the at least one flavoring with a diluent to form a diluted composition to determine a flavor threshold level at which the flavor of the flavoring is not detectable in the diluted composition,

(iii) adding at least one flavoring at a level at or below the flavor threshold level to a sweetener/sweetness enhancer to form a sweetener composition; and

(iv) determining whether the at least one flavoring, when present in the sweetener composition at or below the flavor threshold level, is capable of modifying, masking, reducing and/or suppressing the unpleasant off-taste of the sweetener/sweetness enhancer in the sweetener composition.

When the at least one flavoring is determined to be capable of modifying, masking, reducing and/or suppressing the unpleasant off-taste of the sweetener/sweetness enhancer in the sweetener composition, a modified sweetener composition may be produced by combining a quantity of the capable flavoring with sweetener and/or sweetness enhancer at a level at or below the flavor threshold level to form the modified sweetener composition.

In one embodiment, the modified sweetener composition may be different and separate from the sweetener composition formed in previous steps. Similarly, a consumable product may be formed by combining the capable flavoring with a consumable product, and sweetener and/or sweetness enhancer at a level at or below the flavor threshold level to
5 form the modified sweetener composition.

In one aspect, the present invention relates to the use of at least one flavoring for modifying, masking, reducing and/or suppressing an unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetener in a consumable product composition with
10 the features as defined above. The consumable product composition comprises the sweetener and a consumable product. The at least one flavoring is suitable for masking the unpleasant off-taste of the sweetener in the consumable product composition. The sweetener is present in the consumable product composition such that the sweetness of the sweetener is detectable, e.g., by taste, in the consumable product composition and the
15 flavor of the at least one flavoring is not detectable, e.g., by taste, in the consumable product composition

The invention, in another aspect, relates to the use of at least one flavoring for modifying, masking, reducing and/or suppressing an unpleasant off-taste, aftertaste or lingering
20 sweetness of at least one sweetness enhancer in a consumable product composition. The consumable product composition comprises the sweetness enhancer, a sweetener, and a consumable product. The at least one flavoring is suitable for masking the unpleasant off-taste of the sweetness enhancer in the consumable product composition. The sweetness enhancer is present in the consumable product composition such that the sweetness
25 enhancer is capable of enhancing a sweetness of the sweetener present in the consumable product composition and the flavor of the at least one flavoring is not detectable, e.g., by taste, in the consumable product composition.

The inventors have further now found that some combinations of volatile flavorings and
30 non-volatile flavorings provide for improvement of sweetening or sweetness enhancing characteristics of sweeteners and/or sweetness enhancers.

In one aspect, the present invention relates to the flavoring(s) discussed above, wherein the at least one flavoring comprises at least one non-volatile flavoring and at least one volatile

flavoring. The inventive compositions utilize the volatile flavorings to modify, mask, reduce and/or suppress unpleasant off-tastes in relation to flavor and/or aroma and the non-volatile flavorings modify, mask, reduce and/or suppress unpleasant off-tastes in relation to taste or tongue-related senses. In one embodiment, a weight ratio of the at least one non-volatile flavoring to the at least one volatile flavoring ranges from 2:1 to 100:1, preferably from 6:1 to 40:1.

In one embodiment, the at least one non-volatile flavoring has a boiling point ranging from 150°C to 500°C, preferably from 190°C to 400°C or from 225°C to 350°C. In one embodiment, the at least one volatile flavoring has a boiling point less than 150°C, e.g., less than 140°C, less than 125°C, or less than 100°C.

The non-volatile flavorings may vary widely. For example, the non-volatile flavoring may be selected from the group consisting of:

- 15 a compound comprising a flavanonyl moiety, in particular a flavanone, a hydroxyflavanone, a dihydroxyflavanone or a trihydroxyflavanone;
- a compound comprising a quininyll moiety, in particular quinine, quinine bisulfate, quinine hydrochloride, quinine sulfate, hydroxyquinine;
- a compound comprising a purinyll moiety, in particular caffeine or theobromine;
- 20 a compound comprising a saccharide acetate moiety, in particular glucose penta-acetate or sucrose octa-acetate; and
- benzyl diethyl-(2:6-xylyl-carbamoyl-methyl)-ammonium benzoate, Preferably, the at least one non-volatile flavoring is selected from the group consisting of naringin, naringenin and naringin dihydrochalcone or a naringin containing extract, preferably
- 25 naringin.

The volatile flavorings may vary widely. For example, the volatile flavoring may be selected from the group consisting of:

- at least one carbonyl compound selected from the group consisting of:
- 30 a compound comprising a vanillin moiety, in particular vanillin, ethyl vanillin, methyl vanillate, ethyl vanillate, vanillic acid, vanillin isobutyrate, ethyl vanillin isobutyrate, acetovanillone or 5-methoxyvanillin;
- a compound comprising a benzaldehyde moiety other than a vanillin moiety, in particular 4-hydroxybenzaldehyde, 2-methoxybenzaldehyde, 3-methoxybenzaldehyde, 4-

methoxybenzaldehyde, 4-ethoxybenzaldehyde, 4-ethylbenzaldehyde, 2-hydroxy-4-methylbenzaldehyde, 2-methoxybenzoic acid, 3,4-dihydroxybenzaldehyde, 4-hydroxy-3,5-dimethoxybenzaldehyde, veratraldehyde, anis aldehyde, salicylaldehyde, 3-methoxy salicylaldehyde or 4-methoxy salicylaldehyde;

5 a compound comprising a benzoic acid moiety, 3-methoxybenzoic acid, 4-methoxybenzoic acid, 2-hydroxybenzoic acid, 3-hydroxybenzoic acid, 4-hydroxybenzoic acid, ethyl 2-hydroxy-4-methylbenzoate or anisic acid; and

a compound comprising an acetophenone moiety, in particular 2-hydroxyacetophenone, 3-hydroxyacetophenone or 4-hydroxyacetophenone, most
10 particularly 4-methoxy salicylaldehyde and syringaldehyde.

at least one lactone selected from the group consisting of:

pentano-1,5-lactone, hexano-1,5-lactone, heptano-1,5-lactone, octano-1,5-lactone, nonano-1,5-lactone, decano-1,5-lactone, undecano-1,5-lactone, dodecano-1,5-lactone, tridecano-1,5-lactone, tetradecano-1,5-lactone, pentadecano-1,5-lactone, hexadecano-1,5-lactone, pent-2-eno-1,5-lactone, hex-2-eno-1,5-lactone, hept-2-eno-1,5-lactone, oct-2-eno-1,5-lactone, non-2-eno-1,5-lactone, dec-2-eno-1,5-lactone, undec-2-eno-1,5-lactone, dodec-2-eno-1,5-lactone, tridec-2-eno-1,5-lactone, tetradec-2-eno-1,5-lactone, pentadec-2-eno-1,5-lactone, hexadec-2-eno-1,5-lactone, dec-5-eno-1,5-lactone, dec-6-eno-1,5-lactone, dec-7-eno-1,5-lactone, dec-8-eno-1,5-lactone, undec-5-eno-1,5-lactone, undec-6-eno-1,5-lactone, undec-7-eno-1,5-lactone, undec-8-eno-1,5-lactone, dodec-2-eno-1,5-lactone, nepetalactone

pentano-1,4-lactone, hexano-1,4-lactone, heptano-1,4-lactone, octano-1,4-lactone, nonano-1,4-lactone, decano-1,4-lactone, undecano-1,4-lactone, dodecano-1,4-lactone, tridecano-1,4-lactone, tetradecano-1,4-lactone, pentadecano-1,4-lactone, hexadecano-1,4-lactone, butyloctano-1,4-lactone, dodec-6-eno-1,4-lactone, dec-7-eno-1,4-lactone, cis-dec-7-eno-1,4-lactone, 2,7-dimethylocta-5(trans),7-dieno-1,4-lactone, hex-2-eno-1,4-lactone, 3-methylnonano-1,4-lactone, 3-methyloctano-1,4-lactone, non-2-eno-1,4-lactone, 2-decen-1,4-lactone, dimethylnon-2-eno-1,4-lactone, 3-methyl gamma-decalactone, 4-methyl-5-hexen-1,4-olide, 4-hydroxyoctanoic acid lactone, 4-hydroxy-3-methyl octanoic acid
25 lactone, 4-hydroxyundecanoic acid lactone and 4-hydroxy-2-hexanoic acid lactone.

In one embodiment, in the methods or uses described above, the at least one flavoring does not comprise methoxy salicylaldehyde.

In the following, in case that reference is made to a flavoring used according to the invention suitable for modifying, masking, reducing and/or suppressing an unpleasant off-taste of the sweetener in the consumable product composition, this reference also applies to the at least one flavoring as used in the context of the present invention.

5

According to a preferred embodiment of the present invention, the at least one flavoring is part of a composition X comprising the following substances:

- (1) at least one bitter blocking agent;
- (2) at least one carbonyl compound; and
- 10 (3) at least one lactone.

In one embodiment, the at least one carbonyl compound comprises

- (2a) a first carbonyl compound; and
- (2b) a second carbonyl compound.

15

In one embodiment, the at least one lactone comprises

- (3a) a first lactone; and
- (3b) a second lactone.

- 20 In one embodiment, the at least one bitter blocking agent (1) is a bitterness agent having a bitter off-taste.

In one embodiment, the at least one bitter blocking agent (1) is selected from the group consisting of:

- 25 a compound comprising a flavanonyl moiety, in particular a flavanone, a hydroxyflavanone, a dihydroxyflavanone or a trihydroxyflavanone;
- a compound comprising a quininyll moiety, in particular quinine, quinine bisulfate, quinine hydrochloride, quinine sulfate, hydroxyquinine;
- a compound comprising a purinyll moiety, in particular caffeine or theobromine;
- 30 a compound comprising a saccharide acetate moiety, in particular glucose penta-acetate or sucrose octa-acetate; and
- benzyl diethyl-(2:6-xylyl-carbamoyl-methyl)-ammonium benzoate.

Preferably, the at least one bitter blocking agent (1) is a compound comprising a flavanoyl moiety selected from the group consisting of naringin, naringenin and naringin dihydrochalcone or a naringin containing extract, preferably naringin.

- 5 The at least one bitter blocking agents (1) are commercially available or can be prepared by the skilled person based on his general knowledge.

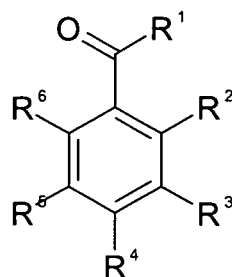
The at least one bitter blocking agents (1) may be of synthetic or of natural origin.

- 10 In one embodiment, the at least one carbonyl compound (2) contains from 7 to 18 carbon atoms, preferably from 7 to 14 carbon atoms.

In one embodiment, the at least one carbonyl compound (2) has a boiling point of from 150°C to 500°C, preferably from 190°C to 400°C.

15

In one embodiment, the at least one carbonyl compound (2) is a carbonyl compound of the formula (I)



(I)

- wherein said carbonyl compound does not contain more than 18 carbon atoms, preferably
 20 from 8 to 14 carbon atoms, and

wherein

R¹ is hydrogen, hydroxy, C₁-C₈ alkyl or C₂-C_g alkenyl; and

R², R³, R⁴, R⁵ and R⁶ are identical or different and each is independently of the others

- 25 hydrogen, hydroxy, Ci-C_g alkyl, C₁-C_galkoxy or C₂-C_g alkenyl.

Preferably, in the carbonyl compound of the formula (I) at least one of R², R³, R⁴, R⁵ and R⁶ is hydroxy or methoxy.

Preferably, the at least one carbonyl compound (2) is selected from the group consisting of a compound comprising a vanillin moiety, in particular vanillin, ethyl vanillin, methyl vanillate, ethyl vanillate, vanillic acid, vanillin isobutyrate, ethyl vanillin isobutyrate, acetovanillone or 5-methoxyvanillin;

a compound comprising a benzaldehyde moiety other than a vanillin moiety, in particular 4-hydroxybenzaldehyde, 2-methoxybenzaldehyde, 3-methoxybenzaldehyde, 4-methoxybenzaldehyde, 4-ethoxybenzaldehyde, 4-ethylbenzaldehyde, 2-hydroxy-4-methylbenzaldehyde, 2-methoxybenzoic acid, 3,4-dihydroxybenzaldehyde, 4-hydroxy-3,5-dimethoxybenzaldehyde, veratraldehyde, anis aldehyde, salicylaldehyde, 3-methoxy salicylaldehyde or 4-methoxy salicylaldehyde;

a compound comprising a benzoic acid moiety, 3-methoxybenzoic acid, 4-methoxybenzoic acid, 2-hydroxybenzoic acid, 3-hydroxybenzoic acid, 4-hydroxybenzoic acid, ethyl 2-hydroxy-4-methylbenzoate or anisic acid; and

a compound comprising an acetophenone moiety, in particular 2-hydroxyacetophenone, 3-hydroxyacetophenone or 4-hydroxyacetophenone.

Preferably, the at least one carbonyl compound (2) is selected from the group consisting of 4-methoxy salicylaldehyde and syringaldehyde. In particular, the at least one carbonyl compound (2) comprises syringaldehyde and/or acetoin.

In a preferred embodiment, the composition X does not comprise methoxy salicylaldehyde, in particular the composition X does not comprise, as at least one carbonyl compound (2), methoxy salicylaldehyde.

The carbonyl compounds of the formula (I) are commercially available or can be prepared by the skilled person based on his general knowledge.

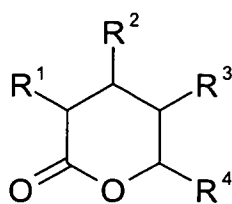
The carbonyl compounds of the formula (I) may be of synthetic or of natural origin.

In one embodiment, the at least one lactone (3) contains from 6 to 18 carbon atoms, preferably from 8 to 14 carbon atoms.

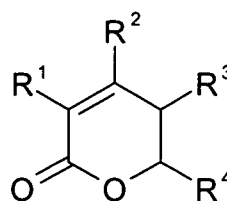
In one embodiment, the at least one lactone (3) has a boiling point of between 150°C and 500°C, preferably between 190°C and 400°C.

In one embodiment, the at least one lactone (3) comprises a saturated or an unsaturated
5 delta-lactone.

In one embodiment, the at least one lactone (3) comprises a delta-lactone of the formulae (II) or (III)



(II)



(III)

10

wherein said lactone does not contain more than 18 carbon atoms, preferably from 8 to 14 carbon atoms, and

wherein

R¹, R², R³ and R⁴ are identical or different and each is independently of the others
15 hydrogen, hydroxy, Ci-Ci₀ alkyl, Ci-Ci₀ alkoxy or C₂-C₁₀ alkenyl.

Preferably, the at least one lactone (3) is selected from the group consisting of:

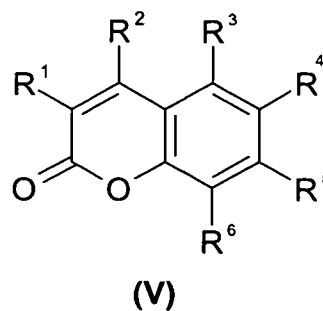
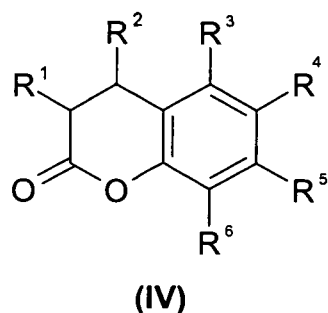
pentano-1,5-lactone, hexano-1,5-lactone, heptano-1,5-lactone, octano-1,5-lactone, nonano-
1,5-lactone, decano-1,5-lactone, undecano-1,5-lactone, dodecano-1,5-lactone, tridecano-
20 1,5-lactone, tetradecano-1,5-lactone, pentadecano-1,5-lactone, hexadecano-1,5-lactone,
pent-2-eno-1,5-lactone, hex-2-eno-1,5-lactone, hept-2-eno-1,5-lactone, oct-2-eno-1,5-
lactone, non-2-eno-1,5-lactone, dec-2-eno-1,5-lactone, undec-2-eno-1,5-lactone, dodec-2-
eno-1,5-lactone, tridec-2-eno-1,5-lactone, tetradec-2-eno-1,5-lactone, pentadec-2-eno-1,5-
lactone, hexadec-2-eno-1,5-lactone, dec-5-eno-1,5-lactone, dec-6-eno-1,5-lactone, **dec-7-**
25 **eno-1,5-lactone**, dec-8-eno-1,5-lactone, undec-5-eno-1,5-lactone, undec-6-eno-1,5-lactone,
undec-7-eno-1,5-lactone, undec-8-eno-1,5-lactone, dodec-2-eno-1,5-lactone and
nepetalactone.

The delta-lactones of the formulae (II) and (III) are commercially available or can be prepared by the skilled person based on his general knowledge.

The delta-lactones of the formulae (II) and (III) may be of synthetic or of natural origin.

5

In one embodiment, the at least one lactone (3) comprises a delta-lactone of the formulae (IV) or (V)



10

wherein said lactone does not contain more than 18 carbon atoms, preferably from 9 to 14 carbon atoms, and

wherein

R¹, R², R³, R⁴, R⁵ and R⁶ are identical or different and each is independently of the others

15 hydrogen, hydroxy, C₁-C₆ alkyl, C₁-C₄ alkoxy or C₂-C₆ alkenyl.

Preferably, the at least one lactone (3) is selected from the group consisting of:

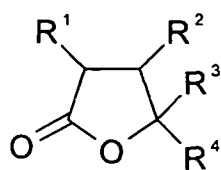
6-methylcoumarin, 3,4-dihydrocoumarin, and 7-ethoxy-4-methylcoumarin.

20 The delta-lactones of the formulae (IV) and (V) are commercially available or can be prepared by the skilled person based on his general knowledge.

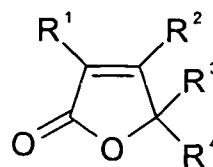
The delta-lactones of the formulae (IV) and (V) may be of synthetic or of natural origin.

25 In one embodiment, the at least one lactone (3) comprises a saturated or an unsaturated gamma-lactone.

In one embodiment, the at least one lactone (3) comprises a gamma-lactone of the formulae (VI) or (VII)



(VI)



(VII)

wherein said lactone does not contain more than 18 carbon atoms, preferably from 8 to 14 carbon atoms, and

5 wherein

R^1 , R^2 and R^3 are identical or different and each is independently of the others hydrogen, hydroxy, Ci-C₁₀ alkyl, Ci-C₁₀ alkoxy or C₂-C₁₀ alkenyl; and

R^4 is hydrogen, C₁-C₁₀ alkyl or C₂-C₁₀ alkenyl;

10 Preferably, the gamma-lactone is selected from the group consisting of:

pentano-1,4-lactone, hexano-1,4-lactone, heptano-1,4-lactone, octano-1,4-lactone, nonano-1,4-lactone, decano-1,4-lactone, undecano-1,4-lactone, dodecano-1,4-lactone, tridecano-1,4-lactone, tetradecano-1,4-lactone, pentadecano-1,4-lactone, hexadecano-1,4-lactone, butyloctano-1,4-lactone, dodec-6-eno-1,4-lactone, dec-7-eno-1,4-lactone, cis-dec-7-eno-1,4-lactone, 2,7-dimethylocta-5(trans),7-dieno-1,4-lactone, hex-2-eno-1,4-lactone, 3-methylnonano-1,4-lactone, 3-methyloctano-1,4-lactone, non-2-eno-1,4-lactone, 2-decen-1,4-lactone, dimethylnon-2-eno-1,4-lactone, 3-methyl gamma-decalactone, 4-methyl-5-hexen-1,4-olide, 4-hydroxyoctanoic acid lactone, 4-hydroxy-3-methyl octanoic acid lactone, 4-hydroxyundecanoic acid lactone and 4-hydroxy-2-hexanoic acid lactone.

20

In one embodiment, the at least one lactone comprises a delta lactone and a gamma lactone, preferably the first lactone (3a) is a delta-lactone and the second lactone (3b) is a gamma-lactone.

25 The gamma-lactones of the formulae (VI) and (VII) are commercially available or can be prepared by the skilled person based on his general knowledge.

The gamma-lactones of the formulae (VI) and (VII) may be of synthetic or of natural origin.

30

As used herein, the term "Ci-C₈-alkyl" means a straight-chain or branched alkyl group with 1 to 8 carbon atoms, preferably a straight-chain or branched alkyl group with 1 to 6 carbon atoms and particularly preferred a straight-chain or branched alkyl group with 1 to 4 carbon atoms. Examples of straight-chain and branched Ci-C₈-alkyl groups include, but are not limited to, methyl, ethyl, propyl, isopropyl, butyl, isobutyl, tert.-butyl, the isomeric pentyls, the isomeric hexyls, the isomeric heptyls, the isomeric octyls, preferably methyl and ethyl and most preferred methyl.

As used herein, the term "Ci-C₁₀-alkyl" means a straight-chain or branched alkyl group with 1 to 10 carbon atoms, preferably a straight-chain or branched alkyl group with 1 to 6 carbon atoms and particularly preferred a straight-chain or branched alkyl group with 1 to 4 carbon atoms. Examples of straight-chain and branched Ci-C₁₀-alkyl groups include, but are not limited to, methyl, ethyl, propyl, isopropyl, butyl, isobutyl, tert.-butyl, the isomeric pentyls, the isomeric hexyls, the isomeric heptyls, the isomeric octyls, preferably methyl and ethyl and most preferred methyl.

As used herein, the term "Ci-C₈-alkoxy" means the group R'O-, wherein R' is C₁-C₈-alkyl and has the meanings defined above. Examples of C₁-C₈-alkoxy groups include, but are not limited to, methoxy, ethoxy, n-propoxy, isopropoxy, n-butoxy, isobutoxy, sec.-butoxy and tert.-butoxy, preferably methoxy and ethoxy.

As used herein, the term "Ci-C₁₀-alkoxy" means the group R'O-, wherein R' is Ci-C₁₀-alkyl and has the meanings defined above. Examples of C₁-C₁₀-alkoxy groups include, but are not limited to, methoxy, ethoxy, n-propoxy, isopropoxy, n-butoxy, isobutoxy, sec-butoxy and tert.-butoxy, preferably methoxy and ethoxy.

As used herein, the term "C₂-C₈-alkenyl" alone or in combination means a straight-chain or branched hydrocarbon residue comprising an olefinic bond and 1 to 8, preferably 1 to 6, more preferably 1 to 4, carbon atoms. Examples of alkenyl groups include, but are not limited to, ethenyl, 1-propenyl, 2-propenyl, isopropenyl, 1-butenyl, 2-butenyl, 3-butenyl and isobutenyl. A preferred example is 2-propenyl.

As used herein, in Part B, the term "as defined above" relates to the definitions of Part B.

As used herein, in Part B, the term "as defined below" relates to the definitions of Part B.

In one embodiment, the at least one bitter blocking agent (1) is present in the composition X in an amount ranging from 15 wt% to 55 wt%.

5

In one embodiment, the at least one carbonyl compound (2) is present in the composition X in an amount ranging from 0.5 wt% to 10.0 wt%.

10 In one embodiment, the at least one lactone (3) is present in the composition X in an amount ranging from 0.06 wt% to 10.0 wt%.

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to the first carbonyl compound (2a) ranges from 50:1 to 200000:1.

15 In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to the second carbonyl compound (2b) ranges from 0.25:1 to 2000:1.

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to the first lactone (3a) ranges from 5:1 to 10000:1.

20

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to the second lactone (3b) ranges from 5:1 to 4000:1.

In one embodiment, the composition X further comprises

25 (4) at least one additional substance.

In one embodiment, the at least one additional substance (4) is selected from at least one amino acid, taurine, maltol, at least one additional flavoring ingredient, and combinations thereof.

30

Preferably, the at least one amino acid are one to thirteen amino acids selected from the group consisting of L-alanine, L-leucine, glycine, L-aspartic acid, L-lysine monohydrate, L-threonine, L-isoleucine, L-tyrosine, L-methionine, L-proline, L-serine, L-valine and L-glutamic acid.

Preferably, the at least one amino acid are one to eleven amino acids selected from the group consisting of L-alanine, L-leucine, glycine, L-aspartic acid, L-threonine, L-isoleucine, L-tyrosine, L-proline, L-serine, L-valine and L-glutamic acid.

5

Preferably, the composition X comprises all of the above thirteen or all of the above eleven amino acids.

10

In a preferred embodiment, the composition X does not comprise the substance methoxy salicylaldehyde.

In one embodiment, the composition X does not comprise all 5 of the following substances: naringin, methoxy salicylaldehyde, syringaldehyde, massoia lactone, and whiskey lactone.

15

In one embodiment, the composition X comprises

(1) at least one bitter blocking agent selected from the group consisting of

a compound comprising a flavanonyl moiety, in particular a flavanone, a hydroxyflavanone, a dihydroxyflavanone or a trihydroxyflavanone, preferably naringin, naringenin and naringin dihydrochalcone or a naringin containing extract, most preferably naringin;

20

a compound comprising a quininyll moiety, in particular quinine, quinine bisulfate, quinine hydrochloride, quinine sulfate, hydroxyquinine;

a compound comprising a purinyll moiety, in particular caffeine or theobromine;

25

a compound comprising a saccharide acetate moiety, in particular glucose penta-acetate or sucrose octa-acetate; and

benzyl diethyl-(2:6-xylyl-carbamoyl-methyl)-ammonium benzoate;

(2) at least one carbonyl compound selected from the group consisting of

30

a compound comprising a vanillin moiety, in particular vanillin, ethyl vanillin, methyl vanillate, ethyl vanillate, vanillic acid, vanillin isobutyrate, ethyl vanillin isobutyrate, acetovanillone or 5-methoxyvanillin;

a compound comprising a benzaldehyde moiety other than a vanillin moiety, in particular 4-hydroxybenzaldehyde, 2-methoxybenzaldehyde, 3-methoxybenzaldehyde, 4-methoxybenzaldehyde, 4-ethoxybenzaldehyde, 4-ethylbenzaldehyde, 2-hydroxy-4-methylbenzaldehyde, 2-methoxybenzoic acid, 3,4-dihydroxybenzaldehyde, 4-hydroxy-3,5-dimethoxybenzaldehyde, veratraldehyde, anis aldehyde, salicylaldehyde, 3-methoxy salicylaldehyde or 4-methoxy salicylaldehyde;

a compound comprising a benzoic acid moiety, 3-methoxybenzoic acid, 4-methoxybenzoic acid, 2-hydroxybenzoic acid, 3-hydroxybenzoic acid, 4-hydroxybenzoic acid, ethyl 2-hydroxy-4-methylbenzoate or anisic acid; and

10 a compound comprising an acetophenone moiety, in particular 2-hydroxyacetophenone, 3-hydroxyacetophenone or 4-hydroxyacetophenone, most particularly 4-methoxy salicylaldehyde and syringaldehyde; and

(3) at least one lactone selected from the group consisting of

15 pentano-1,5-lactone, hexano-1,5-lactone, heptano-1,5-lactone, octano-1,5-lactone, nonano-1,5-lactone, decano-1,5-lactone, undecano-1,5-lactone, dodecano-1,5-lactone, tridecano-1,5-lactone, tetradecano-1,5-lactone, pentadecano-1,5-lactone, hexadecano-1,5-lactone, pent-2-eno-1,5-lactone, hex-2-eno-1,5-lactone, hept-2-eno-1,5-lactone, oct-2-eno-1,5-lactone, non-2-eno-1,5-lactone, dec-2-eno-1,5-lactone, undec-2-eno-1,5-lactone, dodec-2-eno-1,5-lactone, tridec-2-eno-1,5-lactone, tetradec-2-eno-1,5-lactone, pentadec-2-eno-1,5-lactone, hexadec-2-eno-1,5-lactone, dec-5-eno-1,5-lactone, dec-6-eno-1,5-lactone, dec-7-eno-1,5-lactone, dec-8-eno-1,5-lactone, undec-5-eno-1,5-lactone, undec-6-eno-1,5-lactone, undec-7-eno-1,5-lactone, undec-8-eno-1,5-lactone, dodec-2-eno-1,5-lactone, nepetalactone pentano-1,4-lactone, hexano-1,4-lactone, heptano-1,4-lactone, octano-1,4-lactone, nonano-1,4-lactone, decano-1,4-lactone, undecano-1,4-lactone, dodecano-1,4-lactone, tridecano-1,4-lactone, tetradecano-1,4-lactone, pentadecano-1,4-lactone, hexadecano-1,4-lactone, butyloctano-1,4-lactone, dodec-6-eno-1,4-lactone, dec-7-eno-1,4-lactone, cis-dec-7-eno-1,4-lactone, 2,7-dimethylocta-5(trans),7-dieno-1,4-lactone, hex-2-eno-1,4-lactone, 3-methylnonano-1,4-lactone, 3-methyloctano-1,4-lactone, non-2-eno-1,4-lactone, 2-decen-1,4-lactone, dimethylnon-2-eno-1,4-lactone, 3-methyl gamma-decalactone, 4-methyl-5-hexen-1,4-olide, 4-hydroxyoctanoic acid lactone, 4-hydroxy-3-methyl octanoic acid lactone, 4-hydroxyundecanoic acid lactone and 4-hydroxy-2-hexanoic acid lactone.

In one embodiment, the composition X comprises the following substances:

- (1) naringin, preferably of natural origin;
- (2a) syringaldehyde;
- (2b) diacetyl (optionally);
- (2c) acetoin;
- 5 (3a) massoia lactone; preferably of natural origin;
- (3b) whiskey lactone;
- (3c) delta dodecalactone;
- (3d) delta undecalactone;
- (3e) delta decalactone;
- 10 (3f) delta tetradecalactone;
- (4a) L-alanine;
- (4b) L-leucine;
- (4c) glycine;
- (4d) L-aspartic acid;
- 15 (4e) L-threonine;
- (4f) L-isoleucine;
- (4g) L-tyrosine;
- (4h) L-proline;
- (4i) L-serine;
- 20 (4j) L-valine;
- (4k) L-glutamic acid;
- (4l) taurine;
- (4m) maltol;
- (4n) maltodextrine MD14; and
- 25 (4o) arabicgum (spraygum).

In a preferred embodiment, the composition X comprises the following substances:

- (1) naringin, preferably of natural origin;
- (2a) syringaldehyde;
- 30 (2c) acetoin;
- (3a) massoia lactone; preferably of natural origin;
- (3b) whiskey lactone;
- (3c) delta dodecalactone;
- (3d) delta undecalactone;

- (3e) delta decalactone;
- (3f) delta tetradecalactone;
- (4a) alanine, e.g., L-alanine;
- (4b) leucine, e.g., L-leucine;
- 5 (4c) glycine;
- (4d) aspartic acid, e.g., L-aspartic acid;
- (4e) threonine, e.g., L-threonine;
- (4f) isoleucine, e.g., L-isoleucine;
- (4g) tyrosine, e.g., L-tyrosine;
- 10 (4h) proline, e.g., L-proline;
- (4i) serine, e.g., L-serine;
- (4j) valine, e.g., L-valine;
- (4k) glutamic acid, e.g., L-glutamic acid;
- (4l) taurine;
- 15 (4m) maltol;
- (4n) maltodextrine MD 14; and
- (4o) arabicgum (spraygum).

In one embodiment, the composition X comprises the following substances:

- 20 (1) naringin, preferably of natural origin;
- (2a) syringaldehyde;
- (2b) diacetyl (optionally);
- (2c) acetoin;
- (2d) methoxy salicylaldehyde (optionally);
- 25 (3a) massoia lactone; preferably of natural origin;
- (3b) whiskey lactone;
- (3c) delta dodecalactone;
- (3d) delta undecalactone;
- (3e) delta decalactone;
- 30 (3f) delta tetradecalactone;
- (4a) L-alanine;
- (4b) L-leucine;
- (4c) glycine;
- (4d) L-aspartic acid;

- (4e) L-threonine;
- (4f) L-isoleucine;
- (4g) L-tyrosine;
- (4h) L-proline;
- 5 (4i) L-serine;
- (4j) L-valine;
- (4k) L-glutamic acid;
- (4l) taurine;
- (4m) maltol;
- 10 (4n) maltodextrine MD14; and
- (4o) arabicgum (spraygum).

In one embodiment, the composition X comprises the following substances:

- (1) naringin, preferably of natural origin;
- 15 (2a) methoxysalicylaldehyde (optionally);
- (2b) syringaldehyde;
- (2c) acetoin;
- (2d) diacetyl (optionally);
- (3a) massoia lactone; preferably of natural origin;
- 20 (3b) whiskey lactone;
- (3c) delta dodecalactone;
- (3d) delta undecalactone;
- (3e) delta decalactone;
- (4a) L-alanine;
- 25 (4b) L-leucine;
- (4c) glycine;
- (4d) L-aspartic acid;
- (4e) L-lysine monohydrate (optionally);
- (4f) L-threonine;
- 30 (4g) L-isoleucine;
- (4h) L-tyrosine;
- (4i) L-methionine (optionally);
- (4j) L-proline;
- (4k) L-serine;

- (41) L-valine;
- (4m) L-glutamic acid; and
- (4n) maltol.

5 In one embodiment, the composition X comprises the following substances:

- (1) naringin, preferably of natural origin;
- (2a) acetoin; preferably of natural origin;
- (2b) diacetyl; preferably of natural origin;
- (3a) massoia lactone; preferably of natural origin;
- 10 (3b) delta dodecalactone; preferably of natural origin;
- (3c) delta decalactone; preferably of natural origin
- (4a) L-valine; preferably of natural origin;
- (4b) maltol; preferably of natural origin;
- (4c) maltodextrine MD 14; and
- 15 (4d) arabicgum (spraygum).

In one embodiment, the composition X comprises the following substances:

- (1) naringin, preferably of natural origin;
- (2a) acetoin; preferably of natural origin;
- 20 (3a) massoia lactone; preferably of natural origin;
- (3b) delta dodecalactone; preferably of natural origin;
- (3c) delta decalactone; preferably of natural origin
- (4a) L-valine; preferably of natural origin;
- (4b) maltol; preferably of natural origin;
- 25 (4c) maltodextrine MD 14; and
- (4d) arabicgum (spraygum).

All substances mentioned above are commercially available.

- 30 The composition X as defined above can be prepared by a method comprising admixing the substances (1), (2) and (3), preferably the substances (1), (2a), (2b), (3a) and (3b).

In one embodiment, the composition X comprises the following substances:

- (I) naringin;

(II) at least two aldehyde taste improvers; and

(III) at least two lactone mouthfeel enhancers.

In one embodiment, substance (II) is selected from the group consisting of methoxy
5 salicylaldehyde and syringaldehyde as defined below.

In one embodiment, substance (III) is selected from the group consisting of whiskey
lactone and massoia lactone as defined below.

10 In a preferred embodiment, the composition X does not comprise methoxy salicylaldehyde,
in particular the composition X does not comprise, as substance (II), methoxy
salicylaldehyde.

In one embodiment, the substance (I) (naringin) is present in the composition X in an
15 amount ranging from 15 wt% to 55 wt%.

In one embodiment, the substance (II) (at least two aldehyde taste improvers) is present in
the composition X in an amount ranging from 0.5 wt% to 10.0 wt%.

20 In one embodiment, the substance (III) (at least two mouthfeel enhancers) is present in the
composition X in an amount ranging from 0.06 wt% to 10.0 wt%.

In one embodiment, the weight ratio of substance (I) to substances (II) ranges from 0.25:1
to 1980:1, e.g. from 1:1 to 1000:1, from 10:1 to 100:1, from 40:1 to 80:1, wherein the ratio
25 represents the weight ratio of the total weight of substance (I) to the total weight of
substances (II).

In one embodiment, the weight ratio of substance (I) to substance (III) ranges from 2.5:1
to 2857:1, e.g. from 10:1 to 1500:1, from 20:1 to 500:1, from 50:1 to 100:1, wherein the ratio
30 represents the weight ratio of the total weight of substance (I) to the total weight of
substances (3).

In one embodiment the composition X further comprises (IV) at least one amino acid.

Preferably, the at least one amino acid (IV) are one to thirteen amino acids selected from the group consisting of L-alanine, L-leucine, glycine, L-aspartic acid, L-lysine monohydrate, L-threonine, L-isoleucine, L-tyrosine, L-methionine, L-proline, L-serine, L-valine and L-glutamic acid.

5

In one embodiment, the weight ratio of substance (I) to substances (IV) ranges from 0.084:1 to 3356:1.

In one embodiment, the composition X comprises the following substances:

- 10 (vi) naringin;
(vii) methoxy salicylaldehyde;
(viii) syringaldehyde;
(ix) massoia lactone; and
(x) whiskey lactone.

15

Naringin as used herein, e.g. as substance (i) in the composition X is a known compound. Exemplary names for naringin are 7-[[2-0-(6-deoxy- α -L-mannopyranosyl)- β -D-glucopyranosyl]]oxy]-2,3-dihydro-5-hydroxy-2-(4-hydroxyphenyl)-4H-1-benzopyran-4-one (IUPAC name), naringoside, 4',5,7-trihydroxyflavanone-7-rhamnoglucoside and
20 4',5,7-trihydroxyflavanone-7-mtinocide. This listing of names is not meant to limit the scope of the invention. Preferably naringin with the CAS registry number 10236-47-2 is used in the present invention. Naringin is commercially available and may be of synthetic or of natural origin. When naturally occurring naringin is employed as substance (i), naringin is preferably used in its pure form. In one embodiment, naringin extracted from
25 ***Citrus paradisi*** may be used. In another embodiment, naringin may be used in the form of naringin containing extracts or naringin enriched (fractions of) extracts.

Methoxy salicylaldehyde as used herein, e.g. as substance (ii) in the composition X is a known compound, and can in particular be 2-methoxy salicylaldehyde, 3-methoxy
30 salicylaldehyde or 4-methoxy salicylaldehyde. Preferably 4-methoxy salicylaldehyde, in particular with the CAS registry number 673-22-3 is used in the present invention. An exemplary synonym for the name 4-methoxy salicylaldehyde is 2-hydroxy-4-methoxy-benzaldehyde. 4-Methoxy salicylaldehyde is commercially available and may be of synthetic or of natural origin. When naturally occurring 4-methoxy salicylaldehyde is

employed as substance (ii), 4-methoxy salicylaldehyde is preferably used in its pure form. In one embodiment 4-methoxy salicylaldehyde may be used in the form of 4-methoxy salicylaldehyde containing extracts or 4-methoxy salicylaldehyde enriched (fractions of) extracts. Preferably, 4-methoxy salicylaldehyde is of synthetic origin.

5

Syringaldehyde as used herein, e.g. as substance (iii) in the composition X is a known compound. Preferably syringaldehyde with the CAS registry number 134-96-3 is used in the present invention. Exemplary synonyms for syringaldehyde are syringic aldehyde, 4-hydroxy-3,5-dimethoxybenzaldehyde (IUPAC name), 3,5-dimethoxy-4-hydroxybenzene
10 carbonal, gallaldehyde 3,5-dimethyl ether and 4-hydroxy-3,5-dimethoxybenzaldehyde. This listing of names is not meant to limit the scope of the invention. The syringaldehyde is commercially available and may be of synthetic or of natural origin. When naturally occurring syringaldehyde is employed as substance (iii), syringaldehyde is preferably used in its pure form. In one embodiment syringaldehyde may be used in the form of
15 syringaldehyde containing extracts or syringaldehyde enriched (fractions of) extracts. Preferably, syringaldehyde is of synthetic origin.

Massoia lactone as used herein, e.g. as substance (iv) in the composition X is a known compound. Massoia lactone, in one embodiment, comprises alkyl lactones derived from
20 the bark of the Massoia tree (*Cryptocaria massoia*) which may be found throughout Malaysia. In other embodiments, the compounds may be found as a component of cane sugar molasses, cured tobacco and the essential oil of Sweet Osmanthus (*Osmanthus fragrans*). Exemplary synonyms for the massoia lactone are (R)-5,6-dihydro-6-pentyl-2H-pyran-2-one, (R)-5-hydroxy-2-decenoic acid lactone, cocolactone, 5-pentylpent-2-en-5-
25 olide, C-10 massoia lactone and C-12 massoia lactone. This listing of names is not meant to limit the scope of the invention. Preferably, C-10 massoia lactone and/or C-12 massoia lactone are used, with C-10 massoia lactone being particularly preferred. As used herein, "massoia lactone" may mean any possible enantiomers, e.g., the R- and the S-enantiomers, mixtures and racemates thereof. Preferably the C-10 massoia lactone (R)-5,6-dihydro-6-
30 pentyl-2H-pyran-2-one with the CAS registry number 51154-96-2 is used in the present invention. The massoia lactone is commercially available and may be of synthetic or of natural origin. When naturally occurring massoia lactone is employed as substance (iv), massoia lactone is preferably used in its pure form. In one embodiment, massoia

lactone may be used in the form of massoia lactone containing extracts or massoia lactone enriched (fractions of) extracts. Preferably, massoia lactone is of synthetic origin.

Whiskey lactone as used herein, e.g. as substance (v) in the composition X is a known compound. Exemplary names for whiskey lactone are (4*i*?,5*R*)-5-butyl-4-methyldihydrofuran-2(3*H*)-one (IPUAC name), (4*S*,5*S*)-5-butyl-4-methyldihydrofuran-2(3*H*)-one (IUPAC name), *m*-3-methyl-4-octanolide, *trans*-3-*m*ethyl-4-octanolide, (3*S*',4*S*')-(-)-4-butyl-3-methylbutan-4-olide, (3*R*,4*R*)-(-)-4-butyl-3-methylbutan-4-olide quercus lactone; *cis*- β -methyl- γ -octalactone, *trans*- β -methyl- γ -octalactone. This listing of names is not meant to limit the scope of the invention. As used herein, "whiskey lactone" may mean any possible enantiomers, e.g., the *R*- and the *S*-enantiomers, mixtures and racemates thereof. Preferably whiskey lactone with the CAS registry numbers 252009-40-8, 121644-12-0, 39212-23-2 or 147254-32-8 is used in the present invention. Particularly preferred, a mixture of *cis*-3-methyl-4-octanolide (*cis*-whiskey lactone) and *trans*-3-methyl-4-octanolide (*trans*-whiskey lactone), with the CAS registry number 39212-23-2 or 147254-32-8 is used in the present invention. The whiskey lactone is commercially available and may be of synthetic or of natural origin. When naturally occurring whiskey lactone is employed as substance (v), whiskey lactone is preferably used in its pure form. In one embodiment, whiskey lactone may be used in the form of whiskey lactone containing extracts or whiskey lactone enriched (fractions of) extracts. Preferably, whiskey lactone is of synthetic origin.

In one embodiment, substance (ii) is 4-methoxy salicylaldehyde.

In one embodiment, substance (iv) is (i?)-5,6-dihydro-6-pentyl-2*H*-pyran-2-one, i.e. (*R*)-C-10-massoia lactone.

In one embodiment, substance (v) is a mixture of *cis*-3-methyl-4-octanolide (*cis*-whiskey lactone) and *trans*-3-methyl-4-octanolide (*trans*-whiskey lactone).

30

In a preferred embodiment the invention relates to a composition X comprising the following substances:

(vi) naringin;

(vii) 4-methoxy salicylaldehyde;

- (viii) syringaldehyde;
- (ix) (*R*)-5,6-dihydro-6-pentyl-2*H*-pyran-2-one; and
- (x) a mixture of cis- and trans-whiskey lactone.

- 5 In a particularly preferred embodiment, the invention relates to a composition X comprising the following substances:
- (i) naringin;
 - (iii) syringaldehyde;
 - (iv) (*R*)-5,6-dihydro-6-pentyl-2*H*-pyran-2-one; and
 - 10 (v) a mixture of cis- and trans-whiskey lactone.

In some embodiments, the compositions X may comprise at least one additional substance selected from the group consisting of tannic acid, decanoic acid, propanoic acid, phenylethylacetate, phenylethylalcohol, cinnamic alcohol, boronia absolute, guaicwood, 15 e.g., guiacwood oil, onone, e.g., alpha onone and/or beta onone, damascenone, e.g., beta damascenone, indole, and combinations thereof. Preferably, at least one of these additional substances are of natural origin. In one embodiment, all of these additional substances are of natural origin. In one embodiment, at least one of these additional substances is of artificial origin, e.g., synthesized.

20

It has now been surprisingly and unexpectedly found that the compositions X as defined above are useful for taste-masking, in particular for modifying, masking, reducing and/or suppressing unpleasant taste features, in particular an unpleasant off-taste, aftertaste or lingering sweetness, left by sweeteners or sweetness enhancers in the oral cavity and/or for 25 imparting rich taste to a consumable product. Surprisingly, the effect of the composition X remains as long as the taste of the at least one sweetener or the at least one sweetness enhancer is perceived. In one embodiment, the effect of the composition X does not remain any longer than the taste of the at least one sweetener or the at least one sweetness enhancer is perceived, i.e., the composition X does not have a lingering effect.

30

As used herein, the term "taste-masking" as it relates to the composition X as defined above means that the composition X as defined above imparts an unexpected improvement in a taste profile, e.g., for example the taste profile of a sweetener composition, tabletop sweetener composition and/or a consumable product composition. Preferably, taste-

masking is perceived as a modification, masking, reduction and/or suppression of an unpleasant off-taste, aftertaste or lingering sweetness in the oral cavity that may be left by sweeteners or sweetness enhancers. Taste-masking may also be perceived as imparting rich taste to a consumable product. In some instances, for example, the taste-masking may be perceived as a reduction or masking of the bitterness of a sweetener composition or of a beverage or foodstuff containing the sweetener composition. In other instances, the taste-masking may also be perceived as an enhancement in the sweetness of a sweetener composition or of a beverage or foodstuff containing the sweetener composition. The taste-masking may also be a combination of both bitterness reduction and sweetness enhancement.

In some embodiments, the at least one additional substance(s) are selected from the group consisting of tannic acid, decanoic acid, propanoic acid, phenylethylacetate, phenylethylalcohol, cinnamic alcohol, boronia absolute, guaiacwood, e.g., guaiacwood oil, onone, e.g., alpha onone and/or beta onone, damascenone, e.g., beta damascenone, indole, and combinations thereof. Preferably, at least one of these additional substances is of natural origin. In one embodiment, all of these additional substances are of natural origin. In one embodiment, at least one of these additional substances is of artificial origin, e.g., synthesized. These additional substances are commercially available.

As used herein, the term "modifying" as it relates to the composition X as defined above means that consumption thereof creates a new perception of taste, off-taste, aftertaste or lingering sweetness of a sweetener composition or a consumable product in the oral cavity.

As used herein, the term "masking" as it relates to the composition X as defined above means that consumption thereof masks a perception of a taste, off-taste, aftertaste or lingering sweetness of a sweetener composition or a consumable product in the oral cavity.

As used herein, the term "reducing" as it relates to the flavoring or composition X as defined above means that consumption thereof reduces a perception a taste, off-taste, aftertaste or lingering sweetness of a sweetener composition or a consumable product in the oral cavity.

As used herein, the term "suppressing" as it relates to the flavoring or composition X as defined above means that consumption thereof suppresses a perception of a taste, off-taste, aftertaste or lingering sweetness of a sweetener composition or a consumable product in the oral cavity.

5

As used herein, the term "off-taste" means any taste of a sweetener, a sweetness enhancer or a consumable product, e.g., a food or beverage, that is perceived in the oral cavity on or after consumption thereof and that can stay there for a few minutes. Off-tastes include but are not limited to acidic, astringent, bitter, liquorice, metallic or throat-burning. In one embodiment, the off-taste is a metallic off-taste provided by neotame.

10

As used herein, the term "aftertaste" means any taste of a sweetener, a sweetness enhancer or a consumable product, e.g., a food or beverage, that is perceived in the oral cavity after the sweetener, the sweetness enhancer or the consumable product is removed from the oral cavity, e.g., by swallowing or disgorging. The aftertaste may remain in the oral cavity for example, for a few minutes or a few hours. Unpleasant aftertastes include but are not limited to bitter and/or astringent aftertastes. In one embodiment, the aftertaste is provided by acesulfame potassium, saccharin and stevioside.

15

As used herein, the term "lingering sweetness" means a very long-lasting sweetening effect of a sweetener, a sweetness enhancer or a consumable product, e.g., a food or beverage, that is perceived in the oral cavity after the sweetener, the sweetness enhancer or the consumable product is removed from the oral cavity by swallowing or disgorging. The lingering sweetness may remain in the oral cavity for example, for a few minutes or a few hours.

20

25

As used herein, the term "rich taste" means an impression of creaminess, milk fattiness and/or sweetness of a consumable product that is perceived in the oral cavity on or after consumption of a consumable product.

30

As used herein, the term "sweetener(s)" includes all artificial and natural sweeteners, sugar alcohols (or polyols) and sugar sweeteners (or carbohydrates). Artificial and natural sweeteners include but are not limited to abiziasaponin, abrusosides, in particular abrusoside A, abrusoside B, abrusoside C, abrusoside D, acesulfame potassium,

advantame, albiziasaponin, alitame, aspartame, superaspartame, bayunosides, in particular bayunoside 1, bayunoside 2, brazzein, bryoside, bryonoside, bryonodulcoside, carnosifloside, carrelame, curculin, cyanin, chlorogenic acid, cyclamates and its salts, cyclocaryoside I, dihydroquercetin-3-acetate, dihydroflavenol, dulcoside, gaudichaudioside, glycyrrhizin, glycyrrhetin acid, gypenoside, hematoxylin, hernandulcin, isomogrosides, in particular iso-mogroside V, lugduname, magap, mabinlins, micraculin, mogrosides (lo han guo), in particular mogroside IV and mogroside V, monatin and its derivatives, monellin, mukurozioside, naringin dihydrochalcone (NarDHC), neohesperidin dihydrochalcone (NDHC), neotame, osladin, pentadin, periandrin I-V, perillartine, D-phenylalanine, phlomisosides, in particular phlomisoside 1, phlomisoside 2, phlomisoside 3, phlomisoside 4, phloridzin, phyllodulcin, polpodiosides, polypodoside A, pterocaryosides, rebaudiosides, in particular rebaudioside A, rebaudioside B, rebaudioside C, rebaudioside D, rebaudioside F, rebaudioside G, rebaudioside H), rubusosides, saccharin and its salts and derivatives, scandenoside, selliguanin A, siamenosides, in particular siamenoside I, stevia, steviolbioside, stevioside and other steviol glycosides, strogines, in particular strogin 1, strogin 2, strogin 4, suavioside A, suavioside B, suavioside G, suavioside H, suavioside I, suavioside J, sucralose, sucronate, sucrooctate, talin, telosmoside A₁₅, thaumatin, in particular thaumatin I and II, trans-anethol, trans-cinnamaldehyde, trilobatin and D-tryptophane, including extracts or enriched fractions of the natural sweeteners. Sugar alcohols (or polyols) include but are not limited to erythritol, galactitol, hydrogenated starch syrups including maltitol and sorbitol syrups, inositols, isomalt, lactitol, maltitol, mannitol, xylitol, and combinations thereof. Sugar sweeteners (or carbohydrates) include monosaccharides, disaccharides, oligosaccharides and polysaccharides such as but not limited to arabinose, dextrin, dextrose, fructose, high fructose corn syrup, fructooligosaccharides, fructooligosaccharide syrups, galactose, galactooligosaccharides, glucose, glucose and (hydrogenated) starch syrups/hydrolysates, isomaltulose, lactose, hydrolysed lactose, maltose, mannose, rhamnose, ribose, sucrose, stachyose, tagatose, trehalose, xylose, and combinations thereof. The sweeteners are known substances and are for example those described by H. Mitchell (H. Mitchell, "Sweeteners and Sugar Alternatives in Food Technology", Backwell Publishing Ltd, 2006,) and in WO 2009/023975 A2, each of which is incorporated herein by reference in its entirety. The above-identified sweeteners are known in the art and are commercially available.

Suitable hydrogenated starch hydrolysates include, but are not limited to, those disclosed in U.S. patent no. 4,279,931, which is hereby incorporated by reference, and various hydrogenated glucose syrups and/or powders which contain sorbitol, maltitol, hydrogenated disaccharides, hydrogenated higher polysaccharides, or combination thereof.

5 Hydrogenated starch hydrosylates are primarily prepared by the controlled catalytic hydrogenation of con syrups. The resulting hydrogenated starch hydrosylates are mixtures of monomeric, dimeric, and polymeric saccharides. The hydrogenated starch hydrolysates are known in the art and are commercially available.

10 As used herein, the term "sweetness enhancer(s)" means any compound capable of enhancing or intensifying the perception of sweet taste of sweetener compositions or sweetened compositions. The term "sweetness enhancer" is synonymous to the terms "sweet taste potentiator," "sweetness potentiator," and "sweetness intensifier".

15 As shown in the Examples, the inventors have now surprisingly and unexpectedly found that the compositions X as defined above are useful for taste-masking, in particular for modifying, masking, reducing and/or suppressing an unpleasant taste features, in particular an unpleasant off-taste, aftertaste or lingering sweetness left by sweeteners or sweetness enhancers. Preferably, the effect of the flavoring or composition X remains at least as long
20 as the taste of the at least one sweetener, the at least one sweetness enhancer or the consumable product are perceived.

Furthermore, it has been found that the flavorings or compositions X are useful for imparting rich taste to a consumable product.

25

Thus, in one embodiment, the invention relates to the use of a flavoring or composition X as defined above for modifying, masking, reducing and/or suppressing an unpleasant taste feature, in particular an unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetener, a sweetness enhancer or a consumable product.

30

In one embodiment, the unpleasant off-taste of the sweetener, the sweetness enhancer or a consumable product is an acidic off-taste, an astringent off-taste, a bitter off-taste, a liquorice off-taste, a metallic off-taste or a throat-burning off-taste.

In one embodiment, the unpleasant aftertaste of the sweetener, the sweetness enhancer or the consumable product is an astringent or bitter aftertaste.

5 In another embodiment, the invention relates to the use of a flavoring or composition X as defined above for imparting rich taste to a consumable product.

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to the first carbonyl compound (2a) ranges from 50:1 to 200000:1, e.g. from 100:1 to 150000:1, from 500:1 to 100000:1, from 1000:1 to 50000:1, from 10000:1 to 40000:1, wherein the ratio
10 represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of the first carbonyl compound (2a).

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to the second carbonyl compound (2b) ranges from 0.25:1 to 2000:1, e.g. from 1:1 to 1:1000:1,
15 from 10:1 to 500:1, from 20:1 to 250:1, wherein the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of the second carbonyl compound (2b).

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to the first lactone (3a) ranges from 5:1 to 10000:1, e.g. from 10:1 to 5000:1, from 50:1 to 2000:1,
20 from 100:1 to 1000:1, from 200:1 to 500:1, wherein the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of the first lactone (3a).

25 In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to the second lactone (3b) ranges from 5:1 to 4000:1, e.g. from 10:1 to 2000:1, from 20:1 to 1000:1, from 30:1 to 500:1, from 40:1 to 200:1, wherein the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of the second lactone (3b).

30

In one embodiment, the substance (1) (e.g. naringin) is present in the composition X in an amount ranging from 15 wt% to 55 wt%, e.g. from 30 wt% to 40 wt%, from 28 wt% to 44 wt%, from 25 wt% to 48 wt% or from 20 wt% to 50 wt%.

In one embodiment, the substance (2a) (e.g. syringaldehyde) is present in the composition X in an amount ranging from 0.5 wt% to 10.0 wt%, e.g. from 0.5 wt% to 8.0 wt%, from 0.5 wt% to 5.0 wt%, from 1.0 wt% to 3.0 wt, from 0.9 wt% to 3.5 wt%, from 0.8 wt% to 4 wt% or from 0.7 wt% to 4.5 wt%.

5

In one embodiment, the substance (3a) (e.g. massoia lactone) is present in the composition X in an amount ranging from 0.06 wt% to 2.0 wt%, e.g. from 0.06 wt% to 1.5 wt%, from 0.06 wt% to 1.0 wt%, from 0.1 wt% to 0.3 wt%, from 0.09 wt% to 0.4 wt%, from 0.08 wt% to 0.5 wt% or from 0.07 wt% to 0.6 wt%.

10

In one embodiment, the substance (3b) (e.g. whiskey lactone) is present in the composition X in an amount ranging from 0.1 wt% to 5.0 wt%, e.g. from 0.1 wt% to 4.0 wt%, from 0.1 wt% to 3.0 wt%, from 0.1 wt% to 2.0 wt%, from 0.1 wt% to 1.5 wt%, from 0.2 wt% to 1.1 wt%, from 0.3 wt% to 1.2 wt%, from 0.4 wt% to 1.3 wt% or from 0.5 wt% to 1.4 wt%.

15

In one embodiment, the substance (3c) (e.g. delta dodecalactone) is present in the composition X in an amount ranging from 0.1 wt% to 5.0 wt%., e.g. from 0.1 wt% to 4.0 wt%, from 0.1 wt% to 3.0 wt%, from 0.1 wt% to 2.0 wt%, from 0.1 wt% to 1.5 wt%, from 0.7 wt% to 1.1 wt%, from 0.6 wt% to 1.2 wt%, from 0.5 wt% to 1.3 wt% or from 0.4 wt% to 1.4 wt%.

20

In one embodiment, the substance (3d) (e.g. delta undecalactone) is present in the composition X in an amount ranging from 0.1 wt% to 5.0 wt%., e.g. from 0.1 wt% to 4.0 wt%, from 0.1 wt% to 3.0 wt%, from 0.1 wt% to 2.0 wt%, from 0.1 wt% to 1.5 wt%, from 0.7 wt% to 1.1 wt%, from 0.6 wt% to 1.2 wt%, from 0.5 wt% to 1.3 wt% or from 0.4 wt% to 1.4 wt%.

25

In one embodiment, the substance (3e) (e.g. delta decalactone) is present in the composition X in an amount ranging from 0.05 wt% to 0.20 wt%, e.g. from 0.05 wt% to 0.18 wt%, from 0.05 wt% to 0.16 wt%, from 0.05 wt% to 0.14 wt%, from 0.09 wt% to 0.11 wt%, from 0.08 wt% to 0.12 wt%, from 0.07 wt% to 0.13 wt% or from 0.06 wt% to 0.14 wt%.

30

In one embodiment, the substance (3d) (e.g. delta tetradecalactone) is present in the composition X in an amount ranging from 0.1 wt% to 5.0 wt%, e.g. e.g. from 0.1 wt% to 4.0 wt%, from 0.1 wt% to 3.0 wt%, from 0.1 wt% to 2.0 wt%, from 0.1 wt% to 1.5 wt%, from 0.7 wt% to 1.1 wt%, from 0.6 wt% to 1.2 wt%, from 0.5 wt% to 1.3 wt% or from 0.4
5 wt% to 1.4 wt%.

In one embodiment, the weight ratio of substance (i) (naringin) to substance (ii) (methoxy salicylaldehyde) ranges from 50:1 to 200000:1, e.g. from 100:1 to 150000:1, from 500:1 to 100000:1, from 1000:1 to 50000:1, from 10000:1 to 40000:1, wherein the ratio represents
10 the weight ratio of the total weight of substance (i) to the total weight of substance (ii).

In one embodiment, the weight ratio of substance (i) (naringin) to substance (iii) (syringaldehyde) ranges from 0.25:1 to 2000:1, e.g. from 1:1 to 1:1000:1, from 1:1 to 50:1, from 5:1 to 30:1, from 10:1 to 500:1, from 20:1 to 250:1, wherein the ratio represents the
15 weight ratio of the total weight of substance (i) to the total weight of substance (iii).

In one embodiment, the weight ratio of substance (i) (naringin) to substance (iv) (massoia lactone) ranges from 5:1 to 10000:1, e.g. from 10:1 to 5000:1, from 50:1 to 2000:1, from 100:1 to 1000:1, from 100:1 to 200:1, from 200:1 to 500:1, wherein the ratio represents the
20 weight ratio of the total weight of substance (i) to the total weight of substance (iv).

In one embodiment, the weight ratio of substance (i) (naringin) to substance (v) (whiskey lactone) ranges from 5:1 to 4000:1, e.g. from 10:1 to 2000:1, from 20:1 to 1000:1, from 30:1 to 500:1, from 40:1 to 200:1, wherein the ratio represents the weight ratio of the total
25 weight of substance (i) to the total weight of substance (v).

In one embodiment, the flavoring or composition X, e.g. composition X comprising the substances (1), (2) and (3), further comprises at least one additional substance (4).

30 Preferably, the additional substance (4) is selected from amino acids and flavoring ingredients, and combinations thereof.

In one embodiment, the flavoring or composition X, e.g. composition X comprising the substances (i) to (v), further comprises at least one additional substance (vi).

Preferably, the additional substance (vi) is selected from amino acids and flavoring ingredients, and combinations thereof.

5 As used herein, the term "amino acids" may include any natural amino acids, artificial amino acid derivatives and physiologically acceptable salts and hydrates thereof. The natural amino acids may be chosen from the 22 standard amino acids selected from the group consisting of alanine, arginine, asparagine, aspartic acid, cysteine, glutamic acid, glutamine, glycine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, 10 proline, serine, threonine, tryptophan, tyrosine, valine, selenocysteine and pyrrolysine and physiologically acceptable salts and hydrates thereof. As used herein, the term "amino acid" means any possible isomers, comprising L- and D-amino acids, *R*- and *S*-enantiomers, mixtures and racemates thereof, preferably L-amino acids. The above-identified amino acids are known in the art and are commercially available.

15

Preferably, the at least one amino acid are one to thirteen amino acids selected from the group consisting of L-alanine, L-leucine, glycine, L-aspartic acid, L-lysine monohydrate, L-threonine, L-isoleucine, L-tyrosine, L-methionine, L-proline, L-serine, L-valine and L-glutamic acid.

20

Preferably, the at least one amino acid are one to eleven amino acids selected from the group consisting of L-alanine, L-leucine, glycine, L-aspartic acid, L-threonine, L-isoleucine, L-tyrosine, L-proline, L-serine, L-valine, taurine, and L-glutamic acid.

25 In one embodiment, the substance (4a) (e.g. alanine) is present in the composition X in an amount ranging from 0.05 wt% to 0.15 wt%, e.g. from 0.09 wt% to 0.11 wt%, from 0.08 wt% to 0.12 wt%, from 0.07 wt% to 0.13 wt% or from 0.06 wt% to 0.14 wt%.

In one embodiment, the substance (4b) (e.g. leucine) is present in the composition X in an 30 amount ranging from 0.01 wt% to 0.15 wt%, e.g. from 0.05 wt% to 0.07 wt%, from 0.04 wt% to 0.08 wt%, from 0.03 wt% to 0.09 wt% or from 0.02 wt% to 0.1 wt%.

In one embodiment, the substance (4c) (e.g. glycine) is present in the composition X in an amount ranging from 0.04 wt% to 0.24 wt%, e.g. from 0.14 wt% to 0.16 wt%, from 0.10 wt% to 0.18 wt%, from 0.08 wt% to 0.2 wt% or from 0.06 wt% to 0.22 wt%.

- 5 In one embodiment, the substance (4d) (e.g. aspartic acid) is present in the composition X in an amount ranging from 0.05 wt% to 0.50 wt%, e.g. from 0.25 wt% to 0.30 wt%, from 0.20 wt% to 0.35 wt%, from 0.15 wt% to 0.40 wt% or from 0.10 wt% to 0.45 wt%.

- 10 In one embodiment, the substance (4e) (e.g. threonine) is present in the composition X in an amount ranging from 0.03 wt% to 0.30 wt%, e.g. from 0.11 wt% to 0.28 wt%, from 0.09 wt% to 0.26 wt%, from 0.07 wt% to 0.24 wt% or from 0.05 wt% to 0.22 wt%.

- 15 In one embodiment, the substance (4f) (e.g. isoleucine) is present in the composition X in an amount ranging from 0.01 wt% to 0.4 wt%, e.g. from 0.05 wt% to 0.2 wt%, from 0.04 wt% to 0.1 wt%, from 0.03 wt% to 0.09 wt% or from 0.02 wt% to 0.08 wt%. 0.066

- 20 In one embodiment, the substance (4g) (e.g. tyrosine) is present in the composition X in an amount ranging from 0.05 wt% to 0.15 wt%, e.g. from 0.09 wt% to 0.11 wt%, from 0.08 wt% to 0.12 wt%, from 0.07 wt% to 0.13 wt% or from 0.06 wt% to 0.14 wt%.

- In one embodiment, the substance (4h) (e.g. proline) is present in the composition X in an amount ranging from 0.04 wt% to 0.24 wt%, e.g. from 0.14 wt% to 0.16 wt%, from 0.10 wt% to 0.18 wt%, from 0.08 wt% to 0.2 wt% or from 0.06 wt% to 0.22 wt%.

- 25 In one embodiment, the substance (4i) (e.g. serine) is present in the composition X in an amount ranging from 0.45 wt% to 0.80 wt%, e.g. from 0.64 wt% to 0.70 wt%, from 0.60 wt% to 0.75 wt%, from 0.55 wt% to 0.80 wt% or from 0.50 wt% to 0.85 wt%.

- 30 In one embodiment, the substance (4j) (e.g. valine) is present in the composition X in an amount ranging from 0.01 wt% to 0.09 wt%, e.g. from 0.04 wt% to 0.06 wt%, from 0.045 wt% to 0.065 wt%, from 0.03 wt% to 0.07 wt% or from 0.02 wt% to 0.08 wt%.

In one embodiment, the substance (4k) (e.g. glutamic acid) is present in the composition X in an amount ranging 0.20 wt% to 0.80 wt%, e.g. from 0.25 wt% to 0.70 wt%, from 0.30 wt% to 0.75 wt%, from 0.35 wt% to 0.80 wt% or from 0.40 wt% to 0.85 wt%.

- 5 In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to substances (4) ranges from 0.084:1 to 3356:1, e.g. from 0.1:1 to 3000:1, from 0.5:1 to 2000:1, from 1:1 to 1000:1, from 2:1 to 500:1, from 3:1 to 100:1, wherein the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of substance (4).

10

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to L-alanine ranges from 1:1 to 40000:1, e.g. from 10:1 to 20000:1, from 100:1 to 10000:1, from 100:1 to 500:1, from 200:1 to 5000:1, from 200:1 to 400:1, from 500:1 to 3000:1, the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent
15 (1) to the total weight of L-alanine.

20

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to L-leucine ranges from 1.7:1 to 67000:1, e.g. from 10:1 to 50000:1, from 100:1 to 10000:1, from 200:1 to 5000:1, from 500:1 to 3000:1, wherein the ratio represents the weight ratio
of the total weight of the at least one bitter blocking agent (1) to the total weight of L-leucine.

25

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to glycine ranges from 2.1:1 to 84000:1, e.g. from 10:1 to 50000:1, from 10:1 to 500:1, from 100:1 to 10000:1, from 100:1 to 300:1, from 200:1 to 5000:1, from 500:1 to 3000:1, wherein the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent
(1) to the total weight of glycine.

30

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to L-aspartic acid ranges from 1:1 to 41700:1, e.g. from 10:1 to 30000:1, from 10:1 to 30:1, from 50:1 to 300:1, from 100:1 to 10000:1, from 200:1 to 5000:1, from 500:1 to 3000:1, wherein the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of L-aspartic acid.

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to L-lysine monohydrate ranges from 6:1 to 25000:1, e.g. from 10:1 to 20000:1, from 100:1 to 15000:1, from 1000:1 to 10000:1, from 2000:1 to 8000:1, wherein the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of L-lysine monohydrate.

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to L-threonine ranges from 6:1 to 25000:1, e.g. from 10:1 to 20000:1, from 100:1 to 15000:1, from 50:1 to 500:1, from 100:1 to 500:1, from 1000:1 to 10000:1, from 2000:1 to 8000:1, wherein the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of L-threonine.

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to L-isoleucine ranges from 1.5:1 to 63000:1, e.g. from 10:1 to 50000:1, from 100:1 to 10000:1, from 100:1 to 1000:1, from 200:1 to 5000:1, from 200:1 to 800:1, from 500:1 to 3000:1, wherein the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of L-isoleucine.

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to L-tyrosine ranges from 1:1 to 41700:1, e.g. from 10:1 to 30000:1, from 100:1 to 10000:1, from 100:1 to 500:1, from 200:1 to 5000:1, from 200:1 to 400:1, from 500:1 to 3000:1, wherein the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of L-tyrosine.

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to L-methionine ranges from 10:1 to 50000:1, e.g. from 100:1 to 40000:1, from 1000:1 to 30000:1, from 2000:1 to 20000:1, from 3000:1 to 18000:1, from 5000:1 to 15000:1, wherein the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of L-methionine.

In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to L-proline ranges from 3:1 to 125000:1, e.g. from 10:1 to 100000:1, from 100:1 to 50000:1, from 100:1 to 500:1, from 10:1 to 500:1, from 500:1 to 20000:1, from 1000:1 to 10000:1,

from 2000:1 to 8000:1, wherein the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of L-proline.

5 In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to L-serine ranges from 0.4:1 to 14000:1, e.g. from 10:1 to 10000:1, from 1:1 to 500:1, from 100:1 to 5000:1, from 200:1 to 4000:1, from 300:1 to 3000:1, most preferably, wherein the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of L-serine.

10 In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to L-valine (vi) ranges from 2.1:1 to 84000:1, e.g. from 10:1 to 50000:1, from 100:1 to 10000:1, from 100:1 to 1000:1, from 200:1 to 5000:1, from 200:1 to 1000:1, from 500:1 to 3000:1, wherein the ratio represents the weight ratio of the total weight of the at least one bitter blocking agent (1) to the total weight of L-valine.

15 In one embodiment, the weight ratio of the at least one bitter blocking agent (1) to L-glutamic acid ranges from 5:1 to 10000:1, e.g. from 1:1 to 500:1, from 10:1 to 500:1, from 10:1 to 5000:1, from 10:1 to 100:1, from 50:1 to 4000:1, from 100:1 to 3000:1, most preferably the weight ratio is 255:1, wherein the ratio represents the weight ratio of the
20 total weight of the at least one bitter blocking agent (1) to the total weight of L-glutamic acid.

In one embodiment, the weight ratio of substance (i) (naringin) to substances (vi) ranges from 0.084:1 to 3356:1, e.g. from 0.1:1 to 3000:1, from 0.5:1 to 2000:1, from 1:1 to
25 1000:1, from 2:1 to 500:1, from 3:1 to 100:1, wherein the ratio represents the weight ratio of the total weight of substance (i) to the total weight of substance (vi).

In one embodiment, the weight ratio of substance (i)(naringin) to L-alanine (vi) ranges from 1:1 to 40000:1, e.g. from 10:1 to 20000:1, from 100:1 to 10000:1, from 100:1 to
30 500:1, from 200:1 to 5000:1, from 200:1 to 400:1, , from 500:1 to 3000:1, the ratio represents the weight ratio of the total weight of substance (i) to the total weight of L-alanine (vi).

In one embodiment, the weight ratio of substance (i)(naringin) to L-leucine (vi) ranges from 1.7:1 to 67000:1, e.g. from 10:1 to 50000:1, from 100:1 to 10000:1, from 100:1 to 1000:1, from 200:1 to 5000:1, from 200:1 to 800:1, , from 500:1 to 3000:1, wherein the ratio represents the weight ratio of the total weight of substance (i) to the total weight of L-leucine (vi).

In one embodiment, the weight ratio of substance (i)(naringin) to glycine (vi) ranges from 2.1:1 to 84000:1, e.g. from 10:1 to 50000:1, from 10:1 to 500:1, from 100:1 to 10000:1, from 100:1 to 300:1, , from 200:1 to 5000:1, from 500:1 to 3000:1, wherein the ratio represents the weight ratio of the total weight of substance (i) to the total weight of glycine (vi).

In one embodiment, the weight ratio of substance (i)(naringin) to L-aspartic acid (vi) ranges from 1:1 to 41700:1, e.g. from 10:1 to 30000:1, from 10:1 to 30:1, from 50:1 to 300:1, from 100:1 to 10000:1, from 200:1 to 5000:1, from 500:1 to 3000:1, wherein the ratio represents the weight ratio of the total weight of substance (i) to the total weight of L-aspartic acid (vi).

In one embodiment, the weight ratio of substance (i)(naringin) to L-lysine monohydrate (vi) ranges from 6:1 to 25000:1, e.g. from 10:1 to 20000:1, from 100:1 to 15000:1, from 1000:1 to 10000:1, from 2000:1 to 8000:1, wherein the ratio represents the weight ratio of the total weight of substance (i) to the total weight of L-lysine monohydrate (vi).

In one embodiment, the weight ratio of substance (i)(naringin) to L- threonine (vi) ranges from 6:1 to 25000:1, e.g. from 10:1 to 20000:1, from 100:1 to 15000:1, from 50:1 to 500:1, from 100:1 to 500:1, from 1000:1 to 10000:1, from 2000:1 to 8000:1, wherein the ratio represents the weight ratio of the total weight of substance (i) to the total weight of L-threonine.

In one embodiment, the weight ratio of substance (i)(naringin) to L-isoleucine (vi) ranges from 1.5:1 to 63000:1, e.g. from 10:1 to 50000:1, from 100:1 to 10000:1, from 100:1 to 1000:1, from 200:1 to 5000:1, from 200:1 to 800:1, , from 500:1 to 3000:1, wherein the ratio represents the weight ratio of the total weight of substance (i) to the total weight of L-isoleucine (vi).

In one embodiment, the weight ratio of substance (i)(naringin) to L-tyrosine (vi) ranges from 1:1 to 41700:1, e.g. from 10:1 to 30000:1, from 100:1 to 10000:1, from 100:1 to 500:1, from 200:1 to 5000:1, from 200:1 to 400:1, from 200:1 to 5000:1, from 500:1 to 3000:1, wherein the ratio represents the weight ratio of the total weight of substance (i) to the total weight of L-tyrosine (vi).

In one embodiment, the weight ratio of substance (i)(naringin) to L-methionine (vi) ranges from 10:1 to 50000:1, e.g. from 100:1 to 40000:1, from 1000:1 to 30000:1, from 2000:1 to 20000:1, from 3000:1 to 18000:1, from 5000:1 to 15000:1, wherein the ratio represents the weight ratio of the total weight of substance (i) to the total weight of L-methionine (vi).

In one embodiment, the weight ratio of substance (i)(naringin) to L-proline (vi) ranges from 3:1 to 125000:1, e.g. from 10:1 to 100000:1, from 100:1 to 50000:1, from 100:1 to 500:1, from 10:1 to 500:1, from 500:1 to 20000:1, from 1000:1 to 10000:1, from 2000:1 to 8000:1, wherein the ratio represents the weight ratio of the total weight of substance (i) to the total weight of L-proline (vi).

In one embodiment, the weight ratio of substance (i)(naringin) to L-serine (vi) ranges from 0.4:1 to 14000:1, e.g. from 10:1 to 10000:1, from 1:1 to 500:1, from 1:1 to 200:1, from 100:1 to 5000:1, from 200:1 to 4000:1, from 300:1 to 3000:1, most preferably, wherein the ratio represents the weight ratio of the total weight of substance (i) to the total weight of L-serine (vi).

In one embodiment, the weight ratio of substance (i)(naringin) to L-valine (vi) ranges from 2.1:1 to 84000:1, e.g. from 10:1 to 50000:1, from 100:1 to 10000:1, from 100:1 to 1000:1 from 200:1 to 5000:1, from 200:1 to 1000:1, , from 500:1 to 3000:1, wherein the ratio represents the weight ratio of the total weight of substance (i) to the total weight of L-valine (vi).

In one embodiment, the weight ratio of substance (i) (naringin) to L-glutamic acid (vi) ranges from 5:1 to 10000:1, e.g. from 1:1 to 500:1, from 10:1 to 500:1, from 10:1 to 5000:1, from 10:1 to 100:1, , from 50:1 to 4000:1, from 100:1 to 3000:1, most preferably

the weight ratio is 255: 1, wherein the ratio represents the weight ratio of the total weight of substance (i) to the total weight of L-glutamic acid (vi).

As used herein, the term "salt(s)" as it relates to the amino acids means the physiologically acceptable acid addition salts and base salts of the amino acids. Suitable acid addition salts are formed from acids which form non-toxic salts. Examples include but are not limited to the acetate, aspartate, benzoate, besylate, bicarbonate, carbonate, bisulphate, sulphate, borate, camsylate, citrate, edisylate, esylate, formate, fumarate, gluceptate, gluconate, glucuronate, hexafluorophosphate, hibenzate, hydrochloride/chloride, hydrobromide, bromide, hydroiodide, iodide, isethionate, lactate, malate, maleate, malonate, mesylate, methylsulphate, naphthylate, nicotinate, nitrate, orotate, oxalate, palmitate, pamoate, phosphate, hydrogen phosphate, dihydrogen phosphate, sacharate, stearate, succinate, tartrate, tosylate and trifluoroacetate salts. Suitable base salts are formed from bases which form non-toxic salts. Examples include but are not limited to the aluminium, arginine, benzathine, calcium, choline, diethylamine, diolamine, glycine, lysine, magnesium, meglumine, olamine, potassium, sodium, tromethamine and zinc salts.

As used herein, the term "hydrate(s)" as it relates to amino acids means an amino acid that includes water. "Hydrate(s)" are formed by the addition of water or its elements. In one embodiment, an amino acid may form crystals that incorporate water into the crystalline structure without chemical alteration.

As used herein, the term "flavoring ingredients" may include those flavor ingredients known in the art, such as natural and artificial flavors. These flavoring ingredients may be chosen from synthetic flavor oils and flavoring ingredient aromatics and/or oils, oleoresins and extracts derived from plants, leaves, flowers, fruits, and so forth, and combinations thereof. Nonlimiting representative flavor oils include spearmint oil, cinnamon oil, oil of wintergreen (methyl salicylate), peppermint oil, Japanese mint oil, clove oil, bay oil, anise oil, eucalyptus oil, thyme oil, cedar leaf oil, oil of nutmeg, allspice, oil of sage, mace, oil of bitter almonds, and cassia oil. Also useful flavoring ingredients are artificial, natural and synthetic fruit flavors such as vanilla, and citrus oils including lemon, orange, lime, grapefruit, yazu, sudachi, and fruit essences including apple, pear, peach, grape, blueberry, strawberry, raspberry, cherry, plum, pineapple, watermelon, apricot, banana, melon, apricot, ume, cherry, raspberry, blackberry, tropical fruit, mango, mangosteen,

pomegranate, papaya and so forth. Other potential flavors include a milk flavor, a butter flavor, a cheese flavor, a cream flavor, and a yogurt flavor; a vanilla flavor; tea or coffee flavors, such as a green tea flavor, a oolong tea flavor, a tea flavor, a cocoa flavor, a chocolate flavor, and a coffee flavor; mint flavors, such as a peppermint flavor, a spearmint flavor, and a Japanese mint flavor; spicy flavors, such as an asafetida flavor, an ajowan flavor, an anise flavor, an angelica flavor, a fennel flavor, an allspice flavor, a cinnamon flavor, a camomile flavor, a mustard flavor, a cardamom flavor, a caraway flavor, a cumin flavor, a clove flavor, a pepper flavor, a coriander flavor, a sassafras flavor, a savory flavor, a Zanthoxyli Fructus flavor, a perilla flavor, a juniper berry flavor, a ginger flavor, a star anise flavor, a horseradish flavor, a thyme flavor, a tarragon flavor, a dill flavor, a capsicum flavor, a nutmeg flavor, a basil flavor, a marjoram flavor, a rosemary flavor, a bayleaf flavor, and a wasabi (Japanese horseradish) flavor; alcoholic flavors, such as a wine flavor, a whisky flavor, a brandy flavor, a rum flavor, a gin flavor, and a liqueur flavor; floral flavors; and vegetable flavors, such as an onion flavor, a garlic flavor, a cabbage flavor, a carrot flavor, a celery flavor, mushroom flavor, and a tomato flavor. These flavoring ingredients may be used in liquid or solid form and may be used individually or in admixture. Commonly used flavors include mints such as peppermint, menthol, spearmint, artificial vanilla, cinnamon derivatives, and various fruit flavors, whether employed individually or in admixture. Flavors may also provide breath freshening properties, particularly the mint flavors when used in combination with cooling agents.

Other useful flavoring ingredients include aldehydes and esters such as cinnamyl acetate, cinnamaldehyde, citral diethylacetal, dihydrocarvyl acetate, eugenyl formate, p-methylamisol, and so forth may be used. Generally any flavoring ingredient or food additive such as those described in Chemicals Used in Food Processing, publication 1274, pages 63-258, by the National Academy of Sciences, may be used. This publication is incorporated herein by reference.

Further examples of aldehyde flavoring ingredients include but are not limited to acetaldehyde (apple), benzaldehyde (cherry, almond), anisic aldehyde (licorice, anise), cinnamic aldehyde (cinnamon), citral, i.e., alpha-citral (lemon, lime), neral, i.e., beta-citral (lemon, lime), decanal (orange, lemon), ethyl vanillin (vanilla, cream), heliotrope, i.e., piperonal (vanilla, cream), vanillin (vanilla, cream), alpha-amyl cinnamaldehyde (spicy

fruity flavors), butyraldehyde (butter, cheese), valeraldehyde (butter, cheese), citronellal (modifies, many types), decanal (citrus fruits), aldehyde C-8 (citrus fruits), aldehyde C-9 (citrus fruits), aldehyde C-12 (citrus fruits), 2-ethyl butyraldehyde (berry fruits), hexenal, i.e., trans-2 (berry fruits), tolyl aldehyde (cherry, almond), veratraldehyde (vanilla), 2,6-
5 dimethyl-5-heptenal, i.e., melonal (melon), 2,6-dimethyloctanal (green fruit), and 2-dodecenal (citrus, mandarin), cherry, grape, strawberry shortcake, and mixtures thereof. These listings of flavoring ingredients are merely exemplary and are not meant to limit either the term "flavoring ingredient" or the scope of the invention generally.

10 In some embodiments, the flavoring ingredient may be employed in either liquid form and/or dried form. When employed in the latter form, suitable drying means such as spray drying the oil may be used. Alternatively, the flavoring ingredient may be absorbed onto water soluble materials, such as cellulose, starch, sugar, maltodextrin, gum arabic and so forth or may be encapsulated. The actual techniques for preparing such dried forms are
15 well-known.

In some embodiments, the flavoring ingredients may be used in many distinct physical forms well-known in the art to provide an initial burst of flavor and/or a prolonged sensation of flavor. Without being limited thereto, such physical forms include free forms,
20 such as spray dried, powdered, beaded forms, encapsulated forms, and mixtures thereof.

The above-identified flavoring ingredients are known in the art and are commercially available.

25 **Methods of Making a Composition X**

The composition X as defined above may be prepared by a method comprising the step of admixing the substances (1), (2), and (3).

30 The composition X as defined above may be prepared by a method comprising the step of admixing the substances (i), (ii), (iii), (iv), and (v), preferably the step of admixing the substances (i), (iii), (iv), and (v)

The composition X as defined above may be prepared by a method comprising the step of admixing the substances (I), (II), and (III).

5 The method may further comprise the step of combining the composition X of the invention with at least one additional substance, wherein the additional substance is preferably selected from amino acids and flavoring ingredients, and combinations thereof.

10 In the following in cases that reference is made to specific concentrations, percentages, ratios or other features of the composition X, these features also apply to cases in the context of the present invention where not the composition X, but another flavoring is used.

Sweetener Compositions

15 It has now been found that sweetener compositions comprising the flavoring or composition X as defined above are useful in 1) reducing the quantity of standard sugar such as sucrose that may be present in a consumable product; and/or in 2) replacing standard sugar such as sucrose that may be present in a consumable product.

20 In another aspect, the invention relates to a sweetener composition comprising
(c) at least one sweetener; and
(d) a flavoring or composition X with the features as defined above.

25 As used herein, the term "composition X with the features as defined above" includes any and all compositions X as well as their preferred embodiments and specific combinations of substances described above and/or herein including their concentrations and ratios.

30 In one embodiment, the sweetener composition comprises at least one artificial or natural sweetener that, once consumed, is capable of leaving an unpleasant off-taste, aftertaste or lingering sweetness in the oral cavity.

Exemplary artificial or natural sweeteners include but are not limited to abiziasaponin, abrusosides, in particular abrusoside A, abrusoside B, abrusoside C, abrusoside D, acesulfame potassium, advantame, albiziasaponin, alitame, aspartame, superaspartame,

bayunosides, in particular bayunoside 1, bayunoside 2, brazzein, bryoside, bryonoside, bryonodulcoside, carnosifloside, carrelame, curculin, cyanin, chlorogenic acid, cyclamates and its salts, cyclocaryoside I, dihydroquercetin-3-acetate, dihydroflavenol, dulcoside, gaudichaudioside, glycyrrhizin, glycyrrhetin acid, gypenoside, hematoxylin, hemandulcin, isomogrosides, in particular iso-mogroside V, lugdunane, magap, mabinlins, micraculin, mogrosides (lo han guo), in particular mogroside IV and mogroside V, monatin and its derivatives, monellin, mukurozioside, naringin dihydrochalcone (NarDHC), neohesperidin dihydrochalcone (NDHC), neotame, osladin, pentadin, periandrin I-V, perillartine, D-phenylalanine, phlomisides, in particular phlomiside 1, phlomiside 2, phlomiside 3, phlomiside 4, phloridzin, phyllodulcin, polpodiosides, polypodoside A, pterocaryosides, rebaudiosides, in particular rebaudioside A, rebaudioside B, rebaudioside C, rebaudioside D, rebaudioside F, rebaudioside G, rebaudioside H), rubusosides, saccharin and its salts and derivatives, scandenoside, selliguanin A, siamenosides, in particular siamenoside I, stevia, steviolbioside, stevioside and other steviol glycosides, strogines, in particular strogin 1, strogin 2, strogin 4, suavioside A, suavioside B, suavioside G, suavioside H, suavioside I, suavioside J, sucralose, sucronate, sucrooctate, talin, telosmoside A₁₅, thaumatin, in particular thaumatin I and II, trans-anethol, trans-cinnamaldehyde, trilobatin and D-tryptophane, including extracts or enriched fractions of the natural sweeteners. The above-identified sweeteners are known in the art and are commercially available.

Extracts or enriched fractions of natural sweeteners may include extracts with more than 10 wt%, preferably with more than 50 wt% and more preferably with more than 90 wt% of the sweetener concerned in relation to the dry mass of the fraction.

25

In one embodiment, the sweetener is selected from the group consisting of extracts and corresponding enriched fractions of: *Thaumatococcus* extracts (sweet prayers plant), extracts of *Stevia* ssp. (in particular *Stevia rebaudiana*), swingle extract (*Mormordica* or *Siratia grosvenorii*, Luo-Han-Guo), extracts of *Glycyrrhiza* ssp. (in particular *Glycyrrhiza glabra*), extracts of *Rubus* ssp. (in particular *Rubus suavissimus*), citrus extracts, extracts of *Lippia dulcis*, Buddha tea extracts (*Hydrangea dulcis* and other phyllodulcin-containing *Hydrangea* ssp.).

30

Preferably, the at least one sweetener is selected from the group consisting of acesulfame potassium, aspartame, sucralose and thaumatin.

Preferably, the at least one sweetener comprises the sweetener acesulfame potassium.

5

Preferably, the at least one sweetener comprises a first and a second sweetener.

Preferably, the at least one sweetener comprises the sweeteners acesulfame potassium and thaumatin.

10

In one particularly preferred embodiment, the at least one sweetener comprises the sweeteners acesulfame potassium and sucralose.

In one particularly preferred embodiment, the amount of the substances (1), (2) and (3), preferably of (1), (2a), (2b), (3a) and (3b), of the substances (i), if appropriate (ii), (iii), (iv) and (v) and of the substances (I), (II) and (III), respectively, in the sweetener composition is below their taste threshold concentration.

15

In another embodiment, the sweetener composition further comprises at least one additional sweetener.

20

Exemplary additional sweeteners include but are not limited to sugar alcohols or sugar sweeteners selected from the group consisting of erythritol, galactitol, hydrogenated starch syrups, maltitol and sorbitol syrups, inositols, isomalt, lactitol, maltitol, mannitol, xylitol, arabinose, dextrin, dextrose, fructose, high fructose corn syrup, fructooligosaccharides, fructooligosaccharide syrups, galactose, galactooligosaccharides, glucose, glucose and (hydrogenated) starch syrups/hydrolysates, isomaltulose, lactose, hydrolysed lactose, maltose, mannose, rhamnose, ribose, sucrose, tagatose, trehalose, xylose, and combinations thereof. The above-identified sweeteners are known in the art and are commercially available.

25

30

Preferably, the at least one additional sweetener is sucrose.

The at least one additional sweetener may be a caloric sweetener and/or a non-caloric sweetener.

In one embodiment, the inventive sweetener compositions further comprise at least one
5 sweetness enhancer, e.g., at least two or at least three. Suitable sweetness enhancers are well known in the art. In one embodiment, the at least one sweetness enhancer may be selected from the group consisting of terpenes (such as sesquiterpenes, diterpenes, and triterpenes), flavonoids, amino acids, proteins, polyols, other known natural sweeteners (such as cinnamaldehydes, selliguaeins and hematoxylin), secodammarane glycosides,
10 and analogues thereof.

Exemplary sweetness enhancers include stevioside, steviolbioside, rebaudioside A, rebaudioside B, rebaudioside C, rebaudioside D, rebaudioside F, dulcoside A, rubusoside; hernandulcin; pine rosin diterpenoid; mukurozioside; baiyunoside; phlomiside, such as
15 phlomiside I and phlomiside II; glycyrrhizic acid; periandrins, such as periandrin I, periandrin II, periandrin III, and periandrin IV; osladin; polypodosides, such as polypodoside A and polypodoside B; mogrosides, such as mogroside IV and mogroside V; abrusoside A and abrusoside B; cyclocariosides, such as cyclocarioside A and cyclocarioside B; pterocaryoside A and pterocaryoside B; flavonoids, such as phyllodulcin,
20 phloridzin, neoastilbin, and dihydroquercetin acetate; amino acids, such as glycine and monatin; proteins, such as thaumatin (thaumatin I, thaumatin II, thaumatin III, and thaumatin IV), monellin, mabinlins (mabinlin I and mabinlin II), brazzein, miraculin, and curculin; polyols such as erythritol; cinnamaldehyde; selliguaeins, such as selliguaein A and selliguaein B; hematoxylin; and mixtures thereof.

Additional exemplary sweetness enhancers include pine rosin diterpenoids; phloridizin; neoastilbin; dihydroquercetin acetate; glycine; erythritol; cinnamaldehyde; selliguaein A; selliguaein B; hematoxylin; rebaudioside A; rebaudioside B; rebaudioside C; rebaudioside D; rebaudioside E; dulcoside A; steviolbioside; rubusoside; stevia; stevioside; steviol
25 O- β -D-glycoside; mogroside V; Luo Han Guo; siamenoside; siamenoside I; monatin and salts thereof (monatin SS, RR, RS, SR); curculin; glycyrrhizic acid and its salts; thaumatin I; thaumatin II; thaumatin III; thaumatin IV; monellin; mabinlin I; mabinlin II; brazzein; hernandulcin; phyllodulcin; glycyphyllin; phloridzin; trilobatin; baiyunoside; osladin; polypodoside A; polypodoside B; pterocaryoside A; pterocaryoside B; mukurozioside;

mukurozioside lib; phlomisioside I; phlomisioside II; periandrin I; periandrin II; periandrin
 III; periandrin VI; periandrin V; cyclocarioside A; cyclocarioside B; suavioside A;
 suavioside B; suavioside G; suavioside H; suavioside I; suavioside J; labdane glycosides:
 baiyunoside; gaudichaudioside A; mogroside IV; iso-mogroside; bryodulcoside;
 5 bryobioside; bryoside; bryonoside; carnosifloside V; camosifloside VI; scandenoside R6; 1
 1-oxomogroside V; abrusoside A; abrusoside B; abrusoside C; abrusoside D; abrusoside
 E; gypenoside XX; glycyrrhizin; apioglycyrrhizin; araboglycyrrhizin; pentadin;
 perillaldehyde; rebaudioside F; steviol; 13-[(2-0-(3-0-a-D-glucopyranosyl)- β -D-
 glucopyranosyl-3-0- β -D-glucopyranosyl)-oxy]kaur-16-en-18-oic acid
 10 β -D-glucopyranosyl ester; 13-[(2-0- β -D-glucopyranosyl-3-0-(4-0-a-D-glucopyranosyl)-
 β -D-glucopyranosyl- β -D-glucopyranosyl)-oxy] kaur-16-en-18-oic acid β -D-
 glucopyranosyl ester; 13-[(3-0- β -D-glucopyranosyl- β -D-glucopyranosyl)-oxy]kaur-16-en-
 18-oic acid β -D-glucopyranosyl ester; 13-hydroxy-kaur-16-en-18-oic acid β -D-
 glucopyranosyl ester; 13-methyl-16-oxo-17-norkauran-18-oic acid β -D-glucopyranosyl
 15 ester; 13-[(2-0- β -D-glucopyranosyl-3-0- β -D-glucopyranosyl)- β -D-glucopyranosyl)-oxy]
 kaur-15-en-18-oic acid β -D-glucopyranosyl ester; 13-[(2-0- β -D-glucopyranosyl-3-0- β -D-
 glucopyranosyl- β -D-glucopyranosyl)-oxy] kaur-15-en-18-oic acid; 13-[(2-0- β -D-
 glucopyranosyl-3-0- β -D-glucopyranosyl)- β -D-glucopyranosyl)-oxy]-17-hydroxy-kaur-15-
 en-18-oic acid β -D-glucopyranosyl ester; 13-[(2-0- β -D-glucopyranosyl-3-0- β -D-
 20 glucopyranosyl- β -D-glucopyranosyl)-oxy]-16-hydroxy kauran-18-oic acid β -D-
 glucopyranosyl ester; 13-[(2-0- β -D-glucopyranosyl-3-0- β -D-glucopyranosyl- β -D-
 glucopyranosyl)-oxy]-16-hydroxy kauran-18-oic acid; isosteviol; mogroside LA; mogroside
 IE; mogroside 11-A; mogroside 11-E; mogroside III; mogroside V; isomogroside V; 11-
 Oxomogroside; mogrol; 11-oxomogrol; 11-oxomogroside LA; l-[13-hydroxykaur-16-en-
 25 18-oate] β -D-glucopyranuronic acid; 13-[(2-0- β -D-glucopyranosyl- β -D-
 glucopyranosyl)-oxy]-17-hydroxy-kaur-15-en-18-oic acid β -D-glucopyranosyl ester; 13-
 [(2-0- β -D-glucopyranosyl- β -D-glucopyranosyl)-oxy] kaur-16-en-18-oic acid-(2-0- β -D-
 glucopyranosyl- β -D-glucopyranosyl)ester (rebaudioside E); 13-[(2-0-a-L-
 rhamnopyranosyl-3-0- β -D-glucopyranosyl- β -D-glucopyranosyl)-oxy] kaur-16-en-18-oic
 30 acid-(2-0- β -D-glucopyranosyl- β -D-glucopyranosyl) ester; 13-[(2-0- β -D-glucopyranosyl-
 3-0- β -D-glucopyranosyl- β -D-glucopyranosyl)-oxy]-kaur-16-en-18-oic acid-(2-0-a-L-
 rhamnopyranosyl- β -D-glucopyranosyl) ester; 13-[(2-0- β -D-glucopyranosyl- β -D-
 glucopyranosyl)-oxy]-17-oxo-kaur-15-en-oic acid β -D-glucopyranosyl ester; 13-[(2-0-(6-0-
 β -D-glucopyranosyl)- β -D-glucopyranosyl- β -D-glucopyranosyl)-oxy] kaur-16-en-18-oic

acid β -D-glucopyranosyl ester; 13-[(2-0- β -D-glucopyranosyl-3-0- β -D-fructofuranosyl- β -D-glucopyranosyl)oxy] kaur-16-en-18-oic acid β -D-glucopyranosyl ester; 13-[(20- β -D-glucopyranosyl-p-D-glucopyranosyl)oxy] kaur-16-en-18-oic acid-(6-0- β -D-xylopyranosyl- β -D-glucopyranosyl) ester; 13-[(2-0- β -D-glucopyranosyl- β -D-glucopyranosyl)oxy] kaur-16-en-18-oic acid-(4-0-(2-0-a-D-glucopyranosyl)-a-D-glucopyranosyl- β -D-glucopyranosyl) ester; 13-[(2-0- β -D-glucopyranosyl-3-0- β -D-glucopyranosyl- β -D-glucopyranosyl)oxy] kaur-16-en-18-oic acid-(2-0-6-deoxy- β -D-glucopyranosyl- β -D-glucopyranosyl) ester; 13-[(2-0- β -D-glucopyranosyl- β -D-glucopyranosyl)oxy] kaur-15-en-18-oic acid β -D-glucopyranosyl ester; 13-[(2-0- β -D-glucopyranosyl-3-0- β -D-xylopyranosyl- β -D-glucopyranosyl)oxy] kaur-16-en-18-oic acid β -D-glucopyranosyl ester; 13-[(2-0- β -D-xylopyranosyl- β -D-glucopyranosyl)oxy] kaur-16-en-18-oic acid β -D-glucopyranosyl ester; 13-[(3-0- β -D-glucopyranosyl- β -D-glucopyranosyl)oxy] kaur-16-en-18-oic acid β -D-glucopyranosyl ester; 13-[(2-0-6-deoxy- β -D-glucopyranosyl-3-0- β -D-glucopyranosyl- β -D-glucopyranosyl)oxy] kaur-16-en-18-oic acid β -D-glucopyranosyl ester; 13-[(2-0-6-deoxy- β -D-glucopyranosyl- β -D-glucopyranosyl)oxy] kaur-16-en-18-oic acid β -D-glucopyranosyl ester; and mixtures thereof.

Additional exemplary sweetness enhancers include rebaudioside C, rebaudioside F, rebaudioside D, 13-[(2-0- β -D-glucopyranosyl-3-0- β -D-glucopyranosyl)- β -D-glucopyranosyl)oxy]-17-hydroxy-kaur-15-en-18-oic acid β -D-glucopyranosyl ester, 13-[(2-0-(3-0- β -D-glucopyranosyl)- β -D-glucopyranosyl-3-0- β -D-glucopyranosyl- β -D-glucopyranosyl)oxy] kaur-16-en-18-oic acid β -D-glucopyranosyl ester, and Rubusoside. Further for example, the at least one sweetness enhancer is chosen from rebaudioside A, stevioside, rebaudioside D, rebaudioside E, mogroside V, mogroside IV, brazzein, and monatin.

In one embodiment, the flavoring of composition X as defined above is present in the sweetener composition in an amount effective to modify, mask, reduce and/or suppress an unpleasant off-taste, aftertaste or lingering sweetness of the at least one sweetener or the sweetness enhancer, wherein the amount is less than a taste threshold concentration associated with the flavoring or composition X.

Preferably, the effect of the flavoring or composition X remains at least as long as the taste of the at least one sweetener or the at least one sweetness enhancer is perceived.

As used herein and as also defined above, the term "taste threshold concentration associated with the flavoring or composition X" means the minimum concentration at which a person can still detect the flavoring or composition X as defined above by the human sense of taste, in particular in an aqueous solution. In some embodiments, the taste threshold concentration may vary from person to person.

Based on the description of the at least one flavoring as well as of the composition X as defined above and on the specific ranges as defined above a person skilled in the art will be able to select the amount effective to modify, mask, reduce and/or suppress an unpleasant off-taste, aftertaste or lingering sweetness of the at least one sweetener or the sweetness enhancer, wherein the amount is less than a taste threshold concentration associated with the composition X or with the flavoring.

In a preferred embodiment, in the sweetener composition as defined above, the flavoring or composition as defined above is present in an amount effective to modify, mask, reduce and/or suppress an unpleasant bitter and/or astringent aftertaste of acesulfame potassium.

In one embodiment, the sweetener composition comprises from 0.1 wt% to 20 wt% of the flavoring or composition X as defined above based on the total weight of the sweetener composition, e.g. from 0.5 wt% to 20 wt%, from 3 wt% to 18 wt% or from 4 wt% to 16 wt%, from 0.55 wt % to 18 wt%, from 0.60 wt % to 16 wt %, from 0.65 wt % to 14 wt%, from 0.70 wt% to 12 wt%, from 0.75 wt% to 10 wt%, from 0.80 wt% to 8 wt %, from 0.80 wt% to 7 wt %, from 0.80 to 6 wt%, from 0.80 to 5 wt %, from 0.85 wt% to 4 wt %, from 0.85 wt% to 3 wt%, from 0.85 wt% to 2.5 wt %, from 0.85 to 2.3 wt%, from 0.90 wt% to 2.2 wt %, 1.6 wt% to 2.2 wt% from 0.90 wt% to 2.1 wt%, from 1.0 wt% to 1.15 wt%, from 0.9 wt% to 1.2 wt%, from 0.90 to 2.0 wt%, or from 0.90 to 1.8 wt %.

In a preferred embodiment, the sweetener composition comprises at least 0.1 wt% of the flavoring or composition X as defined above based on the total weight of the sweetener composition, e.g., 0.2 wt%, 0.3 wt%, 0.4 wt%, 0.5 wt%, 0.6 wt%, 0.7 wt%, 0.8 wt%, 0.9 wt%, 1.0 wt%, 1.1 wt%, 1.11 wt%, 1.2 wt%, 1.3 wt%, 1.4 wt%, 1.5 wt%, 1.6 wt%, 1.7

wt%, 1.8 wt%, 1.9 wt%, 1.96 wt%, 2.0 wt%, 2.1 wt%, 2.2 wt%, 2.3 wt%, 2.4 wt%, 2.5 wt%, 2.6 wt%, 2.7 wt%, 2.8 wt%, 2.9 wt% or 3.0 wt%.

In one embodiment, the sweetener composition comprises from 80 wt% to 99.5 wt% of the
5 at least one sweetener based on the total weight of the sweetener composition, e.g. from 82 wt% to 99.5 wt%, from 84 wt% to 99.4 wt% , from 94 wt% to 99.5 wt%, from 86 wt% to 99.3 wt%, from 88 wt% to 99.2 wt%, from 86 wt% to 99.1 wt%, from 88 wt% to 99.0 wt%, from 90 wt% to 98.9 wt%, from 92 wt% to 98.9 wt%, from 93 wt % to 98.9 wt%, from 93 wt% to 99 wt%, from 94.2 wt% to 98.1 wt%, from 94 wt% to 99.1 wt%, from 85.1
10 wt% to 98.9 wt%, from 94 wt% to 99.5 wt%, from 94 wt% to 98.9 wt%, from 94 wt% to 98.4 wt%, from 95 wt% to 98.9 wt%, from 82 wt% to 96 wt%, from 84 wt% to 94 wt% or from 86 wt% to 92 wt%.

In one embodiment, the sweetener composition comprises from 35 wt% to 99.9 wt% of
15 acesulfame potassium based on the total weight of the sweetener composition, e.g. from 45 wt% to 99.9 wt%, from 50 wt% to 99.5 wt% , from 60 wt% to 99.5 wt%, from 70 wt% to 99.5 wt%, from 75 wt% to 99.0 wt%, from 70 wt% to 96 wt%, from 75 wt% to 95 wt%, from 76 wt% to 96 wt%, from 81 wt% to 91 wt%, from 80 wt % to 86 wt%, or from 83 wt% to 89 wt%.

20 In one embodiment, the sweetener composition comprises from 1 wt% to 50 wt% of sucralose based on the total weight of the sweetener composition, e.g. from 1 wt% to 40 wt%, from 3 wt% to 40 wt% , from 5 wt% to 35 wt%, from 5 wt% to 30 wt%, from 5 wt% to 15 wt%, from 5 wt% to 17 wt%, from 12 wt% to 25 wt%, from 15 wt% to 22 wt%, or
25 from 9 wt% to 15 wt%.

In a preferred embodiment, the sweetener composition comprises from 77.0 wt% to 87.0 wt% acesulfame potassium. In one embodiment, the sweetener composition further comprises from 11.0 wt% to 19.0 wt% sucralose. In one embodiment, the sweetener
30 composition further comprises 0.9 wt% to 2.2 wt% of the flavoring or composition X as defined above. In one embodiment the sweetener composition may further comprise from 0.0 wt% to 5.0 wt% glycerol. The above weight percentages may be based on the total weight of the sweetener composition.

In a preferred embodiment, the sweetener composition comprises from 35 wt% to 99.9 wt% of acesulfame potassium based on the total weight of the sweetener composition, e.g. from 45 wt% to 99.9 wt%, from 50 wt% to 99.5 wt% , from 60 wt% to 99.5 wt%, from 70 wt% to 99.5 wt%, from 75 wt% to 99.0 wt%, from 70 wt% to 96 wt%, from 75 wt% to 95 wt%, from 77 wt% to 93 wt%, from 80 wt% to 90 wt%, from 82 wt % to 88 wt%, or from 83 wt% to 87 wt%. In one embodiment, the sweetener composition further comprises from 1 wt% to 50 wt% of sucralose based on the total weight of the sweetener composition, e.g. from 1 wt% to 40 wt%, from 3 wt% to 40 wt% , from 5 wt% to 35 wt%, from 5 wt% to 30 wt%, from 12 wt% to 25 wt%, or from 15 wt% to 22 wt%. In one embodiment, the sweetener composition further comprises from 0.1 wt% to 20 wt% of the composition X as defined above, e.g. from 0.5 wt% to 20 wt%, from 0.55 wt % to 18 wt%, from 0.60 wt % to 16 wt %, from 0.65 wt % to 14 wt%, from 0.70 wt% to 12 wt%, from 0.75 wt% to 10 wt%, from 0.80 wt% to 8 wt %, from 0.80 wt% to 7 wt %, from 0.80 to 6 wt%, from 0.80 to 5 wt %, from 0.85 wt% to 4 wt %, from 0.85 wt% to 3 wt%, from 0.85 wt% to 2.5 wt %, from 0.85 to 2.3 wt%, from 0.90 wt% to 2.2 wt %, 1.6 wt% to 2.2 wt% from 0.90 wt% to 2.1 wt%, from 1.0 wt% to 1.15 wt%, from 0.9 wt% to 1.2 wt%, from 0.90 to 2.0 wt%, or from 0.90 to 1.8 wt %.

In a preferred embodiment, the sweetener composition comprises from 45 wt% to 99.9 wt% of acesulfame potassium based on the total weight of the sweetener composition, e.g. from 60 wt% to 99.5 wt%, from 70 wt% to 99.5 wt%, from 75 wt% to 95 wt%, from 77 wt% to 93 wt%, from 80 wt% to 90 wt%, from 81 wt% to 89 wt%, or from 83 wt% to 89 wt%. In one embodiment, the sweetener composition further comprises from 1 wt% to 40 wt% of sucralose based on the total weight of the sweetener composition, e.g. from 3 wt% to 40 wt% , from 3 wt% to 35 wt%, from 3 wt% to 30 wt%, from 3 wt% to 25 wt%, from 5 wt% to 20 wt%, from 7 wt% to 17 wt%, from 9 wt% to 15 wt%, or from 10 wt% to 14 wt%. In one embodiment, the sweetener composition further comprises from 0.1 wt% to 20 wt% of the composition X as defined above, e.g. from 0.1 wt % to 18 wt%, from 0.1 wt % to 15 wt %, from 0.1 wt % to 10 wt%, from 0.1 wt% to 8 wt%, from 0.1 wt% to 5 wt%, from 0.1 wt% to 3 wt %, from 0.3 wt% to 8 wt %, from 0.3 to 5 wt%, from 0.3 to 3 wt %, from 0.5 wt% to 8 wt %, from 0.5 wt% to 5 wt%, from 0.5 wt% to 3 wt %, from 0.75 to 8 wt%, from 0.75 wt% to 5 wt %, 0.75 wt% to 3 wt%, from 1 wt% to 8 wt%, from 1 wt% to 5 wt%, from 1 wt% to 3 wt%, from 1.5 to 3 wt%, or from 1.5 to 2.5 wt %.

In a particularly preferred embodiment, the sweetener composition comprises from 82.0 wt% to 87.0 wt% acesulfame potassium, e.g., from 83.0 wt% to 86.4 wt% or from 83.5 wt% to 85.9 wt%. In one embodiment, the sweetener composition further comprises from 11.0 wt% to 12.0 wt% sucralose, e.g., from 11.2 wt% to 11.7 wt% or from 11.4 wt% to 11.6 wt%. In one embodiment, the sweetener composition further comprises 1.6 wt% to 2.2 wt% of the flavoring or composition X, e.g., from 1.8 wt% to 2.0 wt% or from 1.85 wt.% to 1.89 wt. %. In one embodiment the sweetener composition may comprise from 0.0 wt% to 5.0 wt% glycerol, e.g., from 0 wt.% to 4.0 wt.% or from 0.1 to 4.0 wt.%. The above weight percentages may be based on the total weight of the sweetener composition.

Such embodiments are designated herein as "sweetener composition 1." These sweetener compositions 1, in one embodiment, are suitable for use in reducing the quantity of standard sugar such as sucrose that may be present in a consumable product.

In a particularly preferred embodiment, the sweetener composition comprises from 77.0 wt% to 82.0 wt% acesulfame potassium, e.g., from 77.4 wt% to 80.5 wt% or from 78 wt% to 80 wt%. In one embodiment, the sweetener composition further comprises from 17 wt% to 19 wt% sucralose, e.g., from 17.7 wt% to 18.4 wt% or from 17.8 wt% to 18.3 wt.%. In one embodiment, the sweetener composition further comprises 0.9 wt% to 1.2 wt% of the flavoring or composition X, e.g., from 1.0 wt% to 1.1 wt% or from 1.0 wt.% to 1.05 wt.%. In one embodiment the sweetener composition may comprise from 0.0 wt% to 5.0 wt% glycerol, e.g., from 0 wt.% to 4.0 wt.% or from 0.1 to 4.0 wt.%. The above weight percentages may be based on the total weight of the sweetener composition. Such embodiments are designated herein as "sweetener composition 2." The preferred sweetener composition 2, in one embodiment, is suitable for reducing the quantity of standard sugar such as sucrose that may be present in a consumable product or for replacing or substantially replacing standard sugar such as sucrose that may be present in a consumable product.

In one embodiment, the at least one sweetness enhancer is present in an amount at or below the sweetness detection threshold level of the at least one sweetness enhancer. In some embodiments, the at least one sweetness enhancer is present in an amount below the sweetness detection threshold level of the at least one sweetness enhancer. The sweetness detection threshold level can be specific for a particular compound. However, generally, in some embodiments, the at least one sweetness enhancer is present in an amount ranging

from 0.5 wppm to 3000 wppm, e.g., from 0.5 wppm to 1000 wppm, from 1 wppm to 300 wppm; from 0.1 wppm to 75 wppm.

As used herein, the terms "sweetness threshold," "sweetness recognition threshold," and
5 "sweetness detection threshold" mean the level at which the lowest known concentration of
a certain sweet compound is perceivable by the human sense of taste and it can vary from
person to person. For example, a typical sweetness threshold level for sucrose in water can
be 0.5%. Further, for example, the at least one sweetness enhancer to be used can be
assayed in water at least 25% lower and at least 25% higher than the sucrose detection
10 level of 0.5% in water to determine the sweetness threshold level. A person skilled in the
art will be able to select the concentration of the at least one sweetness enhancer so that it
may impart an enhanced sweetness to a composition comprising at least one sweetener. For
example, a person skilled in the art may select a concentration for the at least one
sweetness enhancer so that the at least one sweetness enhancer does not impart any
15 perceptible sweetness to a composition that does not comprise at least one sweetener.

In some embodiments, the compounds listed above as sweeteners may also function as
sweetness enhancers. Generally speaking, some sweeteners may also function as sweetness
enhancers and *vice versa*. The sweetness enhancer(s) may be present in the sweetener
20 composition in the amounts discussed above with respect to the first sweetener.

In one embodiment of the invention, the sweetener composition of the invention is liquid at
ambient conditions. In another embodiment of the invention, the sweetener composition of
the invention is solid at ambient conditions.

25

The sweetener composition or the consumable product composition of the present
invention may contain further additives known to those skilled in the art. These additives
include but are not limited to dust control agents, bubble forming agents, surfactants,
emulsifiers, slats, fats, gums, hydrocolloids, bulking agents, carriers, fibers, flavoring
30 ingredients, flavor enhancers, flavor stabilizers, acidulants, anti-caking and free-flow
agents. Such additives are for example described by H. Mitchell (H. Mitchell, "Sweeteners
and Sugar Alternatives in Food Technology", Backwell Publishing Ltd, 2006, which is
incorporated herein by reference in its entirety).

Preferably, the additional component is glycerol.

In one embodiment, the sweetener composition has a sweetness level that is at least 190 greater than the sweetness level of natural sugar, e.g., granulated sugar. In one
5 embodiment, the sweetener composition has a sweetness level ranging from 190 to 300 times the sweetness level of natural sugar, e.g., from 210 to 280 times the sweetness of natural sugar. Preferably, a 1 g portion of the sweetener composition is 190 to 300 times sweeter than a 1 gram portion of granulated sugar.

10 Preferably, a 1 gram portion of the sweetener composition provides sweetness comparable to one to three teaspoons of granulated sugar, preferably comparable to two teaspoons of granulated sugar. Preferably, one gram of the sweetener composition contains less calories and carbohydrates than 1 gram of granulated sugar, e.g., less than 0.5 grams of granulated
15 sugar.

For example, the compositions may contain sweetness comparable to that of granulated sugar (sucrose), and therefore can be used "spoon-for-spoon" or "cup-for-cup" in place of
20 sugar.

The form of the sweetener composition may vary widely. For example in one
25 embodiment, the sweetener composition may be a fine, white powder. In one embodiment the sweetener composition is a fine white-yellow powder.

In one embodiment the sweetener composition has a solubility, e.g., at 20°C, of from 230
30 g/l to 310 g/l, e.g., from 250 g/l to 290 g/l, preferably being about 270 g/l. In one embodiment, the sweetener composition is stable at a pH ranging from 3.0 to 7.5. In one embodiment, the sweetener composition is pasteurization stable and/or UHT stable.

The sweetener composition may take any suitable form including, but not limited to, an
35 amorphous solid, a crystal, a powder, a tablet, a liquid, a cube, a glaze or coating, a granulated product, an encapsulated form around or coated on to carriers/particles, wet or dried, or combinations thereof. In a preferred embodiment, the sweetener composition is a liquid at ambient conditions. In another embodiment, the sweetener composition is a solid at ambient conditions.

In one embodiment, the sweetener composition can be provided in pre-portioned packets or ready-to-use formulations, which include the sweetener composition. For example, in one embodiment in which a sweetener other than sucrose is employed, a single serving packet formulation (usually a 1 gram portion) can provide sweetness comparable to that contained in two teaspoons of granulated sugar (sucrose). It is known in the art that a "teaspoon" of sucrose contains approximately 4 grams of sucrose.

In another embodiment in which a sweetener other than sucrose is used, a volume of a ready-to-use formulation can provide sweetness comparable to the same volume of granulated sugar. Preferably, a single serving packet of the composition comprising the compound of formula (I) as defined above or a derivative or a stereoisomer or a salt or a hydrate thereof (e.g., 1 gram) can provide sweetness comparable to 0.9 to 9.0 grams of granulated sugar (sucrose). In another embodiment, 1 gram of the sweetener composition contains less calories and carbohydrates than 1 gram of granulated sugar.

Unless otherwise stated, all measurement numbers are presumed to have the word "about" in front of them if the word "about" is not expressly used. As used herein, the term "about" encompasses the range of experimental error that occurs in any measurement.

As used herein, the phrase "sweetness comparable" means that an experienced sensory evaluator, on average, will determine that the sweetness presented in a first composition, e.g. composition X is within a range of 80% to 120% of the sweetness presented in a second composition, e.g. composition X. The phrase "a sweetness comparable" relates to a determination ascertained by four or more experienced sensor evaluators in a sweetness matching test (designated hereinafter as "taste and spit assay"). Thus, for instance, 100 mg/ml of a sweetener composition provides "sweetness comparable" to 100 mg/ml of sucrose if the sweetener composition has a sweetness falling within the range of sweetness presented in 80-120 mg/ml of sucrose.

The sweetness properties of the sweetener composition, in some embodiments, can be identified by an *in vitro* in cell based assay as described in EP 1 865 316 B1, which is incorporated herein by reference, or by field effector transistor technology of e.g. Alpha MOS.

The taste of the sweetener composition with regard to sweetness and/or sweetness enhancing properties and/or other tastes, in other embodiments, may be assessed *in vivo* by using a panel of trained sensory evaluators experienced in the sweet taste estimation
5 procedure, e.g. in a taste and spit assay.

The taste-masking properties of the flavoring or composition X as defined above, e.g., if the flavoring or composition X as defined above is useful for modifying, masking, reducing and/or suppressing an unpleasant off-taste, aftertaste or lingering sweetness of the
10 at least one sweetener and/or the sweetness enhancer in the sweetener composition may also be assessed using a taste and spit assay.

A taste and spit assay may also been used for assessing whether the effect of the flavoring or composition X remains at least as long as the taste of the at least one sweetener or the at
15 least one sweetness enhancer is perceived. A taste and spit assay may also be used in the analyses of other taste-related determinations and/or assessments.

In these cases, panelists are asked to take a sample of the liquid to be assessed, e.g. the sweetener composition comprising the flavoring or composition X as defined above, into
20 the mouth and after some time allowed for taste perception to spit the sample out completely. Subsequently, the panelists are asked to rinse their mouth well with water or black tea to reduce any potential carry over effects. The tasting of a sample can be repeated if required.

25 In a first descriptive test (qualitative assessment of the sweetener composition comprising the flavoring or composition X as defined above for sweetness, off-taste, aftertaste and/or lingering sweetness) the panelists are asked to taste the quality of single samples (maximum 3 subsequent samples). The individuals of the taste panel are asked to answer the following questions with regard to the quality of taste: 1) does the sample taste sweet?,
30 2) is there another taste detectable (e.g. bitter, sour, salty, umami etc.)?, 3) is there any off- or aftertaste or lingering sweetness?, 4) is there anything else remarkable in the perception of the sample (e.g. rich taste)?

In a second test (qualitative assessment for taste masking properties of the flavoring or

composition X as defined above) the panelists are asked to answer questions in a pairwise comparison test to determine the taste-masking properties of the flavoring or composition X as defined above. In this test the taste of the sweetener composition comprising the flavoring or composition X as defined above is pairwise compared to the taste of the respective sweetener composition without the flavoring or composition X as defined above. Again the panelists are given samples. Two samples are prepared for direct comparison regarding sweetness, off-taste, aftertaste and lingering sweetness.

One sample contains the sweetener composition without the flavoring or composition X as defined above in a solvent. The other sample contains the sweetener composition comprising the flavoring or composition X as defined above. Designation of the samples with A and B is randomized and is decoded after the taste procedure. The questions to be answered are: 1) does one sample taste sweeter than the other?, 2) if so, which one?, 3) are there any other differences in the taste between the two samples? The result of the taste and spit assay is a qualitative evaluation of the differences between the two samples.

Methods of Making a Sweetener Composition X

In another aspect, the present invention relates to a method of providing a sweetener or sweetness enhancer composition, comprising the step of adding to a sweetener or sweetness enhancer the flavoring or composition as defined above to yield a sweetener or sweetness enhancer composition. As a result, the sweetener or sweetness enhancer composition has substantially no unpleasant off-taste, aftertaste or lingering sweetness.

In one embodiment the invention relates to a method of providing a sweetener composition, comprising the step of adding to acesulfame potassium and sucralose the flavoring or composition X as defined above to yield a sweetener composition. In a preferred embodiment, glycerol may be added to the sweetener composition.

In another aspect, the invention relates to a method of modifying, masking, reducing and/or suppressing the unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetener or sweetness enhancer as defined above. The method comprises combining the flavoring or composition X as defined above with the at least one sweetener or sweetness enhancer.

Preferably, the at least one sweetener (and/or sweetness enhancer) is selected from the group consisting of artificial and natural sweeteners as defined above. More preferably, the at least one sweetener is selected from the group consisting of acesulfame potassium, aspartame, sucralose and thaumatin. Most preferably the at least one sweetener is acesulfame potassium.

Tabletop Sweetener Compositions

10 In another aspect, the present invention relates to tabletop sweetener compositions comprising the flavoring or composition X as defined above and to methods of manufacturing such tabletop sweetener compositions.

As used herein, the term "tabletop sweetener," refers to sweetener compositions that 15 comprise at least one sweetener, and optionally, at least one sweetness enhancer, which can be used in the preparation of various food items and/or as an additive to food items. As one example, the tabletop sweetener may be used in the preparation of baked goods or other sweetened foods. As another example, the tabletop sweetener may be used to season, sweeten, or otherwise customize a prepared food item, e.g., beverages, fruit, or yoghurt. In 20 a preferred aspect, the tabletop sweetener is in a crystalline, granulated, or powder form. In various aspects, the tabletop sweetener will comprise one or more sweeteners and/or one or more sweetness enhancers. In one embodiment, the tabletop sweetener may comprise either or both a caloric sweetener and/or substantially non-caloric sweeteners, and, if appropriate, one or more sweetness enhancers. Typical examples of caloric sweeteners that 25 may be used in tabletop sweeteners include sucrose, fructose, and glucose. Common tabletop forms of these caloric sweeteners include cane sugar, bee sugar, and the like. In recent decades, substantially non-caloric sweeteners have gained popularity. In many instances, these sweeteners can be used as substitutes for caloric sweeteners and are often referred to as "sugar substitutes."

30

In many instances, sugar substitutes provide a greater sweetening effect than comparable amounts of caloric sweeteners, such as sucrose or fructose. Therefore, smaller amounts of sugar substitutes are required to achieve sweetness comparable to that of an amount of sugar. Sugar substitutes, however, typically have a taste profile that differs from sucrose or

fructose. Such differences include, but are not limited to, increased astringency, bitterness, various aftertastes, delayed onset of sweetness, and different mouthfeel. Therefore, sugar substitutes are often formulated with other materials that can provide bulk and can enhance the taste profile to be more similar to that of sucrose or fructose. Thus, sugar substitutes have been formulated to create a tabletop sweetener formulation that has a bulk and a taste profile that is comparable to sucrose or fructose. Nevertheless, consumers can still distinguish the low-calorie sweetener formulations from caloric tabletop sweeteners. Therefore, if low-calorie tabletop sweeteners are to replace caloric tabletop sweeteners, formulations of low-calorie sweeteners must be continuously improved to meet consumer demand.

Thus, there is a need for new tabletop sweetener formulations which are low in calories (or have no calories) containing novel taste-masking compositions, which can modify, mask, reduce and/or suppress an unpleasant off-taste, aftertaste or lingering sweetness in the oral cavity left by sweeteners or sweetness enhancers not having the disadvantages of known taste-masking substances. In particular, there is a great interest in new tabletop sweetener formulations comprising compositions having no taste of their own, which do not reduce the sweetening power of the sweetener or sweetness enhancer contained in the tabletop sweetener and in the best case even allow the quantity of sweetener or sweetness enhancer to be reduced. In particular, several or all unpleasant taste impressions including but not limited to bitter, astringent off-taste or aftertaste and/or lingering sweetness should be improved, i.e. reduced or suppressed.

Thus, in another aspect, the invention relates to a tabletop sweetener composition comprising

- (c) at least one sugar sweetener, which is selected from the group consisting of monosaccharides, disaccharides, oligosaccharides and polysaccharides, preferably the at least one sugar sweetener is selected from the group consisting of arabinose, dextrin, dextrose, fructose, high fructose corn syrup, fructooligosaccharides, fructooligosaccharide syrups, galactose, galactooligosaccharides, glucose, glucose and (hydrogenated) starch syrups/hydrolysates, isomaltulose, lactose, hydrolysed lactose, maltose, mannose, rhamnose, ribose, sucrose, stachyose, tagatose, trehalose, xylose, and combinations thereof, most preferably the at least one sugar sweetener is a disaccharide and/or fructose;

(d) at least one sugar alcohol (or polyol), which is selected from the group consisting of erythritol, galactitol, hydrogenated starch syrups including maltitol and sorbitol syrups, inositols, isomalt, lactitol, maltitol, mannitol, xylitol, and combinations thereof, preferably the at least one sugar alcohol is erythritol; and

5 (c) at least one sweetener or sweetener composition as defined above.

Preferably, the at least one artificial or natural sweetener is selected from the group consisting of acesulfame potassium, aspartame, sucralose and thaumatin.

10 As used herein, a "taste-masking amount" of the flavoring or composition X as defined above means an amount of the flavoring or composition X as defined above that imparts an unexpected improvement in the taste profile of e.g. tabletop sweetener compositions. As mentioned above, in some instances, for example, the taste-masking may be perceived as a reduction or masking of the bitterness of the sweetener composition, the tabletop sweetener
15 composition or of the beverage or foodstuff containing the sweetener composition. In other instances, for example, the taste masking may also be perceived as an enhancement in the sweetness of the sweetener composition, the tabletop sweetener composition or of the beverage or foodstuff containing the sweetener composition. The taste masking may also be a combination of both bitterness reduction and sweetness enhancement.

20

In one embodiment, the tabletop sweetener composition comprises from 0.5 wt% to 20 wt% of the flavoring or composition X as defined above based on the total weight of the tabletop sweetener composition, e.g. from 3 wt% to 18 wt% or from 4 wt% to 16 wt% of the flavoring or composition X as defined above based on the total weight of the sweetener
25 composition.

In one embodiment, the tabletop sweetener composition as defined above comprises the flavoring or composition X as defined above in a taste-masking amount effective to modify, mask, reduce and/or suppress an unpleasant off-taste or aftertaste of the at least
30 one artificial or natural sweetener, wherein the taste-masking amount is less than a taste threshold concentration associated with the flavoring or composition X.

In a preferred embodiment, the tabletop sweetener composition as defined above comprises the flavoring or composition X as defined above in an amount effective to modify, mask,

reduce and/or suppress an unpleasant off-taste or aftertaste of acesulfame potassium, aspartame, sucralose or thaumatin wherein the amount is less than a taste threshold concentration associated with the flavoring or composition X.

- 5 Preferably, the effect of the flavoring or composition X remains at least as long as the taste of the sugar sweetener, the sugar alcohol and the at least one sweetener are perceived.

In one embodiment, the tabletop sweetener composition as defined above further comprises a taste-improving amount of cellulose.

10

In some embodiments, the tabletop sweetener composition comprises a disaccharide and contains no fructose. In other embodiments, the tabletop sweetener composition comprises fructose and does not contain disaccharide. In other embodiments, the tabletop sweetener compositions comprise both a disaccharide and fructose.

15

As used herein, the terms "sugar sweetener(s)" or "carbohydrate(s)" refer to monosaccharides, disaccharides, oligosaccharides and polysaccharides such as but not limited to arabinose, dextrin, dextrose, fructose, high fructose corn syrup, fructooligosaccharides, fructooligosaccharide syrups, galactose, galactooligosaccharides, glucose, glucose and (hydrogenated) starch syrups/hydrolysates, isomaltulose, lactose, hydrolysed lactose, maltose, mannose, rhamnose, ribose, sucrose, stachyose, tagatose, trehalose, xylose, and combinations thereof.

20

As used herein, the term "disaccharide" refers to any sugar having two monosaccharide units. The monosaccharide units may exist as either ketones or aldehydes, and may have either a cyclic or acyclic structure. When a monosaccharide exists as a cyclic structure, the monosaccharide may exist as a hemiacetal or hemiketal, among other forms. Moreover, when a monosaccharide exists as a cyclic structure, either anomer is included within this definition. Illustrative monosaccharides include trioses, tetroses, pentoses, hexoses, heptoses, octoses, and nonoses. In forming a disaccharide, the monosaccharide units may bond to form either reducing disaccharides or non-reducing disaccharides.

25

30

As used herein, the terms "sugar alcohol(s)" or "polyol(s)" refer to sugar alcohols such as but not limited to erythritol, galactitol, hydrogenated starch syrups including maltitol and

sorbitol syrups, inositols, isomalt, lactitol, maltitol, mannitol, xylitol, and combinations thereof.

As used herein, the term "erythritol" refers to a sugar alcohol well known to the skilled person. Erythritol, in either food grade or reagent grade is readily available through commercial sources.

As used herein, the term "cellulose" refers to any cellulosic material known to the skilled person. In typical embodiments, the cellulose includes polysaccharides having linear chains of at least several hundred beta-linked D-glucose units. When obtained from commercial sources, for example, the cellulose may exist as a powder. Further, in typical embodiments, the cellulose is insoluble or substantially insoluble in water; yet, in an application like tabletop sweeteners, when incorporated in such an application, it preferably will not detract substantially from the overall product dissolution. Chemically modified celluloses can be employed in the compositions as defined above provided the modifications do not result in water soluble material. The cellulose may have any particle size (or particle size distribution) that is suitable for use in a sweetener composition. For example, in some embodiments, the size of the cellulose particles may range from 1 micron to 400 microns, e.g., from 3 microns to 300 microns, from 5 microns to 200 microns, or from 6 microns to 100 microns. In some embodiments, the insoluble cellulose is a cellulose that if used in amounts exceeding 1% in an aqueous medium can lead to significant viscosity change.

In some embodiments, a "taste-improving amount" of cellulose is used. This "taste-improving amount" refers to an amount of cellulose that imparts an unexpected improvement in the taste profile of sweetener compositions. In some instances, for example, the taste improvement may be perceived as an enhancement in the sweetness of the sweetener composition or of the beverage or foodstuff containing the sweetener composition. In other instances, for example, the taste improvement may be perceived as a reduction or masking of the bitterness of the sweetener composition or of the beverage or foodstuff containing the sweetener composition. The taste improvement may also be a combination of both sweetness enhancement and bitterness reduction. In some embodiments of the sweetener compositions, the taste-improving amount of cellulose ranges from 0.4 wt% to 3.0 wt%, e.g., from 0.7 wt% to 2.0 wt%, of cellulose, based on the

total weight of the sweetener composition. In some embodiments, the sweetener composition contains 1 wt% cellulose, based on the total weight of the sweetener composition.

- 5 In one embodiment, the disaccharide includes, but is not limited to, disaccharides containing glucose, fructose, and galactose. In another embodiment, the disaccharide includes, but is not limited to, sucrose, lactose, maltose, trehalose, and isomaltulose. In another embodiment, the disaccharide is isomaltulose.
- 10 In a preferred embodiment, the disaccharide is selected from the group consisting of sucrose, lactose, maltose, trehalose, and isomaltulose.

Sweetener compositions may contain varying amounts of at least one sugar sweetener, in particular of a disaccharide and/or fructose, of at least one sugar alcohol, in particular of
15 erythritol, of the artificial or natural sweetener as defined above, and of cellulose. The desired amount of artificial or natural sweetener as defined above may vary depending on, among other factors, the desired use of the tabletop sweetener composition, the presence or absence of other components in the tabletop sweetener composition, the identity of any sugar sweetener, in particular of a disaccharide, if present, and the presence or absence of
20 fructose.

In some embodiments, the tabletop sweetener composition contains from 40 wt% to 90 wt% sugar alcohol, in particular erythritol, based on the total weight of the sweetener composition, e.g., from 50 wt% to 60 wt%, from 55 wt% to 65 wt%, from 57 wt% to 63
25 wt%, or from 60 wt% to 62 wt%. In a preferred embodiment, the sweetener composition contains more than 50 wt% sugar alcohol, in particular erythritol, based on the total weight of the sweetener composition.

In some embodiments, the tabletop sweetener composition contains from 27 wt% to 50
30 wt% sugar sweetener, in particular disaccharide, based on the total weight of the sweetener composition, e.g., from 35 wt% to 45 wt%, from 30 wt% to 40 wt%, from 30 wt% to 38 wt%, from 32 wt% to 36 wt%, or from 33 wt% to 35 wt%. In some such embodiments, the sweetener composition contains 41 wt% of sugar sweetener, in particular disaccharide, based on the total weight of the sweetener composition. In still other embodiments, the

tabletop sweetener composition contains 33-34 wt% of sugar sweetener, in particular disaccharide, based on the total weight of the sweetener composition. In a preferred embodiment, the sugar sweetener is isomaltulose.

- 5 In some embodiments, the sweetener composition contains from 0.5 wt% to 7.0 wt% of the artificial or natural sweetener as defined above, based on the total weight of the sweetener composition, e.g., from 0.7 wt% to 5.0 wt%, or from 1.0 wt% to 2.5 wt%. The amount of the artificial or natural sweetener as defined above used may in certain situations depend on the purity of the material. In one embodiment, the tabletop sweetener composition as
10 defined above comprises from 0.5 wt% to 7.0 wt% acesulfame potassium, aspartame, sucralose or thaumatin.

- In another embodiment, tabletop sweetener compositions as defined above contain (a) from 38 wt% to 43 wt% of isomaltulose; (b) from 50 wt% to 60 wt% erythritol; (c) from 0.75
15 wt% to 1.75 wt% the artificial or natural sweetener as defined above; and (d) from 4 wt% to 16 wt% composition as defined above; based on the total weight of the tabletop sweetener composition.

- In another embodiment, tabletop sweetener compositions of the invention contain (a) from
20 30 wt% to 38 wt% of isomaltulose; (b) from 55 wt% to 65 wt% erythritol; (c) from 0.75 wt% to 1.75 wt% the artificial or natural sweetener as defined above; and (d) from 4 wt% to 16 wt% flavoring or composition X as defined above based on the total weight of the tabletop sweetener composition.

- 25 Tabletop sweetener compositions of the invention may also contain amounts of other ingredients in addition to the sugar sweeteners such as disaccharide and/or fructose, the sugar alcohol such as erythritol, the artificial or natural sweetener as defined above and cellulose. Such additional ingredients include, but are not limited to, sweetness modifiers, mouthfeel enhancers, flavoring ingredients (e.g., vanilla flavoring), and the like. Honey
30 and/or evaporated cane juice may be used in place of or in combination with the sugar alcohol, in particular in place of or in combination with erythritol. Natural flavors and other ingredients are preferred when the product is to be labeled as "all-natural."

In another embodiment, the tabletop sweetener composition comprises less than 2 wt% of a sweetness modifier, e.g., less than 1 wt%. In terms of ranges, the tabletop sweetener composition may, for example, comprise between 0.01 wt% and 2 wt% sweetness modifier, in particular between 0.1 wt% and 1.5 wt% sweetness modifier.

5

In another embodiment, the tabletop sweetener composition comprises less than 1 wt% of a mouthfeel enhancer, e.g., less than 0.5wt%. In terms of ranges, the tabletop sweetener composition may, for example, comprise between 0.01 wt% and 1 wt% mouthfeel enhancer, in particular between 0.1 wt% and 0.5 wt% mouthfeel enhancer.

10

In another embodiment, the tabletop sweetener composition comprises less than 1 wt% of a flavoring ingredient, e.g., less than 0.5wt%. In terms of ranges, the tabletop sweetener composition may, for example, comprise between 0.01 wt% and 1 wt% flavoring ingredient, in particular between 0.1 wt% and 0.5 wt% flavoring ingredient.

15

In some embodiments, sweetener compositions of the invention provide at least one, if not more than one, of the following desirable characteristics: (a) fewer calories per gram than standard table sugar; (b) fewer calories than an amount of standard table sugar perceived as providing comparable sweetness; and (c) lower glycemic index than that of standard table sugar. In some embodiments, the sweetener composition has less than 5 calories/gram, or less than 3 calories/gram, or less than 1 calorie/gram. As used herein, the term "calorie" refers to the unit of energy commonly appearing on the packaging of food and/or beverage items sold in the United States. The term, as such, does not refer to 1 cal. of energy, but rather corresponds to approximately 1 kcal. of energy. In a typical tabletop sweetener application, for example, the sweetener composition can be packaged in a form where it provides a similar sweetness to 7 grams of sucrose, preferably 5 g of sucrose, while providing less than 5 calories.

20

25

30

In another embodiment, tabletop sweetener compositions of the invention contain a plurality of sweetener particles, wherein such particles contain one or more of the ingredients present in the tabletop sweetener composition. In some embodiments, the tabletop sweetener composition substantially comprises sweetener particles. In such embodiments, the tabletop sweetener composition contains at least 80 wt% sweetener

particles, or at least 85 wt% sweetener particles, or at least 90 wt% sweetener particles, based on the total weight of the tabletop sweetener composition.

Sweetener particles, when present in the tabletop sweetener composition, can have any size
5 suitable for use of the composition as a sweetener. In some embodiments, the average size of the sweetener particles is between 50 microns and 1250 microns, e.g., between 100 microns and 1000 microns. Screening to eliminate particles of undesired sizes can be carried out during the manufacturing process. Thus, in some embodiments, the particle sizes, after screening to eliminate undesired large particles which may be as large as 1500
10 μm , may vary up to 16 mesh, e.g., up to 14 mesh, or up to 12 mesh, based on the standard United States sieve scale. Further, smaller particle sizes, e.g., 50 mesh, 100 mesh, or 150 mesh, or particles having sizes less than 1 μm , e.g., less than 0.5 μm , may be present with the larger particles. Screening to eliminate particles having sizes less than, for example, 100 mesh or 150 mesh can be carried out if desired.

15 Sweetener particles in the tabletop sweetener composition may or may not have uniform composition. Preferably, the tabletop sweetener compositions of the invention comprise the artificial or natural sweetener as defined above and an effective amount of the flavoring or composition X as defined above where the composition is a mixture of particles. More
20 specifically, the mixture comprises (a) particles having an erythritol core and (b) particles having a disaccharide core and the artificial or natural sweetener as defined above and the flavoring or composition X as defined above, as well as other components, are predominantly coated on the particles. These coatings on the cores can be either a continuous phase or a discontinuous phase, i.e., where the different coating components
25 form discrete regions in the core coatings.

Thus, in another aspect, the invention relates to a tabletop sweetener composition comprising:

- 30 (a) a plurality of first sweetener particles, where the first sweetener particles have (i) a sugar alcohol core, in particular an erythritol core, (ii) a first sugar alcohol core-coating layer, in particular a first erythritol core-coating layer comprising the artificial or natural sweetener as defined above and the flavoring or composition X as defined above, and (iii) a second sugar alcohol core-coating layer, in particular a second

erythritol core-coating layer comprising a sugar sweetener, in particular a disaccharide carbohydrate, where the second sugar alcohol core-coating layer, in particular the second erythritol core-coating layer is disposed over the first sugar alcohol core-coating layer, in particular over the erythritol core-coating layer; and

- 5 (b) a plurality of second sweetener particles, where the second sweetener particle has (i) a sugar sweetener core, in particular a disaccharide core, (ii) a first sugar sweetener core-coating layer, in particular a first disaccharide core-coating layer comprising the artificial or natural sweetener as defined above and the flavoring or composition X as defined above, and (iii) a second sugar sweetener core-coating layer, in particular a
10 second disaccharide core-coating layer comprising a sugar sweetener, in particular a disaccharide carbohydrate, where the second sugar sweetener core-coating layer, in particular the second disaccharide core-coating layer, is disposed over the first sugar sweetener core-coating layer, in particular over the disaccharide core-coating layer.

- 15 In such embodiments, the core-coating layers may or may not have uniform compositions, and may or may not substantially coat the underlying core or layer. In some embodiments, the first sugar alcohol core-coating layer, in particular the first erythritol core-coating layer and/or the first sugar sweetener core-coating layer, in particular the first disaccharide core-coating layer have discrete regions of the artificial or natural sweetener as defined above
20 and the flavoring or composition X as defined above.

In another embodiment, the tabletop sweetener composition comprises a mixture of the plurality of first sweetener particles and the plurality of second sweetener particles.

- 25 In another embodiment of the tabletop sweetener composition, the sugar sweetener core, in particular the disaccharide core contains isomaltulose. Further, in some embodiments, the second sugar alcohol core-coating layer in particular the second erythritol core-coating layer and/or the second sugar sweetener core-coating layer in particular the disaccharide core-coating layer contain isomaltulose.

30

These tabletop sweetener compositions may also contain flavoring ingredients (e.g., vanilla flavor), mouthfeel enhancers, and/or sweetness modifiers. When one or more of these are present, the first sugar alcohol core-coating layer, in particular the first erythritol core-coating layer and/or the sugar sweetener core-coating layer in particular the disaccharide

core-coating layer may contain one or more of flavoring ingredients (e.g., vanilla flavor), mouthfeel enhancers, and/or sweetness modifiers. Moreover, as used herein, the term "layer" may or may not refer to a material that entirely surrounds the underlying material. Thus, a "layer" may be non-uniform in composition and may provide only discontinuous coverage of the underlying material. Moreover, when one layer covers another, the boundary between the layers may or may not be discrete; thus, the boundary between layers may be continuous or semi-continuous.

In the sweetener compositions described herein, the tabletop sweetener compositions may or may not contain other particles in addition to the plurality of first sweetener particles and the plurality of second sweetener particles. The first sweetener particles and the second sweetener particles may have any particle size that is suitable for use of the flavoring or composition X as a sweetener.

In some embodiments, the average size of the first sweetener particles and second sweetener particles is between 50 microns and 1250 microns, e.g., between 100 microns and 1000 microns. In some embodiments, the particle sizes of the first sweetener particles and the second sweetener particles, after screening to eliminate undesired large particles which may be as large as 1500 μm , will vary up to 16 mesh, e.g., up to 14 mesh, or up to 12 mesh, based on the standard United States sieve scale. Further, smaller particle sizes, e.g., 50 mesh, 100 mesh, or 150 mesh, or particles having sizes less than 1 μm , e.g., less than 0.5 μm , will be present with the larger particles. In some embodiments, the tabletop sweetener composition comprises a mixture of the plurality of first sweetener particles and the second sweetener particles. Such a mixture may or may not contain other types of particles.

The layers in the sweetener composition particles are generally not distinct, i.e., there is no clear demarcation between the first layer and the second layer. For example, in one embodiment, the first layer contains the artificial or natural sweetener as defined above, optional flavoring components, etc., all encased in sugar sweetener, in particular encased in disaccharide; and the second layer will be predominantly sugar sweetener, in particular disaccharide with some of the other components. The relative quantities of the various components in the layers, and whether there are layers in the particles, can be modified as necessary by adjusting when during the manufacturing process the components are added.

In some embodiments of the invention, the tabletop sweetener composition comprises the artificial or natural sweetener as defined above and a taste-masking amount of the flavoring or composition X as defined above as a mixture, where the mixture comprises (a) particles having a sugar alcohol core, in particular an erythritol core and (b) particles having a sugar sweetener core, in particular a disaccharide core. In some such embodiments, the disaccharide core comprises isomaltulose. Further, in some such embodiments, the sugar alcohol core, in particular the erythritol core and/or the sugar sweetener core, in particular the disaccharide core further comprise coating layers having discrete regions of the artificial or natural sweetener as defined above and the flavoring or composition X as defined above. When such coating layers are present, the coating layers may or may not substantially coat the underlying core material. These particles may have any particle size that is suitable for use of the flavoring or composition X in a sweetener composition. In some embodiments, the average size of the particles is between 50 microns and 1250 microns, e.g., between 100 microns and 1000 microns. In some embodiments, the particle sizes of the particles range from 16 mesh, or from 14 mesh, or from 12 mesh to 100 mesh, based on the standard United States sieve scale.

Sweetener compositions of the invention may have any dissolution rate in water that is suitable for their use as sweeteners. In some embodiments, the sweetener composition can have a dissolution rate in water at 10°C of between 100 seconds and 200 seconds, e.g., between 125 seconds and 175 seconds, or between 140 seconds and 160 seconds, based on the dissolution of 2 grams of the sweetener composition in 240 ml of water. In some embodiments, the sweetener composition can have a dissolution rate in water at 45°C of between 50 seconds and 150 seconds, e.g., between 75 seconds and 125 seconds, or between 85 seconds and 110 seconds, based on the dissolution of 2 grams of the sweetener composition in 240 ml of water. In some embodiments, the dissolution rate of the sweetener composition is 150 seconds at 10°C and 96 seconds at 45°C, based on the dissolution of 2 grams of the sweetener composition in 240 ml of stirred water.

In another embodiment, the invention relates to single-serving packets.

In another embodiment, the invention relates to tabletop sweeteners comprising the artificial or natural sweetener as defined above. Preferably, the tabletop sweetener is a

tabletop tablet sweetener, tabletop "spoon to spoon" sweetener, tabletop "sachet" sweetener, tabletop liquid sweetener. The tabletop sweeteners, in addition to the artificial or natural sweetener as defined above may contain further substances including but not limited to binding agents, citric acid, cyclamate, lactose, carboxymethylcellulose, leucin, maltodextrin, isomalt, NHDC, potassium hydroxide (in aqueous solution), dextrose, other bulking agents, sodium cyclamate, sodium hydrogen carbonate, sodium saccharin and tartaric acid.

In another embodiment, the invention relates to a package containing a predetermined amount, e.g., from 0.8 grams to 3.5 grams, of a solid tabletop sweetener composition, where the predetermined amount of the solid tabletop sweetener composition has a sweetness equivalent to four times (by weight) the predetermined amount of sucrose, and where the solid sweetener composition comprises:

- (a) from 38 wt% to 43 wt% of isomaltulose;
- (b) from 50 wt% to 60 wt% erythritol;
- (c) from 0.75 wt% to 1.75 wt% of the artificial or natural sweetener as defined above; and
- (d) from 4 wt% to 16 wt% the flavoring or composition X as defined above.

20

In another embodiment, the invention relates to a package containing a predetermined amount, e.g., from 0.8 grams to 3.5 grams, of a solid sweetener composition, where the predetermined amount of the solid sweetener composition has a sweetness equivalent to four times (by weight) the predetermined amount of sucrose, and where the solid sweetener composition comprises:

25

- (a) from 30 wt% to 38 wt% of isomaltulose;
- (b) from 55 wt% to 65 wt% erythritol;
- (c) from 0.75 wt% to 1.75 wt% of the artificial or natural sweetener as defined above; and
- (d) from 4 wt% to 16 wt% the flavoring or composition X as defined above.

30

In the tabletop sweetener packages containing a predetermined amount of the solid tabletop sweetener composition, the predetermined amount may be 1 gram and may have a

sweetness equivalent to 4 grams of sucrose, or the predetermined amount may be 2 grams and may have a sweetness equivalent to 8 grams of sucrose.

5 The tabletop sweetener packages may contain a formulation for a ready-to-use sweetener or tabletop sweetener compositions in the form of cubes for use, for example, in restaurants. The cubes weigh approximately 8 grams and are of equivalent size to a standard cube of granulate sugar, which is 2.2cm x 2.2 cm x 1 cm.

10 Tabletop sweetener compositions of the invention may have any bulk density that is suitable for their use as sweeteners. In some embodiments, the bulk density of the sweetener composition ranges from 0.5 g/cm³ to 1.0 g/cm³, or from 0.7 g/cm³ to 0.8 g/cm³. In some embodiments, the bulk density of the sweetener composition is 0.76 g/cm³.

15 In another aspect, the invention relates to a method of making a tabletop sweetener composition, comprising the steps of:

- a) providing a fluid-bed coating apparatus;
- b) introducing dry sugar sweetener, in particular disaccharide and/or fructose; dry sugar alcohol, in particular erythritol; dry artificial or natural sweetener as defined above;
- 20 and dry flavoring or composition X as defined above powder to the fluid-bed coating apparatus;
- c) charging a substantially all of the dry ingredients in the fluid-bed coating apparatus;
- d) spraying a coating solution into the fluid-bed coating apparatus to form coated sweetener particles; and
- 25 e) drying the coated sweetener particles.

In another aspect, the invention relates to a method of making a tabletop sweetener composition, comprising the steps of:

- 30 a) providing a fluid-bed coating apparatus;
- b) introducing dry sugar sweetener, in particular disaccharide carbohydrate and/or fructose; dry sugar alcohol, in particular erythritol; and dry artificial or natural sweetener as defined above to the fluid-bed coating apparatus;
- c) charging a substantially all of the dry ingredients in the fluid-bed coating apparatus;

- d) spraying a coating solution into the fluid-bed coating apparatus to form coated sweetener particles;
- e) during the spraying step, introducing dry flavoring or composition X as defined above powder to the fluid-bed coating apparatus; and
- 5 f) drying the coated sweetener particles.

The methods of the invention described above may be carried out as described in WO 2010/025158 A1, which is incorporated herein by reference in its entirety.

10 **Consumables containing a Flavoring or Composition X of the Invention, a Sweetener Composition of the Invention or a Tabletop Sweetener Composition of the Invention**

The flavorings or compositions X of the invention as defined above or a sweetener composition of the invention as defined above can be added to any consumable products
15 including but not limited to beverages, dental products, cosmetic products, pharmaceutical products and animal feed or animal food, in particular to beverages. The tabletop sweetener compositions of the invention as described above can be added to any consumable products, which are produced in a household or on a small scale. Such consumable products may contain an amount of natural sugar.

20

Thus, in another aspect, the invention relates to a consumable product composition comprising

- (a) a consumable product; and
- (b) a flavoring or composition X as defined above.

25

Thus, in another aspect, the invention relates to a consumable product composition comprising

- (a) a consumable product; and
- (b) a sweetener composition as defined above.

30

Thus, in another aspect, the invention relates to a consumable product composition comprising

- (a) a consumable product; and
- (b) a tabletop sweetener composition as defined above.

The invention, in another aspect, further relates to a consumable product composition as defined above, wherein the flavoring or composition X as defined above is present in the consumable product composition in an amount effective to modify, mask, reduce and/or suppress an unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetener, a sweetness enhancer or a consumable product, wherein the amount is less than a taste threshold concentration associated with the flavoring or composition X.

Preferably, the effect of the flavoring or composition X remains as long as the taste of the sweetener, the sweetness enhancer or the consumable product are perceived.

Preferably, the unpleasant off-taste of the sweetener, the sweetness enhancer or the consumable product is an acidic off-taste, an astringent off-taste, a bitter off-taste, a liquorice off-taste, a metallic off-taste or a throat-burning off-taste.

Preferably, the unpleasant aftertaste of the sweetener, the sweetness enhancer or the consumable product is an astringent or bitter aftertaste.

Preferably, the flavoring or composition X as defined above is present in an amount effective to impart rich taste to a consumable product.

As used herein, the unit "wppm" refers to weight parts per million and means 1 milligram per kilogram.

In one embodiment, the flavoring or composition X as defined above is present in the consumable product composition in a concentration from 0.01 wppm to 50 wppm, e.g. from 0.05 wppm to 40 wppm, from 0.1 wppm to 30 wppm, from 0.15 wppm to 20 wppm, from 0.2 wppm to 10 wppm, from 0.3 wppm to 9 wppm, from 0.4 wppm to 8 wppm, from 0.5 wppm to 7 wppm, from 0.6 wppm to 6 wppm.

In a preferred embodiment, the consumable product composition comprises the sweetener composition 1. The flavoring or composition X as defined above is present in the consumable product composition in a concentration from 1.00 wppm to 8 wppm, e.g. from

1.80 wppm to 6 wppm, e.g., from 2.1 wppm to 5.3 wppm, from 2.5 wppm to 5.3 wppm, from 1.7 wppm to 4.4 wppm, from 2.0 to 4.4 wppm, or from 2.4 wppm to 6 wppm.

In a preferred embodiment, the consumable product composition comprises the sweetener composition 2. The flavoring or composition X as defined above is present in the consumable product composition in a concentration from 0.3 wppm to 8 wppm, e.g. from 0.5 wppm to 6 wppm, from 0.7 wppm to 1.7 wppm, from 2.5 wppm to 4.4 wppm, from 3.4 wppm to 4.9 wppm, from 2.2 wppm to 3.8 wppm, from 0.6 to 1.4 wppm, from 2.1 wppm to 3.6 wppm, from 2.7 wppm to 4 wppm, from 1.8 wppm to 3.1 wppm, from 0.8 wppm to 1.8 wppm, from 2.7 wppm to 4.8 wppm, from 3.7 to 5.3 wppm, from 2.4 wppm to 4.1 wppm.

In one embodiment, the at least one bitter blocking agent (1) is present in the consumable product composition in a concentration from 0.5 wppm to 50 wppm, e.g. from 1 wppm to 40 wppm, from 2 wppm to 30 wppm, from 3 wppm to 20 wppm or from 4 wppm to 10 wppm.

In one embodiment, the first carbonyl compound (2a) is present in the consumable product composition in a concentration from 0.0001 wppm to 0.001 wppm, e.g. from 0.00015 wppm to 0.0009 wppm, from 0.0002 wppm to 0.0007 wppm or from 0.00021 wppm to 0.0005 wppm.

In one embodiment, the second carbonyl compound (2b) is present in the consumable product composition in a concentration from 0.01 wppm to 2 wppm, e.g. from 0.03 wppm to 1.8 wppm, from 0.05 wppm to 1.6 wppm or from 0.07 wppm to 1.3 wppm.

In one embodiment, the first lactone (3a) is present in the consumable product composition in a concentration from 0.002 wppm to 0.1 wppm, e.g. from 0.004 wppm to 0.08 wppm, from 0.006 wppm to 0.06 wppm or from 0.008 wppm to 0.04 wppm.

30

In one embodiment, the second lactone (3b) is present in the consumable product composition in a concentration from 0.005 wppm to 0.1 wppm, e.g. from 0.006 wppm to 0.09 wppm, from 0.007 wppm to 0.08 wppm or from 0.008 wppm to 0.07 wppm.

In one embodiment, substance (i) (naringin) is present in the consumable product composition in a concentration from 0.5 wppm to 50 wppm, e.g. from 1 wppm to 40 wppm, from 2 wppm to 30 wppm, from 3 wppm to 20 wppm or from 4 wppm to 10 wppm.

5 In one embodiment, substance (ii) (4-methoxy salicylaldehyde) is present in the consumable product composition in a concentration from 0.0001 wppm to 0.001 wppm, e.g. from 0.00015 wppm to 0.0009 wppm, from 0.0002 wppm to 0.0007 wppm or from 0.00021 wppm to 0.0005 wppm.

10 In one embodiment, substance (iii) (syringaldehyde) is present in the consumable product composition in a concentration from 0.01 wppm to 2 wppm, e.g. from 0.03 wppm to 1.8 wppm, from 0.05 wppm to 1.6 wppm or from 0.07 wppm to 1.3 wppm.

In one embodiment, substance (iv) (massoia lactone) is present in the consumable product
15 composition in a concentration from 0.002 wppm to 0.1 wppm, e.g. from 0.004 wppm to 0.08 wppm, from 0.006 wppm to 0.06 wppm or from 0.008 wppm to 0.04 wppm.

In one embodiment, substance (v) (whiskey lactone) is present in the consumable product composition in a concentration from 0.005 wppm to 0.1 wppm, e.g. from 0.006 wppm to
20 0.09 wppm, from 0.007 wppm to 0.08 wppm or from 0.008 wppm to 0.07 wppm.

In one embodiment, substance (4a) (L-alanine) is present in the consumable product composition in a concentration from 0.0005 wppm to 0.5 wppm, e.g. from 0.001 wppm to 0.01 wppm, from 0.003 wppm to 0.009 wppm or from 0.004 wppm to 0.008 wppm.

25

In one embodiment, substance (4b) (L-leucine) is present in the consumable product composition in a concentration from 0.0003 wppm to 0.3 wppm, e.g. from 0.0005 wppm to 0.01 wppm, from 0.0007 wppm to 0.009 wppm or from 0.0009 wppm to 0.008 wppm.

30 In one embodiment, substance (4c) (glycine) is present in the consumable product composition in a concentration from 0.00024 wppm to 0.24 wppm, e.g. from 0.0005 wppm to 0.01 wppm, from 0.0007 wppm to 0.009 wppm or from 0.0009 wppm to 0.008 wppm.

In one embodiment, substance (4d) (L-aspartic acid) is present in the consumable product composition in a concentration from 0.00048 wppm to 0.48 wppm, e.g. from 0.0005 wppm to 0.01 wppm, from 0.0007 wppm to 0.009 wppm or from 0.0009 wppm to 0.008 wppm.

- 5 In one embodiment, L-lysine monohydrate is present in the consumable product composition in a concentration from 0.00008 wppm to 0.08 wppm, e.g. from 0.0001 wppm to 0.008 wppm, from 0.0003 wppm to 0.006 wppm or from 0.0004 wppm to 0.004 wppm.

- 10 In one embodiment, substance (4e) (L-threonine) is present in the consumable product composition in a concentration from 0.00008 wppm to 0.08 wppm, e.g. from 0.0001 wppm to 0.008 wppm, from 0.0003 wppm to 0.006 wppm or from 0.0004 wppm to 0.004 wppm.

- 15 In one embodiment, substance (4f) (L-isoleucine) is present in the consumable product composition in a concentration from 0.00032 wppm to 0.32 wppm, e.g. from 0.0005 wppm to 0.01 wppm, from 0.0007 wppm to 0.009 wppm or from 0.0009 wppm to 0.008 wppm.

- 20 In one embodiment, substance (4g) (L-tyrosine) is present in the consumable product composition in a concentration from 0.00048 wppm to 0.48 wppm, e.g. from 0.0005 wppm to 0.01 wppm, from 0.0007 wppm to 0.009 wppm or from 0.0009 wppm to 0.008 wppm.

In one embodiment, L-methionine is present in the consumable product composition in a concentration from 0.00004 wppm to 0.04 wppm, e.g. from 0.00006 wppm to 0.008 wppm, from 0.00008 wppm to 0.006 wppm or from 0.0001 wppm to 0.004 wppm.

- 25 In one embodiment, substance (4h) (L-proline) is present in the consumable product composition in a concentration from 0.00016 wppm to 0.16 wppm, e.g. from 0.0002 wppm to 0.01 wppm, from 0.0007 wppm to 0.009 wppm or from 0.0009 wppm to 0.008 wppm.

- 30 In one embodiment, substance (4i) (L-serine) is present in the consumable product composition in a concentration from 0.00104 wppm to 1.04 wppm, e.g. from 0.002 wppm to 0.08 wppm, from 0.006 wppm to 0.06 wppm or from 0.008 wppm to 0.04 wppm.

In one embodiment, substance (4j) (L-valine) is present in the consumable product composition in a concentration from 0.00024 wppm to 0.24 wppm, e.g. from 0.0005 wppm to 0.01 wppm, from 0.0007 wppm to 0.009 wppm or from 0.0009 to 0.008 wppm.

- 5 In one embodiment, substance (4k) (L-glutamic acid) is present in the consumable product composition in a concentration from 0.002 wppm to 0.1 wppm, e.g. from 0.004 wppm to 0.08 wppm, from 0.006 wppm to 0.06 wppm or from 0.008 wppm to 0.04 wppm.

Preferably, the sweetener composition of the invention and the tabletop sweetener
10 composition of the invention are present in the consumable in an amount effective to increase a sweetness level of the consumable.

In one embodiment, the sweetener composition as defined as defined above is present in the consumable product composition in a concentration from 0.1 wppm to 900 wppm, e.g.
15 from 10 wppm to 850 wppm, from 50 wppm to 800 wppm, from 100 wppm to 750 wppm, from 60 wppm to 500 wppm, from 70 wppm to 400 wppm, from 110 wppm to 270 wppm, from 130 wppm to 270 wppm, from 70 wppm to 150 wppm, from 230 wppm to 400 wppm, from 310 wppm to 440 wppm or from 200 wppm to 340 wppm.

- 20 In one embodiment, the tabletop sweetener composition as defined above is present in the consumable product composition in a concentration from 0.1 wppm to 80 wppm, e.g. from 0.2 wppm to 50 wppm, from 0.5 wppm to 10 wppm or from 1 wppm to 5 wppm.

Preferably, the sweetener composition or the tabletop sweetener composition of the
25 consumable product composition comprises acesulfame potassium.

In one embodiment, acesulfame potassium is present in the consumable product composition in a concentration from 0.1 wppm to 900 wppm, e.g. from 10 wppm to 850 wppm, from 50 to 800 wppm or from 100 to 750 wppm.

30

Preferably, the sweetener composition or the tabletop sweetener composition of the consumable product composition comprises acesulfame potassium and sucralose.

In one embodiment, sucralose is present in the consumable product composition in a concentration from 0.1 wppm to 900 wppm, e.g. from 10 wppm to 850 wppm, from 50 wppm to 800 wppm or from 100 wppm to 750 wppm.

- 5 Preferably, the sweetener composition or the tabletop sweetener composition of the consumable product composition comprises acesulfame potassium and thaumatin.

The following consumable products and their ingredients are suitable for use in embodiments of the present invention.

10

Consumable products include all food products, including but not limited to cereal products, rice products, tapioca products, sago products, baker's products, biscuit products, pastry products, bread products, confectionery products, desert products, gums, chewing gums, chocolates, ices, honey products, treacle products, yeast products, baking-powder, salt and spice products, savoury products, mustard products, vinegar products, sauces (condiments), tobacco products, cigars, cigarettes, processed foods, cooked fruits and vegetable products, meat and meat products, jellies, jams, fruit sauces, egg products, milk and dairy products, yoghurts, cheese products, butter and butter substitute products, milk substitute products, soy products, edible oils and fat products, pharmaceuticals, beverages, carbonated beverages, alcoholic drinks, beers, soft drinks, mineral and aerated waters and other non-alcoholic drinks, fruit drinks, fruit juices, coffee, artificial coffee, tea, cocoa, including forms requiring reconstitution, food extracts, plant extracts, meat extracts, condiments, sweeteners, nutraceuticals, gelatins, pharmaceutical and non-pharmaceutical gums, tablets, lozenges, drops, emulsions, elixirs, syrups and other preparations for making beverages, and combinations thereof.

15
20
25

As used herein, the term "non-alcoholic drinks" includes, but is not limited to all non-alcoholic drinks mentioned in the Directive 2003/15/EC of 22 December 2003 and in the Directive 94/35/EC of 30 June 2004, which are incorporated herein by reference, on sweeteners for use in foodstuffs. Examples include, but are not limited to water-based, flavored drinks, energy-reduced or with no added sugar, milk- and milk-derivative-based or fruit-juice-based drinks, energy-reduced or with no added sugar, "Gaseosa": non-alcoholic water-based drink with added carbon dioxide, sweeteners and flavorings.

30

Consumable products include without limitation, water-based consumable products, solid dry consumable products, dairy products, dairy-derived products and dairy-alternative products.

- 5 In one embodiment, the consumable product is a water-based consumable product selected from the group consisting of beverage, water, near water drink (optionally), aqueous beverage, enhanced/slightly sweetened water drink, flavored carbonated and still mineral and table water, non-carbonated beverage, carbonated water, still water, soft drink, carbonated soft drink (optionally), non-alcoholic drink, alcoholic drink, beer, wine, liquor,
- 10 fruit drink, juice drink (optionally), juice, fruit juice, vegetable juice, nectar (optionally), broth drink, coffee, tea, black tea, green tea, oolong tea, herbal infusion, cacao (water-based), tea-based drink (optionally), coffee-based drinks, cacao-based drink, dessert, syrup, frozen fruit, frozen fruit juice, water-based ice, fruit ice, sorbet, dressing, salad dressing, jams, marmalades, canned fruit, savoury, delicatessen products like delicatessen salads,
- 15 sauces, ketchup, mustard, pickles and marinated fish, sauce, soup, and beverage botanical materials (whole or ground), or instant powder for reconstitution (coffee beans, ground coffee, instant coffee, cacao beans, cacao powder, instant cacao, tea leaves, instant tea powder).
- 20 Near water drinks as used herein, are drinks comprising lower sensory attributes in terms of sweetness, acidity, flavor, color compared to other categories. Near water drinks are containing the major traditionally used ingredients known in the beverage industry but at lower dosage to achieve a character closer to water.
- 25 In another embodiment, the consumable product is a solid dry consumable product selected from the group consisting of cereals, baked food products, biscuits, bread, breakfast cereal, cereal bar, energy bars/nutritional bars, granola, cakes, rice cakes, cookies, crackers, donuts, muffins, pastries, confectioneries, chewing gum, chocolate products, chocolates, fondant, candy, hard candy, marshmallow, pressed tablets, snack foods, botanical materials
- 30 (whole or ground), and instant powders for reconstitution.

In another embodiment, the consumable product is a dairy product, dairy-derived product and/or dairy-alternative product selected from the group consisting of milk, fluid milk, cultured milk product, cultured and noncultured dairy-based drink, cultured milk product

cultured with lactobacillus, yoghurt, yoghurt-based beverage, smoothy, lassi, milk shake, acidified milk, acidified milk beverage, butter milk, kefir, milk-based beverages, milk/juice blend, fermented milk beverage, icecream, dessert, sour cream, dip, salad dressing, cottage cheese, frozen yoghurt, soy milk, rice milk, soy drink, and rice milk drink.

5

In a preferred embodiment, the consumable product is a beverage.

In a particularly preferred embodiment, the beverage is a near water drink, a tea-based drink, a carbonated soft drink, a juice drink or nectar.

10

In a particularly preferred embodiment, the consumable product is a tea-based drink comprising the sweetener composition 1, and the flavoring or composition X as defined above is present in the tea-based drink in a concentration from 1.50 wppm to 6.0 wppm, e.g. from 1.76 wppm to 5.94 wppm, from 2.15 wppm to 5.27 wppm, or from 2.42 wppm to 4.32 wppm.

15

In a preferred embodiment, the consumable product composition is a tea-based drink and the sweetener composition 1 as defined above is present in the consumable product composition in a concentration from 110 wppm to 270 wppm, e.g., from 130 wppm to 250 wppm.

20

In a particularly preferred embodiment, the consumable product is a carbonated soft drink comprising the sweetener composition 1, and the flavoring or composition X as defined above is present in the carbonated soft drink in a concentration from 1.50 wppm to 6.0 wppm, e.g. from 2.08 wppm to 5.94 wppm, from 2.54 wppm to 5.27 wppm, 2.08 wppm to 4.32 wppm, or from 2.86 wppm to 5.94 wppm.

25

In a preferred embodiment, the consumable product composition is a carbonated soft drink and the sweetener composition 1 as defined above is present in the consumable product composition in a concentration from 130 wppm to 270 wppm, e.g., from 150 wppm to 250 wppm.

30

In a particularly preferred embodiment, the consumable product is a juice drink comprising the sweetener composition 1, and the flavoring or composition X as defined above is

present in the juice drink in a concentration from 1.50 wppm to 6.0 wppm, e.g. from 2.08 wppm to 5.94 wppm, from 2.54 wppm to 5.27 wppm, 2.08 wppm to 4.32 wppm, or from 2.86 wppm to 5.94 wppm.

5 In a preferred embodiment, the consumable product composition is a juice drink and the sweetener composition 1 as defined above is present in the consumable product composition in a concentration from 130 wppm to 270 wppm, e.g., from 150 wppm to 250 wppm.

10 In a particularly preferred embodiment, the consumable product is a near water drink comprising the sweetener composition 2, and the flavoring or composition X as defined above is present in the near water drink in a concentration from 0.50 wppm to 6.0 wppm, e.g. from 0.63 wppm to 1.80 wppm, from 0.77 wppm to 1.65 wppm, from 0.63 wppm to 1.35 wppm, or from 0.84 wppm to 1.80 wppm.

15

In a preferred embodiment, the consumable product composition is a near water drink and the sweetener composition 1 as defined above is present in the consumable product composition in a concentration from 70 wppm to 150 wppm, e.g., from 80 wppm to 140 wppm.

20

In a particularly preferred embodiment, the consumable product is a tea-based drink comprising the sweetener composition 2, and the flavoring or composition X as defined above is present in the tea-based drink in a concentration from 0.50 wppm to 6.0 wppm, e.g. from 2.07 wppm to 4.80 wppm, from 2.53 wppm to 4.40 wppm, from 2.07 wppm to 3.6 wppm, or from 2.76 wppm to 4.8 wppm.

25

In a preferred embodiment, the consumable product composition is a tea drink and the sweetener composition 1 as defined above is present in the consumable product composition in a concentration from 230 wppm to 400 wppm, e.g., from 250 wppm to 480 wppm.

30

In a particularly preferred embodiment, the consumable product is a carbonated soft drink comprising the sweetener composition 2, and the flavoring or composition X as defined above is present in the carbonated soft drink in a concentration from 0.50 wppm to 6.0

wppm, e.g. from 2.79 wppm to 5.28 wppm, from 3.41 wppm to 4.84 wppm, from 2.79 wppm to 3.96 wppm, or from 3.72 wppm to 5.28wppm.

In a preferred embodiment, the consumable product composition is a carbonated soft drink and the sweetener composition 1 as defined above is present in the consumable product composition in a concentration from 310 wppm to 440 wppm, e.g., from 330 wppm to 420 wppm.

In a particularly preferred embodiment, the consumable product is a juice drink comprising the sweetener composition 2, and the flavoring or composition X as defined above is present in the juice drink in a concentration from 0.50 wppm to 6.0 wppm, e.g. from 2.79 wppm to 5.28 wppm, from 3.41 wppm to 4.84 wppm, from 2.79 wppm to 3.96 wppm, or from 3.72 wppm to 5.28 wppm.

In a preferred embodiment, the consumable product composition is a juice drink and the sweetener composition 1 as defined above is present in the consumable product composition in a concentration from 310 wppm to 440 wppm, e.g., from 330 wppm to 420 wppm.

In a particularly preferred embodiment, the consumable product is nectar comprising the sweetener composition 2, and the flavoring or composition X as defined above is present in the nectar in a concentration from 0.50 wppm to 6.0 wppm, e.g. from 1.80 wppm to 4.08 wppm, from 2.2 wppm to 3.74 wppm, from 1.8 wppm to 3.06 wppm, or from 2.40 wppm to 4.08 wppm.

In a preferred embodiment, the consumable product composition is nectar and the sweetener composition 1 as defined above is present in the consumable product composition in a concentration from 200 wppm to 340 wppm, e.g., from 220 wppm to 320 wppm.

In one embodiment, the consumable product composition is characterized by the dosage of the sweetener composition therein. For example, the consumable product composition may comprise from 0.07 to 0.44 g/1 of the sweetener composition, e.g., from 0.11 g/1 to

0.27 g/l, from 0.13 g/l to 0.27 g/l, from 0.07 to 0.15 g/l, from 0.23 g/l to 0.4 g/l, from 0.31 g/l to 0.44 g/l, or from 0.2 g/l to 0.34 g/l.

The sweetener compositions may be employed in near water drinks, tea-based drinks, carbonated soft drinks, juice drinks and nectars. Some exemplary embodiments are shown in the table below.

<i>Exemplary consumable product compositions</i>	<i>Sugar standard dosage</i>		<u><i>Examples:</i></u> <i>Sugar reduction with Sweetener composition 1</i>	<u><i>Examples:</i></u> <i>Sugar replacement with sweetener composition 2</i>	
	<i>low</i>	<i>high</i>	<i>sugar dosage</i>	<i>dosage: sweetener composition 1</i>	<i>dosage: sweetener composition 2</i>
calorie reduced and low caloric Beverages/ Drinks					
near water drinks	20g/l	40g/l			0,07-0,15g/l
tea drinks	60g/l	90g/l	40g/l	0,11-0,27g/l	0,23-0,40g/l
carbonated softdrinks	75g/l	100g/l	50g/l	0,13-0,27g/l	0,31-0,44g/l
juice drinks	75g/l	100g/l	50g/l	0,13-0,27g/l	0,31-0,44g/l
nectars	50g/l	80g/l			0,20-0,34g/l

In one embodiment, the consumable product composition comprises a beverage; and a sweetener composition comprising acesulfame potassium, sucralose and the flavoring or composition X as defined above.

Preferably, the consumable product is a carbonated drink and the invention relates to a carbonated drink comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention.

Preferably, the consumable product is a non-carbonated drink and the invention relates to a non-carbonated drink comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention.

5 In another embodiment, the consumable products are alcoholic beverages and the invention relates to alcoholic beverages comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention, preferably to shandy beer, wine cooler, wildberry cooler (e.g., 5% alcohol), strawberry daiquiri cooler (e.g., 5% alcohol), margarita cooler (e.g., 5% alcohol) and raspberry cooler. In addition, the alcoholic
10 beverages may contain further substances including but not limited to acesulfame potassium, aspartame, beer, color, citric acid monohydrate, cyclamate, fruit juice (e.g. peach, pineapple), lemon flavor, margarita flavor, rum flavor, sucrose, vodka, wildberry flavor, wine and water.

15 In another embodiment, the consumable products are fruit juices and the invention relates to fruit juices comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention, preferably to functional fruit drinks (e.g., 30 % fruit juice content), fruit nectar, fruit juice drinks, no sugar added fruit beverages (e.g., 5 % juice, kiwi-strawberry flavored) and ruby red grapefruit and tangerine juice drinks (from
20 concentrate). In addition, the fruit juices may contain further substances including but not limited to acesulfame potassium, aspartame, anthocyan, ascorbic acid, carotinoids, citric acid (e.g., anhydrous), cyclamate, luteine, fruit concentrate, fruit juice concentrate, flavor, fruit, grapefruit pulp cells, grapefruit flavor, kiwi juice concentrate, kiwi-strawberry flavor, malic acid, pectin, ruby red grapefruit concentrate, strawberry juice concentrate, tangerine
25 juice concentrate, tangerine flavor, grape extract, vegetable extract (e.g., pumpkin, carrot, aronia, blackcurrant, hibiscus etc.) and water.

In another embodiment, the consumable product is ice tea and the invention relates to ice tea comprising a sweetener composition of the invention or a tabletop sweetener
30 composition of the invention, preferably to ice tea and sugar free ice tea mix. In addition, the ice tea may contain further substances including but not limited to base with lemon flavor, base with tea component, citric acid, cyclamate, flavor, instant tea, lemon juice, maltodextrin, malic acid (e.g., powdered), saccharin, sucralose, sucrose, tea and tea extract.

In another embodiment, the consumable products are soft drinks without sugar and the invention relates to soft drinks without sugar comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention, preferably to soft drinks Cola flavored, fruit nectars, fruit juice drinks, soft drinks, soft drinks lemon lime flavored, diet sparkling waters (e.g., peach flavored) and sugar free liquid beverages. In addition, the soft drinks without sugar may contain further substances including but not limited to acesulfame potassium, alitame, aspartame, bilberry flavor, citric acid monohydrate, caffeine, cola flavor, cyclamate, peach flavor, potassium citrate, sodium-cyclamate, grape color, grape flavor, sodium benzoate, sodium citrate, sodium-saccharin, ethylmaltol, flavor, lemon-lime flavor, maltol, neotame, NHDC, passion fruit flavor, pectin, phosphoric acid (85%), saccharin, sucralose and water.

In another embodiment, the consumable products are soft drinks with sugar and the invention relates to soft drinks with sugar comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention. In addition, the soft drinks with sugar may contain further substances including but not limited to acesulfame potassium, aspartame, citric acid monohydrate, concentrate, caffeine, flavor, fructose, glucose, glucose syrup, high fructose con syrup (HFCS, e.g., HFCS having total solids: approx. 77 %, fructose: 55 % and glucose: 41 %), neotame, orangeade base, phosphoric acid (e.g., 85%), sodium-cyclamate, sucrose and water.

In another embodiment, the consumable products are sports drinks and the invention relates to sports drinks comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention, preferably to isotonic energy drinks and whey drinks. In addition, the sports drinks may contain further substances including but not limited to acesulfame potassium, aspartame, ascorbic acid, concentrate, caffeine, citric acid, flavor, glucose (e.g., anhydrous), herbs, minerals, neohesperidine-DC, natural extracts, sucralose, taurine, vitamins, water and whey powder.

In another embodiment, the consumable products are dry powder beverages and the invention relates to dry powder beverages comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention. In addition, the dry powder beverages may contain further substances including but not limited to acesulfame potassium, aspartame, apple flavor, ascorbic acid, citric acid, cherry flavor, malic acid,

orange flavor, raspberry flavor, sodium chloride, trisodium citrate, tricalcium phosphate, titanium dioxide and xanthan gum.

In another embodiment, the consumable product is ice coffee and the invention relates to ice coffee comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention. In addition, the ice coffee may contain further substances including but not limited to acesulfame potassium, aspartame, coffee extract, ethylmaltol, flavor and neohesperidine-DC.

In another embodiment, the consumable products are instant cake fillings and the invention relates to instant cake fillings comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention. In addition, the cake fillings may contain further substances including but not limited to milk, isomalt, oligofructose, modified starch, flavors and colors. In another embodiment, the cake fillings may contain further substances including but not limited to raspberries, strawberry puree, polydextrose, isomalt, sorbitol, glycerin, fructose, pectin, locust bean gum, calcium chloride, sodium bicarbonate, citric acid and water.

In another embodiment, the consumable products are biscuits and the invention relates to biscuits comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention. In addition, the biscuits may contain further substances including but not limited to isomalt, powdered isomalt, granulated isomalt, polydextrose, shortening, water, sodium bicarbonate, ammonium bicarbonate, skimmed milk powder, salt, flour, cake flour, flavor, inulin, wheat fiber, shortening, ground raisins, raisin paste, salt, oatrim gel, liquid whole eggs, liquid egg whites, powdered egg whites, egg yolk, vanilla, butter flavor, vanilla flavor, chocolate flavor, cocoa, high fructose corn syrup (HFCS), methocel, baking soda, cinnamon, sodium acid pyrophosphate, margarine spread, margarine, emulsifier, molasses, mono- and diglycerides, powdered cellulose, ground hazelnuts, hazelnuts, sorbitol, oat fiber, vital wheat gluten, chocolate chips, maltitol and fat replacer.

In another embodiment, the consumable products are cakes and the invention relates to cakes comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention. In addition, the cakes may contain further substances

including but not limited to baking powder, baking soda, blueberry flavor, all purpose flour, cake flour, diacetyl 4X, dextrose, dried butter flavor, flour, cellulose, crystalline fructose, emulsifier, egg whites solid, eggs, dried egg white, fat replacers such as inulin, isomalt, lecithin, milk, non fat dry milk, modified starch, maltodextrin, oligofructose, potato fiber, polydextrose, salt, shortening, crystalline sorbitol, sodium aluminium phosphate, sucrose, butter flavor, chocolate flavor, (dried) vanilla flavor, water, wheat fiber, xanthan gum and vegetable oil.

In another embodiment, the consumable products are bakery products other than cakes and the invention relates to bakery products other than cakes comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention, preferably to light hot fudge toppings, tartlets with strawberry fillings, sugar free maple flavored syrups, sugar free dark chocolate coatings, sugar free chocolate syrups, reduced-calorie chocolate syrups, no sugar added caramel corn, light chocolate frostings, light caramel toppings and light apple tart. In addition, the bakery products may contain further substances including but not limited to acesulfame potassium, aspartame, baking powder, baking soda, disodium phosphate, maple flavor, caramel flavor, caramel color, flour, carrageenan, cocoa powder, cocoa butter, (microcrystalline) cellulose, citric acid, calcium chloride, crystalline fructose, fructose, chocolate liquor, eggs, dried egg white, fudge flavor, isomalt, lecithin, non fat dry milk, hydrogenated starch hydrolysate, margarine, modified starch, maltisorb, maltodextrin, nonfat dry milk, oligofructose, potassium sorbate, pectin, potato fiber, hydrogenated potato starch, polydextrose, skimmed milk powder, shortening, (crystalline) sorbitol, sodium benzoate, salt, sorbitol, potassium sorbate, (powdered) sucrose, butter flavor, chocolate flavor, vanillin, (dried) vanilla flavor, water, wheat fiber and xanthan gum.

In another embodiment, the consumable products are confectionary products and the invention relates to confectionary products comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention, preferably to all confectionary products mentioned in the Directive 2003/15/EC of 22 December 2003 and in the Directive 94/35/EC of 30 June 2004 on sweeteners for use in foodstuffs, each of which are incorporated herein by reference. Examples include, but are not limited to, confectionaries (with or without added sugar), cocoa- or dried-fruit-based confectionaries, energy-reduced or with not added sugar, starch-based confectionaries, energy-reduced or

with not added sugar, cornets and wafers for ice-cream, with not added sugar, *Essoblatten*, cocoa-, milk-, dried-fruit- or fat-based sandwich spreads, energy-reduced or with not added sugar, breakfast cereals, e.g., with a fiber content of more than 15%, and containing at least 20% bran, energy-reduced or sugar-reduced, breath-freshening micro-sweets with or without added sugar, strongly flavored freshening throat pastilles with or without added sugar, chewing gum with or without added sugar, energy-reduced tablet form confectioneries, cider and perry, drinks consisting of a mixture of a non-alcoholic drink and beer, cider, perry, spirits or wine, spirit drinks containing less than 15% alcohol by volume, alcohol-free beer or beer with an alcohol content not exceeding 1,2% vol., "biere de table/Tafelbier/table beer" (original wort content less than 6%), except for "obergariges Einfachbier", beers with a minimum acidity of 30 milli-equivalents expressed as NaOH, brown beers of the "oud bruin" type, energy-reduced beer, edible ices, energy-reduced or sugar-reduced canned or bottled fruit, energy-reduced or with or without added sugar, energy-reduced jams, jellies and marmalades, energy-reduced fruit and vegetable preparations, sweet-sour preserves of fruit and vegetables, *Feinkostsalat*, sweet-sour preserves and semi-preserves of fish and marinades of fish, crustaceans and mollusks, energy-reduced soups, sauces, mustard, fine bakery products for special nutritional uses, foods intended for use in energy-restricted diets for weight reduction as referred to in Directive 1996/8/EC, dietary foods for special medical purposes as defined in Directive 1999/21/EC, food supplements as defined in Directive 2002/46/EC supplied in a liquid form, food supplements as defined in Directive 2002/46/EC supplied in a solid form, food supplements as defined in Directive 2002/46/EC, based on vitamins and/or mineral elements and supplied in a syrup-type or chewable form. These Directives are incorporated herein by reference. Particularly preferred confectionary products are sugar free hard candy, reduced calorie no sugar added hard candy, hard candies, sugar free milk chocolate, milk chocolate, sugar free gummy bear, reduced calorie no sugar added gummy bear, sugar free dark chocolate, reduced calorie no sugar added hard candy, reduced calorie no sugar added caramel, reduced calorie caramel, raspberry jellies, jellies, plain bitter chocolate, toffees, sugar-free rice cake, sugar free peppermint breathmint, sugar free orange chewy candy and sugar free jelly beans. In addition, the confectionary products may contain further substances including but not limited to butter fat, (caramel) flavor, citric acid (monohydrate), cherry flavor, chocolate liquor, cocoa butter, cocoa mass, color, corn syrup, (microcrystalline) cellulose, disodium phosphate, egg Albumen-dried, evaporated milk, gelatin, glycerol monostearate, gum Arabic, hydrogenated starch hydrolysate,

hydrogenated fat, isomalt, lecithin, lemon oil, maltitol (syrup, powdered and/or granular), medium-grain brown rice, Korean black rice, maltol, mocha paste, neohesperidine-DC, orange flavor, pectin, peppermint flavor, polydextrose, raspberry puree, raspberry puree, salt, sodium caseinate, sorbitol (powder), starch, sucrose, vanillin, vegetable fat, whole
5 milk powder, skimmed milk powder, water and xylitol.

US Patent Nos. 6,627,233; 5,698,181; 5,688,491; 5,451,404; and 5,009,893 are hereby incorporated by reference in their entireties, including, but not limited to, the flavorings, sweeteners, sweetness enhancers, additional flavoring ingredients, solutions, consumables,
10 consumable compositions, and formulations that are disclosed therein."

In another embodiment, the consumable products are delicacies sauces and the invention relates to delicacies sauces comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention, preferably to sugar reduced ketchup with
15 sugar, no added sugar Ketchup and tomato ketchup. In addition, the delicacies sauces may contain further substances including but not limited to citric acid, modified starch, mustard, onions, pectin, polydextrose, saccharine sodium, salt, spices, sucralose, sugar, thickener, tomato concentrate and vinegar.

20 In another embodiment, the consumable products are cereals and the invention relates to cereals comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention.

In another embodiment, the consumable products are dairy products and the invention
25 relates to dairy products comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention, preferably to fruit quarks, whipped creams, (vanilla flavored skim) milk drinks and yoghurt drinks. In addition, the dairy products may contain further substances including but not limited to acesulfame potassium, aspartame, blackcurrant, blackberry, blueberry, cyclamate, flavor, fruit preparation, fruit juice
30 concentrate, fructose, gelatin, inulin, oat, orange juice, pectin, raspberry, redcurrant, stabilizer, wheat fiber, water, quarks, yoghurt, whipped cream and whey.

In another embodiment, the consumable products are desserts and the invention relates to desserts comprising a sweetener composition of the invention or a tabletop sweetener

composition of the invention, preferably to jellied red fruit cocktails, strawberry sorbet, (fat-free/sugar-free) instant pudding chocolate flavors, instant desserts, vanilla puddings, vanilla pudding - powder mixtures and litchee gelees. In addition, the desserts may contain further substances including but not limited to acesulfame potassium, aspartame, blackberries, brandy, citric acid, caramel color, color, cyclamate, chocolate flavor, cocoa powder, corn starch, disodium phosphate, emulsifier, fructose, granulated sugar, white soft sugar, agar powder, ingestible dextrin, mannan, maltodextrin, mono- and diglycerides, inulin, polydextrose, lemon juice, maltodextrin, milk modified food starch, polydextrose, raspberries, redcurrant juice, salt, soy lecithin, strawberries, strawberry puree, tetrasodium pyrophosphate, litchee flavor, vanilla flavor, wheat starch, water and xanthan gum.

As used herein, the term "desserts" includes, but is not limited to all desserts mentioned in the Directive 2003/15/EC of 22 December 2003 and in the Directive 94/35/EC of 30 June 2004 on sweeteners for use in foodstuffs. These Directives are incorporated herein by reference. Examples include, but are not limited to water-based flavored desserts, energy-reduced or with not added sugar, milk- and milk-derivative-paste preparations, energy-reduced or with no added sugar, fruit-and-vegetable-based desserts, energy-reduced or with no added sugar, egg-based desserts, energy-reduced or with no added sugar, cereal-based desserts, energy-reduced or with no added sugar, breakfast cereals or cereal-based products, energy-reduced or with no added sugar, fat-based desserts, energy-reduced or with no added sugar, edible ices, energy-reduced or with no added sugar, jams, jellies, marmalades and crystallized fruit, energy-reduced or with no added sugar, fruit preparations, energy-reduced or with no added sugar, and "snacks", certain flavors of ready-to-eat, prepacked, dry, savoury starch products and coated nuts.

In another embodiment, the consumable product is water-based ice and the invention relates to water-based ice comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention, preferably to "ice-pops" and no sugar added strawberry sorbet. In addition, the water-based ice may contain further substances including but not limited to acesulfame potassium, aspartame, citric acid, color, fruit concentrate, flavor, isomalt, lemon juice, polydextrose, strawberry puree, sorbitol, thickener and water.

In another embodiment, the consumable product is ice cream and the invention relates to ice cream comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention. In addition, the ice-cream may contain further substances including but not limited to color, emulsifier, flavor, isomalt, milk fat, fat replacer, skim
5 milk powder, polydextrose and lactitol.

In another embodiment, the consumable product is yoghurt and the invention relates to yoghurt comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention. In addition, the yoghurt may contain further substances
10 including but not limited to acesulfame potassium, alitame, aspartame, citric acid monohydrate, tri-calcium-dicitrate, cyclamate, Na-cyclamate, fruit preparation, high fructose corn syrup (HFCS), inulin, fructose, fructose syrup, oligofructose syrup, neohesperidine-DC, pectin-solution, saccharin, starch, strawberries, strawberry-flavor, sucralose, water and (low fat, preferably between 0,1 % to 1,5 % fat) yoghurt.

15

In another embodiment, the consumable products are jams and the invention relates to jams comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention. In addition, the jams may contain further substances including but not limited to gelling agent, isomalt, maltitol, pectin, sorbitol and strawberries.

20

In another embodiment, the consumable product is chewing-gum and the invention relates to chewing-gum comprising a sweetener composition of the invention or a tabletop sweetener composition of the invention.

25 The amount of the sweetener composition in the consumable of the invention is dependent on the concentration of the natural and or artificial sweeteners contained therein as well as on the presence of further auxiliary substances such as carbon dioxide, flavors (e.g. spices, natural extract or oils), colors, acidulants (e.g. phosphoric acid and citric acid), preservatives, potassium, sodium.

30

In another embodiment, the consumable product is a dental product and the invention relates to a dental product comprising a sweetener composition of the invention. Dental products include, but are not limited to toothpaste, dental floss, mouthwash, denture

adhesive, enamel whitener, fluoride treatments and oral care gels. These products are also known in the art.

In a preferred embodiment the consumable product is toothpaste and the invention relates
5 to toothpaste comprising a sweetener composition of the invention. In addition, the
toothpaste may contain further substances including but not limited to abrasive silica,
dicalcium phosphate dehydrate, hydrated silica (thickener), ethyl alcohol, peppermint
flavor, mint flavor, potassium sorbate, sodium lauryl sulphate, sodium
carboxymethylcellulose, sodium monofluorophosphate, sodium monofluorophosphate,
10 sorbitol solution, tetrasodium phosphate and titanium dioxide.

In another embodiment, the consumable product is a cosmetic product and the invention
relates to a cosmetic product comprising a sweetener composition of the invention.
Cosmetic products include but are not limited to lipstick, lip balm, lip gloss, and petroleum
15 jelly. These products are also known in the art.

In another embodiment, the consumable product is a pharmaceutical product and the
invention relates to a pharmaceutical product comprising a sweetener composition of the
invention. Pharmaceutical products include but are not limited to over-the-counter and
20 prescription drugs including but not limited to non-tobacco snuff, tobacco substitutes,
chewable medications, cough syrups, throat sprays, throat lozenges, cough drops,
antibacterial products, pill coatings, gel caplets, soluble fiber preparations, antacids, tablet
cores, rapidly absorbed liquid compositions, stable foam compositions, rapidly
disintegrating pharmaceutical dosage forms, beverage concentrates for medicinal purposes,
25 aqueous pharmaceutical suspensions, liquid concentrate compositions, and stabilized
sorbic acid solutions, phosphate buffers, saline solutions, emulsion, non-aqueous
pharmaceutical solvents, aqueous pharmaceutical carriers, solid pharmaceutical carrier,
and pharmaceutical preservatives/additives (antimicrobials, antioxidants, chelating agents,
inert gases, flavoring agents, coloring agents).

30

In another embodiment, the consumable product is animal feed or animal food and the
invention relates to animal feed or animal food comprising a sweetener composition of the
invention.

A conventional beverage may comprise from 20 g/1 to 100 g/1 standard sugar such as e.g. sucrose and this standard sugar may achieve a first level sweetness. It has now been found that by using the inventive sweetener composition to replace at least a portion of this standard sugar, the amount of standard sugar in a beverage can be reduced or eliminated
5 maintaining the same sweetness level.

A conventional tea drink may comprise from 60 g/1 to 90 g/1 standard sugar such as e.g. sucrose. It has now been found that by using the inventive sweetener composition, e.g., sweetener composition 1, the amount of sugar in the tea drink may be reduced by at least
10 20%, e.g. at least 30%, at least 40%, or at least 55%. In one embodiment wherein the beverage is a tea drink, the tea drink comprises from 20 g/1 to 60 g/1, e.g. from 30 g/1 to 50 g/1, 35 g/1 to 45 g/1 standard sugar. In one embodiment the tea drink comprises the sweetener composition 1 in an amount ranging from 0.1 g/1 to 0.27 g/1, e.g., from 0.14 g/1 to 0.24 g/1. As a result, the inventive tea drink comprises less standard sugar than a
15 conventional tea drink while maintaining the same sweetness.

A conventional carbonated soft drink may comprise from 75 g/1 to 100 g/1 standard sugar such as e.g. sucrose. It has now been found that by using the inventive sweetener composition, e.g., sweetener composition 1, the amount of sugar in the carbonated soft
20 drink may be reduced by at least 20%, e.g. at least 30%, at least 40%, or at least 50%. In one embodiment wherein the beverage is a carbonated soft drink, the carbonated soft drink comprises from 25 g/1 to 75 g/1, e.g. from 30 g/1 to 70 g/1, 40 g/1 to 60 g/1 standard sugar. In one embodiment the carbonated soft drink comprises the sweetener composition 1 in an amount ranging from 0.13 g/1 to 0.27 g/1, e.g., from 0.16 g/1 to 0.24 g/1. As a result, the
25 inventive carbonated soft drink comprises less standard sugar than a conventional carbonated soft drink while maintaining the same sweetness.

A conventional juice drink may comprise from 75 g/1 to 100 g/1 standard sugar such as e.g. sucrose. It has now been found that by using the inventive sweetener composition, e.g.,
30 sweetener composition 1, the sugar dosage may be reduced by at least 20%, e.g. at least 30%, at least 40%, or at least 50%. In one embodiment wherein the beverage is a juice drink, the juice drink comprises from 25 g/1 to 75 g/1, e.g. from 30 g/1 to 70 g/1, 40 g/1 to 60 g/1 standard sugar. In one embodiment the juice drink comprises the sweetener composition 1 in an amount ranging from 0.13 g/1 to 0.27 g/1, e.g., from 0.16 g/1 to 0.24

g/1.. As a result, the inventive juice drink comprises less standard sugar than a conventional carbonated soft drink while maintaining the same sweetness.

5 A conventional near water drink may comprise from 20 g/1 to 40 g/1 standard sugar such as e.g. sucrose. It has now been found that by using the inventive sweetener composition, e.g., sweetener composition 2, the sugar dosage may be eliminated or substantially eliminated. In one embodiment wherein the beverage is a near water drink, the near water drink comprises 0 g/1 standard sugar. In one embodiment, the near water drink comprises the sweetener composition 2 in an amount ranging from 0.07 g/1 to 0.15 g/1, e.g., from 0.09 g/1
10 to 0.14 g/1. As a result, the inventive near water drink comprises little or no standard sugar and still maintains the sweetness similar to that of a sugar-sweetened near water drink.

A conventional tea drink may comprise from 60 g/1 to 90 g/1 standard sugar such as e.g. sucrose. It has now been found that by using the inventive sweetener composition, e.g.,
15 sweetener composition 2, the sugar dosage may be eliminated or substantially eliminated. In one embodiment wherein the beverage is a tea drink, the tea drink comprises little or no standard sugar. In one embodiment the tea drink comprises the sweetener composition 2 in an amount ranging from 0.23 g/1 to 0.40 g/1, e.g., from 0.26 g/1 to 0.37 g/1. As a result, the inventive tea drink comprises little or no standard sugar and still maintains the sweetness
20 similar to that of a sugar-sweetened tea drink.

A conventional carbonated soft drink may comprise from 75 g/1 to 100 g/1 standard sugar such as e.g. sucrose. It has now been found that by using the inventive sweetener composition, e.g., sweetener composition 2, the sugar dosage may be eliminated or
25 substantially eliminated. In one embodiment wherein the beverage is a carbonated soft drink, the carbonated soft drink comprises 0 g/1 standard sugar. In one embodiment the carbonated soft drink comprises the sweetener composition 2 in an amount ranging from 0.31 g/1 to 0.44 g/1, e.g., from 0.34 g/1 to 0.41 g/1. As a result, the inventive carbonated soft drink comprises little or no standard sugar and still maintains the sweetness similar to that
30 of a sugar-sweetened carbonated soft drink.

A conventional juice drink may comprise from 75 g/1 to 100 g/1 standard sugar such as e.g. sucrose. It has now been found that by using the inventive sweetener composition, e.g., sweetener composition 2, the sugar dosage may be eliminated or substantially eliminated.

In one embodiment wherein the beverage is a juice drink, the juice drink comprises 0 g/1 standard sugar. In one embodiment the juice drink comprises the sweetener composition 2 in an amount ranging from 0.31 g/1 to 0.44 g/1, e.g., from 0.28 g/1 to 0.41 g/1. As a result, the inventive juice drink comprises little or no standard sugar and still maintains the sweetness similar to that of a sugar-sweetened juice drink.

A conventional nectar may comprise from 50 g/1 to 80 g/1 standard sugar such as e.g. sucrose. It has now been found that by using the inventive sweetener composition, e.g., sweetener composition 2, the sugar dosage may be eliminated or substantially eliminated.

In one embodiment wherein the beverage is a nectar and, nectar comprises 0 g/1 standard sugar. In one embodiment the nectar comprises the sweetener composition 2 in an amount ranging from 0.20 g/1 to 0.34 g/1, e.g., from 0.17 g/1 to 0.31 g/1. As a result, the inventive nectar comprises little or no standard sugar and still maintains the sweetness similar to that of a sugar-sweetened nectar.

In one embodiment, the consumable product composition comprises

- (a) a beverage; and
- (b) a sweetener composition comprising acesulfame potassium and a composition X comprising the following substances:
 - (i) naringin;
 - (vi) 4-methoxy salicylaldehyde;
 - (vii) syringaldehyde;
 - (viii) (i?)-5,6-dihydro-6-pentyl-2*H*-pyran-2-one; and
 - (ix) a mixture of cis- and trans-whiskey lactone.

In one embodiment, the consumable product composition comprises

- (a) a beverage; and
- (b) a sweetener composition comprising acesulfame potassium and a composition X comprising the following substances:
 - (i) naringin;
 - (iii) syringaldehyde;
 - (iv) (7?)-5,6-dihydro-6-pentyl-2*H*-pyran-2-one; and
 - (v) a mixture of cis- and trans-whiskey lactone.

In one embodiment, the consumable product composition comprises

- (a) a beverage; and
- (b) a sweetener composition comprising acesulfame potassium and a composition X comprising the following substances:

- 5 (1) naringin, preferably of natural origin;
- (2a) syringaldehyde;
- (2b) acetoin;
- (3a) massoia lactone; preferably of natural origin;
- (3b) whiskey lactone;
- 10 (3c) delta dodecalactone;
- (3d) delta undecalactone;
- (3e) delta decalactone;
- (3f) delta tetradecalactone;
- (4a) L-alanine;
- 15 (4b) L-leucine;
- (4c) glycine;
- (4d) L-aspartic acid;
- (4e) L-threonine;
- (4f) L-isoleucine;
- 20 (4g) L-tyrosine;
- (4h) L-proline;
- (4i) L-serine;
- (4j) L-valine;
- (4k) L-glutamic acid;
- 25 (4l) taurine;
- (4m) maltol;
- (4n) maltodextrine MD14; and
- (4o) arabicgum (spraygum).

30 In one embodiment, the consumable product composition comprises

- (a) a beverage; and
- (b) a sweetener composition comprising acesulfame potassium and a composition X comprising the following substances:
 - (1) naringin, preferably of natural origin;

- (2a) syringaldehyde;
- (2b) diacetyl;
- (2c) acetoin;
- (3a) massoia lactone; preferably of natural origin;
- 5 (3b) whiskey lactone;
- (3c) delta dodecalactone;
- (3d) delta undecalactone;
- (3e) delta decalactone;
- (3f) delta tetradecalactone;
- 10 (4a) L-alanine;
- (4b) L-leucine;
- (4c) glycine;
- (4d) L-aspartic acid;
- (4e) L-threonine;
- 15 (4f) L-isoleucine;
- (4g) L-tyrosine;
- (4h) L-proline;
- (4i) L-serine;
- (4j) L-valine;
- 20 (4k) L-glutamic acid;
- (4l) taurine;
- (4m) maltol;
- (4n) maltodextrine MD14; and
- (4o) arabicgum (spraygum).

25

In one embodiment, the consumable product composition comprises

- (a) a beverage; and
 - (b) a sweetener composition comprising acesulfame potassium and a composition X comprising the following substances:
- 30 (1) naringin, preferably of natural origin;
 - (2a) syringaldehyde;
 - (2b) diacetyl;
 - (2c) acetoin;
 - (2d) methoxy salicylaldehyde;

- (3a) massoia lactone; preferably of natural origin;
- (3b) whiskey lactone;
- (3c) delta dodecalactone;
- (3d) delta undecalactone;
- 5 (3e) delta decalactone;
- (3f) delta tetradecalactone;
- (4a) L-alanine;
- (4b) L-leucine;
- (4c) glycine;
- 10 (4d) L-aspartic acid;
- (4e) L-threonine;
- (4f) L-isoleucine;
- (4g) L-tyrosine;
- (4h) L-proline;
- 15 (4i) L-serine;
- (4j) L-valine;
- (4k) L-glutamic acid;
- (4l) taurine;
- (4m) maltol;
- 20 (4n) maltodextrine MD14; and
- (4o) arabicgum (spraygum).

In one embodiment, the consumable product composition comprises

- (a) a beverage; and
- 25 (b) a sweetener composition comprising acesulfame potassium and a composition X comprising the following substances:
 - (1) naringin, preferably of natural origin;
 - (2a) syringaldehyde;
 - (2b) acetoin;
 - 30 (3a) massoia lactone; preferably of natural origin;
 - (3b) whiskey lactone;
 - (3c) delta dodecalactone;
 - (3d) delta undecalactone;
 - (3e) delta decalactone;

- (3f) delta tetradecalactone;
- (4a) L-alanine;
- (4b) L-leucine;
- (4c) glycine;
- 5 (4d) L-aspartic acid;
- (4e) L-threonine;
- (4f) L-isoleucine;
- (4g) L-tyrosine;
- (4h) L-proline;
- 10 (4i) L-serine;
- (4j) L-valine;
- (4k) L-glutamic acid;
- (4l) taurine;
- (4m) maltol;
- 15 (4n) maltodextrine MD 14; and
- (4o) arabicgum (spraygum).

In one embodiment, the consumable product composition comprises

- (a) a beverage; and
- 20 (b) a sweetener composition comprising acesulfame potassium and a composition X comprising the following substances:
 - (1) naringin, preferably of natural origin;
 - (2a) syringaldehyde;
 - (2b) acetoin;
 - 25 (2c) diacetyl;
 - (3a) massoia lactone; preferably of natural origin;
 - (3b) whiskey lactone;
 - (3c) delta dodecalactone;
 - (3d) delta undecalactone;
 - 30 (3e) delta decalactone;
 - (4a) L-alanine;
 - (4b) L-leucine;
 - (4c) glycine;
 - (4d) L-aspartic acid;

- (4e) L-lysine monohydrate;
- (4f) L-threonine;
- (4g) L-isoleucine;
- (4h) L-tyrosine;
- 5 (4i) L-methionine;
- (4j) L-proline;
- (4k) L-serine;
- (4l) L-valine;
- (4m) L-glutamic acid; and
- 10 (4n) maltol.

In one embodiment, the consumable product composition comprises

- (a) a beverage; and
- (b) a sweetener composition comprising acesulfame potassium and a composition X
- 15 comprising the following substances:
 - (1) naringin, preferably of natural origin;
 - (2a) methoxysalicylaldehyde;
 - (2b) syringaldehyde;
 - (2c) acetoin;
 - 20 (2d) diacetyl;
 - (3a) massoia lactone; preferably of natural origin;
 - (3b) whiskey lactone;
 - (3c) delta dodecalactone;
 - (3d) delta undecalactone;
 - 25 (3e) delta decalactone;
 - (4a) L-alanine;
 - (4b) L-leucine;
 - (4c) glycine;
 - (4d) L-aspartic acid;
 - 30 (4e) L-lysine monohydrate;
 - (4f) L-threonine;
 - (4g) L-isoleucine;
 - (4h) L-tyrosine;
 - (4i) L-methionine;

- (4j) L-proline;
- (4k) L-serine;
- (4l) L-valine;
- (4m) L-glutamic acid; and
- 5 (4n) maltol.

In one embodiment, the consumable product composition comprises

- (a) a beverage; and
 - (b) a sweetener composition comprising acesulfame potassium and a composition X
- 10 comprising the following substances:
- (1) naringin, preferably of natural origin;
 - (2a) acetoin; preferably of natural origin;
 - (2b) diacetyl; preferably of natural origin;
 - (3a) massoia lactone; preferably of natural origin;
 - 15 (3b) delta dodecalactone; preferably of natural origin;
 - (3c) delta decalactone; preferably of natural origin;
 - (4a) L-valine; preferably of natural origin;
 - (4b) maltol; preferably of natural origin;
 - (4c) maltodextrine MD 14; and
 - 20 (4d) arabicgum (spraygum).

In one embodiment, the consumable product composition comprises

- (a) a beverage; and
 - (b) a sweetener composition comprising acesulfame potassium and a composition X
- 25 comprising the following substances:
- (1) naringin, preferably of natural origin;
 - (2a) acetoin; preferably of natural origin;
 - (3a) massoia lactone; preferably of natural origin;
 - (3b) delta dodecalactone; preferably of natural origin;
 - 30 (3c) delta decalactone; preferably of natural origin;
 - (4a) L-valine; preferably of natural origin;
 - (4b) maltol; preferably of natural origin;
 - (4c) maltodextrine MD 14; and
 - (4d) arabicgum (spraygum).

In another aspect, the invention relates to a method of sweetening a consumable product composition, comprising the step of adding to a consumable product the flavoring or composition X as defined above to yield a sweetened consumable product composition, wherein the sweetened consumable product has substantially no unpleasant off-taste, 5 aftertaste or lingering sweetness.

Preferably, the effect of the flavoring or composition X remains at least as long as the taste of the consumable product is perceived.

10

Preferably, the sweetened consumable product has a rich taste.

In another aspect, the invention relates to a method of providing a sweetener or sweetness enhancer composition, comprising the step of adding to a sweetener or sweetness enhancer 15 the flavoring or composition X as defined above to yield a sweetener or sweetness enhancer composition, wherein the sweetener or sweetness enhancer composition has substantially no unpleasant off-taste, aftertaste or lingering sweetness.

While the invention has been described in detail, modifications within the spirit and scope 20 of the invention will be readily apparent to those of skill in the art. In view of the foregoing discussion, relevant knowledge in the art and references discussed above in connection with the Background and Detailed Description, the disclosures of which are all incorporated herein by reference. In addition, it should be understood that aspects of the invention and portions of various embodiments and various features recited below and/or 25 in the appended items may be combined or interchanged either in whole or in part. In the foregoing descriptions of the various embodiments, those embodiments which refer to another embodiment may be appropriately combined with other embodiments as will be appreciated by one of skill in the art. Furthermore, those of ordinary skill in the art will appreciate that the foregoing description is by way of example only, and is not intended to 30 limit the invention.

Examples for Part A and Part B - Taste and Spit Assay with the Compositions of the Invention

The following Examples for Part A and Part B are merely specific embodiments of the present invention and are intended to illustrate but not to limit the invention.

A. Taste and spit assay with regard to bitter aftertaste/sweetness in the aftertaste: Using a panel of 11 trained sensory evaluators - Examples 1 and 2, for Part A and Part B

1. General test conditions

All tests were conducted under controlled and standardized conditions based on international norms (DIN 10962 and ISO 8589). Room temperature and humidity (20°C and 40 - 70% relative humidity) were constantly tracked. Air was constantly exchanged.

Panelists were seated in sensory test cabins in order to allow undisturbed individual assessment. The lighting was identical for each panelist, flexible from red-light to full day-light condition.

All samples were presented according to a fully balanced experimental design. The samples were prepared by a trained laboratory assistant.

35 ml of the samples were served in clear plastic cups labelled with random three digit blinding codes. All beverages were measured at a serving temperature of 6.0 °C to 8.0 °C. The data was collected on paper (in order to be quick and straight forward) along with a digital stop-watch.

Neutralization between samples was guaranteed by both time (breaks of minimum 15 minutes) and by offering a selection of neutralizing food and drinks such as still water, cucumber, white baguette and unsalted rice crackers. However, in the last 5 min of the break only water was allowed to give the mouth time to recover.

2. Test conditions

The panel used the sweetness scale anchored by three concentrations of sucrose:

	1,1% sucrose	very weak	(intensity 1 on a 10 point line scale)
5	7% sucrose	moderate	(intensity 5 on a 10 point line scale)
	21,5% sucrose	very strong	(intensity 10 on a 10 point line scale)

Sweetness was assessed with the 1st sip (max. 30 ml, min. of 15 ml) and scored in the aftertaste (after 2 minutes).

10

With the 2nd sip (max. 30 ml, min. of 15 ml) bitter aftertaste (after 2 minutes) was evaluated and scored independent of the temporal dimension.

All samples were tested in duplicate.

15

The panelists were asked to estimate the bitter aftertaste in each case on a scale from 0 (not perceivable) to 10 (very strong).

3. Example 1, for Part A and Part B: Taste and spit assay with regard to bitter aftertaste

20

The taste of a sample of a sweetener composition comprising acesulfame potassium, sucralose and the composition X of the invention with regard to bitter aftertaste was assessed by using a panel of trained sensory evaluators experienced in the descriptive sensory analysis. 11 Panelists were asked to taste the quality of single samples of 35 ml volume.

25

As used in the Examples, the term "concentration (wppm)" means "concentration based on total weight of the sample (wppm)".

30

The following liquids have been assessed:

Sample 1: A preparation containing Sugar Target (saccharose 10 Brix) and water

Sample 2: A preparation containing 500 wppm acesulfame K and water

Sample 3: A preparation containing 500 wppm acesulfame K, 75 wppm sucralose and
5 water

Sample 4: A preparation containing water and the following ingredients:

Ingredient	Concentration (wppm)
Acesulfame K	500
Sucralose	75
Naringin	5.1
4-Methoxy salicylaldehyde	0.00025
Syringaldehyde	0.1
(<i>R</i>)-5,6-Dihydro-6-pentyl-2 <i>H</i> -pyran-2-one (massoia lactone)	0.02
<i>cis/trans</i> -whiskey lactone	0.05
L-alanine	0.005
L-leucine	0.003
glycine	0.0024
L-aspartic acid	0.0048
L-lysine monohydrate	0.0008
L-threonine	0.0008
L-isoleucine	0.0032
L-tyrosine	0.0048
L-methionine	0.0004
L-proline	0.0016
L-serine	0.0104
L-valine	0.0024
L-glutamic acid	0.02

10 The panelists were asked to taste the samples 1 to 4 and to evaluate the bitter aftertaste of

samples 1 to 4 to determine the bitter aftertaste of a sweetener composition comprising acesulfame potassium, sucralose and the composition X of the invention.

Results: The results of the taste and spit assay are based on a qualitative evaluation of the differences between the four samples and are shown in Fig. 1. The bar diagram demonstrates that a sweetener composition comprising acesulfame potassium, sucralose and the composition X of the invention is perceived by the panelists as having a significantly lower bitter aftertaste than the respective sweetener composition without the composition X of the invention.

4. Example 2, for Part A and Part B: Taste and spit assay with regard to sweetness in the aftertaste

The taste of a sample of a sweetener composition comprising acesulfame potassium, sucralose and the composition X of the invention was assessed with regard to sweetness in the aftertaste by using a panel of trained sensory evaluators experienced in the descriptive sensory analysis in comparison to the sweet aftertaste of saccharose and a sweetener composition comprising acesulfame potassium, respectively. 11 Panelists were asked to taste the quality of single samples of 35 ml volume.

As used in the Examples, the term "concentration (wppm)" means "concentration based on total weight of the sample (wppm)".

The following liquids have been assessed:

Sample 1: A preparation containing Sugar Target (saccharose 10 Brix) and water

Sample 2: A preparation containing 500 wppm acesulfame K, 75 wppm sucralose and water

Sample 3: A preparation containing water and the following ingredients:

Ingredient	Concentration

	(vvppm)
Acesulfame K	500
Sucralose	75
Naringin	5.1
4-Methoxy salicylaldehyde	0.00025
Syringaldehyde	0.1
(7?)-5,6-Dihydro-6-pentyl-2 <i>H</i> -pyran-2-one (massoia lactone)	0.02
<i>cis/trans-whiskey</i> lactone	0.05
L-alanine	0.005
L-leucine	0.003
glycine	0.0024
L-aspartic acid	0.0048
L-lysine monohydrate	0.0008
L-threonine	0.0008
L-isoleucine	0.0032
L-tyrosine	0.0048
L-methionine	0.0004
L-proline	0.0016
L-serine	0.0104
L-valine	0.0024
L-glutamic acid	0.02

The panelists were asked to taste the samples 1 to 3 and to evaluate the sweet aftertaste of samples 1 to 3 in to determine the sweetness in the aftertaste of a sweetener composition comprising acesulfame potassium, sucralose and the composition X of the invention.

5

Results: The results of the taste and spit assay are based on a qualitative evaluation of the differences between the three samples and are shown in Fig. 2. The bar diagram demonstrates that saccharose is less sweet in the aftertaste than acesulfame potassium and sucralose, and that a sweetener composition comprising acesulfame potassium, sucralose and the composition of the invention is perceived by the panelists as having the strongest sweetness in the aftertaste.

10

5 **5. Summary:** The results of the taste and spit assay demonstrate that, surprisingly and unexpectedly, the composition of the invention 1) significantly reduces the bitter aftertaste of sweetener compositions; and 2) results in prolonged sweetness of the sweetener composition in the aftertaste. As such, the composition of the invention is capable for providing for a reduction in the quantity of sweetener used.

10 **B. Taste and spit assay with regard to bitter aftertaste/sweetness in the aftertaste:**
Using a panel of 4 trained sensory evaluators - Examples 3 to 31, for Part A and/or Part B

1. General test conditions

15 All tests were conducted under controlled and standardized conditions.

The samples were prepared by a trained laboratory assistant.

35 ml of the samples were served at room temperature in clear plastic cups.

20 Neutralization between samples was guaranteed by both time (breaks of minimum 15 minutes) and by consumption of a selection of neutralizing food and drinks such as still water.

25 **2. Test conditions**

The following samples comprising a composition of the invention were tested for their ability to improve the taste of artificial sweeteners.

30 All samples were tested in duplicate and evaluated at least 3 different concentrations in comparison to 3 base samples (samples 1 to 3).

As used in the Examples, the term "concentration (wppm)" means "concentration based on total weight of the sample (wppm)".

The following base samples have been used:

Sample 1: A preparation containing saccharose (10 Brix) and water ("Sugar Target")

Sample 2: A preparation containing 350 wppm acesulfame K and water

Sample 3: A preparation containing 350 wppm acesulfame K, 80 wppm sucralose and water

The taste of a sample of a sweetener composition comprising acesulfame potassium, sucralose and a composition of the invention was assessed by using a panel of trained sensory evaluators experienced in the descriptive sensory analysis. 4 panelists were asked to taste the quality of single samples of 35 ml volume.

The panelists were asked to evaluate and to describe the taste impression of the samples 4 to 32 containing a sweetener composition comprising acesulfame potassium, sucralose and a composition of the invention, e.g. bitter aftertaste, creaminess, fullness and character of the sweeteners in each case in comparison to the base samples 1 to 3.

The results of the taste and spit assay are based in each case on a qualitative evaluation of the differences between the samples.

Example 3, for Part A and Part B

Sample 4: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition comprising the following substances:

Ingredient	Concentration (wppm)
naringin	1.6
4-methoxy salicylaldehyde	0.0025
syringaldehyde	0.0802

massoia lactone	0.0097
whiskey lactone	0.0291

Results: Sample 4 comprising acesulfame potassium, sucralose and the composition X of the invention as defined above was perceived by all panelists as reducing the bitterness, and improving the creaminess, fullness and character of the sweeteners.

5

Example 4, for Part A and Part B

Sample 5: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition comprising the following substances:

10

Ingredient	Concentration (wppm)
naringin	1.6
4-methoxy salicylaldehyde	0.0025
syringaldehyde	0.0802
massoia lactone	0.0097
whiskey lactone	0.00291
L-alanine	0.0048
L-leucine	0.0030
glycine	0.0075
L-aspartic acid	0.0132
L-threonine	0.0057
L-isoleucine	0.0032
L-tyrosine	0.0048
L-proline	0.0067
L-serine	0.0315
L-valine	0.0024
L-glutamic acid	0.0201

Results: Sample 5 comprising acesulfame potassium, sucralose and the composition of the invention as defined above was perceived by all panelists as reducing the bitterness, and

improving the creaminess, fullness and character of the sweeteners. The amino acids give a better aftertaste than the preparation of Example 3 which does not contain amino acids. Also, the fullness of the product is much more comparable with sugar.

5 Example 5, for Part A and Part B

Sample 6: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition comprising the following substances:

Ingredient	Concentration (wppm)
naringin	1.6
4-methoxy salicylaldehyde	0.0025
massoia lactone	0.0097

10

Results: Sample 6 comprising acesulfame potassium, sucralose and the composition X of the invention as defined above was perceived by all panelists as reducing the bitterness, and improving the creaminess, fullness and character of the sweeteners.

15 Example 6, for Part A and Part B

Sample 7: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition comprising the following substances:

Ingredient	Concentration (wppm)
naringin	1.6
4-methoxy salicylaldehyde	0.0025
massoia lactone	0.0097
L-alanine	0.0048
L-leucine	0.0030
glycine	0.0075
L-aspartic acid	0.0132

L-threonine	0.0057
L-isoleucine	0.0032
L-tyrosine	0.0048
L-proline	0.0067
L-serine	0.0315
L-valine	0.0024
L-glutamic acid	0.0201

Results: Sample 7 comprising acesulfame potassium, sucralose and the composition of the invention as defined above was perceived by all panelists as reducing the bitterness, and improving the creaminess, fullness and character of the sweeteners. The amino acids give a better aftertaste than the preparation of Example 5 which does not contain amino acids. Also, the fullness of the product is much more comparable with sugar.

Example 7, for Part A and Part B

Sample 8: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition comprising the following substances:

Ingredient	Concentration (wppm)
naringin	1.6
syringaldehyde	0.0802
whiskey lactone	0.0291

Results: Sample 8 comprising acesulfame potassium, sucralose and the composition of the invention as defined above was perceived by all panelists as reducing the bitterness, and improving the creaminess, fullness and character of the sweeteners.

Example 8, for Part A and Part B

Sample 9: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition comprising the following substances:

Ingredient	Concentration (wppm)
naringin	1.6
syringaldehyde	0.10802
whiskey lactone	0.0291
L-alanine	0.0048
L-leucine	0.0030
glycine	0.0075
L-aspartic acid	0.0132
L-threonine	0.0057
L-isoleucine	0.0032
L-tyrosine	0.0048
L-proline	0.0067
L-serine	0.0315
L-valine	0.0024
L-glutamic acid	0.0201

Results: Sample 9 comprising acesulfame potassium, sucralose and the composition of the invention as defined above was perceived by all panelists as reducing the bitterness, and improving the creaminess, fullness and character of the sweeteners. The amino acids give a better aftertaste than the preparation of Example 7 which does not contain amino acids. Also, the fullness of the product is much more comparable with sugar.

Example 9, for Part A and Part B

Sample 10: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition comprising the following substances, i.e. a composition without bitter blocking agent naringin:

Ingredient	Concentration (wppm)
4-methoxy salicylaldehyde	0.0025

syringaldehyde	0.080
massoia lactone	0.02097
whiskey lactone	0.0291

Results: Sample 10 comprising acesulfame potassium, sucralose, and the compounds listed above was perceived by all panelists as improving the creaminess, fullness and character of the sweeteners, but still bitter lingering.

5

Example 10, for Part A and Part B

Sample 11: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition comprising the following substances, i.e. a composition X without bitter blocking agent naringin:

10

Ingredient	Concentration (wppm)
4-methoxy salicylaldehyde	0.0025
syringaldehyde	0.0802
massoia lactone	0.0097
whiskey lactone	0.0291
L-alanine	0.0048
L-leucine	0.0030
glycine	0.0075
L-aspartic acid	0.0132
L-threonine	0.0057
L-isoleucine	0.0032
L-tyrosine	0.0048
L-proline	0.0067
L-serine	0.0315
L-valine	0.0024
L-glutamic acid	0.0201

Results: Sample 11 comprising acesulfame potassium, sucralose, and the compounds

listed above was perceived by all panelists as improving the creaminess, fullness and character of the sweeteners, but still bitter lingering. The amino acids provided a better aftertaste than the preparation of Example 9 which does not contain amino acids. Also, the fullness of the product was much more comparable with sugar.

5

Example 11, for Part A and Part B

Sample 12 A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and the additional compounds listed below:

10

Ingredient	Concentration (wppm)
naringin	1.6
benzaldehyde	0.02
syringaldehyde	0.0802
massoia lactone	0.0097
whiskey lactone	0.0291

Results: Benzaldehyde in sample 12 used below its threshold did not add any further effect to the composition of the invention.

15 **Example 12, for Part A and Part B**

Sample 13: A preparation containing water, acesulfame K (350 wppm), sucralose (75 wppm) and the additional compounds listed below:

Ingredient	Concentration (wppm)
naringin	1.6
4-methoxy salicylaldehyde	0.0025
benzaldehyde	0.02
massoia lactone	0.0097
whiskey lactone	0.0291

L-alanine	0.0048
L-leucine	0.0030
glycine	0.0075
L-aspartic acid	0.0132
L-threonine	0.0057
L-isoleucine	0.0032
L-tyrosine	0.0048
L-proline	0.0067
L-serine	0.0315
L-valine	0.0024
L-glutamic acid	0.0201

Results: Benzaldehyde in sample 13 used below its threshold did not add any further effect to the composition of the invention.

5 Example 13, for Part A and Part B

Sample 14 A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition X comprising the following substances:

Ingredient	Concentration (wppm)
naringin	1.6
4-methoxy salicylaldehyde	0.0025
syringaldehyde	0.0802
delta-undecalactone	0.0388
whiskey lactone	0.0291

Results: Delta-undecalactone was perceived by all panelists as not being too volatile and as adding a creamy taste, and as improving the total composition.

Example 14, for Part B

Sample 15: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition X comprising the following substances:

Ingredient	Concentration (wppm)
naringin	1.6
4-methoxy salicylaldehyde	0.0025

- 5 **Results:** The sample 15 comprising acesulfame potassium, sucralose and the composition of the invention as defined above was perceived by all panelists as improving the bitter aftertaste and sweetener profile.

Example 15, for Part B

10

Sample 16: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition comprising the following substances:

Ingredient	Concentration (wppm)
naringin	1.6
4-methoxy salicylaldehyde	0.0025
L-alanine	0.0048
L-leucine	0.0030
glycine	0.0075
L-aspartic acid	0.0132
L-threonine	0.0057
L-isoleucine	0.0032
L-tyrosine	0.0048
L-proline	0.0067
L-serine	0.0315
L-valine	0.0024
L-glutamic acid	0.0201

Results: Sample 16 comprising acesulfame potassium, sucralose and the composition of the invention as defined above was perceived by all panelists as improving the bitter aftertaste and sweetener profile. The amino acids give a better aftertaste than the preparation of Example 14 which does not contain amino acids. Also, the fullness of the product is much more comparable with sugar.

Example 16, for Part B

Sample 17: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition X comprising the following substances:

Ingredient	Concentration (wppm)
naringin	1.6
massoia lactone	0.0097

Results: The sample 17 comprising acesulfame potassium, sucralose and the composition of the invention as defined above was perceived by all panelists as improving the bitterness. A part of the creaminess and fullness is more like sugar.

Example 17, for Part B

Sample 18: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition comprising following substances:

Ingredient	Concentration (wppm)
naringin	1.6
massoia lactone	0.0097
L-alanine	0.0048
L-leucine	0.0030
glycine	0.0075
L-aspartic acid	0.0132

L-threonine	0.0057
L-isoleucine	0.0032
L-tyrosine	0.0048
L-proline	0.0067
L-serine	0.0315
L-valine	0.0024
L-glutamic acid	0.0201

Results: Sample 18 comprising acesulfame potassium, sucralose and the composition of the invention as defined above was perceived by all panelists as improving the bitter aftertaste and sweetener profile. The amino acids give a better aftertaste than the preparation of Example 16 which does not contain amino acids. Also, the fullness of the product is much more comparable with sugar.

Example 18, for Part B

Sample 19: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition X comprising the following substances:

Ingredient	Concentration (wppm)
naringin	1.6

Results: Sample 19 comprising acesulfame potassium, sucralose and the composition of the invention as defined above, i.e. naringin, was perceived by all panelists as improving the bitter aftertaste of acesulfame K.

Example 19, for Part B

Sample 20: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition comprising the following substances:

Ingredient	Concentration

	(wppm)
naringin	1.6
L-alanine	0.0048
L-leucine	0.0030
glycine	0.0075
L-aspartic acid	0.0132
L-threonine	0.0057
L-isoleucine	0.0032
L-tyrosine	0.0048
L-proline	0.0067
L-serine	0.0315
L-valine	0.0024
L-glutamic acid	0.0201

Results: The sample 17 comprising acesulfame potassium, sucralose and the composition of the invention as defined above was perceived by all panelists as not only improving the bitter aftertaste of acesulfame K but also the overall mouthfeel, which is fuller, i.e. like sugar, and less watery. The amino acids give a better aftertaste than the preparation of Example 13 which does not contain amino acids.

Example 20, for Part B

- 10 Sample 21: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition comprising the following substances:

Ingredient	Concentration (wppm)
naringin	1.6
maltol	2.4
L-alanine	0.0048
L-leucine	0.0030
glycine	0.0075
L-aspartic acid	0.0132

L-threonine	0.0057
L-isoleucine	0.0032
L-tyrosine	0.0048
L-proline	0.0067
L-serine	0.0315
L-valine	0.0024
L-glutamic acid	0.0201

Results: Sample 21 comprising acesulfame potassium, sucralose and the composition of the invention as defined above was perceived by all panelists as improving the bitter aftertaste of acesulfame K and the overall mouthfeel, which is fuller, i.e. like sugar, and less watery.

Example 21, for Part B

Sample 22: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition comprising the following substances:

Ingredient	Concentration (wppm)
naringin	1.6
maltol	2.4
L-alanine	0.0048
L-leucine	0.0030
glycine	0.0075
L-aspartic acid	0.0132
L-threonine	0.0057
L-isoleucine	0.0032
L-tyrosine	0.0048
L-proline	0.0067
L-serine	0.0315
L-valine	0.0024
L-glutamic acid	0.0201

diacetyl	0.0001
acetoin	0.0015
delta dodecalactone	0.0388
delta undecalactone	0.0388
delta decalactone	0.0048
delta tetradecalactone	0.0388

Results: The sample 22 comprising acesulfame potassium, sucralose and the composition of the invention as defined above was perceived by all panelists as improving the bitter aftertaste of acesulfame K and the overall mouthfeel, which is fuller, i.e. like sugar, and less watery. Sample 22 gives a better fatty mouthfeel and a better sugar character than sample 21.

Example 22, for Part B

- 10 Sample 23: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition comprising the following substances:

Ingredient	Concentration (wppm)
4-methoxy salicylaldehyde	0.0025
massoia lactone	0.0097

15 **Results:** Sample 23 comprising acesulfame potassium, sucralose and the composition of the invention as defined above was perceived by all panelists as giving a bit of creaminess and the aldehyde improves the mouthfeel.

Example 23, for Part B

- 20 Sample 24: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition comprising the following substances:

Ingredient	Concentration

	(wppm)
4-methoxy salicylaldehyde	0.0025
massoia lactone	0.0097
L-alanine	0.0048
L-leucine	0.0030
glycine	0.0075
L-aspartic acid	0.0132
L-threonine	0.0057
L-isoleucine	0.0032
L-tyrosine	0.0048
L-proline	0.0067
L-serine	0.0315
L-valine	0.0024
L-glutamic acid	0.0201

Results: Sample 24 comprising acesulfame potassium, sucralose and the composition of the invention as defined above was perceived by all panelists as giving a bit of creaminess and the aldehyde improves the mouthfeel. The amino acids give a better mouthfeel than the preparation of Example 17 which does not contain amino acids.

Example 24, for Part B

Sample 25: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition comprising the following substances:

Ingredient	Concentration (wppm)
syringaldehyde	0.0802
massoia lactone	0.00972

Results: Sample 25 comprising acesulfame potassium, sucralose and the composition of the invention as defined above was perceived by all panelists as improving the smoothness and the fullness of the sweeteners.

Example 25, for Part B

Sample 26: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition comprising the following substances:

Ingredient	Concentration (wppm)
syringaldehyde	0.0802
massoia lactone	0.0097
L-alanine	0.0048
L-leucine	0.0030
glycine	0.0075
L-aspartic acid	0.0132
L-threonine	0.0057
L-isoleucine	0.0032
L-tyrosine	0.0048
L-proline	0.0067
L-serine	0.0315
L-valine	0.0024
L-glutamic acid	0.0201

Results: Sample 26 comprising acesulfame potassium, sucralose and the composition of the invention as defined above was perceived by all panelists as improving the smoothness and the fullness of the sweeteners. The amino acids give a better mouthfeel than the preparation of Example 19 which does not contain amino acids.

Example 26, for Part B

Sample 27: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition comprising the following substances:

Ingredient	Concentration

	(wppm)
4-methoxy salicylaldehyde	0.0025
whiskey lactone	0.0291

Results: Sample 27 comprising acesulfame potassium, sucralose and the composition of the invention as defined above was perceived by all panelists as improving the creaminess and sweet character of the sweeteners.

5

Example 27, for Part B

Sample 28: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition comprising the following substances:

10

Ingredient	Concentration (wppm)
4-methoxy salicylaldehyde	0.0025
whiskey lactone	0.0291
L-alanine	0.0048
L-leucine	0.0030
glycine	0.0075
L-aspartic acid	0.0132
L-threonine	0.0057
L-isoleucine	0.0032
L-tyrosine	0.0048
L-proline	0.0067
L-serine	0.0315
L-valine	0.0024
L-glutamic acid	0.0201
L-alanine	0.0048
L-leucine	0.0030

Results: Sample 28 comprising acesulfame potassium, sucralose and the composition of the invention as defined above was perceived by all panelists as improving the creaminess

and sweet character of the sweeteners. The amino acids give a better mouthfeel than the preparation of Example 21 which does not contain amino acids.

Example 28, for Part B

5

Sample 29: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition comprising the following substances:

Ingredient	Concentration (wppm)
syringaldehyde	0.0802
whiskey lactone	0.0291

- 10 **Results:** Sample 29 comprising acesulfame potassium, sucralose and the composition of the invention as defined above was perceived by all panelists as improving creaminess and smoothness.

Example 29, for Part B

15

Sample 30: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition comprising the following substances:

Ingredient	Concentration (wppm)
syringaldehyde	0.0802
whiskey lactone	0.0291
L-alanine	0.0048
L-leucine	0.0030
glycine	0.0075
L-aspartic acid	0.0132
L-threonine	0.0057
L-isoleucine	0.0032
L-tyrosine	0.0048

L-proline	0.0067
L-serine	0.0315
L-valine	0.0024
L-glutamic acid	0.0201

Results: Sample 30 comprising acesulfame potassium, sucralose and the composition of the invention as defined above was perceived by all panelists as improving creaminess and smoothness. The amino acids give a better aftertaste than the preparation of Example 23
5 which does not contain amino acids.

Example 30, for Part B

Sample 31: A preparation containing water, acesulfame K (350 wppm), sucralose (80
10 wppm) and the following substances:

Ingredient	Concentration (wppm)
quinine	0.01
methoxy salicylaldehyde	0.0025
syringaldehyde	0.0802
massoia lactone	0.009
whiskey lactone	0.0291

Results: Quinine at a concentration below its threshold does not add anything to the effects of the composition.

Example 31, for Part B

Sample 32: A preparation containing water, acesulfame K (350 wppm), sucralose (80
20 wppm) and the following substances:

Ingredient	Concentration (wppm)

quinine	0.01
methoxy salicylaldehyde	0.0025
syringaldehyde	0.0802
massoia lactone	0.0097
whiskey lactone	0.0291
L-alanine	0.0048
L-leucine	0.0030
glycine	0.0075
L-aspartic acid	0.0132
L-threonine	0.0057
L-isoleucine	0.0032
L-tyrosine	0.0048
L-proline	0.0067
L-serine	0.0315
L-valine	0.0024
L-glutamic acid	0.0201

Results: Quinine at a concentration below its threshold does not add anything to the effects of the composition.

- 5 **C. Taste and spit assay with regard to bitter aftertaste/sweetness in the aftertaste:
Using a panel of 4 trained sensory evaluators - Examples 32 and 33, for Part A
and Part B**

1. General test conditions

10

All tests were conducted under controlled and standardized conditions.

The samples were prepared by a trained laboratory assistant.

- 15 35 ml of the samples were served in clear plastic cups. All beverages were measured at a serving temperature of 6.0 °C to 8.0 °C. The data was collected on paper (in order to be quick and straight forward) along with a digital stop-watch.

Neutralization between samples was guaranteed by both time (breaks of minimum 15 minutes) and by offering a selection of neutralizing food and drinks such as still water, cucumber, white baguette and unsalted rice crackers. However, in the last 5 min of the break only water was allowed to give the mouth time to recover.

2. Test conditions

The panel used the sweetness scale anchored by three concentrations of sucrose:

10	1,1% sucrose	very weak	(intensity 1 on a 10 point line scale)
	7% sucrose	moderate	(intensity 5 on a 10 point line scale)
	21,5% sucrose	very strong	(intensity 10 on a 10 point line scale)

Sweetness was assessed with the 1st sip (max. 30 ml, min. of 15 ml) and scored in the aftertaste (after 2 minutes).

With the 2nd sip (max. 30 ml, min. of 15 ml) bitter aftertaste (after 2 minutes) was evaluated and scored independent of the temporal dimension.

All samples were tested in duplicate.

The panelists were asked to estimate the bitter aftertaste in each case on a scale from 0 (not perceivable) to 10 (very strong).

3. Example 32, for Part A and Part B: Taste and spit assay with regard to bitter aftertaste

The taste of a sample of a sweetener composition comprising acesulfame potassium, sucralose and the composition of the invention with regard to bitter aftertaste was assessed by using a panel of trained sensory evaluators experienced in the descriptive sensory analysis. 4 panelists were asked to taste the quality of single samples of 35 ml volume.

As used in the Examples, the term "concentration (wppm)" means "concentration based on total weight of the sample (wppm)".

The following liquids have been assessed:

Sample 1: A preparation containing Sugar Target (saccharose 10 Brix) and water

5

Sample 2: A preparation containing 500 wppm acesulfame K and water

Sample 3: A preparation containing 350 wppm acesulfame K and water

10 Sample 4: A preparation containing 350 wppm acesulfame K, 80 wppm sucralose and water

Sample 5: A preparation containing water, acesulfame K, sucralose and the composition X comprising substances (1) to (10):

15

Ingredient	Concentration (wppm)
Acesulfame K	350
Sucralose	80
(1) L-valin of natural origin	0.003
(2) maltol of natural origin	3
(3) naringin of natural origin	2
(4) maltodextrine MD 14	0.15
(5) arabicgum (spraygum)	0.066
(6) acetoin of natural origin	0.0023
(7) delta dodecalactone of natural origin	0.057
(8) diacetyl of natural origin	0.0002
(9) delta decalactone of natural origin	0.007
(10) massoia lactone of natural origin	0.014

Sample 6: A preparation containing water, acesulfame K, sucralose and the composition comprising substances (1) to (25):

Ingredient	Concentration (wppm)
Acesulfame K	350
Sucralose	80
(1) L-valin	0.0024
(2) maltol	2.4
(3) naringin of natural origin	1.6
(4) maltodextrine MD 14	0.31
(5) arabicgum (spraygum)	0.13
(6) acetoin	0.0015
(7) delta dodecalactone	0.0388
(8) diacetyl	0.0001
(9) delta decalactone	0.0048
(10) massoia lactone of natural origin	0.0097
(11) L-alanine	0.0048
(12) L-leucine	0.0030
(13) glycine	0.0075
(14) L-aspartic acid	0.0132
(15) L-threonine	0.0057
(16) L-isoleucine	0.0032
(17) L-tyrosine	0.0048
(18) L-proline	0.0067
(19) L-serine	0.0315
(20) L-glutamic acid	0.0201
(21) taurine	0.0056
(22) syringaldehyde	0.0802
(23) delta undecalactone	0.0388
(24) whiskey lactone	0.0291
(25) delta tetradecalactone	0.0388

Sample 7: A preparation containing water, acesulfame K, sucralose and the composition X comprising substances (1) to (26)

Ingredient	Concentration (wppm)
Acesulfame K	350
Sucralose	80
(1) L-valin	0.0024
(2) maltol	2.4
(3) naringin of natural origin	1.6
(4) maltodextrine MD 14	0.31
(5) arabicgum (spraygum)	0.13
(6) acetoin	0.0015
(7) delta dodecalactone	0.0388
(8) diacetyl	0.0001
(9) delta decalactone	0.0048
(10) massoia lactone of natural origin	0.0097
(11) L-alanine	0.0048
(12) L-leucine	0.0030
(13) glycine	0.0075
(14) L-aspartic acid	0.0132
(15) L-threonine	0.0057
(16) L-isoleucine	0.0032
(17) L-tyrosine	0.0048
(18) L-proline	0.0067
(19) L-serine	0.0315
(20) L-glutamic acid	0.0201
(21) taurine	0.0056
(22) syringaldehyde	0.0802
(23) delta undecalactone	0.0388
(24) whiskey lactone	0.0291
(25) delta tetradecalactone	0.0388
(26) methoxy salicylaldehyde	0.0025

Sample 8: A preparation containing water, acesulfame K, sucralose and the composition X comprising substances (1) to (9):

Ingredient	Concentration (wppm)
Acesulfame K	350
Sucralose	80
(1) L-valin of natural origin	0.003
(2) maltol of natural origin	3
(3) naringin of natural origin	2
(4) maltodextrine MD 14	0.15
(5) arabicgum (spraygum)	0.066
(6) acetoin of natural origin	0.0023
(7) delta dodecalactone of natural origin	0.057
(8) delta decalactone of natural origin	0.007
(9) massoia lactone of natural origin	0.014

Sample 9: A preparation containing water, acesulfame K, sucralose and the composition X comprising substances (1) to (9) and (11) to (25):

5

Ingredient	Concentration (wppm)
Acesulfame K	350
Sucralose	80
(1) L-valin	0.0024
(2) maltol	2.4
(3) naringin of natural origin	1.6
(4) maltodextrine MD 14	0.31
(5) arabicgum (spraygum)	0.13
(6) acetoin	0.0015
(7) delta dodecalactone	0.0388
(8) delta decalactone	0.0048
(9) massoia lactone of natural origin	0.0097
(11) L-alanine	0.0048
(12) L-leucine	0.0030

(13) glycine	0.0075
(14) L-aspartic acid	0.0132
(15) L-threonine	0.0057
(16) L-isoleucine	0.0032
(17) L-tyrosine	0.0048
(18) L-proline	0.0067
(19) L-serine	0.0315
(20) L-glutamic acid	0.0201
(21) taurine	0.0056
(22) syringaldehyde	0.0802
(23) delta undecalactone	0.0388
(24) whiskey lactone	0.0291
(25) delta tetradecalactone	0.0388

Sample 10: A preparation containing water, acesulfame K, sucralose and the composition X comprising substances (1) to (9) and (11) to (26)

Ingredient	Concentration (wppm)
Acesulfame K	350
Sucralose	80
(1) L-valin	0.0024
(2) maltol	2.4
(3) naringin of natural origin	1.6
(4) maltodextrine MD 14	0.31
(5) arabicgum (spraygum)	0.13
(6) acetoin	0.0015
(7) delta dodecalactone	0.0388
(8) delta decalactone	0.0048
(9) massoia lactone of natural origin	0.0097
(11) L-alanine	0.0048
(12) L-leucine	0.0030
(13) glycine	0.0075

(14) L-aspartic acid	0.0132
(15) L-threonine	0.0057
(16) L-isoleucine	0.0032
(17) L-tyrosine	0.0048
(18) L-proline	0.0067
(19) L-serine	0.0315
(20) L-glutamic acid	0.0201
(21) taurine	0.0056
(22) syringaldehyde	0.0802
(23) delta undecalactone	0.0388
(24) whiskey lactone	0.0291
(25) delta tetradecalactone	0.0388
(26) methoxy salicylaldehyde	0.0025

The panelists were asked to taste the samples 1 to 10 and to evaluate the bitter aftertaste of samples 1 to 10 to determine the bitter aftertaste of a sweetener composition comprising acesulfame potassium, sucralose and the composition X of the invention.

Results: The results of the taste and spit assay are based on a qualitative evaluation of the differences between the seven samples. The samples 5 to 10 comprising acesulfame potassium, sucralose and a composition of the invention were perceived by all panelists as having a significantly lower bitter aftertaste compared to the respective sweetener composition of samples 2 to 4 without a composition of the invention and these samples were perceived to be sweeter than samples 1 to 4.

4. Example 33, for Part A and Part B: Taste and spit assay with regard to sweetness in the aftertaste

The taste of a sample of a sweetener composition comprising acesulfame potassium, sucralose and the composition of the invention was assessed with regard to sweetness in the aftertaste by using a panel of trained sensory evaluators experienced in the descriptive sensory analysis in comparison to the sweet aftertaste of saccharose and a sweetener

composition comprising acesulfame potassium, respectively. 4 panelists were asked to taste the quality of single samples of 35 ml volume.

The samples with the same composition as in Example 1 have been assessed:

5

The panelists were asked to taste the samples 1 to 10 and to evaluate the sweet aftertaste of samples 1 to 10 in to determine the sweetness in the aftertaste of a sweetener composition comprising acesulfame potassium, sucralose and the composition of the invention.

- 10 **Results:** The results of the taste and spit assay are based on a qualitative evaluation of the differences between the seven samples. Sample 1 containing saccharose was perceived by all panelists as less sweet in the aftertaste compared to acesulfame potassium and sucralose. The samples 5 to 10 comprising acesulfame potassium, sucralose and a composition X of the invention were perceived by all panelists as having a significantly
15 lower lingering aftertaste compared to the respective sweetener composition of samples 2 to 4 without a composition of the invention..

5. **Summary:** The results of the taste and spit assay demonstrate that, surprisingly and unexpectedly, the compositions of the invention 1) significantly reduce the bitter aftertaste
20 of sweetener compositions; and 2) increase the sweetness perception and 3) result in decreasing the sweet lingering of the sweetener composition in the aftertaste. As such, the compositions of the invention are capable for providing for a reduction in the quantity of sweetener used.

25 **Example 34, for Part B**

Identification of naringin as a taste-modifying compound

- Naringin was diluted in water until the diluted solution reached a concentration of
30 1.6 wppm. At this concentration, its taste was no longer detectable in water.

Then, naringin was tested at this concentration in an acesulfame K (350 ppm) solution and in an acesulfame K (350 wppm) / sucralose (80 wppm) solution. At this concentration, although not detectable, the naringin was considered by all panelists to improve the bitter

aftertaste of acesulfame K.

D. Comparative taste and spit assay with regard to aftertaste, fullness and creaminess of artificial sweeteners: Using a panel of 4 trained sensory evaluators
- Examples 35 and 36, for Part A

1. General test conditions

All tests were conducted under controlled and standardized conditions.

The samples were prepared by a trained laboratory assistant.

35 ml of the samples were served at room temperature in clear plastic cups.

Neutralization between samples was guaranteed by both time (breaks of minimum 15 minutes) and by consumption of a selection of neutralizing food and drinks such as still water.

2. Test conditions

The following samples comprising a composition X of the invention were tested for their ability to improve aftertaste, fullness and creaminess of artificial sweeteners.

In this taste and spit assay, the descriptors aftertaste, fullness and creaminess have the following meanings:

Aftertaste means the aftertaste of the artificial sweetener(s).

Fullness means body and fullness of the sweetener compositions.

Creaminess means the creaminess of the sweetener compositions.

All samples were tested in duplicate and were evaluated in direct comparison to a sample comprising artificial sweetener(s) in combination with only the bitter blocking agent naringin (sample 1, e.g. sample 1a or sample 1b). No other compounds were utilized in combination with the artificial sweetener(s) and the naringin.

The taste of a sample of a sweetener composition comprising artificial sweetener(s) and a composition X of the invention (samples 2 to 8, e.g. samples 2a to 8a or samples 2b to 8b) was assessed using a panel of trained sensory evaluators experienced in the descriptive sensory analysis. 4 panelists were asked to taste the quality of single samples of 35 ml volume.

The panelists were asked to evaluate and to quantify the taste-masking properties of the samples 2 to 8 (e.g. samples 2a to 8a or samples 2b to 8b) with regard to aftertaste, fullness and creaminess on a scale ranging from 0 to 10 in comparison to sample 1. Sample 1 (e.g. sample 1a or sample 1b) was set at 5.

With regard to aftertaste, the panelists were asked to score a sample lower than 5 if the sample had a lower aftertaste in comparison with sample 1.

With regard to fullness and creaminess, the panelists were asked to score a sample higher than 5 if the sample had an improved fullness and/or creaminess in comparison with sample 1.

The results of the taste and spit assay are based on the evaluation of the differences between the samples.

3. Example 35: Comparative taste and spit assay based on acesulfame K

The tastes of samples of sweetener compositions comprising the artificial sweetener acesulfame K and compositions X of the invention (samples 2a to 8a) were tested and evaluated in direct comparison to a sample comprising only acesulfame K and naringin (sample 1a).

Sample 1a: A preparation containing water, acesulfame K (350 wppm) and the bitter blocking agent naringin present at a concentration of 1.6 wppm.

Sample 2a: A preparation containing water, acesulfame K (350 wppm), and a composition X of the invention comprising the following substances:

Type of Substance	Ingredient	Concentration based on total weight of the sample (wppm)
bitter blocking agent	naringin	1.6
carbonyl compound	acetoin	0.0015
lactone	massoia lactone	0.0097

- 5 Sample 3a: A preparation containing water, acesulfame K (350 wppm), and a composition X of the invention comprising the following substances:

Type of Substance	Ingredient	Concentration based on total weight of the sample (wppm)
bitter blocking agent	naringin	1.6
carbonyl compound	acetoin	0.0015
lactone	delta dodecalactone	0.0388

- 10 Sample 4a: A preparation containing water, acesulfame K (350 wppm), and a composition X of the invention comprising the following substances:

Type of Substance	Ingredient	Concentration based on total weight of the sample (wppm)
bitter blocking agent	naringin	1.6
carbonyl compound	syringaldehyde	0.0802
lactone	delta dodecalactone	0.0388

Sample 5a: A preparation containing water, acesulfame K (350 wppm), and a composition X of the invention comprising the following substances:

Type of Substance	Ingredient	Concentration based on total weight of the sample (wppm)
bitter blocking agent	naringin	1.6
carbonyl compound	syringaldehyde	0.0802
lactone	whiskey lactone	0.0291

5

Sample 6a: A preparation containing water, acesulfame K (350 wppm), and a composition X of the invention comprising the following substances:

Type of Substance	Ingredient	Concentration based on total weight of the sample (wppm)
bitter blocking agent	naringin	1.6
carbonyl compound	methoxy salicylaldehyde	0.0025
lactone	delta dodecalactone	0.0388

10

Sample 7a: A preparation containing water, acesulfame K (350 wppm), and a composition X of the invention comprising the following substances:

Type of Substance	Ingredient	Concentration based on total weight of the sample (wppm)
bitter blocking agent	naringin	1.6

carbonyl compound	methoxy salicylaldehyde	0.0025
lactone	massoia lactone	0.0097

Sample 8a: A preparation containing water, acesulfame K (350 wppm), and a composition X of the invention comprising the following substances:

5

Type of Substance	Ingredient	Concentration based on total weight of the sample (wppm)
bitter blocking agent	naringin	1.6
carbonyl compound	acetoin	0.0015
lactone	massoia lactone	0.0097
lactone	delta dodecalactone	0.0388
lactone	whiskey lactone	0.0291

Results: The results of the comparative taste and spit assay are shown in the table below.

Descriptor	Sample 1a	Sample 2a	Sample 3a	Sample 4a	Sample 5a	Sample 6a	Sample 7a	Sample 8a
Aftertaste	5	4	5	4	4	4	3	3
Fullness	5	8	8	6	7	8	8	8
Creaminess	5	8	8	5	5	7	5	7

10

Samples 2a, 6a and 8a comprising acesulfame K and the respective embodiment of the composition X of the invention as defined above were each perceived by all panelists as having a reduced aftertaste, an improved fullness and an improved creaminess in comparison with sample 1 comprising only acesulfame K and naringin.

15

Sample 3a comprising acesulfame K and the respective embodiment of the composition X of the invention as defined above was perceived by all panelists as having an improved

fullness and an improved creaminess in comparison with sample 1 comprising only acesulfame K and naringin.

Samples 4a, 5a and 7a comprising acesulfame K and the respective embodiment of the composition X of the invention as defined above were each perceived by all panelists as having a reduced aftertaste and an improved fullness in comparison with sample 1 comprising only acesulfame K and naringin.

Summary: The results of the comparative taste and spit assays demonstrate that, in comparison to the bitter blocking agent naringin alone, the composition X of the invention surprisingly and unexpectedly 1) reduces the aftertaste of acesulfame K; 2) improves the fullness of acesulfame K; and/or 3) improves the creaminess of acesulfame K. Thus, the comparative taste and spit assays show that the composition X of the invention imparts an unexpected improvement in the taste profile of acesulfame K in comparison to the bitter blocking agent naringin alone.

4. Example 36: Comparative taste and spit assay based on acesulfame K and sucralose

The tastes of samples of sweetener compositions comprising the artificial sweeteners acesulfame K and sucralose, and compositions X of the invention (samples 2b to 8b) were tested and evaluated in direct comparison to a sample comprising only acesulfame K, sucralose and naringin (sample 1b).

Sample 1b: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and the bitter blocking agent naringin present at a concentration of 1.6 wppm.

Sample 2b: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition X of the invention comprising the following substances:

Type of Substance	Ingredient	Concentration based on total weight of the sample (wppm)
bitter blocking agent	naringin	1.6
carbonyl compound	acetoin	0.0015
lactone	massoia lactone	0.0097

Sample 3b: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition X of the invention comprising the following substances:

5

Type of Substance	Ingredient	Concentration based on total weight of the sample (wppm)
bitter blocking agent	naringin	1.6
carbonyl compound	acetoin	0.0015
lactone	delta dodecalactone	0.0388

Sample 4b: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition X of the invention comprising the following substances:

10

Type of Substance	Ingredient	Concentration based on total weight of the sample (wppm)
bitter blocking agent	naringin	1.6
carbonyl compound	syringaldehyde	0.0802
lactone	delta dodecalactone	0.0388

Sample 5b: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition X of the invention comprising the following substances:

5

Type of Substance	Ingredient	Concentration based on total weight of the sample (wppm)
bitter blocking agent	naringin	1.6
carbonyl compound	syringaldehyde	0.0802
lactone	whiskey lactone	0.0291

Sample 6b: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition X of the invention comprising the following substances:

10

Type of Substance	Ingredient	Concentration based on total weight of the sample (wppm)
bitter blocking agent	naringin	1.6
carbonyl compound	methoxy salicylaldehyde	0.0025
lactone	delta dodecalactone	0.0388

Sample 7b: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition X of the invention comprising the following substances:

15

Type of Substance	Ingredient	Concentration based on total

		weight of the sample (wppm)
bitter blocking agent	naringin	1.6
carbonyl compound	methoxy salicylaldehyde	0.0025
lactone	massoia lactone	0.0097

Sample 8b: A preparation containing water, acesulfame K (350 wppm), sucralose (80 wppm) and a composition X of the invention comprising the following substances:

Type of Substance	Ingredient	Concentration based on total weight of the sample (wppm)
bitter blocking agent	naringin	1.6
carbonyl compound	acetoin	0.0015
lactone	massoia lactone	0.0097
lactone	delta dodecalactone	0.0388
lactone	whiskey lactone	0.0291

Results: The results of the comparative taste and spit assay are shown in the table below.

Descriptor	Sample 1b	Sample 2b	Sample 3b	Sample 4b	Sample 5b	Sample 6b	Sample 7b	Sample 8b
Aftertaste	5	5	4	3	5	3	3	2
Fullness	5	6	7	7	6	7	7	8
Creaminess	5	8	9	7	5	6	6	7

Samples 3b, 4b and 6b to 8b comprising acesulfame K, sucralose and the respective embodiment of the composition X of the invention as defined above were each perceived by all panelists as having a reduced aftertaste, an improved fullness and an improved

creaminess in comparison with sample 1 comprising only acesulfame K, sucralose and naringin.

5 **Sample 2b** comprising acesulfame K, sucralose and the respective embodiment of the composition X of the invention as defined above was perceived by all panelists as having an improved fullness and an improved creaminess in comparison with sample 1 comprising only acesulfame K, sucralose and naringin.

10 **Sample 5b** comprising acesulfame K, sucralose and the respective embodiment of the composition X of the invention as defined above was perceived by all panelists as having an improved fullness in comparison with sample 1 comprising only acesulfame K, sucralose and naringin.

15 **Summary:** The results of the comparative taste and spit assays demonstrate that, in comparison to the bitter blocking agent naringin alone, the composition X of the invention surprisingly and unexpectedly 1) reduces the aftertaste of the acesulfame K and sucralose combination; 2) improves the fullness of the acesulfame K and sucralose combination; and/or 3) improves the creaminess of the acesulfame K and sucralose combination. Thus, the comparative taste and spit assays show that the composition X of the invention imparts
20 an unexpected improvement in the taste profile of acesulfame K and sucralose combination in comparison to the bitter blocking agent naringin alone.

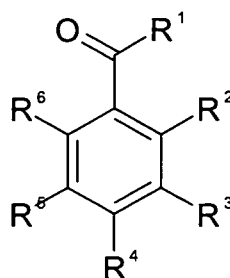
Claims

1. A composition X comprising the following substances:
 - (1) at least one bitter blocking agent;
 - 5 (2) at least one carbonyl compound; and
 - (3) at least one lactone.
2. The composition X of claim 1, wherein the at least one carbonyl compound comprises
 - 10 (2a) a first carbonyl compound; and
 - (2b) a second carbonyl compound.
3. The composition X of claim 1 or 2, wherein the at least one lactone comprises
 - (3a) a first lactone; and
 - 15 (3b) a second lactone.
4. The composition X of any one of claims 1 to 3, wherein the at least one bitter blocking agent (1) has a bitter off-taste.
- 20 5. The composition X of any one of claims 1 to 4, wherein the at least one bitter blocking agent (1) is selected from the group consisting of:
 - a compound comprising a flavanonyl moiety, in particular a flavanone, a hydroxyflavanone, a dihydroxyflavanone or a trihydroxyflavanone;
 - a compound comprising a quininyll moiety, in particular quinine, quinine bisulfate,
 - 25 quinine hydrochloride, quinine sulfate, hydroxyquinine;
 - a compound comprising a purinyll moiety, in particular caffeine or theobromine;
 - a compound comprising a saccharide acetate moiety, in particular glucose penta-acetate or sucrose octa-acetate; and
 - benzyl diethyl-(2:6-xylyl-carbamoyl-methyl)-ammonium benzoate.
- 30 6. The composition X of claim 5, wherein the at least one bitter blocking agent (1) is a compound comprising a flavanoyll moiety selected from the group consisting of naringin, naringenin and naringin dihydrochalcone or a naringin containing extract, preferably naringin.

7. The composition X of any one of claims 1 to 6, wherein the at least one carbonyl compound (2) contains from 7 to 18 carbon atoms, preferably from 7 to 14 carbon atoms.

5

8. The composition X of any one of claims 1 to 7, wherein the at least one carbonyl compound (2) is a carbonyl compound of the formula (I)



(I)

,

- 10 wherein said carbonyl compound does not contain more than 18 carbon atoms, preferably from 8 to 14 carbon atoms, and

wherein

R¹ is hydrogen, hydroxy, C₁-C₈ alkyl or C₂-C₈ alkenyl; and

- 15 R², R³, R⁴, R⁵ and R⁶ are identical or different and each is independently of the others hydrogen, hydroxy, C₁-C₈ alkyl, C₁-C₈ alkoxy or C₂-C₈ alkenyl.

9. The composition X of claim 8, wherein in the carbonyl compound of the formula (I) at least one of R², R³, R⁴, R⁵ and R⁶ is hydroxy or methoxy.

20

10. The composition X of any one of claims 1 to 9, wherein the at least one carbonyl compound (2) is selected from the group consisting of
- a compound comprising a vanillin moiety, in particular vanillin, ethyl vanillin, methyl vanillate, ethyl vanillate, vanillic acid, vanillin isobutyrate, ethyl vanillin isobutyrate, acetovanillone or 5-methoxyvanillin;
- 25 a compound comprising a benzaldehyde moiety other than a vanillin moiety, in particular 4-hydroxybenzaldehyde, 2-methoxybenzaldehyde, 3-methoxybenzaldehyde, 4-methoxybenzaldehyde, 4-ethoxybenzaldehyde, 4-

ethylbenzaldehyde, 2-hydroxy-4-methylbenzaldehyde, 2-methoxybenzoic acid, 3,4-dihydroxybenzaldehyde, 4-hydroxy-3,5-dimethoxybenzaldehyde, veratraldehyde, anis aldehyde, salicylaldehyde, 3-methoxy salicylaldehyde or 4-methoxy salicylaldehyde;

a compound comprising a benzoic acid moiety, 3-methoxybenzoic acid, 4-methoxybenzoic acid, 2-hydroxybenzoic acid, 3-hydroxybenzoic acid, 4-hydroxybenzoic acid, ethyl 2-hydroxy-4-methylbenzoate or anisic acid; and

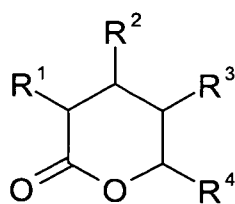
a compound comprising an acetophenone moiety, in particular 2-hydroxyacetophenone, 3-hydroxyacetophenone or 4-hydroxyacetophenone.

11. The composition X of any one of claims 1 to 10, wherein the at least one carbonyl compound (2) comprises syringaldehyde and/or acetoin.

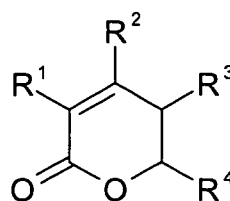
12. The composition X of any one of claims 1 to 11, wherein the at least one lactone (3) contains from 6 to 18 carbon atoms, preferably from 8 to 14 carbon atoms.

13. The composition X of any one of claims 1 to 12, wherein the at least one lactone (3) comprises a saturated or an unsaturated delta-lactone.

14. The composition X of any one of claims 1 to 13, wherein the at least one lactone (3) comprises a delta-lactone of the formulae (II) or (III)



(II)



(III)

wherein said lactone does not contain more than 18 carbon atoms, preferably from 8 to 14 carbon atoms, and

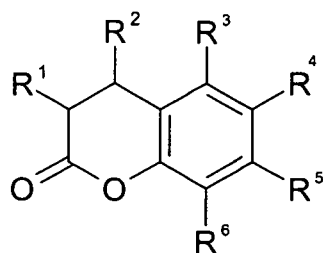
wherein

R^1 , R^2 , R^3 and R^4 are identical or different and each is independently of the others hydrogen, hydroxy, Ci-Cio alkyl, Ci-Cio alkoxy or C₂-C₁₀ alkenyl.

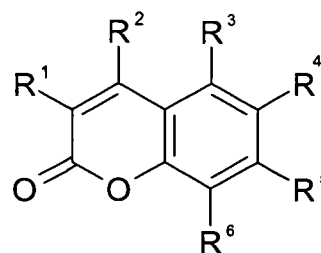
15. The composition X of any one of claims 1 to 14, wherein the at least one lactone (3) is selected from the group consisting of:

pentano-1,5-lactone, hexano-1,5-lactone, heptano-1,5-lactone, octano-1,5-lactone, nonano-1,5-lactone, decano-1,5-lactone, undecano-1,5-lactone, dodecano-1,5-lactone, tridecano-1,5-lactone, tetradecano-1,5-lactone, pentadecano-1,5-lactone, hexadecano-1,5-lactone, pent-2-eno-1,5-lactone, hex-2-eno-1,5-lactone, hept-2-eno-1,5-lactone, oct-2-eno-1,5-lactone, non-2-eno-1,5-lactone, dec-2-eno-1,5-lactone, undec-2-eno-1,5-lactone, dodec-2-eno-1,5-lactone, tridec-2-eno-1,5-lactone, tetradec-2-eno-1,5-lactone, pentadec-2-eno-1,5-lactone, hexadec-2-eno-1,5-lactone, dec-5-eno-1,5-lactone, dec-6-eno-1,5-lactone, dec-7-eno-1,5-lactone, dec-8-eno-1,5-lactone, undec-5-eno-1,5-lactone, undec-6-eno-1,5-lactone, undec-7-eno-1,5-lactone, undec-8-eno-1,5-lactone, dodec-2-eno-1,5-lactone and nepetalactone.

16. The composition X of any one of claims 1 to 15, wherein the at least one lactone (3) comprises a delta-lactone of the formulae (IV) or (V)



(IV)



(V)

wherein said lactone does not contain more than 18 carbon atoms, preferably from 9 to 14 carbon atoms, and

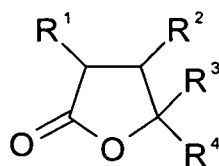
wherein

R^1 , R^2 , R^3 , R^4 , R^5 and R^6 are identical or different and each is independently of the others hydrogen, hydroxy, Ci-C₆ alkyl, C₁-C₄ alkoxy or C₂-C₆ alkenyl.

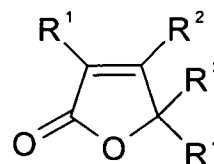
17. The composition X of any one of claims 1 to 13 and 16, wherein the at least one lactone (3) is selected from the group consisting of:
6-methylcoumarin, 3,4-dihydrocoumarin, and 7-ethoxy-4-methylcoumarin.

- 5 18. The composition X of any one of claims 1 to 17, wherein the at least one lactone (3) comprises a saturated or an unsaturated gamma-lactone.
19. The composition of any one of claims 1 to 18, wherein the at least one lactone (3) comprises a gamma-lactone of the formulae (VI) or (VII)

10



(VI)



(VII)

wherein said lactone does not contain more than 18 carbon atoms, preferably from 8 to 14 carbon atoms, and

15

wherein

R¹, R² and R³ are identical or different and each is independently of the others hydrogen, hydroxy, C₁-C₁₀ alkyl, C₁-C₁₀ alkoxy or C₂-C₁₀ alkenyl; and
R⁴ is hydrogen, C₁-C₁₀ alkyl or C₂-C₁₀ alkenyl.

20

20. The composition X of claim 18 or 19, wherein the gamma-lactone is selected from the group consisting of:

25

pentano-1,4-lactone, hexano-1,4-lactone, heptano-1,4-lactone, octano-1,4-lactone, nonano-1,4-lactone, decano-1,4-lactone, undecano-1,4-lactone, dodecano-1,4-lactone, tridecano-1,4-lactone, tetradecano-1,4-lactone, pentadecano-1,4-lactone, hexadecano-1,4-lactone, butyloctano-1,4-lactone, dodec-6-eno-1,4-lactone, dec-7-eno-1,4-lactone, cis-dec-7-eno-1,4-lactone, 2,7-dimethylocta-5(trans),7-dieno-1,4-lactone, hex-2-eno-1,4-lactone, 3-methylnonano-1,4-lactone, 3-methyloctano-1,4-lactone, non-2-eno-1,4-lactone, 2-decen-1,4-lactone, dimethylnon-2-eno-1,4-lactone, 3-methyl gamma-decalactone, 4-methyl-5-hexen-1,4-olide, 4-

hydroxyoctanoic acid lactone, 4-hydroxy-3-methyl octanoic acid lactone, 4-hydroxyundecanoic acid lactone and 4-hydroxy-2-hexanoic acid lactone.

21. The composition X of any one of claims 1 to 20, wherein the at least one lactone
5 comprises a delta lactone and a gamma lactone, preferably the first lactone (3a) is a delta-lactone and the second lactone (3b) is a gamma-lactone.

22. The composition X of any one of claims 2 to 21, wherein the at least one bitter
10 blocking agent (1) is present in the composition X in an amount ranging from 15 wt% to 55 wt%.

23. The composition X of any one of claims 2 to 22, wherein the at least one carbonyl
15 compound (2) is present in the composition X in an amount ranging from 0.5 wt% to 10.0 wt%.

24. The composition X of any one of claims 3 to 23, wherein the at least one lactone (3)
is present in the composition X in an amount ranging from 0.06 wt% to 10.0 wt%.

25. The composition X of any one of claims 1 to 24, further comprising
20 (4) at least one additional substance.

26. The composition X of claim 25, wherein the at least one additional substance (4) is
selected from at least one amino acid, maltol, taurine, at least one additional
flavoring ingredient, and combinations thereof.

27. The composition X of claim 26, wherein the at least one amino acid are one to
25 eleven amino acids selected from the group consisting of L-alanine, L-leucine, glycine, L-aspartic acid, L-threonine, L-isoleucine, L-tyrosine, L-proline, L-serine, L-valine and L-glutamic acid.

28. The composition X of any one of claims 1 to 27, wherein the composition X does
30 not comprise methoxy salicylaldehyde.

29. The composition X of any one of claims 1 to 28, wherein the composition X does not comprise all 5 of the following substances: naringin, methoxy salicylaldehyde, syringaldehyde, massoia lactone, and whiskey lactone.

5 30. A process for the preparation of a composition X of any one of claims 1 to 29 comprising admixing the substances (1), (2) and (3), preferably the substances (1), (2a), (2b), (3a) and (3b).

31. A composition X comprising the following substances:

- 10 (i) naringin;
(ii) methoxy salicylaldehyde;
(ii) syringaldehyde;
(iv) massoia lactone; and
(v) whiskey lactone.

15

32. The composition X of claim 31, wherein substance (ii) is 4-methoxy salicylaldehyde.

20

33. The composition X of claim 31 or 32, wherein substance (iv) is (?)-5,6-dihydro-6-pentyl-2*H*-pyran-2-one.

34. The composition X of any one of claims 31 to 33, wherein substance (v) is a mixture of *m*-3-methyl-4-octanolide (*cis*-whiskey lactone) and *trans*-3-methyl-4-octanolide (*trans*-whiskey lactone).

25

35. The composition X of claim 31, wherein substance (ii) is 4-methoxy salicylaldehyde, substance (iv) is (*R*)-5,6-dihydro-6-pentyl-2 *H*-pyran-2-one and substance (v) is a mixture of *cis*-3-methyl-4-octanolide (*cis*-whiskey lactone) and *trans*-3-methyl-4-octanolide (*trans*-whiskey lactone).

30

36. The composition X of any one of claims 31 to 35, wherein the weight ratio of substance (i) to substance (ii) ranges from 50:1 to 200000:1.

37. The composition X of any one of claims 31 to 36, wherein weight ratio of substance (i) to substance (iii) ranges from 0.25:1 to 2000:1.
38. The composition X of any one of claims 31 to 37, wherein the weight ratio of substance (i) to substance (iv) ranges from 5:1 to 10000:1.
39. The composition X of any one of claims 31 to 38, wherein the weight ratio of substance (i) to substance (v) ranges from 5:1 to 4000:1.
40. The composition X of any one of claims 31 to 39, further comprising at least one additional substance (vi).
41. The composition X of claim 40, wherein the at least one additional substance (vi) is selected from amino acids and at least one additional flavoring ingredient, and combinations thereof.
42. The composition X of claim 41, wherein the at least one amino acid (vi) are one to eleven amino acids selected from the group consisting of L-alanine, L-leucine, glycine, L-aspartic acid, L-threonine, L-isoleucine, L-tyrosine, L-proline, L-serine, L-valine and L-glutamic acid.
43. The composition X of any one of claims 31 to 42, wherein the weight ratio of substance (i) to substances (vi) ranges from 0.084:1 to 3356:1.
44. A process for the preparation of a composition of any one of claims 31 to 43 comprising admixing the substances (i), (ii), (iii), (iv), and (v).
45. A sweetener composition, comprising
- (a) at least one sweetener; and
 - (b) a composition X as defined in any one of claims 1 to 29 and 31 to 43.
46. The sweetener composition of claim 45, wherein the at least one sweetener is selected from the group consisting of abiziasaponin, abrusosides, in particular abrusoside A, abrusoside B, abrusoside C, abrusoside D, acesulfame potassium,

advantame, albiziasaponin, alitame, aspartame, superaspartame, bayunosides, in particular bayunoside 1, bayunoside 2, brazzein, bryoside, bryonoside, bryonodulcoside, carnosifloside, carrelame, curculin, cyanin, chlorogenic acid, cyclamates and its salts, cyclocaryoside I, dihydroquercetin-3-acetate, 5 dihydroflavenol, dulcoside, gaudichaudioside, glycyrrhizin, glycyrrhetin acid, gypenoside, hematoxylin, hernandulcin, isomogrosides, in particular iso-mogroside V, lugduname, magap, mabinlins, micraculin, mogrosides (lo han guo), in particular mogroside IV and mogroside V, monatin and its derivatives, monellin, mukurozioside, naringin dihydrochalcone (NarDHC), neohesperidin 10 dihydrochalcone (NDHC), neotame, osladin, pentadin, periandrin I-V, perillartine, D-phenylalanine, phlomisosides, in particular phlomisoside 1, phlomisoside 2, phlomisoside 3, phlomisoside 4, phloridzin, phyllodulcin, polpodiosides, polypodoside A, pterocaryosides, rebaudiosides, in particular rebaudioside A, rebaudioside B, rebaudioside C, rebaudioside D, rebaudioside F, rebaudioside G, 15 rebaudioside H), rubusosides, saccharin and its salts and derivatives, scandenoside, selligueanin A, siamenosides, in particular siamenoside I, stevia, steviolbioside, stevioside and other steviol glycosides, strogines, in particular strogin 1, strogin 2, strogin 4, suavioside A, suavioside B, suavioside G, suavioside H, suavioside I, suavioside J, sucralose, sucronate, sucrooctate, talin, telosmoside A₁₅, thaumatin, in 20 particular thaumatin I and II, trans-anethol, trans-cinnamaldehyde, trilobatin and D-tryptophane, including extracts or enriched fractions of the natural sweeteners.

47. The sweetener composition of claim 45 or 46, wherein the at least one sweetener is selected from the group consisting of acesulfame potassium, aspartame, sucralose and thaumatin. 25

48. The sweetener composition of any one of claims 45 to 47, wherein the at least one sweetener comprises acesulfame potassium.

30 49. The sweetener composition of any one of claims 45 to 47, wherein the at least one sweetener comprises acesulfame potassium and sucralose.

50. The sweetener composition of any one of claims 45 to 47, wherein the at least one sweetener comprises acesulfame potassium and thaumatin.

51. The sweetener composition of any one of claims 45 to 50, wherein the amount of the substances (1), (2) and (3), preferably of the substances (1), (2a), (2b), (3a) and (3b), and of the substances (i), (ii), (iii), (iv) and (v) in the sweetener composition is below their taste threshold concentration.
52. The sweetener composition of any one of claims 45 to 51, comprising from 80 wt% to 99.5 wt% of the at least one sweetener based on the total weight of the sweetener composition.
53. The sweetener composition of any one of claims 45 to 52, comprising from 0.1 wt% to 20 wt%, in particular from 0.5 to 20 wt%, of the composition X as defined in any one of claims 1 to 29 and 31 to 43 based on the total weight of the sweetener composition.
54. The sweetener composition of claim 53, comprising from 94.0 wt% to 99.5 wt% of the at least one sweetener based on the total weight of the sweetener composition, preferably from 94.0 wt% to 98.4 wt%.
55. The sweetener composition of claim 54, wherein the at least one sweetener comprises acesulfame potassium and sucralose.
56. The sweetener composition of claim 55, wherein the acesulfame potassium is present in an amount ranging from 35 wt% to 99 wt% and the sucralose is present in an amount ranging from 1 wt% to 50 wt% based on the total weight of the sweetener composition.
57. The sweetener composition of any one of claims 45 to 56, wherein the composition X as defined in any one of claims 1 to 29 and 31 to 43 is present in an amount ranging from 0.8 wt% to 5 wt%.
58. The sweetener composition of claim 57, comprising from 94.0 wt% to 99.5 wt% of the at least one sweetener based on the total weight of the sweetener composition, preferably from 94.0 wt% to 99.1 wt%.

59. The sweetener composition of claim 58, wherein the at least one sweetener comprises acesulfame potassium and sucralose.
- 5 60. The sweetener composition of claim 59, wherein the acesulfame potassium is present in an amount ranging from 77.0 wt% to 82.0 wt% and the sucralose is present in an amount ranging from 17.0 wt% to 19.0 wt% based on the total weight of the sweetener composition.
- 10 61. The sweetener composition of any one of claims 45 to 53 and 58 to 60, wherein the composition X as defined in any one of claims 1 to 29 and 31 to 43 is present in an amount ranging from 0.9 wt% to 2.2 wt%.
62. The sweetener composition of any one of claims 45 to 61 wherein the composition
15 further comprises glycerol, and the glycerol is preferably present in an amount ranging from 0.1 wt% to 4.0 wt%.
63. The sweetener composition of any one of claims 45 to 62, wherein the composition, has a sweetness level that is at least 190 times the sweetness of natural sugar.
20
64. The sweetener composition of any one of claims 45 to 62, wherein the composition, has a sweetness level that ranges from 190 to 300 times the sweetness of natural sugar.
- 25 65. The sweetener composition of any one of claims 45 to 62, wherein the composition is stable when maintained at pH ranging from 3.0 to 7.5.
66. The sweetener composition of any one of claims 45 to 65, further comprising at least one additional sweetener.
30
67. The sweetener composition of claim 66, wherein the at least one additional sweetener is selected from the group consisting of erythritol, galactitol, hydrogenated starch syrups, maltitol and sorbitol syrups, inositols, isomalt, lactitol, maltitol, mannitol, xylitol, arabinose, dextrin, dextrose, fructose, high fructose corn

syrup, fructooligosaccharides, fructooligosaccharide syrups, galactose, galactooligosaccharides, glucose, glucose and (hydrogenated) starch syrups/hydrolysates, isomaltulose, lactose, hydrolysed lactose, maltose, mannose, rhamnose, ribose, sucrose, tagatose, trehalose, xylose, and combinations thereof.

5

68. The sweetener composition of claim 66 or 67, wherein the at least one additional sweetener is a caloric sweetener.

10

69. The sweetener composition of claim 66 or 67, wherein the at least one additional sweetener is a non-caloric sweetener.

70. The sweetener composition of any one of claims 45 to 67, further comprising at least one sweetness enhancer.

15

71. The sweetener composition of any one of claims 45 to 70, wherein the composition X as defined in any one of claims 1 to 29 and 31 to 43 is present in an amount effective to modify, mask, reduce and/or suppress an unpleasant off-taste, aftertaste or lingering sweetness of the at least one sweetener or the at least one sweetness enhancer, wherein the amount of the composition X in the sweetener composition is less than a taste threshold concentration associated with the composition X, preferably and wherein the effect of the composition X remains at least as long as the taste of the at least one sweetener or the at least one sweetness enhancer is perceived.

20

72. The sweetener composition of claim 71, wherein the unpleasant off-taste of the sweetener or the sweetness enhancer is an acidic off-taste, an astringent off-taste, a bitter off-taste, a liquorice off-taste, a metallic off-taste or a throat-burning off-taste.

25

73. The sweetener composition of claim 71, wherein the unpleasant aftertaste of the sweetener or the sweetness enhancer is an astringent or bitter aftertaste.

30

74. The sweetener composition of any one of claims 45 to 73, wherein the sweetener composition is a liquid at ambient conditions.

75. The sweetener composition of any one of claims 45 to 73, wherein the sweetener composition is a solid at ambient conditions.

5 76. The sweetener composition of any one of claims 45 to 75, further comprising an additional component selected from the group consisting of dust control agents, in particular glycerol, bubble forming agents, surfactants, emulsifiers, salts, fats, gums, and hydrocolloids, bulking agents, carriers, fibers, at least one additional flavoring ingredient, flavor enhancers, flavor stabilizers, acidulants, anti-caking and
10 free-flow agents.

77. A method of modifying, masking, reducing and/or suppressing the unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetener or sweetness enhancer, the method comprising combining the composition X as defined in any
15 one of claims 1 to 29 and 31 to 43 with the at least one sweetener or sweetness enhancer.

78. The method of claim 77, wherein the method comprises modifying, masking, reducing and/or suppressing the unpleasant off-taste, aftertaste or lingering
20 sweetness of at least one sweetener or at least one sweetness enhancer, the method comprising combining an amount of the composition X as defined in any one of claims 1 to 29 and 31 to 43 effective to modify, mask, reduce and/or suppress an unpleasant off-taste, aftertaste or lingering sweetness of the at least one sweetener or the at least one sweetness enhancer with the at least one sweetener or at least one
25 sweetness enhancer, wherein the amount of the composition X in the sweetener composition is less than a taste threshold concentration associated with the composition X and wherein the effect of the composition X remains at least as long as the taste of the at least one sweetener or the at least one sweetness enhancer is perceived.

30 79. The method of claim 77 or 78, wherein the at least one sweetener is selected from the group consisting of abiziasaponin, abrusosides, in particular abrusoside A, abrusoside B, abrusoside C, abrusoside D, acesulfame potassium, advantame, albiziasaponin, alitame, aspartame, superaspartame, bayunosides, in particular

bayunoside 1, bayunoside 2, brazzein, bryoside, bryonoside, bryonodulcoside, carnosifloside, carrelame, curculin, cyanin, chlorogenic acid, cyclamates and its salts, cyclocaryoside I, dihydroquercetin-3-acetate, dihydroflavenol, dulcoside, gaudichaudioside, glycyrrhizin, glycyrrhetin acid, gypenoside, hematoxylin, hernandulcin, isomogrosides, in particular iso-mogroside V, lugduname, magap, mabinlins, micraculin, mogrosides (lo han guo), in particular mogroside IV and mogroside V, monatin and its derivatives, monellin, mukurozioside, naringin dihydrochalcone (NarDHC), neohesperidin dihydrochalcone (NDHC), neotame, osladin, pentadin, periandrin I-V, perillartine, D-phenylalanine, phlomisiosides, in particular phlomisioside 1, phlomisioside 2, phlomisioside 3, phlomisioside 4, phloridzin, phyllodulcin, polpodiosides, polypodoside A, pterocaryosides, rebaudiosides, in particular rebaudioside A, rebaudioside B, rebaudioside C, rebaudioside D, rebaudioside F, rebaudioside G, rebaudioside H), rubusosides, saccharin and its salts and derivatives, scandenoside, selliguanin A, siamenosides, in particular siamenoside I, stevia, steviolbioside, stevioside and other steviol glycosides, strogines, in particular strogins 1, strogins 2, strogins 4, suavioside A, suavioside B, suavioside G, suavioside H, suavioside I, suavioside J, sucralose, sucronate, sucrooctate, talin, telosmoside A¹, thaumatin, in particular thaumatin I and II, trans-anethol, trans-cinnamaldehyde, trilobatin and D-tryptophane, including extracts or enriched fractions of the natural sweeteners.

80. The method of any one of claims 77 to 79, wherein the at least one sweetener is selected from the group consisting of acesulfame potassium, aspartame, sucralose and thaumatin.

81. A tabletop sweetener composition comprising

(a) at least one sugar sweetener, which is selected from the group consisting of monosaccharides, disaccharides, oligosaccharides and polysaccharides, preferably the at least one sugar sweetener is selected from the group consisting of arabinose, dextrin, dextrose, fructose, high fructose corn syrup, fructooligosaccharides, fructooligosaccharide syrups, galactose, galactooligosaccharides, glucose, glucose and (hydrogenated) starch syrups/hydrolysates, isomaltulose, lactose, hydrolysed lactose, maltose, mannose, rhamnose, ribose, sucrose, stachyose, tagatose, trehalose, xylose, and

combinations thereof, most preferably the at least one sugar sweetener is a disaccharide and/or fructose;

(b) at least one sugar alcohol (or polyol), which is selected from the group consisting of erythritol, galactitol, hydrogenated starch syrups including maltitol and sorbitol syrups, inositols, isomalt, lactitol, maltitol, mannitol, xylitol, and combinations thereof, preferably the at least one sugar alcohol is erythritol;

(c) at least one sweetener as defined in claim 46; and

(d) an amount of a composition X as defined in any one of claims 1 to 29 and 31 to 43.

82. The tabletop sweetener composition of claim 81, wherein the at least one sweetener is selected from the group consisting of acesulfame potassium, aspartame, sucralose and thaumatin.

83. The tabletop sweetener composition of claim 81 or 82, further comprising a taste-improving amount of cellulose.

84. The tabletop sweetener composition of any one of claims 81 to 83, wherein the tabletop sweetener composition comprises from 40 wt% to 90 wt% sugar alcohol based on the total weight of the tabletop sweetener composition.

85. The tabletop sweetener composition of any one of claims 81 to 84, wherein the tabletop sweetener composition comprises from 27 wt% to 50 wt% sugar sweetener based on the total weight of the tabletop sweetener composition.

86. The tabletop sweetener composition of any one of claims 81 to 85, wherein the tabletop sweetener composition comprises from 0.5 wt% to 7.0 wt% acesulfame potassium, aspartame, sucralose or thaumatin.

87. The tabletop sweetener composition of any one of claims 81 to 86, wherein the tabletop sweetener composition comprises from 0.5 wt% to 20 wt% of the composition as defined in any one of claims 1 to 13.

88. The tabletop sweetener composition of any one of claims 81 to 87, wherein the composition X as defined in any one of claims 1 to 29 and 31 to 43 is present in an amount effective to modify, mask, reduce and/or suppress an unpleasant off-taste or aftertaste of acesulfame potassium, aspartame, sucralose and thaumatin, wherein the amount is less than a taste threshold concentration associated with the composition.
89. The tabletop sweetener composition of any one of claims 81 to 87, wherein the composition X as defined in any one of claims 1 to 29 and 31 to 43 is present in an amount effective to modify, mask, reduce and/or suppress an unpleasant off-taste or aftertaste of acesulfame potassium, aspartame, sucralose and thaumatin, wherein the amount of the composition X in the tabletop sweetener composition is less than a taste threshold concentration associated with the composition and wherein the effect of the composition X remains at least as long as the taste of the sugar sweetener, the sugar alcohol and the at least one sweetener are perceived.
90. Consumable product composition comprising
- (a) a consumable product; and
 - (b) a composition X as defined in any one of claims 1 to 29 and 31 to 43.
91. Consumable product composition comprising
- (a) a consumable product; and
 - (b) a sweetener composition as defined in any one of claims 45 to 76.
92. Consumable product composition comprising
- (a) a consumable product; and
 - (b) a tabletop sweetener composition as defined in any one of claims 81 to 89.
93. The consumable product composition of any one of claims 90 to 92, wherein the consumable product is selected from water-based consumables, solid dry consumables, dairy products, dairy-derived products and dairy-alternative products.
94. The consumable product composition of any one of claims 90 to 93, wherein the consumable product is a water-based consumable product selected from the group

consisting of beverage, water, near water drink, aqueous beverage, enhanced/slightly sweetened water drink, flavored carbonated and still mineral and table water, non-carbonated beverage, carbonated water, still water, soft drink, carbonated soft drink, non-alcoholic drink, alcoholic drink, beer, wine, liquor, fruit drink, juice drink, juice, fruit juice, vegetable juice, nectar, broth drink, coffee, tea, black tea, green tea, oolong tea, herbal infusion, cacao (water-based), tea-based drink, coffee-based drinks, cacao-based drink, dessert, syrup, frozen fruit, frozen fruit juice, water-based ice, fruit ice, sorbet, dressing, salad dressing, jams, marmalades, canned fruit, savoury, delicatessen products like delicatessen salads, sauces, ketchup, mustard, pickles and marinated fish, sauce, soup, and beverage botanical materials (whole or ground), or instant powder for reconstitution (coffee beans, ground coffee, instant coffee, cacao beans, cacao powder, instant cacao, tea leaves, instant tea powder).

95. The consumable product composition of any one of claims 90 to 93, wherein the consumable product is a solid dry consumable product selected from the group consisting of cereals, baked food products, biscuits, bread, breakfast cereal, cereal bar, energy bars/nutritional bars, granola, cakes, rice cakes, cookies, crackers, donuts, muffins, pastries, confectioneries, chewing gum, chocolate products, chocolates, fondant, candy, hard candy, marshmallow, pressed tablets, snack foods, botanical materials (whole or ground), and instant powders for reconstitution.
96. The consumable product composition of any one of claims 90 to 93, wherein the consumable product is a dairy product, dairy-derived product and/or dairy-alternative product selected from the group consisting of milk, fluid milk, cultured milk product, cultured and noncultured dairy-based drink, cultured milk product cultured with lactobacillus, yoghurt, yoghurt-based beverage, smoothy, lassi, milk shake, acidified milk, acidified milk beverage, butter milk, kefir, milk-based beverages, milk/juice blend, fermented milk beverage, icecream, dessert, sour cream, dip, salad dressing, cottage cheese, frozen yoghurt, soy milk, rice milk, soy drink, and rice milk drink.
97. The consumable product composition of any one of claims 90 to 93, wherein the consumable product is a beverage, in particular a near water drink, a carbonated

beverage, in particular a carbonated soft drink, a juice drink, nectar, or a tea-based drink.

- 5 98. The consumable product composition of claim 90 or 91, wherein the consumable product is a dental product selected from the group consisting of toothpaste, dental floss, mouthwash, denture adhesive, enamel whitener, fluoride treatments and oral care gels, preferably toothpaste.
- 10 99. The consumable product composition of claim 90 or 91, wherein the consumable product is a cosmetic product selected from the group consisting of lipstick, lip balm, lip gloss and petroleum jelly.
- 15 100. The consumable product composition of claim 90 or 91, wherein the consumable product is a pharmaceutical product selected from the group consisting of over-the-counter and prescription drugs, non-tobacco snuff, tobacco substitutes, chewable medications, cough syrups, throat sprays, throat lozenges, cough drops, antibacterial products, pill coatings, gel caplets, soluble fiber preparations, antacids, tablet cores, rapidly absorbed liquid compositions, stable foam compositions, rapidly disintegrating pharmaceutical dosage forms, beverage concentrates for medicinal purposes, aqueous pharmaceutical suspensions, liquid concentrate compositions, and stabilized sorbic acid solutions, phosphate buffers, saline solutions, emulsion, non-aqueous pharmaceutical solvents, aqueous pharmaceutical carriers, solid pharmaceutical carrier, and pharmaceutical preservatives/additives (antimicrobials, antioxidants, chelating agents, inert gases, additional flavoring agents, coloring agents).
- 20 25 101. The consumable product composition of claim 90 or 91, wherein the consumable product is an animal feed or animal food.
- 30 102. The consumable product composition of any one of claims 90 to 101, wherein the composition as defined in any one of claims 1 to 29 and 31 to 43 is present in the consumable product composition in an amount effective to modify, mask, reduce and/or suppress an unpleasant off-taste, aftertaste or lingering sweetness of at least

one sweetener, a sweetness enhancer or a consumable product, wherein the amount is less than a taste threshold concentration associated with the composition.

- 5 103. The consumable product composition of any one of claims 90 to 101, wherein the composition X as defined in any one of claims 1 to 29 and 31 to 43 is present in the consumable product composition in an amount effective to modify, mask, reduce and/or suppress an unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetener, a sweetness enhancer or a consumable product, wherein the amount of the composition X is less than a taste threshold concentration associated with the composition X and wherein the effect of the composition X remains at least as long as the taste of the sweetener, the sweetness enhancer or the consumable product are perceived.
- 10 104. The consumable product composition of claim 102 or 103, wherein the unpleasant off-taste of the sweetener, the sweetness enhancer or the consumable product is an acidic off-taste, an astringent off-taste, a bitter off-taste, a liquorice off-taste, a metallic off-taste or a throat-burning off-taste.
- 15 105. The consumable product composition of claim 102 or 103, wherein the unpleasant aftertaste of the sweetener, the sweetness enhancer or the consumable product is an astringent or bitter aftertaste.
- 20 106. The consumable product composition of any one of claims 90 to 101, wherein the composition X as defined in any one of claims 1 to 29 and 31 to 43 is present in an amount effective to impart rich taste to a consumable product.
- 25 107. The consumable product composition of any one of claims 90 to 101, wherein the composition X as defined in any one of claims 1 to 29 and 31 to 43 is present in the consumable product composition in a concentration from 0.01 wppm to 50 wppm, in particular from 0.7 wppm to 6 wppm.
- 30 108. The consumable product composition of any one of claims 90 to 101, wherein the sweetener composition as defined in any one of claims 15 to 45 is present in the

consumable product composition in a concentration from 0.1 wppm to 900 wppm, in particular from 70 wppm to 440 wppm.

109. The consumable product composition of claim 91 comprising the sweetener
5 composition as defined in any one of claims 53 to 57.

110. The consumable product composition of claim 109, wherein the sweetener
composition is present in an amount ranging from 110 wppm to 270 wppm, in
particular, from 130 wppm to 270 wppm.

10 111. The consumable product composition of claim 110, wherein the consumable
product is a tea drink and the sweetener composition is present in an amount
ranging from 110 wppm to 270 wppm.

15 112. The consumable product composition of claim 110, wherein the consumable
product is a carbonated soft drink and the sweetener composition is present in an
amount ranging from 130 wppm to 270 wppm.

20 113. The consumable product composition of claim 110, wherein the consumable
product is a juice drink and the sweetener composition is present in an amount
ranging from 130 wppm to 270 wppm.

114. The consumable product of claims 110 to 113, wherein the consumable product
composition has a reduced amount of sugar and/or calories.

25 115. The consumable product composition of claim 91 comprising the sweetener
composition 58 to 61.

30 116. The consumable product composition of claim 115 wherein the sweetener
composition is present in an amount ranging from 70 wppm to 440 wppm, in
particular, from 200 wppm to 440 wppm.

117. The consumable product composition of claim 115, wherein the consumable product is a tea drink and the sweetener composition is present in an amount ranging from 230 wppm to 400 wppm.
- 5 118. The consumable product composition of claim 115, wherein the consumable product is a near water drink and the sweetener composition is present in an amount ranging from 70 wppm to 150 wppm.
- 10 119. The consumable product composition of claim 115, wherein the consumable product is a carbonated soft drink and the sweetener composition is present in an amount ranging from 310 wppm to 440 wppm.
- 15 120. The consumable product composition of claim 115, wherein the consumable product is a juice drink and the sweetener composition is present in an amount ranging from 310 wppm to 440 wppm.
- 20 121. The consumable product composition of claim 115, wherein the consumable product is a nectar and the sweetener composition is present in an amount ranging from 200 wppm to 340 wppm.
- 25 122. The consumable product of claims 115 to 121, wherein the consumable product composition has a reduced amount of sugar and/or calories.
123. The consumable product of claims 115 to 121, wherein the consumable product composition comprises substantially no sugar and/or calories.
- 30 124. The consumable product of claims 115 to 121, wherein the consumable product composition comprises no sugar and/or calories.
125. The consumable product composition of any one of claims 92 to 97, wherein the tabletop sweetener composition as defined in any one of claims 81 to 89 is present in the consumable product composition in a concentration from 0.1 wppm to 80 wppm.

126. The consumable product composition of any one of claims 92 to 97, wherein the sweetener composition or the tabletop sweetener composition comprises acesulfame potassium.

5 127. The consumable product composition of any one of claims 92 to 97, wherein the sweetener composition or the tabletop sweetener composition comprises acesulfame potassium and sucralose.

10 128. The consumable product composition of any one of claims 92 to 97 wherein the sweetener composition or the tabletop sweetener composition comprises acesulfame potassium and thaumatin.

129. The consumable product composition of claim 91, wherein the consumable product is a beverage and the sweetener composition comprises acesulfame potassium, sucralose and the composition X as defined in any one of claims 1 to 29 and 31 to 43.

130. A method of modifying, masking, reducing and/or suppressing an unpleasant off-taste, aftertaste or lingering sweetness of a consumable product composition, comprising the step of adding to a consumable product the composition X as defined in any one of claims 1 to 29 and 31 to 43 in an amount effective to modify, mask, reduce or suppress the unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetener, a sweetness enhancer or a consumable product, that is less than the composition's taste threshold concentration.

25 131. The method of claim 130, wherein the amount of the composition X is less than the composition X's taste threshold concentration and wherein the effect of the composition X remains at least as long as the taste of the consumable product is perceived.

30 132. A method of imparting rich taste to a consumable product, comprising adding to a consumable product the composition X as defined in any one of claims 1 to 29 and 31 to 43.

133. The method of claim 130 or 131, wherein the composition X as defined in any one of claims 1 to 29 and 31 to 43 shall be contained in the consumable product in an amount of 0.01 wppm to 50 wppm, preferably in an amount of 0.01 wppm to 30 wppm

5

134. Use of a composition X as defined in any one of claims 1 to 29 and 31 to 43 for modifying, masking, reducing and/or suppressing an unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetener, at least one sweetness enhancer or a consumable product.

10

135. The use of claim 134, wherein the amount of the composition X in the sweetener composition as defined in any one of claims 45 to 76 is less than a taste threshold concentration associated with the composition X and wherein the effect of the composition X remains at least as long as the taste of the at least one sweetener, the at least one sweetness enhancer or the consumable product are perceived.

15

136. The use of claim 134 or 135, wherein the unpleasant off-taste of the sweetener, the sweetness enhancer or a consumable product is an acidic off-taste, an astringent off-taste, a bitter off-taste, a liquorice off-taste, a metallic off-taste or a throat-burning off-taste.

20

137. The use of claim 136, wherein the unpleasant aftertaste of the sweetener, the sweetness enhancer or the consumable product is an astringent or bitter aftertaste.

25 138. Use of a composition X as defined in any one of claims 1 to 29 and 31 to 43 for imparting rich taste to a consumable product.

139. A method of sweetening a consumable product composition, comprising the step of adding to a consumable product the composition X as defined in any one of claims 1 to 29 and 31 to 43 to yield a sweetened consumable product composition, wherein the sweetened consumable product has substantially no unpleasant off-taste, aftertaste or lingering sweetness.

30

140. The method of claim 139, comprising the step of adding to a consumable product the composition X as defined in any one of claims 1 to 29 and 31 to 43 in an amount effective to modify, mask, reduce or suppress the unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetener, a sweetness enhancer or a consumable product, that is less than the composition X's taste threshold concentration, to yield a sweetened consumable product composition, wherein the sweetened consumable product has substantially no unpleasant off-taste, aftertaste or lingering sweetness.
141. The method of claim 140, wherein the sweetened consumable product has a rich taste.
142. A method of providing a sweetener or sweetness enhancer composition, comprising the step of adding to a sweetener or sweetness enhancer the composition X as defined in any one of claims 1 to 29 and 31 to 43 to yield a sweetener or sweetness enhancer composition, wherein the sweetener or sweetness enhancer composition has substantially no unpleasant off-taste, aftertaste or lingering sweetness.
143. The method of claim 142, comprising the step of adding to a sweetener or sweetness enhancer the composition X as defined in any one of claims 1 to 29 and 31 to 43 to yield a sweetener or sweetness enhancer composition, wherein the sweetener or sweetness enhancer composition has substantially no unpleasant off-taste, aftertaste or lingering sweetness.
144. A composition X comprising:
- (1) at least one bitter blocking agent selected from the group consisting of a compound comprising a flavanonyl moiety, in particular a flavanone, a hydroxyflavanone, a dihydroxyflavanone or a trihydroxyflavanone, preferably naringin, naringenin and naringin dihydrochalcone or a naringin containing extract, most preferably naringin;
- a compound comprising a quininyll moiety, in particular quinine, quinine bisulfate, quinine hydrochloride, quinine sulfate, hydroxyquinine;
- a compound comprising a purinyll moiety, in particular caffeine or theobromine;

a compound comprising a saccharide acetate moiety, in particular glucose penta-acetate or sucrose octa-acetate; and
benzyl diethyl-(2:6-xylyl-carbamoyl-methyl)-ammonium benzoate;

5 (2) at least one carbonyl compound selected from the group consisting of
a compound comprising a vanillin moiety, in particular vanillin, ethyl vanillin, methyl vanillate, ethyl vanillate, vanillic acid, vanillin isobutyrate, ethyl vanillin isobutyrate, acetovanillone or 5-methoxyvanillin;

10 a compound comprising a benzaldehyde moiety other than a vanillin moiety, in particular 4-hydroxybenzaldehyde, 2-methoxybenzaldehyde, 3-methoxybenzaldehyde, 4-methoxybenzaldehyde, 4-ethoxybenzaldehyde, 4-ethylbenzaldehyde, 2-hydroxy-4-methylbenzaldehyde, 2-methoxybenzoic acid, 3,4-dihydroxybenzaldehyde, 4-hydroxy-3,5-dimethoxybenzaldehyde, veratraldehyde, anis aldehyde, salicylaldehyde, 3-methoxy salicylaldehyde or 4-methoxy
15 salicylaldehyde;

a compound comprising a benzoic acid moiety, 3-methoxybenzoic acid, 4-methoxybenzoic acid, 2-hydroxybenzoic acid, 3-hydroxybenzoic acid, 4-hydroxybenzoic acid, ethyl 2-hydroxy-4-methylbenzoate or anisic acid; and

20 a compound comprising an acetophenone moiety, in particular 2-hydroxyacetophenone, 3-hydroxyacetophenone or 4-hydroxyacetophenone, most particularly 4-methoxy salicylaldehyde and syringaldehyde; and

(3) at least one lactone selected from the group consisting of

25 pentano-1,5-lactone, hexano-1,5-lactone, heptano-1,5-lactone, octano-1,5-lactone, nonano-1,5-lactone, decano-1,5-lactone, undecano-1,5-lactone, dodecano-1,5-lactone, tridecano-1,5-lactone, tetradecano-1,5-lactone, pentadecano-1,5-lactone, hexadecano-1,5-lactone, pent-2-eno-1,5-lactone, hex-2-eno-1,5-lactone, hept-2-eno-1,5-lactone, oct-2-eno-1,5-lactone, non-2-eno-1,5-lactone, dec-2-eno-1,5-lactone, undec-2-eno-1,5-lactone, dodec-2-eno-1,5-lactone, tridec-2-eno-1,5-lactone, tetradec-2-eno-1,5-lactone, pentadec-2-eno-1,5-lactone, hexadec-2-eno-1,5-lactone, dec-5-eno-1,5-lactone, dec-6-eno-1,5-lactone, dec-7-eno-1,5-lactone, dec-8-eno-1,5-lactone, undec-5-eno-1,5-lactone, undec-6-eno-1,5-lactone, undec-7-eno-1,5-lactone, undec-8-eno-1,5-lactone, dodec-2-eno-1,5-lactone, nepetalactone

30

pentano-1,4-lactone, hexano-1,4-lactone, heptano-1,4-lactone, octano-1,4-lactone, nonano-1,4-lactone, decano-1,4-lactone, undecano-1,4-lactone, dodecano-1,4-lactone, tridecano-1,4-lactone, tetradecano-1,4-lactone, pentadecano-1,4-lactone, hexadecano-1,4-lactone, butyloctano-1,4-lactone, dodec-6-eno-1,4-lactone, dec-7-eno-1,4-lactone, cis-dec-7-eno-1,4-lactone, 2,7-dimethylocta-5(trans),7-dieno-1,4-lactone, hex-2-eno-1,4-lactone, 3-methylnonano-1,4-lactone, 3-methyloctano-1,4-lactone, non-2-eno-1,4-lactone, 2-decen-1,4-lactone, dimethylnon-2-eno-1,4-lactone, 3-methyl gamma-decalactone, 4-methyl-5-hexen-1,4-olide, 4-hydroxyoctanoic acid lactone, 4-hydroxy-3-methyl octanoic acid lactone, 4-hydroxyundecanoic acid lactone and 4-hydroxy-2-hexanoic acid lactone.

145. A composition X comprising:

- (I) naringin;
- (II) at least two aldehyde taste improvers; and
- (III) at least two lactone mouthfeel enhancers.

146. The composition X of claim 145, wherein substance (II) is selected from the group consisting of methoxy salicylaldehyde and syringaldehyde.

147. The composition X of claim 145, wherein substance (III) is selected from the group consisting of whiskey lactone and massoia lactone.

148. The composition X of claim 145, wherein the weight ratio of substance (I) to substances (II) ranges from 0.25:1 to 1980:1.

149. A solution comprising

- (a) a solvent; and
- (b) a composition X as defined in any one of claims 1 to 29 and 31 to 43.

150. The solution of claim 149, wherein the composition X is present in an amount ranging from 0.01 wppm to 1000 wppm, based on the total weight of the solution.

151. The solution of claim 149 or 150, wherein the solvent comprises a consumable organic solvent, a consumable inorganic solvent and/or a consumable polar solvent.

152. The solution of claims 149-151, wherein the solvent is water.

153. The solution of claims 149-152, further comprising at least one sweetener and/or
5 sweetness enhancer.

154. The solution of claim 153, wherein the at least one sweetener and/or sweetness
enhancer comprises acesulfame potassium.

10 155. A sweetener composition comprising:

(i) a sweetener; and

(ii) at least one flavoring;

wherein the at least one flavoring is suitable for modifying, masking, reducing
and/or suppressing an unpleasant off-taste of the sweetener in a consumable
15 product composition formed by adding the sweetener composition to a consumable
product; and

wherein a weight ratio of the at least one flavoring to the sweetener in the
consumable product composition is such that the sweetness of the sweetener is
detectable by taste in the consumable product composition and the flavor of the at
20 least one flavoring is not detectable by taste in the consumable product
composition.

156. A sweetness enhancer composition comprising:

(i) a sweetness enhancer; and

25 (ii) at least one flavoring;

wherein the at least one flavoring is suitable for modifying, masking, reducing
and/or suppressing an unpleasant off-taste of the sweetness enhancer in a
consumable product composition formed by adding the sweetness enhancer
composition and a sweetener to a consumable product; and

30 wherein a weight ratio of the at least one flavoring to the sweetness enhancer in the
consumable product composition is such that the sweetness enhancer is capable of
enhancing a sweetness of the sweetener present in the consumable product
composition and the flavor of the at least one flavoring is not detectable by taste in
the consumable product composition.

157. A consumable product composition comprising:

- (i) a sweetener; and
- (ii) at least one flavoring; and
- 5 (iii) a consumable product

wherein the at least one flavoring is suitable for modifying, masking, reducing and/or suppressing an unpleasant off-taste of the sweetener in the consumable product composition; and

wherein the sweetener is present in an amount such that the sweetness of the sweetener is detectable by taste in the consumable product composition, and

wherein the at least one flavoring is present in an amount such that the flavor of the at least one flavoring is not detectable by taste in the consumable product composition.

158. A consumable product composition comprising:

- (i) a sweetness enhancer;
- (ii) a sweetener;
- (iii) at least one flavoring having a flavor; and
- (iv) a consumable product

wherein the at least one flavoring is suitable for modifying, masking, reducing and/or suppressing an unpleasant off-taste of the sweetness enhancer in the consumable product composition; and

wherein the sweetness enhancer is present in the consumable product composition in an amount such that the sweetness enhancer is capable of enhancing a sweetness of the sweetener present in the consumable product composition, and

wherein the at least one flavoring is present in an amount such that the flavor of the at least one flavoring is not detectable by taste in the consumable product composition.

159. A method of modifying, masking, reducing and/or suppressing an unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetener/sweetness enhancer composition, the method comprising the step of adding to a consumable product composition the sweetener or sweetness enhancer composition of any of claims 155 or 156.

160. A method of modifying, masking, reducing and/or suppressing an unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetener/sweetness enhancer composition, the method comprising the steps of:

5 (i) diluting at least one flavoring with a diluent to form a diluted composition to determine a flavor threshold level at which the flavor of the flavoring is not detectable by taste in the diluted composition, and

(ii) adding the at least one flavoring at a level at or below the flavor threshold level to consumable product composition comprising at least one sweetener and
10 optionally at least one sweetness enhancer;

wherein the at least one flavoring, when present in the consumable product composition at or below the flavor threshold level, is capable of modifying, masking, reducing and/or suppressing the unpleasant off-taste of the sweetener and / or the sweetness enhancer in the consumable product composition.

15 161. Use of at least one flavoring for modifying, masking, reducing and/or suppressing an unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetener in a consumable product composition comprising the sweetener and a consumable product,

20 wherein the at least one flavoring is suitable for modifying, masking, reducing and/or suppressing an unpleasant off-taste, aftertaste or lingering sweetness of the at least one sweetener in the consumable product composition; and

wherein the sweetener is present in the consumable product composition such that the sweetness of the sweetener is detectable by taste in the consumable product
25 composition and the flavor of the at least one flavoring is not detectable by taste in the consumable product composition.

162. Use of at least one flavoring for modifying, masking, reducing and/or suppressing an unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetness
30 enhancer in a consumable product composition comprising the sweetness enhancer, a sweetener, and a consumable product,

wherein the at least one flavoring is suitable for modifying, masking, reducing and/or suppressing an unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetness enhancer in the consumable product composition; and

wherein the sweetness enhancer is present in the consumable product composition such that the sweetness enhancer is capable of enhancing a sweetness of the sweetener present in the consumable product composition and the flavor of the at least one flavoring is not detectable by taste in the consumable product composition.

163. The composition of any one of claims 155-158 or the method of any one of claims 159 or 160 or the use of any one of claims 161 or 162, wherein the at least one flavoring is selected from the group consisting of:

a compound comprising a flavanonyl moiety, in particular a flavanone, a hydroxyflavanone, a dihydroxyflavanone or a trihydroxyflavanone;

a compound comprising a quininy moiety, in particular quinine, quinine bisulfate, quinine hydrochloride, quinine sulfate, hydroxyquinine;

a compound comprising a puriny moiety, in particular caffeine or theobromine;

a compound comprising a saccharide acetate moiety, in particular glucose penta-acetate or sucrose octa-acetate; and

benzyl diethyl-(2:6-xylyl-carbamoyl-methyl)-ammonium benzoate.

164. The composition of any one of claims 155-158 or the method of any of claims 159 or 160 or the use of any of claims 161 or 162, wherein the at least one flavoring is selected from the group consisting of naringin, naringenin and naringin dihydrochalcone or a naringin containing extract, preferably naringin.

165. The composition of any one of claims 155-158 or the method of any of claims 159 or 160 or the use of any of claims 161 or 162, wherein the at least one flavoring is selected from the group consisting of:

at least one carbonyl compound selected from the group consisting of a compound comprising a vanillin moiety, in particular vanillin, ethyl vanillin, methyl vanillate, ethyl vanillate, vanillic acid, vanillin isobutyrate, ethyl vanillin isobutyrate, acetovanillone or 5-methoxyvanillin;

a compound comprising a benzaldehyde moiety other than a vanillin moiety, in particular 4-hydroxybenzaldehyde, 2-methoxybenzaldehyde, 3-methoxybenzaldehyde, 4-methoxybenzaldehyde, 4-ethoxybenzaldehyde, 4-ethylbenzaldehyde, 2-hydroxy-4-methylbenzaldehyde, 2-methoxybenzoic acid, 3,4-

dihydroxybenzaldehyde, 4-hydroxy-3,5-dimethoxybenzaldehyde, veratraldehyde, anis aldehyde, salicylaldehyde, 3-methoxy salicylaldehyde or 4-methoxy salicylaldehyde;

a compound comprising a benzoic acid moiety, 3-methoxybenzoic acid, 4-methoxybenzoic acid, 2-hydroxybenzoic acid, 3-hydroxybenzoic acid, 4-hydroxybenzoic acid, ethyl 2-hydroxy-4-methylbenzoate or anisic acid; and

a compound comprising an acetophenone moiety, in particular 2-hydroxyacetophenone, 3-hydroxyacetophenone or 4-hydroxyacetophenone, most particularly 4-methoxy salicylaldehyde and syringaldehyde.

at least one lactone selected from the group consisting of:

pentano-1,5-lactone, hexano-1,5-lactone, heptano-1,5-lactone, octano-1,5-lactone, nonano-1,5-lactone, decano-1,5-lactone, undecano-1,5-lactone, dodecano-1,5-lactone, tridecano-1,5-lactone, tetradecano-1,5-lactone, pentadecano-1,5-lactone, hexadecano-1,5-lactone, pent-2-eno-1,5-lactone, hex-2-eno-1,5-lactone, hept-2-eno-1,5-lactone, oct-2-eno-1,5-lactone, non-2-eno-1,5-lactone, dec-2-eno-1,5-lactone, undec-2-eno-1,5-lactone, dodec-2-eno-1,5-lactone, tridec-2-eno-1,5-lactone, tetradec-2-eno-1,5-lactone, pentadec-2-eno-1,5-lactone, hexadec-2-eno-1,5-lactone, dec-5-eno-1,5-lactone, dec-6-eno-1,5-lactone, dec-7-eno-1,5-lactone, dec-8-eno-1,5-lactone, undec-5-eno-1,5-lactone, undec-6-eno-1,5-lactone, undec-7-eno-1,5-lactone, undec-8-eno-1,5-lactone, dodec-2-eno-1,5-lactone, nepetalactone, pentano-1,4-lactone, hexano-1,4-lactone, heptano-1,4-lactone, octano-1,4-lactone, nonano-1,4-lactone, decano-1,4-lactone, undecano-1,4-lactone, dodecano-1,4-lactone, tridecano-1,4-lactone, tetradecano-1,4-lactone, pentadecano-1,4-lactone, hexadecano-1,4-lactone, butyloctano-1,4-lactone, dodec-6-eno-1,4-lactone, dec-7-eno-1,4-lactone, cis-dec-7-eno-1,4-lactone, 2,7-dimethylocta-5(trans),7-dieno-1,4-lactone, hex-2-eno-1,4-lactone, 3-methylnonano-1,4-lactone, 3-methyloctano-1,4-lactone, non-2-eno-1,4-lactone, 2-decen-1,4-lactone, dimethylnon-2-eno-1,4-lactone, 3-methyl gamma-decalactone, 4-methyl-5-hexen-1,4-olide, 4-hydroxyoctanoic acid lactone, 4-hydroxy-3-methyl octanoic acid lactone, 4-hydroxyundecanoic acid lactone and 4-hydroxy-2-hexanoic acid lactone.

166. The composition of any one of claims 155-158 or 163-165 or the method of any of claims 159, 160 or 163-165 or the use of any of claims 161-165, wherein the sweetener composition, the sweetness enhancer composition, or the consumable

product composition further comprises at least one additional substance selected from the group consisting of amino acids, flavoring ingredients, and combinations thereof.

- 5 167. The composition, method, or use of claim 166, wherein the amino acids are selected from the group consisting of L-alanine, L-leucine, glycine, L-aspartic acid, L-lysine monohydrate, L-threonine, L-isoleucine, L-tyrosine, L-methionine, L-proline, L-serine, L-valine and L-glutamic acid.
- 10 168. The composition of any one of claims 155-158 or 163-167 or the method of any of claims 159, 160 or 163-167 or the use of any of claims 161-167, wherein the at least one flavoring is present in an amount ranging from 0.5 wt% to 20.0 wt%, preferably from 1.6 wt% to 2.2 wt%, more preferably from 0.9 wt% to 1.2 wt%, based on the total weight of the sweetener composition.
- 15
169. The composition of any one of claims 155-158 or 163-168 or the method of any of claims 159, 160, or 163-168 or the use of any of claims 161-168, wherein the sweetener is present in an amount ranging from 94.0 wt% to 99.5 wt%, preferably from 94.0 wt% to 98.4 wt%, based on the total weight of the sweetener composition.
- 20
170. The composition of any one of claims 155-158 or 163-169 or the method of any of claims 159, 160 or 163-169 or the use of any of claims 161-169, wherein the sweetener comprises acesulfame potassium and sucralose and the acesulfame potassium is present in an amount ranging from 82.0 wt% to 87.0 wt% and the sucralose is present in an amount ranging from 11.0 wt% to 12.0 wt%, based on the total weight of the sweetener composition.
- 25
171. The composition of any one of claims 155-158 or 163-169 or the method of any of claims 159, 160, or 163-169 or the use of any of claims 161-169, wherein the sweetener comprises acesulfame potassium and sucralose and the acesulfame potassium is present in an amount ranging from 77.0 wt% to 82.0 wt% and the sucralose is present in an amount ranging from 17.0 wt% to 19.0 wt%, based on the total weight of the sweetener composition.
- 30

172. The composition of any one of claims 155-158 or 163-169 or the method of any of claims 159, 160, or 163-169 or the use of any of claims 161-169, wherein the sweetener and/or the sweetness enhancer is selected from the group consisting of abiziasaponin, abrusosides, in particular abrusoside A, abrusoside B, abrusoside C, abrusoside D, acesulfame potassium, advantame, albiziasaponin, alitame, aspartame, superaspartame, bayunosides, in particular bayunoside 1, bayunoside 2, brazzein, bryoside, bryonoside, bryonodulcoside, camosifloside, carrelame, curculin, cyanin, chlorogenic acid, cyclamates and its salts, cyclocaryoside I, dihydroquercetin-3 -acetate, dihydroflavenol, dulcoside, gaudichaudioside, glycyrrhizin, glycyrrhetin acid, gypenoside, hematoxylin, hernandulcin, isomogrosides, in particular iso-mogroside V, lugduname, magap, mabinlins, micraculin, mogrosides (lo han guo), in particular mogroside IV and mogroside V, monatin and its derivatives, monellin, mukurozioside, naringin dihydrochalcone (NarDHC), neohesperidin dihydrochalcone (NDHC), neotame, osladin, pentadin, periandrin I-V, perillartine, D-phenylalanine, phlomisiosides, in particular phlomisioside 1, phlomisioside 2, phlomisioside 3, phlomisioside 4, phloridzin, phyllodulcin, polpodiosides, polypodoside A, pterocaryosides, rebaudiosides, in particular rebaudioside A, rebaudioside B, rebaudioside C, rebaudioside D, rebaudioside F, rebaudioside G, rebaudioside H), rubusosides, saccharin and its salts and derivatives, scandenoside, selligueanin A, siamenosides, in particular siamenoside I, stevia, steviolbioside, stevioside and other steviol glycosides, strogines, in particular strogin 1, strogin 2, strogin 4, suavioside A, suavioside B, suavioside G, suavioside H, suavioside I, suavioside J, sucralose, sucronate, sucrooctate, talin, telosmoside A₁₅, thaumatin, in particular thaumatin I and II, trans-anethol, trans-cinnamaldehyde, trilobatin and D-tryptophane, including extracts or enriched fractions of the natural sweeteners.
173. The composition, method, or use of claim 172, wherein the sweetener and/or the sweetness enhancer comprises acesulfame potassium.
174. The composition of any one of claims 155-158 or 163-173 or the method of any of claims 159, 160, or 163-173 or the use of any of claims 161-173, wherein the at least one flavoring is part of a composition comprising:

at least one non-volatile flavoring; and
at least one volatile flavoring.

175. The composition, method, or use of claim 174, wherein a weight ratio of the at least one non-volatile flavoring to the at least one volatile flavoring ranges from 2:1 to 100:1, preferably from 6:1 to 40:1.
176. The composition, method, or use of any of claims 174 or 175, wherein the at least one non-volatile flavoring has a boiling point ranging from 150°C to 500°C, preferably from 190°C to 400°C.
177. The composition, method, or use of any of claims 174 to 175, wherein the at least one volatile flavoring has a boiling point less than 150°C.
178. The composition, method, or use of any of claims 174 to 176, wherein the at least one non-volatile flavoring is selected from the group consisting of:
a compound comprising a flavanonyl moiety, in particular a flavanone, a hydroxyflavanone, a dihydroxyflavanone or a trihydroxyflavanone;
a compound comprising a quininy moiety, in particular quinine, quinine bisulfate, quinine hydrochloride, quinine sulfate, hydroxyquinine;
a compound comprising a puriny moiety, in particular caffeine or theobromine;
a compound comprising a saccharide acetate moiety, in particular glucose penta-acetate or sucrose octa-acetate; and
benzyl diethyl-(2:6-xylyl-carbamoyl-methyl)-ammonium benzoate.
179. The composition, method, or use of any of claims 174 to 178, wherein the at least one non-volatile flavoring is selected from the group consisting of naringin, naringenin and naringin dihydrochalcone or a naringin containing extract, preferably naringin.
180. The composition, method, or use of any of claims 174 to 179, wherein the at least one volatile flavoring is selected from the group consisting of:
at least one carbonyl compound selected from the group consisting of:
a compound comprising a vanillin moiety, in particular vanillin, ethyl vanillin,

methyl vanillate, ethyl vanillate, vanillic acid, vanillin isobutyrate, ethyl vanillin isobutyrate, acetovanillone or 5-methoxyvanillin;

a compound comprising a benzaldehyde moiety other than a vanillin moiety, in particular 4-hydroxybenzaldehyde, 2-methoxybenzaldehyde, 3-methoxybenzaldehyde, 4-methoxybenzaldehyde, 4-ethoxybenzaldehyde, 4-ethylbenzaldehyde, 2-hydroxy-4-methylbenzaldehyde, 2-methoxybenzoic acid, 3,4-dihydroxybenzaldehyde, 4-hydroxy-3,5-dimethoxybenzaldehyde, veratraldehyde, anisaldehyde, salicylaldehyde, 3-methoxy salicylaldehyde or 4-methoxy salicylaldehyde;

a compound comprising a benzoic acid moiety, 3-methoxybenzoic acid, 4-methoxybenzoic acid, 2-hydroxybenzoic acid, 3-hydroxybenzoic acid, 4-hydroxybenzoic acid, ethyl 2-hydroxy-4-methylbenzoate or anisic acid; and

a compound comprising an acetophenone moiety, in particular 2-hydroxyacetophenone, 3-hydroxyacetophenone or 4-hydroxyacetophenone, most particularly 4-methoxy salicylaldehyde and syringaldehyde.

at least one lactone selected from the group consisting of:

pentano-1,5-lactone, hexano-1,5-lactone, heptano-1,5-lactone, octano-1,5-lactone, nonano-1,5-lactone, decano-1,5-lactone, undecano-1,5-lactone, dodecano-1,5-lactone, tridecano-1,5-lactone, tetradecano-1,5-lactone, pentadecano-1,5-lactone, hexadecano-1,5-lactone, pent-2-eno-1,5-lactone, hex-2-eno-1,5-lactone, hept-2-eno-1,5-lactone, oct-2-eno-1,5-lactone, non-2-eno-1,5-lactone, dec-2-eno-1,5-lactone, undec-2-eno-1,5-lactone, dodec-2-eno-1,5-lactone, tridec-2-eno-1,5-lactone, tetradec-2-eno-1,5-lactone, pentadec-2-eno-1,5-lactone, hexadec-2-eno-1,5-lactone, dec-5-eno-1,5-lactone, dec-6-eno-1,5-lactone, dec-7-eno-1,5-lactone, dec-8-eno-1,5-lactone, undec-5-eno-1,5-lactone, undec-6-eno-1,5-lactone, undec-7-eno-1,5-lactone, undec-8-eno-1,5-lactone, dodec-2-eno-1,5-lactone, nepetalactone, pentano-1,4-lactone, hexano-1,4-lactone, heptano-1,4-lactone, octano-1,4-lactone, nonano-1,4-lactone, decano-1,4-lactone, undecano-1,4-lactone, dodecano-1,4-lactone, tridecano-1,4-lactone, tetradecano-1,4-lactone, pentadecano-1,4-lactone, hexadecano-1,4-lactone, butyloctano-1,4-lactone, dodec-6-eno-1,4-lactone, dec-7-eno-1,4-lactone, cis-dec-7-eno-1,4-lactone, 2,7-dimethylocta-5(trans),7-dieno-1,4-lactone, hex-2-eno-1,4-lactone, 3-methylnonano-1,4-lactone, 3-methyloctano-1,4-lactone, non-2-eno-1,4-lactone, 2-decen-1,4-lactone, dimethylnon-2-eno-1,4-lactone, 3-methyl gamma-decalactone, 4-methyl-5-hexen-1,4-olide, 4-

hydroxyoctanoic acid lactone, 4-hydroxy-3-methyl octanoic acid lactone, 4-hydroxyundecanoic acid lactone and 4-hydroxy-2-hexanoic acid lactone.

181. The composition of any one of claims 155-158 or 163-180 or the method of any of
5 claims 159, 160, or 163-180 or the use of any of claims 161-180, wherein the at least one flavoring is part of a composition X comprising the following substances:

- (1) at least one bitter blocking agent;
- (2) at least one carbonyl compound; and
- (3) at least one lactone.

10 182. The composition of any one of claims 155-158 or 163-181 or the method of any of claims 159, 160 or 163-181 or the use of any of claims 161-180, wherein the bitter blocking agent is naringin, the carbonyl compound is an aldehyde and the lactone is a delta lactone.

15 183. The composition, method, or use of claim 182, wherein the at least one carbonyl compound comprises

- (2a) a first carbonyl compound; and
- (2b) a second carbonyl compound.

20 184. The composition, method, or use of any of claims 182 or 183, wherein the at least one lactone comprises

- (3a) a first lactone; and
- (3b) a second lactone.

25 185. The composition, method, or use of any of claims 182 to 184, wherein the at least one bitter blocking agent (1) has a bitter off-taste.

30 186. The composition, method, or use of any of claims 182 to 185, wherein the at least one bitter blocking agent (1) is selected from the group consisting of:

a compound comprising a flavanonyl moiety, in particular a flavanone, a hydroxyflavanone, a dihydroxyflavanone or a trihydroxyflavanone;

a compound comprising a quininyl moiety, in particular quinine, quinine bisulfate, quinine hydrochloride, quinine sulfate, hydroxyquinine;

a compound comprising a purinyl moiety, in particular caffeine or theobromine;

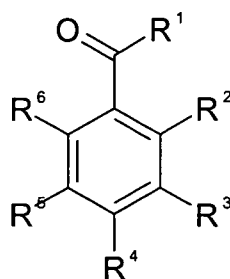
a compound comprising a saccharide acetate moiety, in particular glucose penta-acetate or sucrose octa-acetate; and

benzyl diethyl-(2:6-xylyl-carbamoyl-methyl)-ammonium benzoate.

187. The composition, method, or use of claim 186, wherein the at least one bitter blocking agent (1) is a compound comprising a flavanoyl moiety selected from the group consisting of naringin, naringenin and naringin dihydrochalcone or a naringin containing extract, preferably naringin.

188. The composition, method, or use of any of claims 182 to 187, wherein the at least one carbonyl compound (2) contains from 7 to 18 carbon atoms, preferably from 7 to 14 carbon atoms.

189. The composition, method, or use of any of claims 182 to 188, wherein the at least one carbonyl compound (2) is a carbonyl compound of the formula (I)



(I)

wherein said carbonyl compound does not contain more than 18 carbon atoms, preferably from 8 to 14 carbon atoms, and

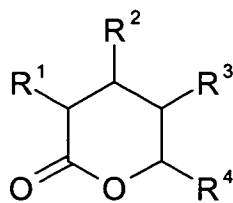
wherein

R¹ is hydrogen, hydroxy, C₁-C₈ alkyl or C₂-C₈ alkenyl; and

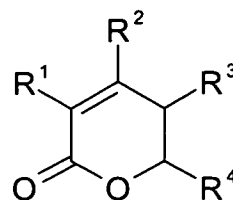
R², R³, R⁴, R⁵ and R⁶ are identical or different and each is independently of the others hydrogen, hydroxy, C₁-C₈ alkyl, C₁-C₈ alkoxy or C₂-C₈ alkenyl.

190. The composition, method, or use of claim 189, wherein in the carbonyl compound of the formula (I) at least one of R^2 , R^3 , R^4 , R^5 and R^6 is hydroxy or methoxy.
- 5 191. The composition, method, or use of any of claims 182 to 190, wherein the at least one carbonyl compound (2) is selected from the group consisting of
a compound comprising a vanillin moiety, in particular vanillin, ethyl vanillin, methyl vanillate, ethyl vanillate, vanillic acid, vanillin isobutyrate, ethyl vanillin isobutyrate, acetovanillone or 5-methoxyvanillin;
10 a compound comprising a benzaldehyde moiety other than a vanillin moiety, in particular 4-hydroxybenzaldehyde, 2-methoxybenzaldehyde, 3-methoxybenzaldehyde, 4-methoxybenzaldehyde, 4-ethoxybenzaldehyde, 4-ethylbenzaldehyde, 2-hydroxy-4-methylbenzaldehyde, 2-methoxybenzoic acid, 3,4-dihydroxybenzaldehyde, 4-hydroxy-3,5-dimethoxybenzaldehyde, veratraldehyde,
15 anis aldehyde, salicylaldehyde, 3-methoxy salicylaldehyde or 4-methoxy salicylaldehyde;
a compound comprising a benzoic acid moiety, 3-methoxybenzoic acid, 4-methoxybenzoic acid, 2-hydroxybenzoic acid, 3-hydroxybenzoic acid, 4-hydroxybenzoic acid, ethyl 2-hydroxy-4-methylbenzoate or anisic acid; and
20 a compound comprising an acetophenone moiety, in particular 2-hydroxyacetophenone, 3-hydroxyacetophenone or 4-hydroxyacetophenone.
192. The composition, method, or use of any of claims 182 to 191, wherein the at least one carbonyl compound (2) comprises syringaldehyde and/or acetoin.
25
193. The composition, method, or use of any of claims 182 to 192, wherein the at least one lactone (3) contains from 6 to 18 carbon atoms, preferably from 8 to 14 carbon atoms.
- 30 194. The composition, method, or use of any of claims 182 to 193, wherein the at least one lactone (3) comprises a saturated or an unsaturated delta-lactone.

195. The composition, method, or use of any of claims 182 to 194, wherein the at least one lactone (3) comprises a delta-lactone of the formulae (II) or (III)



(II)



(III)

,

5

wherein said lactone does not contain more than 18 carbon atoms, preferably from 8 to 14 carbon atoms, and

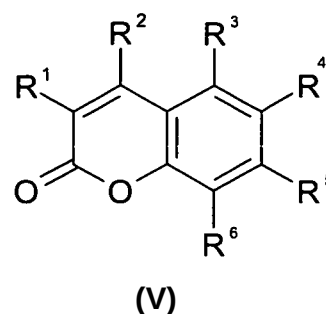
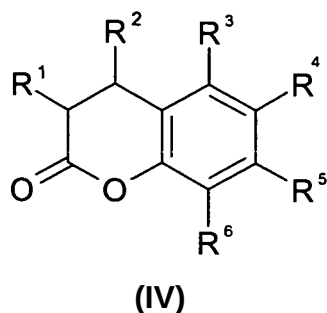
wherein

- 10 R^1 , R^2 , R^3 and R^4 are identical or different and each is independently of the others hydrogen, hydroxy, C_1 - C_{10} alkyl, C_1 - C_{10} alkoxy or C_2 - C_{10} alkenyl.

196. The composition, method, or use of any of claims 182 to 195, wherein the at least one lactone (3) is selected from the group consisting of:

- 15 pentano-1,5-lactone, hexano-1,5-lactone, heptano-1,5-lactone, octano-1,5-lactone, nonano-1,5-lactone, decano-1,5-lactone, undecano-1,5-lactone, dodecano-1,5-lactone, tridecano-1,5-lactone, tetradecano-1,5-lactone, pentadecano-1,5-lactone, hexadecano-1,5-lactone, pent-2-eno-1,5-lactone, hex-2-eno-1,5-lactone, hept-2-eno-1,5-lactone, oct-2-eno-1,5-lactone, non-2-eno-1,5-lactone, dec-2-eno-1,5-lactone, undec-2-eno-1,5-lactone, dodec-2-eno-1,5-lactone, tridec-2-eno-1,5-lactone, tetradec-2-eno-1,5-lactone, pentadec-2-eno-1,5-lactone, hexadec-2-eno-1,5-lactone, dec-5-eno-1,5-lactone, dec-6-eno-1,5-lactone, dec-7-eno-1,5-lactone, dec-8-eno-1,5-lactone, undec-5-eno-1,5-lactone, undec-6-eno-1,5-lactone, undec-7-eno-1,5-lactone, undec-8-eno-1,5-lactone, dodec-2-eno-1,5-lactone and
25 nepetalactone.

197. The composition, method, or use of any of claims 182 to 196, wherein the at least one lactone (3) comprises a delta-lactone of the formulae (IV) or (V)



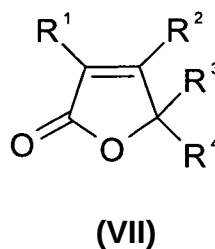
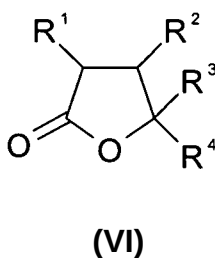
wherein said lactone does not contain more than 18 carbon atoms, preferably from 9 to 14 carbon atoms, and

5

wherein

R^1 , R^2 , R^3 , R^4 , R^5 and R^6 are identical or different and each is independently of the others hydrogen, hydroxy, C_1 - C_6 alkyl, C_1 - C_4 alkoxy or C_2 - C_6 alkenyl.

- 10 198. The composition, method, or use of any of claims 182 to 194 and 197, wherein the at least one lactone (3) is selected from the group consisting of:
6-methylcoumarin, 3,4-dihydrocoumarin, and 7-ethoxy-4-methylcoumarin.
- 15 199. The composition, method, or use of any of claims 182 to 198, wherein the at least one lactone (3) comprises a saturated or an unsaturated gamma-lactone.
200. The composition, method, or use of any of claims 182 to 199, wherein the at least one lactone (3) comprises a gamma-lactone of the formulae (VI) or (VII)



20

wherein said lactone does not contain more than 18 carbon atoms, preferably from 8 to 14 carbon atoms, and

wherein

R^1 , R^2 and R^3 are identical or different and each is independently of the others hydrogen, hydroxy, C_i - C_{10} alkyl, C_1 - C_{10} alkoxy or C_2 - C_{10} alkenyl; and R^4 is hydrogen, C_1 - C_{10} alkyl or C_2 - C_{10} alkenyl;

- 5 201. The composition, method, or use of any of claims 199 or 200, wherein the gamma-lactone is selected from the group consisting of:
 pentano-1,4-lactone, hexano-1,4-lactone, heptano-1,4-lactone, octano-1,4-lactone, nonano-1,4-lactone, decano-1,4-lactone, undecano-1,4-lactone, dodecano-1,4-lactone, tridecano-1,4-lactone, tetradecano-1,4-lactone, pentadecano-1,4-lactone,
 10 hexadecano-1,4-lactone, butyloctano-1,4-lactone, dodec-6-eno-1,4-lactone, dec-7-eno-1,4-lactone, cis-dec-7-eno-1,4-lactone, 2,7-dimethylocta-5(trans),7-dieno-1,4-lactone, hex-2-eno-1,4-lactone, 3-methylnonano-1,4-lactone, 3-methyloctano-1,4-lactone, non-2-eno-1,4-lactone, 2-decen-1,4-lactone, dimethylnon-2-eno-1,4-lactone, 3-methyl gamma-decalactone, 4-methyl-5-hexen-1,4-olide, 4-
 15 hydroxyoctanoic acid lactone, 4-hydroxy-3-methyl octanoic acid lactone, 4-hydroxyundecanoic acid lactone and 4-hydroxy-2-hexanoic acid lactone.
202. The composition, method, or use of any of claims 182 to 201, wherein the at least one lactone comprises a delta lactone and a gamma lactone, preferably the first
 20 lactone (3a) is a delta-lactone and the second lactone (3b) is a gamma-lactone.
203. The composition, method, or use of any of claims 183 to 202, wherein the at least one bitter blocking agent (1) is present in the composition X in an amount ranging from 15 wt% to 55 wt%.
- 25 204. The composition, method, or use of any of claims 183 to 203, wherein the at least one carbonyl compound (2) is present in the composition X in an amount ranging from 0.5 wt% to 5.0 wt%.
- 30 205. The composition, method, or use of any of claims 184 to 204, wherein the at least one lactone (3) is present in the composition X in an amount ranging from 0.06 wt% to 7.0 wt%.

206. The composition, method, or use of any of claims 182 to 205, further comprising
(4) at least one additional substance.

207. The composition, method, or use of claim 206, wherein the at least one additional
5 substance (4) is selected from at least one amino acid, maltol, taurine, at least one
additional flavoring ingredient, and combinations thereof.

208. The composition, method, or use of claim 207, wherein the at least one amino acid
are one to eleven amino acids selected from the group consisting of L-alanine, L-
10 leucine, glycine, L-aspartic acid, L-threonine, L-isoleucine, L-tyrosine, L-proline,
L-serine, L-valine and L-glutamic acid.

209. The composition, method, or use of any one of claims 155 to 208, wherein the
composition or the at least one flavoring does not comprise methoxy
15 salicylaldehyde.

210. The composition, method, or use of any of claims 182 to 209, wherein the
composition X does not comprise all 5 of the following substances: naringin,
methoxy salicylaldehyde, syringaldehyde, massoia lactone, and whiskey lactone.
20

211. The composition, method, or use of any of claims 182 to 210, wherein the
composition X comprises the following substances:

- (i) naringin;
- (ii) methoxy salicylaldehyde;
- 25 (ii) syringaldehyde;
- (iv) massoia lactone; and
- (v) whiskey lactone.

212. The composition, method, or use of claim 211, wherein substance (ii) is 4-methoxy
30 salicylaldehyde.

213. The composition, method or use of any of claims 211 or 212, wherein substance (iv) is (*R*)-5,6-dihydro-6-pentyl-2 *H*-pyran-2-one.

214. The composition, method or use of any one of claims 211 to 212, wherein substance (v) is a mixture of *cis*-3-methyl-4-octanolide (*cis*-whiskey lactone) and trans-3-methyl-4-octanolide (trans-whiskey lactone).

215. The composition, method, or use of claim 214, wherein substance (ii) is 4-methoxy salicylaldehyde, substance (iv) is (*R*)-5,6-dihydro-6-pentyl-2 *H*-pyran-2-one and substance (v) is a mixture of *cis*-3-methyl-4-octanolide (m-whiskey lactone) and trans-3-methyl-4-octanolide (trans-whiskey lactone).

216. The composition, method or use of any one of claims 211 to 215, wherein the weight ratio of substance (i) to substance (ii) ranges from 50:1 to 200000:1.

217. The composition, method or use of any one of claims 211 to 216, wherein weight ratio of substance (i) to substance (iii) ranges from 0.25:1 to 2000:1.

218. The composition, method or use of any one of claims 211 to 217, wherein the weight ratio of substance (i) to substance (iv) ranges from 5:1 to 10000:1.

219. The composition, method or use of any one of claims 211 to 218, wherein the weight ratio of substance (i) to substance (v) ranges from 5:1 to 4000:1.

220. The composition, method or use of any one of claims 211 to 219, further comprising at least one additional substance (vi).

221. The composition, method or use of claim 220, wherein the at least one additional substance (vi) is selected from amino acids and at least one additional flavoring ingredient, and combinations thereof.

222. The composition, method or use of claim 221, wherein the at least one amino acid (vi) are one to eleven amino acids selected from the group consisting of L-alanine, L-leucine, glycine, L-aspartic acid, L-lysine monohydrate, L-threonine, L-isoleucine, L-tyrosine, L-methionine, L-proline, L-serine, L-valine and L-glutamic acid.
223. The composition, method or use of any one of claims 211 to 222, wherein the weight ratio of substance (i) to substances (vi) ranges from 0.084:1 to 3356:1.
224. A tabletop sweetener composition comprising
- (a) at least one sugar sweetener, which is selected from the group consisting of monosaccharides, disaccharides, oligosaccharides and polysaccharides, preferably the at least one sugar sweetener is selected from the group consisting of arabinose, dextrin, dextrose, fructose, high fructose corn syrup, fructooligosaccharides, fructooligosaccharide syrups, galactose, galactooligosaccharides, glucose, glucose and (hydrogenated) starch syrups/hydrolysates, isomaltulose, lactose, hydrolysed lactose, maltose, mannose, rhamnose, ribose, sucrose, stachyose, tagatose, trehalose, xylose, and combinations thereof, most preferably the at least one sugar sweetener is a disaccharide and/or fructose;
- (b) at least one sugar alcohol (or polyol), which is selected from the group consisting of erythritol, galactitol, hydrogenated starch syrups including maltitol and sorbitol syrups, inositols, isomalt, lactitol, maltitol, mannitol, xylitol, and combinations thereof, preferably the at least one sugar alcohol is erythritol; and
- (c) at least one sweetener composition as defined in any of claims 1 or 9 to 68 or at least one sweetness enhancer composition of any of claims 2 and 9 to 68.
225. The tabletop sweetener composition of claim 224, wherein the at least one sweetener in the sweetener composition is selected from the group consisting of acesulfame potassium, aspartame, sucralose and thaumatin.
226. The tabletop sweetener composition of claim 224 or 225, further comprising a taste-improving amount of cellulose.

227. The tabletop sweetener composition of any one of claims 224 to 226, wherein the tabletop sweetener composition comprises from 40 wt% to 90 wt% sugar alcohol based on the total weight of the tabletop sweetener composition.

5

228. The tabletop sweetener composition of any one of claims 224 to 227, wherein the tabletop sweetener composition comprises from 27 wt% to 50 wt% sugar sweetener based on the total weight of the tabletop sweetener composition.

10

229. The tabletop sweetener composition of any one of claims 224 to 226, wherein the tabletop sweetener composition comprises from 0.5 wt% to 7.0 wt% acesulfame potassium, aspartame, sucralose or thaumatin.

15

230. The tabletop sweetener composition of any one of claims 224 to 227, wherein the tabletop sweetener composition comprises from 0.5 wt% to 20 wt% of the composition as defined in any one of claims 182 to 223.

20

231. The consumable product composition of any one of claims 157, 158, or 163 to 223, wherein the consumable product is selected from water-based consumables, solid dry consumables, dairy products, dairy-derived products and dairy-alternative products.

25

232. The consumable product composition of any one of claims 157, 158, 163 to 223, or 231, wherein the consumable product is a water-based consumable product selected from the group consisting of beverage, water, near water drink, aqueous beverage, enhanced/slightly sweetened water drink, flavored carbonated and still mineral and table water, non-carbonated beverage, carbonated water, still water, soft drink, carbonated soft drink, non-alcoholic drink, alcoholic drink, beer, wine, liquor, fruit drink, juice drink, juice, fruit juice, vegetable juice, nectar, broth drink, coffee, tea, black tea, green tea, oolong tea, herbal infusion, cacao (water-based), tea-based drink, coffee-based drinks, cacao-based drink, dessert, syrup, frozen fruit, frozen fruit juice, water-based ice, fruit ice, sorbet, dressing, salad dressing, jams, marmalades, canned fruit, savoury, delicatessen products like delicatessen salads, sauces, ketchup, mustard, pickles and marinated fish, sauce, soup, and beverage

30

botanical materials (whole or ground), or instant powder for reconstitution (coffee beans, ground coffee, instant coffee, cacao beans, cacao powder, instant cacao, tea leaves, instant tea powder).

- 5 233. The consumable product composition of any one of claims 157, 158, 163 to 223, or
231, wherein the consumable product is a solid dry consumable product selected
from the group consisting of cereals, baked food products, biscuits, bread, breakfast
cereal, cereal bar, energy bars/nutritional bars, granola, cakes, rice cakes, cookies,
crackers, donuts, muffins, pastries, confectioneries, chewing gum, chocolate
10 products, chocolates, fondant, candy, hard candy, marshmallow, pressed tablets,
snack foods, botanical materials (whole or ground), and instant powders for
reconstitution.
- 15 234. The consumable product composition of any one of claims 157, 158, 163 to 223, or
231, wherein the consumable product is a dairy product, dairy-derived product
and/or dairy-alternative product selected from the group consisting of milk, fluid
milk, cultured milk product, cultured and noncultured dairy-based drink, cultured
milk product cultured with lactobacillus, yoghurt, yoghurt-based beverage,
smoothy, lassi, milk shake, acidified milk, acidified milk beverage, butter milk,
20 kefir, milk-based beverages, milk/juice blend, fermented milk beverage, icecream,
dessert, sour cream, dip, salad dressing, cottage cheese, frozen yoghurt, soy milk,
rice milk, soy drink, and rice milk drink.
- 25 235. The consumable product composition of any one of claims 157, 158, 163 to 223, or
231, wherein the consumable product is a beverage, in particular a near water drink,
a carbonated beverage, in particular a carbonated soft drink, a juice drink, nectar, or
a tea-based drink.
- 30 236. The consumable product composition of any one of claims 157, 158, or 163 to 223,
wherein the consumable product is a dental product selected from the group
consisting of toothpaste, dental floss, mouthwash, denture adhesive, enamel
whitener, fluoride treatments and oral care gels, preferably toothpaste.

237. The consumable product composition of any one of claims 157, 158, or 163 to 223, wherein the consumable product is a cosmetic product selected from the group consisting of lipstick, lip balm, lip gloss and petroleum jelly.

238. The consumable product composition of any one of claims 157, 158, or 163 to 223, wherein the consumable product is a pharmaceutical product selected from the group consisting of over-the-counter and prescription drugs, non-tobacco snuff, tobacco substitutes, chewable medications, cough syrups, throat sprays, throat lozenges, cough drops, antibacterial products, pill coatings, gel caplets, soluble fiber preparations, antacids, tablet cores, rapidly absorbed liquid compositions, stable foam compositions, rapidly disintegrating pharmaceutical dosage forms, beverage concentrates for medicinal purposes, aqueous pharmaceutical suspensions, liquid concentrate compositions, and stabilized sorbic acid solutions, phosphate buffers, saline solutions, emulsion, non-aqueous pharmaceutical solvents, aqueous pharmaceutical carriers, solid pharmaceutical carrier, and pharmaceutical preservatives/additives (antimicrobials, antioxidants, chelating agents, inert gases, additional flavoring agents, coloring agents).

239. The consumable product composition of any one of claims 157, 158, or 163 to 223, wherein the consumable product is an animal feed or animal food.

240. The consumable product composition of any one of claims 157, 158, 163 to 223, or 231 to 239, wherein the composition X as defined in any one of claims 182 to 223 is present in an amount effective to impart rich taste to a consumable product.

241. The consumable product composition of any one of claims 157, 158, 163 to 223, or 231 to 240 wherein the composition X as defined in any one of claims 182 to 223 is present in the consumable product composition in a concentration from 0.01 wppm to 50 wppm, in particular from 0.7 wppm to 6 wppm.

242. The consumable product composition of any one of claims 157, 158, 163 to 223, or 231 to 241, wherein the sweetener composition as defined in any one of claims 155 or 163 to 223 is present in the consumable product composition in a concentration from 0.1 wppm to 900 wppm, in particular from 70 wppm to 440

wppm, or wherein the sweetener composition is present in an amount ranging from 110 wppm to 270 wppm, in particular, from 130 wppm to 270 wppm.

243. The consumable product composition of claim 242, wherein the consumable
5 product is a tea drink and the sweetener composition is present in an amount ranging from 110 wppm to 270 wppm.

244. The consumable product composition of claim 242, wherein the consumable
10 product is a carbonated soft drink and the sweetener composition is present in an amount ranging from 130 wppm to 270 wppm.

245. The consumable product composition of claim 242, wherein the consumable
product is a juice drink and the sweetener composition is present in an amount
15 ranging from 130 wppm to 270 wppm.

246. The consumable product composition of any of claims 157, 158, 163 to 223, or 231
to 245, wherein the consumable product composition has a reduced amount of
sugar and/or calories.

20 247. The consumable product composition of claim 246 wherein the sweetener composition is present in an amount ranging from 70 wppm to 440 wppm, in particular, from 200 wppm to 440 wppm.

248. The consumable product composition of claim 246, wherein the consumable
25 product is a tea drink and the sweetener composition is present in an amount ranging from 230 wppm to 400 wppm.

249. The consumable product composition of claim 246, wherein the consumable
product is a near water drink and the sweetener composition is present in an amount
30 ranging from 70 wppm to 150 wppm.

250. The consumable product composition of claim 246, wherein the consumable product is a carbonated soft drink and the sweetener composition is present in an amount ranging from 310 wppm to 440 wppm.
- 5 251. The consumable product composition of claim 246, wherein the consumable product is a juice drink and the sweetener composition is present in an amount ranging from 310 wppm to 440 wppm.
- 10 252. The consumable product composition of claim 246, wherein the consumable product is a nectar and the sweetener composition is present in an amount ranging from 200 wppm to 340 wppm.
- 15 253. The consumable product composition of claims 246 to 252, wherein the consumable product composition has a reduced amount of sugar and/or calories.
254. The consumable product composition of claims 246 to 252, wherein the consumable product composition comprises substantially no sugar and/or calories.
- 20 255. The consumable product composition of claims 246 to 252, wherein the consumable product composition comprises no sugar and/or calories.
- 25 256. The consumable product composition of any one of claims 157, 158, 163 to 223 or 231 to 255, comprising a tabletop sweetener composition as defined in any of claims 224 to 230, wherein the tabletop sweetener composition is preferably present in the consumable product composition in a concentration from 0.1 wppm to 80 wppm.
- 30 257. The consumable product composition of any one of claims 157, 158, 163 to 223 or 231 to 256, wherein the sweetener composition or the tabletop sweetener composition comprises acesulfame potassium, preferably acesulfame potassium and sucralose or acesulfame potassium and thaumatin..

258. The consumable product composition of any of claims 157, 158, 163 -223, or 231 to 257, wherein the consumable product composition has an overall flavor detectably different from an overall flavor of a similar consumable product composition that does not comprise the at least one flavoring.

5

259. A method of modifying, masking, reducing and/or suppressing an unpleasant off-taste, aftertaste or lingering sweetness of at least one sweetener/sweetness enhancer composition, the method comprising the steps of:

(i) selecting at least one flavoring,

10

(ii) diluting the at least one flavoring with a diluent to form a diluted composition to determine a flavor threshold level at which the flavor of the flavoring is not detectable by taste in the diluted composition,

(iii) adding at least one flavoring at a level at or below the flavor threshold level to a sweetener/sweetness enhancer to form a sweetener composition; and

15

(iv) determining whether the at least one flavoring, when present in the sweetener composition at or below the flavor threshold level, is capable of modifying, masking, reducing and/or suppressing the unpleasant off-taste of the sweetener/sweetness enhancer in the sweetener composition.

20

260. A method of identifying a flavoring being capable of modifying, masking, reducing and/or suppressing an unpleasant off-taste of at least one sweetener/sweetness enhancer, the method comprising the steps of:

(i) selecting at least one flavoring,

25

(ii) diluting the at least one flavoring with a diluent to form a diluted composition to determine a flavor threshold level at which the flavor of the flavoring is not detectable by taste in the diluted composition, and

(iii) adding at least one flavoring at a level at or below the flavor threshold level to a sweetener/sweetness enhancer to form a sweetener composition; and

30

(iv) determining whether the at least one flavoring, when present in the sweetener composition at or below the flavor threshold level, is capable of modifying, masking, reducing and/or suppressing the unpleasant off-taste of the sweetener/sweetness enhancer in the sweetener composition.

261. The method of any of claims 259 or 260, further comprising the step of adding

the at least one flavoring to a sweetener composition when the at least one flavoring is determined to be capable of modifying, masking, reducing and/or suppressing the unpleasant off-taste of the sweetener/sweetness enhancer in the sweetener composition.

5

262. The method of any of claims 259 or 260, further comprising the step of adding the at least one flavoring to a consumable product to form a consumable product composition when the at least one flavoring is determined to be capable of modifying, masking, reducing and/or suppressing the unpleasant off-taste of the sweetener/sweetness enhancer in the consumable product composition.

10

263. The method of any of claims 259 or 261, further comprising the step of refraining from using the at least one flavoring when the at least one flavoring is determined to be incapable of modifying, masking, reducing and/or suppressing the unpleasant off-taste of the sweetener/sweetness enhancer in the sweetener composition.

15

264. The composition, method or use of any of claims 155 to 263, wherein the unpleasant off-taste of the sweetener, the sweetness enhancer or the consumable product is an acidic off-taste, an astringent off-taste, a bitter off-taste, a liquorice off-taste, a metallic off-taste or a throat-burning off-taste.

20

265. The composition, method or use of any of claims 155 to 263, wherein the unpleasant aftertaste of the sweetener, the sweetness enhancer or the consumable product is an astringent or bitter aftertaste.

25

266. A solution comprising
(a) a sweetener; and
(b) at least one flavoring; and
(c) a solvent;

30

wherein the at least one flavoring is suitable for modifying, masking, reducing and/or suppressing an unpleasant off-taste of the sweetener in a consumable product composition formed by adding the solution to a consumable product; and wherein the sweetener is present in an amount such that the sweetness of the sweetener is detectable by taste in the consumable product composition, and

wherein the at least one flavoring is present in an amount such that the flavor of the at least one flavoring is not detectable by taste in the consumable product composition.

- 5 267. A solution comprising
- (a) a sweetness enhancer
 - (b) a sweetener;
 - (c) at least one flavoring having a flavor; and
 - (d) a solvent;

10 wherein the at least one flavoring is suitable for modifying, masking, reducing and/or suppressing an unpleasant off-taste of the sweetness enhancer in a consumable product composition formed by adding the solution to a consumable product; and

15 wherein the sweetness enhancer is present in the consumable product composition in an amount such that the sweetness enhancer is capable of enhancing a sweetness of the sweetener present in the consumable product composition, and

20 wherein the at least one flavoring is present in an amount such that the flavor of the at least one flavoring is not detectable by taste in the consumable product composition.

268. The solution of claims 266 or 267, wherein the at least one flavoring is present in an amount ranging from 0.01 wppm to 1000 wppm, based on the total weight of the solution.

25 269. The solution of claims 266-268, wherein the solvent comprises a consumable organic solvent, a consumable inorganic solvent and / or a consumable polar solvent.

270. The solution of claims 266-269, wherein the solvent is water.

30

271. The solution of claims 266-270, further comprising at least one sweetener and/or sweetness enhancer.

272. The solution of claim 271, wherein the at least one sweetener and/or sweetness enhancer comprises acesulfame potassium.

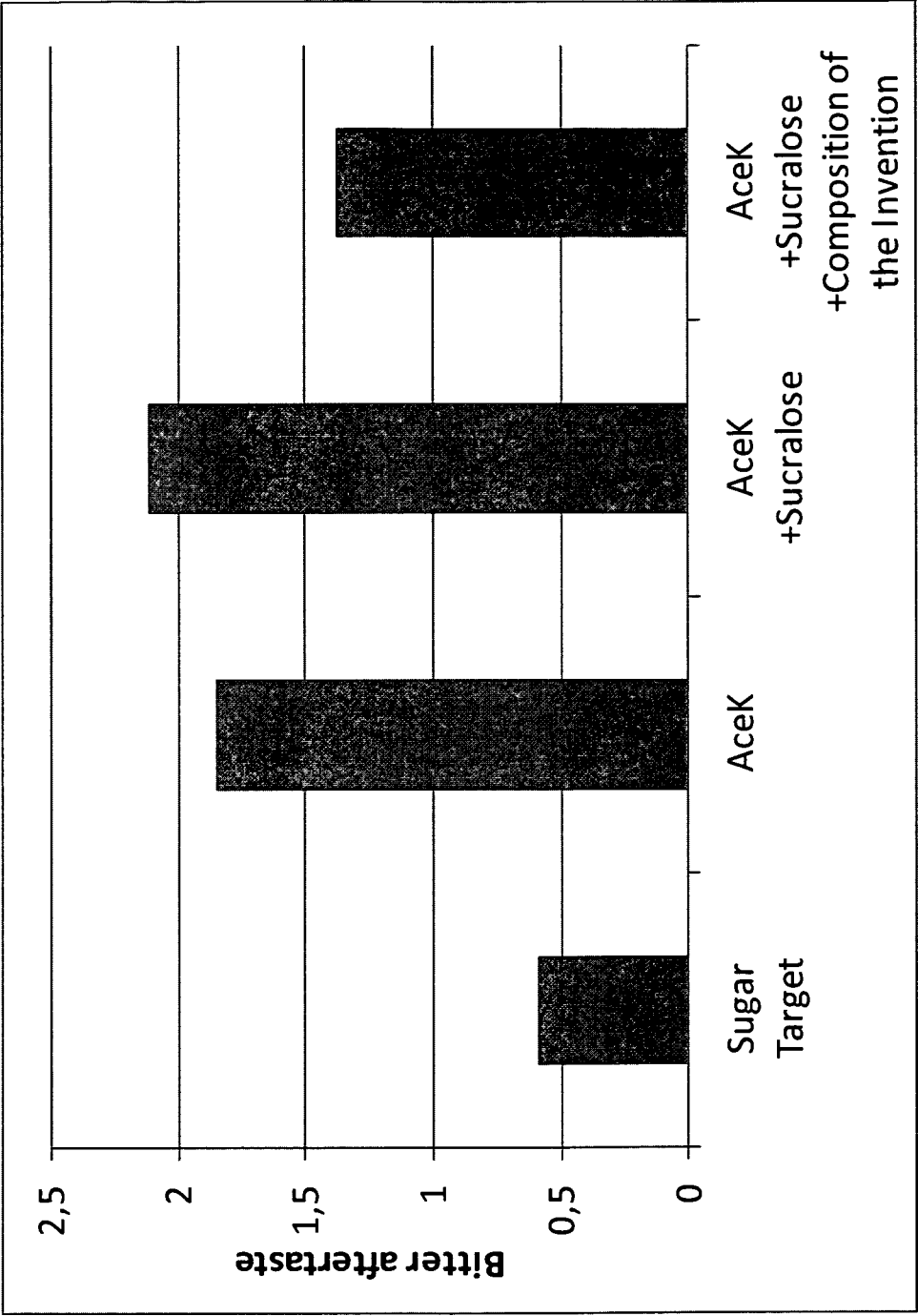


Fig. 1

Fig. 2

