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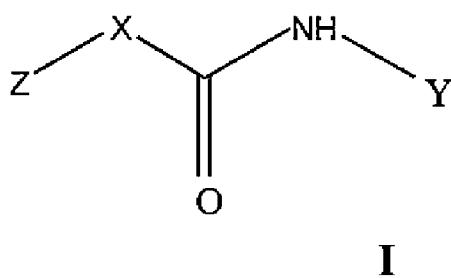
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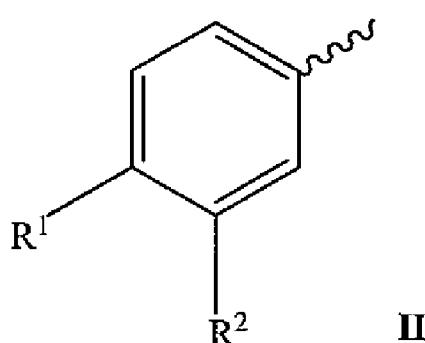
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(54) Title: COMPOUNDS



I



II

(57) Abstract: A method of modulating the flavour of an orally-receivable product, such as a foodstuff, beverage, dentifrice or medicine, comprising the addition thereto of a flavour-modulating proportion of at least one compound of the formula I in which X is selected from CHOH , $\text{C}=\text{O}$, $\text{CH}_2\text{-CO}$ and $\text{CH}=\text{C}(\text{OH})$, Y is selected from C1-C7 linear and branched alkyl and $\text{CH}_2\text{CH}_2\text{OH}$, Z is selected from CH_3 and a moiety of the formula II in which the wavy bond represents bond linking Z to X and R^1 and R^2 are selected from the possibilities (i) both hydrogen; (ii) independently OH and OCH_3 ; and (iii) R^1 and R^2 together with their bonds to the phenyl ring form a ring of the formula $-\text{O}-\text{CH}_2-\text{O}-$; such that, when Z is CH_3 , X is $\text{C}=\text{O}$ and Y is $\text{CH}_2\text{CH}_2\text{OH}$



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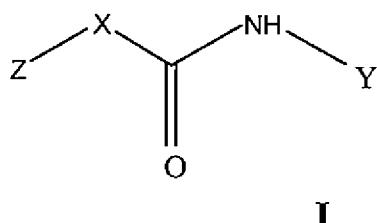
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COMPOUNDS

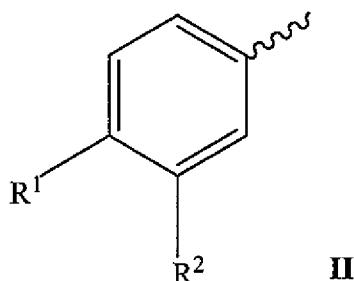
This disclosure relates to flavour modulation and to compounds for achieving this.

5 The modulation of flavour in orally-receivable compositions, such as foodstuffs, beverages, medicines, mouthwashes and the like, by the addition of edible substances to confer or modify flavour has become an important factor in the production of such compositions. The use of "modulation" in this description covers the cases of conferring flavour and modifying flavour. New flavours are constantly being sought. In addition, there is interest 10 in the modification of existing flavours. This has become very important, especially the enhancement of salt, umami and sugar taste in health foods. Generally, this involves giving the impression that there is present more of a substance, typically salt, monosodium glutamate (MSG) or sugar, than there actually is. Thus, the quantities of the original materials can be reduced, with consequent important health and dietary benefits. In such 15 cases, the quantity of edible substance added is generally so low that it cannot be tasted. The nature of this action is not completely understood.

It has now been found that a particular class of substances can have such a modulating effect on the flavour of an orally-receivable product. There is therefore provided a method 20 of modulating the flavour of an orally-receivable product, comprising the addition thereto of a flavour-modulating proportion of at least one compound of the formula I



in which X is selected from CHOH, C=O, CH₂-CO and CH=C(OH),
 25 Y is selected from C1-C7 linear and branched alkyl and CH₂CH₂OH,
 Z is selected from CH₃ and a moiety of the formula II



in which the wavy bond represents bond linking Z to X and
R¹ and R² are selected from the possibilities

5 (i) both hydrogen;
 (ii) independently OH and OCH₃; and
 (iii) R¹ and R² together with their bonds to the phenyl ring form a ring of the
 formula –O-CH₂-O-;

such that, when Z is CH₃, X is C=O and Y is CH₂CH₂OH

10

Some of the compounds hereinabove mentioned are novel. There is therefore provided a compound of the formula I as hereinabove described, in which

X is selected from CHOH and C=O,

Y is selected from n-heptyl, heptan-4-yl and CH₂CH₂OH,

15 Z is a moiety of the formula II in which R1 and R2 are selected from one of the following:

(a) R1 is OH and R2 is OCH₃;
 (b) R1 is OCH₃ and R2 is OH;
 (c) R¹ and R² together with their bonds to the phenyl ring form a ring of the formula
 –O-CH₂-O-

20

Particular specific examples are

N-(2-hydroxyethyl)-2-oxo-2-phenylacetamide

2-(benzo[d][1,3]dioxol-5-yl)-N-(2-hydroxyethyl)-2-oxoacetamide

2-(benzo[d][1,3]dioxol-5-yl)-N-(heptan-4-yl)-2-oxoacetamide

25 N-(heptan-4-yl)-2-(4-hydroxy-3-methoxyphenyl)-2-oxoacetamide

N-heptyl-2-(4-hydroxy-3-methoxyphenyl)-2-oxoacetamide

N-(heptan-4-yl)-2-hydroxy-2-(4-hydroxy-3-methoxyphenyl)acetamide

N-heptyl-2-hydroxy-2-(4-hydroxy-3-methoxyphenyl)acetamide

N-heptyl-2-oxo-3-phenylpropanamide
N-(heptan-4-yl)-2-oxo-3-phenylpropanamide
N-(2-hydroxyethyl)-2-oxo-propanoyl amide

5 The compounds can be prepared in several ways known by those skilled in the art. One of the typical methods involves reaction of the free acid with the corresponding amine in the presence of a coupling agent, typical examples are carbodiimides. Another method involves reaction of the ester with the desired amine in the presence of a base catalyst. This can be the amine itself. Reactions can be carried out without or with organic solvents. THF, 1,4-
10 dioxane, dichloromethane or chloroform were preferred when the coupling reagents are used. When the alpha keto carboxylic esters are used reactions can be carried out without solvent or with solvent, ethanol being particularly suited.

Reaction temperature is dependent on the reactivity of the compounds but is between room
15 temperature and 120° C.

It might sometimes be required to protect functional groups that would otherwise react under the chosen reaction conditions. Also it is possible that conversions need to take place after the amide bond is established. The skilled person will readily recognise when such
20 protection is necessary.

The compounds may be incorporated by conventional means into orally-receivable compositions. Within the term "orally-receivable compositions" is included all compositions that are taken into the mouth for ingestion or for spitting out for any reason,
25 be it for pleasure, nourishment or medicinal reasons. These include, but are not limited to foodstuffs, beverages, nutraceuticals and dental care products including mouth wash.

Food products include cereal products, rice products, pasta products, ravioli, tapioca products, sago products, baker's products, biscuit products, pastry products, bread products,
30 confectionery products, dessert products, gums, chewing gums, chocolates, ices, honey products, treacle products, yeast products, salt and spice products, savory products, mustard products, vinegar products, sauces (condiments), processed foods, cooked fruits and vegetable products, meat and meat products, meat analogues/substitutes, jellies, jams, fruit

sauces, egg products, milk and dairy products, cheese products, butter and butter substitute products, milk substitute products, soy products, edible oils and fat products, medicaments, food extracts, plant extracts, meat extracts, condiments, nutraceuticals, gelatins, tablets, lozenges, drops, emulsions, elixirs, syrups, and combinations thereof.

5

Other specific compositions include condiments and sauces (cold, warm, instant, preserved, sate, tomato, BBQ Sauce, Ketchup, mayonnaise and analogues, bechamel), gravy, chutney, salad dressings (shelf stable, refrigerated), batter mixes, vinegar, pizza, instant noodles, french fries, croutons, salty snacks (potato chips, crisps, nuts, tortilla-tostada, pretzels, 10 cheese snacks, corn snacks, potato-snacks, ready-to-eat popcorn, microwaveable popcorn, caramel corn, pork rinds, nuts), crackers (Saltines, 'Ritz' type), "sandwich-type" cracker snacks, breakfast cereals, cheeses and cheese products including cheese analogues (reduced sodium cheese, pasteurized processed cheese (food, snacks & spreads), savoury spreads, cold pack cheese products, cheese sauce products), meats, aspic, cured meats (ham, bacon), 15 luncheon/breakfast meats (hotdogs, cold cuts, sausage), soy-based products, tomato products, potato products, dry spice or seasoning compositions, liquid spice or seasoning compositions including pesto, marinades, and soup-type/meal-alternative beverages, and vegetable juices including tomato juice, carrot juice, mixed vegetable juices and other vegetable juices.

20

Beverages includes any liquid, available in liquid or dissolvable form for consumption, and includes juices, fruit juices, vegetable juices, tea and tea-based drinks, coffee and coffee-based drinks, soft drinks and sodas, fermented and distilled alcoholic drinks, such as beer, lager, stout, wines, and flavoured alcoholic beverages, such as "alcopops".

25

Processed foods include margarine, peanut butter, soup (clear, canned, cream, instant, UHT), canned juices, canned vegetable juice, canned tomato juice, canned fruit juice, canned juice drinks, canned vegetables, pasta sauces, frozen entrees, frozen dinners, frozen hand-held entrees, dry packaged dinners (macaroni & cheese, dry dinners-add meat, dry 30 salad/side dish mixes, dry dinners-with meat). Soups may be in different forms including condensed wet, ready-to-serve, ramen, dry, and bouillon, processed and pre-prepared low-sodium foods.

There is therefore also provided an orally-receivable product, comprising a product base and a compound of Formula I, as hereinabove defined. By "product base" is meant the totality of all the standard ingredients of the particular orally-receivable product in question, used in art-recognised quantities. It will be understood that there may be used more than 5 one compound of Formula I, and that the use of the singular "a compound" does not limit the composition to one such compound.

The concentration used will depend on the particular composition and the desired nature of the modulation. The skilled person can readily determine a suitable concentration in every 10 case, but as a non-limiting, general indication, the concentration lies between 0.1 and 100 ppm. In the case of use as a flavourant, typical concentrations will be between 5 and 100 ppm whereas typical concentrations for flavour modification will be between 0.1 and 10 ppm

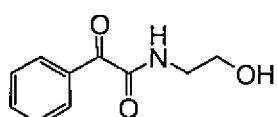
15 There is therefore also provided

(a) a method of flavouring an orally-receivable product, comprising the addition thereto of from 0.1 to 100 ppm. of a compound of Formula I, as hereinabove defined; and
 (b) a method of modifying the flavour of a flavourant-containing orally receivable product, comprising the addition thereto of from 0.1-10 ppm of a compound of Formula I, as 20 hereinabove defined..

The method is now further described with reference to the following examples, which exemplify particular embodiments and which are not intended to be in any way limiting.

25 Example 1

Preparation of N-(2-hydroxyethyl)-2-oxo-2-phenylacetamide



30 EDCI (1-(3-dimethylaminopropyl)-3-ethylcarbodiimide hydrochloride) (3 g, 15.6 mmol) and HOBT (1-hydroxybenzotriazole) (0.2 g, 1.5 mmol) were added to a stirred and cooled

(0°C) solution of phenylglyoxylic acid (2 g, 13.3 mmol) in DCM (50 ml). The resulting reaction mixture was cooled to -5°C and then ethanolamine (2 g, 32.8 mmol) was added dropwise at reaction temperature below 0°C. Upon the addition, the resulting suspension was stirred for 1 hour at temperature below 0°C and then at room temperature overnight.

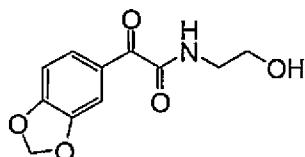
5 The reaction mixture was poured into 1% aqueous hydrochloric acid solution (30 ml). The DCM phase was washed with water and concentrated in vacuum.

The crude product was chromatographed on a silica gel column using ethylacetate/hexane (1:2) as eluent to provide the title compound (0.5 g, 19.5% yield) as yellow oil.

10 ¹H-NMR in DMSO-d6: 3.207-3.430(2H, m, NH-CH₂-CH₂), 3.449-3.591(2H, m, CH₂-CH₂-OH), 4.565(1H, s, OH), 7.500-8.071(5H, 3x m, 5x aromatic H), 8.715-9.050(1H, s, NH)

Example 2

15 Preparation of 2-(benzo[d][1,3]dioxol-5-yl)-N-(2-hydroxyethyl)-2-oxoacetamide



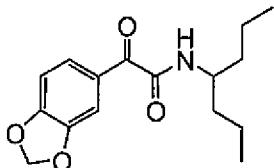
Ethanolamine (3.5 g, 49 mmol) was added to a stirred solution of benzo[1,3]dioxol-5-yl-oxo-acetic acid ethyl ester (2.5 g, 11 mmol) in ethanol (40 ml) at room temperature. The 20 resulting reaction mixture was heated to reflux for 2 hours. Then ethanol was distilled off and stirring was continued at 120°C for 1 hour. The reaction mixture was cooled to room temperature and then 50 ml of THF and 100 ml of aqueous HCl solution were added and stirred for 30 minutes. The mixture was extracted twice with DCM (50 ml). The organic layer was washed twice with water (50 ml) and evaporated to provide a dark sticky product.

25 The product was further crystallized in pentane/ethyl acetate. Red crystals of the title compound (0.9 g, 34.5% yield) were obtained.

¹H-NMR in CDCl₃: 3.207-3.430(2H, m, NH-CH₂-CH₂), 3.449-3.591(2H, m, CH₂-CH₂-OH), 4.565(1H, s, OH), 5.98-6.14(2H, s, -O-CH₂-O), 6.73-8.27(3H, 3x m, aromatic H), 30 7.72-7.67(1H, s, NH)

Example 3

Preparation of 2-(benzo[d][1,3]dioxol-5-yl)-N-(heptan-4-yl)-2-oxoacetamide

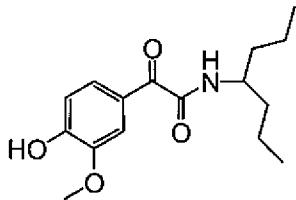


4-Heptylamine (2.5 g, 22 mmol) was added to a stirred solution of benzo[1,3]dioxol-5-yl-5-oxo-acetic acid ethyl ester (2 g, 9 mmol) in ethanol (40 ml) at room temperature. The resulting reaction mixture was heated to reflux for 4 hours. Then ethanol was distilled off and stirring was continued at 110°C for 2 hours. The reaction mixture was cooled to room temperature and then 50ml of THF and 100ml of aqueous HCl solution were added and stirred for 30 minutes. The mixture was extracted twice with DCM (50 ml). The organic layer was washed twice with water (50ml) and concentrated in vacuum. The crude product was chromatographed on a silica gel column using ethylacetate/ heptane (2:3) as eluent to provide the title compound (0.5g, 29% yield) as red crystals.

¹H-NMR in CDCl₃: 0.93(6H, t, 2x -CH₂-CH₃), 1.183-1.547(8H, m, 2x C-CH₂-CH₂-CH₃), 4.00(1H, m, CONH-CH), 6.07(2H, s, -O-CH₂-O), 6.82(1H, d, NH), 6.8508.25(3H, d,s,d, aromatic H)

Example 4

Preparation of N-(heptan-4-yl)-2-(4-hydroxy-3-methoxyphenyl)-2-oxoacetamide

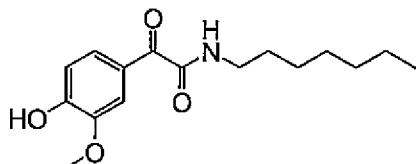


20 N-(heptan-4-yl)-2-(4-hydroxy-3-methoxyphenyl)-2-oxoacetamide was prepared from 4-hydroxy-3-methoxy-phenyl)-oxo-acetic acid ethyl ester and 4-heptylamine by the same procedure described for the preparation of 2-(benzo[d][1,3]dioxol-5-yl)-N-(heptan-4-yl)-2-oxoacetamide. White crystals of the title compound (0.7 g, 34% yield) were obtained.

¹H-NMR in DMSO-6d: 0.88(6H, t, 2x -CH₂-CH₃), 1.183-1.547(8H, m, 2x C-CH₂-CH₂-CH₃), 3.80(3H, s, CH₃-O-Ar), 3.90(1H, m, CONH-CH), 6.77-7.50(3H, m, aromatic H), 8.47(1H, s, CONH), 8.87(1H, s, phenolic OH)

Example 5

5 Preparation of N-heptyl-2-(4-hydroxy-3-methoxyphenyl)-2-oxoacetamide



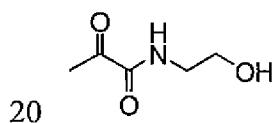
Manganese oxide 60% (4.5 g, 31 mmol) was added to a stirred solution of N-heptyl-2-hydroxy-2-(4-hydroxy-3-methoxy-phenyl)-acetamide (0.5 g, 1.7 mmol) in chloroform (50 ml) at room temperature. The resulting mixture was stirred at room temperature for 24 hrs,

10 filtered, and centrifuged to remove the remaining of manganese oxide. The filtrate was concentrated in vacuum. The crude product was chromatographed on a silica gel column using ethyl acetate/ heptane (2:3) as eluent to provide the title compound (0.15g, 30% yield) as pale yellow crystals.

¹H-NMR in DMSO-6d: 0.84(3H, t, CH₂-CH₃), 1.04-1.49(10H, m, NH-CH₂(CH₂)₅CH₃),
15 2.89-3.17(2H, m, CONH-CH₂),
3.80(3H, s, CH₃-O-Ar), 6.77-7.50(3H, m, aromatic H), 8.87(1H, s, phenolic OH), 7.73-
7.99(1H, m, NH),

Example 6

Preparation of N-(2-hydroxyethyl)-2-oxopropanamide



Ethanolamine (16 g, 66 mmol) was added dropwise to stirred ethyl pyruvate (8 g, 69 mmol) at temperature between 22 and 48°C. Then the mixture was heated to 120°C and stirred at this temperature for 3 hours. During the reaction, the formed ethanol and water were removed by distillation. The reaction mixture was cooled to room temperature and poured

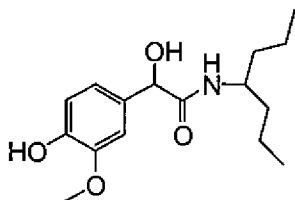
into 40ml of water. The mixture was acidified to pH < 1 and stirred for 30minutes at room temperature. The solution was saturated with sodium chloride and extracted with ethyl acetate a few times. The ethyl acetate layer was evaporated to dryness. The remaining residual oil was purified by silica gel column chromatography using heptane/ ethyl acetate 5 to yield colorless oil (1g, 9% yield).

¹H-NMR in DMSO-d6: 2.25-2.35(3H, s, CH₃-CO), 3.1-3.3(2H, m, NH-CH₂-CH₂), 3.4-3.51(2H, m, CH₂-CH₂-OH), 4.6-4.8(1H, s, OH), 8..-8.5(1H, s, NH)

Example 7

Preparation of N-(heptan-4-yl)-2-hydroxy-2-(4-hydroxy-3-methoxyphenyl)acetamide

10

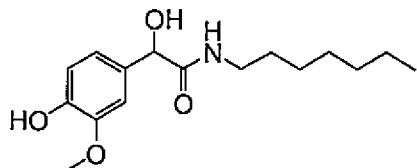


A solution of dicyclohexyl carbodiimide (DCC) (5.5 g, 26.7 mmol) in 1,4-dioxane (50 ml) was added to a stirred solution of 4-hydroxy-3-methoxymandelic acid (5 g, 25.3 mmol) and 15 N-hydroxysuccinimide (3 g, 26.1 mmol) in 1,4-dioxane (100 ml) at room temperature. The resulting white suspension was stirred at room temperature for 16hours. Then the reaction mixture was filtered. The filtrate was poured into a stirred solution of 4-heptylamine in water (20 ml) and sodium bicarbonate (2.5 g, 20 mmol) was added. The resulting solution was heated to 50°C and stirred at this temperature for 1.5 hour. The cooled solution was 20 acidified to pH < 2 using aq. HCl 5% solution and extracted three times with ethyl acetate (100ml). The combined organic layers were washed with brine, dried with sodium sulfate, filtered and the filtrate concentrated by evaporation under reduced pressure. The residue was purified by crystallization from ethyl acetate/ heptane to yield the title product (5.5g, 73.6%) as white crystals.

25 ¹H-NMR in DMSO-6d: 0.76-0.82(6H, m, 2x -CH₂-CH₃), 1.11-1.43(8H, m, 2x C-CH₂-CH₂-CH₃), 3.69(1H, m, CONH-CH), 3.72(3H, s, CH₃-O-Ar), 4.75(1H, s, CHOH-CONH), 5.9(1H, d, CHOHCONH), 6.69-7.02(3H, m, aromatic H), 8.46(1H, d, NH), 8.95(1H, s, phenolic OH)

Example 8

Preparation of N-heptyl-2-hydroxy-2-(4-hydroxy-3-methoxyphenyl)acetamide

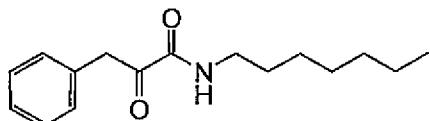


N-heptyl-2-hydroxy-2-(4-hydroxy-3-methoxyphenyl)acetamide was prepared from 4-hydroxy-3-methoxymandelic acid and n-heptylamine by the same procedure described for the preparation of N-(heptan-4-yl)-2-hydroxy-2-(4-hydroxy-3-methoxyphenyl)acetamide. White crystals of the title compound (6.7g, 89% yield) were obtained.

¹H-NMR in DMSO-6d: 0.84(3H, t, CH₂-CH₃), 1.04-1.49(10H, m, NH-CH₂(CH₂)₅CH₃), 2.89-3.17(2H, m, CONH-CH₂), 3.35(1H, s, CHOH-CONH), 3.73(3H, s, CH₃-O-Ar), 4.75(1H, s, CHOH-CONH), 5.9(1H, d, CHOHCNH), 6.69-7.02(3H, m, aromatic H), 7.87(1H, m, NH), 8.87(1H, s, phenolic OH)

Example 9

N-heptyl-2-oxo-3-phenylpropanamide

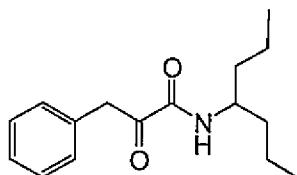


A suspension of phenylpyruvic acid (2.1g; 12.8mmol) in DCM (50ml) was cooled to 0°C. Then EDCI (3g, 15.6mmol) and HOBr (0.2g, 1.5mmol) were added successively. The resulted solution was cooled to -5°C and then heptylamine (1.5g, 13mmol) was added dropwise at temperature below 0°C. Upon the addition the ice bath was removed and the reaction mixture was stirred overnight at room temperature. The reaction mixture was poured into 1% aqueous hydrochloric acid solution (30ml). The DCM phase was washed with water and concentrated in vacuum. The crude product was chromatographed on a silica gel column using ethylacetate/hexane (1:2) as eluent to provide the title compound (0.8g, 24% yield).

¹H-NMR in DMSO-d6: 0.84(3H, t, CH₂-CH₃), 1.04-1.49(10H, m, NH-CH₂(CH₂)₅CH₃), 2.89-3.17(2H, m, CONH-CH₂), 3.5-4.0(2H, s, CO-CH₂-Ar), 7.500-8.071(5H, 3x m, 5x aromatic H), 7.73-7.99(1H, m, NH)

Example 10

5 N-(heptan-4-yl)-2-oxo-3-phenylpropanamide



A solution of DCC (2,8g) in 1, 4-dioxane (10ml) was added to a solution of phenylpyruvic acid (2g) and N-hydroxysuccinimide (1,5g) in 1, 4-dioxane (50) at rt. The resulting yellow suspension was stirred at rt for 18hrs. Then the reaction mixture was filtered. The filtrate 10 was poured into a solution of 4-heptylamine in water (20ml) and then NaHCO₃ (1,2g) was added. The resulting reaction mixture was stirred for 2,5hrs at 50°C, then cooled to rt and brought to pH < 2 using aq. HCl 5% solution. Ethyl acetate was added (100ml) and then the organic layer was separated washed twice with brine (50ml) and concentrated by evaporation under reduced pressure. The residue was dissolved in ethyl acetate/ heptane 15 and placed in the refrigerator overnight. The crude product was purified by flash column chromatography (silica gel; ethyl acetate/ heptane) to provide the title compound (0.5g, 16% yield) as yellow solid.

¹H-NMR in DMSO-d6: 0.76-0.82(6H, m, 2x -CH₂-CH₃), 1.11-1.43(8H, m, 2x C-CH₂-CH₂-CH₃), 3.69(1H, m, CONH-CH), 3.5-4.0(2H, s, CO-CH₂-Ar), 7.500-8.071(5H, 3x m, 20 5x aromatic H), 6.0-6.5(1H, d, NH)

Example 11

Testing of compounds

25 Example 11A:

Two solutions were prepared:

A a solution of 0.3% NaCl

B a solution of 0.3% NaCl and 10 ppm Example 1 compound

The samples were tasted by a trained sensory panel composed of 20 women aged between 30 and 60.

Solution A : salty

5 Solution B : more salty, salivating

Example 11B:

Two solutions were prepared:

A a solution of 0.3% NaCl

10 B a solution of 0.3% NaCl and 10 ppm Example 5 compound.

The samples were tasted by a trained sensory panel composed of 20 women aged between 30 and 60.

Solution A : salty

15 Solution B : more salty, salivating, lingering

Example 11C:

Two solutions were prepared:

A a solution of 0.3% NaCl and 0.03 % MSG

20 B a solution of 0.3% NaCl and 0.03 % MSG and 10 ppm Example 6 compound.

The samples were tasted by a trained sensory panel composed of 20 women aged between 30 and 60.

Solution A : salty, umami

25 Solution B : more salty, more umami

Example 11D:

Two solutions were prepared:

A a solution of 0.3% NaCl, 0.03 % MSG

30 B a solution of 0.3% NaCl, 0.03 % MSG and 10 ppm N-heptyl-2-oxo-3-phenylpropionamide as prepared in example 9.

The samples were tasted by a trained sensory panel composed of 20 women aged between 30 and 60.

Solution A : salty, umami

Solution B : salty, stronger umami, more bouillon-like

Example 11E

5 Two solutions were prepared:

A a solution of 0.3% NaCl and 0.03% MSG

B a solution of 0.3% NaCl, 0.03% MSG and 1 ppm N-(4-heptyl)-2-oxo-3-phenylpropionamide as prepared in example 10.

The samples were tasted by a trained sensory panel composed of 20 women aged between

10 30 and 60.

Solution A : salty, umami

Solution B : salty, more umami, more bouillon-like, slightly tingling.

Example 11F

15 Two solutions were prepared:

A a solution of 0.3% NaCl and 0.03% MSG

B a solution of 0.3% NaCl, 0.03% MSG and 1 ppm N-heptyl 3-methoxy-4-hydroxy-mandelic acid as prepared in Example 8.

The samples were tasted by a trained sensory panel composed of 20 women aged between

20 30 and 60.

Solution A : salty, umami

Solution B : salty, more umami, slightly pungent.

Example 12

25 Use in tomato soup

A tomato soup mix was prepared from 9.4 g of sodium chloride, 1 g of mono sodium glutamate, 0.08 g ribonucleotides (ex yeast), 32 g of tomato powder (ex Spreda), 25.1 g of glucose, 21 g of starch (Ultrasperse 5 ex National Starch), 5 g of palm fat powder, 3 g of

30 yeast powder, 1 g of onion powder, 0.15 g of carrot powder, 0.05 g of ground white pepper, 0.3 g celery extract powder, 0.05 g of ground laurel leaf powder, and 1.85 g of sucrose.

25 G of the well mixed ingredients was added to 250 g of boiling water and stirred until completely dissolved.

The reference soup was compared with a batch of the same soup containing 10 ppm of N-(2-hydroxyethyl)-2-(benzo[1,3]dioxol-5-yl)-2-oxoacetamide as prepared in example 2. A small group of flavourists (2 male, 2 female) tasted the soups and agreed that the test soup was more umami, was more lingering and was more complex than the base soup.

5

Example 13

Use in potato chips

Plain potato chips were prepared.

10 One part was flavoured with 1.2 % sodium chloride (sample A)

One part was flavoured with 1.2 % sodium chloride and 0.3 % MSG (sample b)

One part was flavoured with 1.2 % sodium chloride and 2.5 ppm N-(4-heptyl)-2-(benzo[1,3]dioxol-5-yl)-2-oxo-acetamide as prepared in example 3 (sample C).

15 The samples were tasted by a trained sensory panel composed of 20 women aged between 30 and 60.

The panel agreed that sample C was preferred over the other two samples.

Sample A was described as salty, sample B as salty and umami and sample C as salty,

20 umami, long lasting, savoury, bouillon. A slight bitter off-note was also observed in sample C.

Example 14

Use in tomato ketchup

25

A tomato ketchup was prepared from 19 % tomato paste (28-30 % dry weight), 8 % of vinegar (15 %), 3 % of sodium chloride, 20 % of sugar and 50 % of water.

30 To one half of the batch was added 2 ppm of N-(4-heptyl) 2-(4-hydroxy-3-methoxyphenol)-2-oxoacetamide (Example 5)

A small group of flavourists (2 male, 2 female) tasted the ketchups and agreed that the test ketchup tasted clearly more umami, more sweet and more full / complex compared with the base ketchup.

Example 15

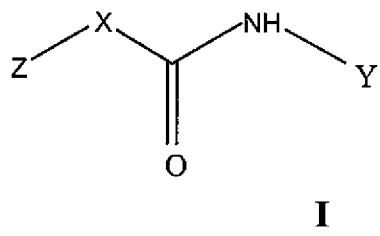
Further use in tomato ketchup

A batch of tomato ketchup was prepared as described in Example 12. To one half of the
5 batch was added 20 ppm N-(4-heptyl) 4-hydroxy-3-methoxy-mandelic amide as prepared
in Example 7.

A small group of flavourists (2 male, 2 female) tasted the ketchups and agreed that the test
ketchup tasted more umami, more bouillon-like and more full/complex compared with the
10 base ketchup.

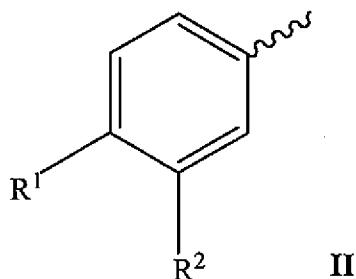
Claims:

1. A method of modulating the flavour of an orally-receivable product, comprising the addition thereto of a flavour-modulating proportion of at least one compound of the
5 formula I



in which

10 X is selected from CHO₂, C=O, CH₂-CO and CH=C(OH),
Y is selected from C1-C7 linear and branched alkyl and CH₂CH₂OH,
Z is selected from CH₃ and a moiety of the formula II



15 20 in which the wavy bond represents bond linking Z to X and
R¹ and R² are selected from the possibilities
(i) both hydrogen;
(ii) independently OH and OCH₃; and
(iii) R¹ and R² together with their bonds to the phenyl ring form a ring of the
formula -O-CH₂-O-;
such that, when Z is CH₃, X is C=O and Y is CH₂CH₂OH.

25 2. A method according to claim 1, in which the compound of formula I is selected from
the group consisting of:
N-(2-hydroxyethyl)-2-oxo-2-phenylacetamide

2-(benzo[d][1,3]dioxol-5-yl)-N-(2-hydroxyethyl)-2-oxoacetamide

2-(benzo[d][1,3]dioxol-5-yl)-N-(heptan-4-yl)-2-oxoacetamide

N-(heptan-4-yl)-2-(4-hydroxy-3-methoxyphenyl)-2-oxoacetamide

N-heptyl-2-(4-hydroxy-3-methoxyphenyl)-2-oxoacetamide

5 N-(heptan-4-yl)-2-hydroxy-2-(4-hydroxy-3-methoxyphenyl)acetamide

N-heptyl-2-hydroxy-2-(4-hydroxy-3-methoxyphenyl)acetamide

N-heptyl-2-oxo-3-phenylpropanamide

N-(heptan-4-yl)-2-oxo-3-phenylpropanamide

N-(2-hydroxyethyl)-2-oxo-propanoyl amide

10

3. An orally-receivable product comprising a product base and a compound of Formula I as defined in claim 1.

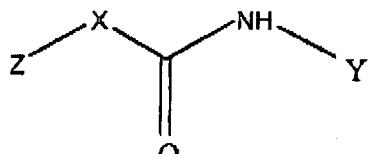
4. A product according to claim 3, in which the concentration of compound of Formula I is from 0.1 to 100 ppm.

5. A method of flavouring an orally-receivable product, comprising the addition thereto of from 0.1 to 100 ppm. of a compound of Formula I, as defined in claim 1.

20 6. A method of modifying the flavour of a flavourant-containing orally receivable product, comprising the addition thereto of from 0.1-10 ppm of a compound of Formula I, as defined in claim 1.

7. A compound of the formula I,

25



II

in which

X is selected from CHO₂ and C=O,

Y is selected from n-heptyl, heptan-4-yl and CH₂CH₂OH,

Z is a moiety of the formula II in which R1 and R2 are selected from one of the following:

(a) R1 is OH and R2 is OCH₃;

(b) R1 is OCH₃ and R2 is OH;

5 (c) R¹ and R² together with their bonds to the phenyl ring form a ring of the formula

-O-CH₂-O-

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2010/059027

A. CLASSIFICATION OF SUBJECT MATTER
INV. A23L1/226 C07C235/34 C07C235/78
ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A23L C07C

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

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

EPO-Internal, WPI Data, FSTA, CHEM ABS Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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A	EP 0 535 928 A2 (SHIONOGI & CO [JP]) 7 April 1993 (1993-04-07) claim 1; example 4 -----	7

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

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"O" document referring to an oral disclosure, use, exhibition or other means
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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT
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