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(54) CHEWING GUMS

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Description

[0001] The present invention relates to chewing gums..

Prior art

[0002] Halitosis is a condition that restricts the sufferer's social life. It is estimated that 15% to 40% of the population suffers from moderate halitosis (Rosing CK et al., Braz Oral Res 2011;25(5):466-71). Bad breath is usually caused by the presence of volatile sulphur compounds (VSC) (Kleinberg I et al., Crit Rev Oral Biol. Med. 1990;1(4):247-59). Said compounds are generated by catabolism of proteins by the oral bacteria (De Boever EH et al., J Am. Dent. Assoc 1995;126(10):1384-93). The nose can perceive very low concentrations of VSC as an unpleasant odour; in clinical practice it is considered that 75 ppb (parts per billion) of VSC in the air exhaled is the minimum threshold for a classification of moderate halitosis (van den Broek AM. et al., J Dent. 2007;35:627-635).

[0003] Some foods, such as garlic and Brussels sprouts, can increase halitosis (Tangerman A,. Halitosis in medicine: a review. Int. Dent J. 2002;52 Suppl. 3:201-206). Moreover, "morning breath" may be present at the beginning of the day, mainly caused by stagnation of the saliva produced during the night (Rosenberg M.J. Am. Dent. Assoc. 1996;127:475-482). Most research and patented inventions concentrate on antibacterial treatment of the causes of halitosis at particular times of day (morning) or after eating particular foods (such as mouthwashes based on garlic or methionine).

[0004] Vegetable extracts are used and described due to some properties against halitosis; for example, coated products in the form of corrugated sugar-free pastilles containing vegetable extracts can be found on the market (Hali Control™ containing 0.36% green coffee beans and 0.36% burdock).

[0005] Sweets and chewing gum containing green tea extracts are known to reduce halitosis generated by garlic-based mouthwashes (H. Yasuda, et al., Nippon Shishubyo Gakkai Kaishi, 37,141,1995). Chewing gum and tablets containing magnolia bark extract (MBE) are also known to reduce the salivary concentration of some bacteria, considered to be among the causes of halitosis (Greenberg M et al., J. Agric. Food Chem. 2007;55(23):9465-9). However, chewing gums for use against the symptoms of halitosis, which are not generated artificially and use synergic formulations of said vegetable extracts with zinc salts, are not known.

[0006] An article has been published about the ability of mouthwashes based on zinc salts to reduce the volatile sulphur compounds generated artificially after rinsing the mouth with cysteine, an aminoacid containing sulphur. In said article, the effective amount of zinc (administered as zinc acetate dihydrate) ranged from a minimum of 3 mg to a maximum of 30 mg (Young, A et al., (2003). Eur. J. Oral Sci. 111(5): 400-404).

[0007] One study of chewable tablets containing 6.8 mg of Zn, in the form of various salts, concluded that the effect against VSC, generated artificially by a cysteine mouthwash, is independent of the solubility constants of the salts (Young, A., G. Jonski et al. (2002), Eur. J. Oral Sci. 110(1): 31-34).

[0008] Finally, an *in vivo* study conducted on 11 volunteers found that chewing gum containing 2 mg or 0.5 mg of zinc acetate reduced VSC by 45% and 16% respectively, as against a 14% reduction after chewing a placebo chewing gum. In practice, when 0.5 mg of zinc was used, the effect was indistinguishable from that of the placebo (Waler SM. Acta Odontol. Scand. 1997;55(3):198-200).

[0009] Combinations of zinc or vegetable extracts with other ingredients, with an anti-halitosis function, have been illustrated in some patents. They involve incorporating the mixtures into chewing gum.

[0010] EP1998736 discloses combinations of magnolia bark extract and essential oils with an antibacterial function.

[0011] EP2046274 discloses combinations of magnolia bark extract and some flavouring compounds (in particular menthone and isomenthone) naturally contained in essential oils. Said combinations are said to be particularly effective in reducing halitosis caused by the consumption of halitosis-causing foods.

[0012] EP1901704 and EP1957169 disclose combinations of magnolia bark extract and surfactants.

[0013] WO 02091848 discloses the use of herbal extracts, including green tea extracts and magnolia bark extracts, combined with other oral hygiene ingredients such as xylitol (anti-plaque) and zinc (anti-halitosis). However, the optimum amounts for simultaneous use of vegetable extracts and zinc are not illustrated. The two functional ingredients are treated separately. In fact, the purpose of the vegetable extracts is to combat halitosis, whereas the purpose of the other functional ingredients (oral care actives) is to provide further benefits in the oral hygiene area.

[0014] The herbal extracts are said to perform their action by means of an antibacterial effect, while an effect on VSC is not reported.

[0015] EP1387662 discloses the use of two different metal ions combined with polyphosphates, and optionally MBE. EP1843731 also discloses the use of MBE combined with polyphosphates, but with an anti-tartar function.

[0016] WO2006/079343 discloses gums in tablet form containing zinc salts and green tea extracts.

[0017] WO2007/067340 reports the use of magnolia extracts, and optionally zinc, in chewing gum.

[0018] KR2004/0019145 reports mouthwashes containing zinc salts and green tea. There are no teachings relating

to synergic combinations of MBE and zinc in chewing gum, especially as regards the optimum doses able to guarantee long-lasting symptomatic treatment after a single use of the chewing gum by patients suffering from real halitosis, ie. halitosis not caused by mouthwashes containing sulphated amino acids or garlic, and not associated with specific times of day (morning).

Description of the invention

[0019] It has now been found that it is possible to prepare a chewing gum consisting of at least one first region with gum base and a second, fully water-soluble region without gum base, comprising a synergic combination of an effective amount of vegetable extracts selected from magnolia bark extract, green tea extract and combinations thereof and an effective amount of zinc ions, at least partly contained in microgranules which are fully water-soluble.

[0020] The invention allows the use of lower amounts of zinc than is taught in the literature. This generates an organoleptic advantage, as zinc has a marked astringent power, which can improve compliance with the treatment, as well as providing an economic benefit.

[0021] The invention can be advantageously used to treat the symptoms of halitosis, namely to reduce the volatile sulphur compounds (VSC) in the exhaled air. In other words, a single portion of chewing gum, suitable to be consumed on one occasion, produces the above-mentioned effect.

[0022] "Single portion of chewing gum" means a single piece of chewing gum, or a number of pieces which can be consumed simultaneously. A single piece of chewing gum can be selected from the following formats and weights: a stick weighing 1 g to 3 g, a pellet weighing 1 g to 4 g, a pellet with filling weighing 1 g to 5 g, a bubble gum with liquid filling weighing 1 g to 9 g, or a multi-layer stick weighing 1.5 g to 9 g. A number of pieces which can be consumed simultaneously, to form a single portion, can be selected from the preceding formats; however, if a number of pieces combine to form a single portion, the weight of the single piece is preferably less than 3 g, even more preferably less than 2.5 g and, in some forms of embodiment, less than 1 g. In the embodiment according to the invention, the use of sugar-free chewing gum is particularly advantageous. The absence of fermentable sugars in the composition of the gum prevents the chewing gum from supplying fermentable substrates to micro-organisms connected with VSC production. At the same time, chewing increases the salivary flow which, through its cleansing action, produces a first effect of reducing VSC.

[0023] The chewing gum comprises flavours and additives such as sweeteners, acidifiers, thickeners, wetting agents, emulsifiers, antioxidants, stabilisers and coating agents.

[0024] In particular a chewing gum wherein said first region constitutes a core, and said second region, which is fully water-soluble, constitutes a coating that at least partly covers the first region, is preferable. Said forms are also known as pellets.

[0025] Chewing gum can made in various formats, such as cushion, ball, cube and disc shapes.

[0026] Methods of obtaining the first region of the chewing gum according to the invention, containing gum base, are known.

[0027] The ingredients of the first region of the chewing gum according to the invention, containing gum base, can be selected from gum base, sweeteners such as sugars, polyalcohols, intensive sweeteners, additives such as dyes, acidifiers, emulsifiers, flavours in solid or liquid form, wetting agents, technological adjuvants such as emulsifiers or plasticisers, active pharmacological ingredients, vegetable extracts, functional ingredients such as vitamins or mineral salts, and dyes.

[0028] If the form of embodiment according to the invention is a chewing gum in the form of a pellet, the first region is called the core, and the second region, which is fully water-soluble, is called the coating.

[0029] The two main types of coating are hard and soft coatings.

[0030] In hard coatings, the cores are inserted in a coating pan wherein, once in rotation, they undergo repeated syrup-spraying and drying cycles. Powders can be applied at some of these stages.

[0031] The syrups are constituted by mixtures of sugars or polyalcohols, water, binders, and optionally pigments, intensive sweeteners and flavours.

[0032] Polyalcohols are used to coat sugar-free chewing gum. The most commonly used polyalcohols include sorbitol, isomalt, maltitol and xylitol.

[0033] The preferred binders are hydrocolloids such as gum arabic, gelatin, starches, including modified starches, and mixtures thereof.

[0034] The powders can simply consist of polyols in crystals ground to very fine granulates, or mixtures of polyalcohols and binders, such as xylitol and gum arabic, mannitol and gum arabic, or maltitol and gum arabic.

[0035] The coating can constitute the second, fully water-soluble region. It is particularly advantageous to incorporate the vegetable extracts according to the invention in said second region. In other forms of embodiment, said second region does not consist of the coating, as illustrated below.

[0036] In some forms of embodiment, the vegetable extracts are contained in the first region of the chewing gum.

[0037] A coating consisting of maltitol or a mixture of glucopyranosyl-mannitol and glucopyranosyl-sorbitol amounting to more than 70% by dry weight of the coating is particularly advantageous.

[0038] In some forms of embodiment of the invention the first region can contain at least one filling, which may be a solid such as hard candy, toffee, chocolate, marzipan or fondant, or may consist of particulate matter containing xylitol or other polyalcohols in crystals, or dextrose in crystals. Alternatively, said filling can take the form of a fluid, such as a syrup. Combinations among the forms described by way of example are possible. The filling can contain one or more polyalcohols, additives, vitamins, mineral salts, including zinc salts, vegetable extracts, including green tea and magnolia bark extracts, dyes, acidifiers and flavours.

[0039] The filling is usually inserted in the first region, comprising gum base, during the extrusion stage.

[0040] Depending on the type of core and filling material, and on the shape of the piece of chewing gum, the filling can be totally incorporated in the piece of chewing gum or can be visible from the exterior of the chewing gum on one or more sides.

[0041] As an alternative to the pellet shape, the chewing gum according to the invention can be configured so that said first region and said second region are arranged in overlapping, alternating layers. Methods and formulations for said particular configuration are known (US5437879).

[0042] Regardless of the form of embodiment of the chewing gum according to the invention, the preferred flavours are those deriving from species of the genera Mentha, Citrus, Spilanthes and menthol, artificial and natural flavours with the function of refreshing and salivation-stimulating agents and combinations thereof. Flavours derived from various species of mint (peppermint, spearmint and the like) and citrus fruit (orange, lemon, grapefruit, lime and the like), artificial or natural flavours with the function of cooling agents, are associated with the sensation of cooling and cleanliness, and their pleasant odour can effectively mask the sensation of bad breath, thus completing the organoleptically perceptible effect of the reduction in the symptoms of halitosis.

[0043] Flavours with the function of cooling agents are typically menthol esters, such as menthyl lactate, menthyl succinate and menthyl glutarate; or amides such as N-ethyl-p-menthane-3-carboxamide, 2-isopropyl-N,2,3-trimethylbutyramide, ethyl 3-(p-menthane-3-carboxamido)-acetate, N-para-benzen-acetonitrile menthane carboxamide and N-(2-(pyridin-2-yl)ethyl)-3-para-menthane-3-carboxamide, but there may also be other compounds such as isopulegol and (-)-menthoxypropan-1,2-diol.

[0044] Flavouring compounds with salivation-stimulating properties such as spilanthol, to which other compounds with sialogogic properties such as pellitorine and sanshool have recently been added, are obtained from the genus Spilanthes.

[0045] Zinc is contained in the chewing gum in the form of ions. Hereafter, "zinc" therefore refers to the ionic form.

[0046] It is particularly advantageous to include zinc in the first region containing gum base. Inclusion in the zone with gum base results in slow release, which leads to long-lasting efficacy of the gum according to the invention.

[0047] The zinc is contained, at least partly, in fully water-soluble microgranules. The fully water-soluble microgranules do not contain polymers used in the manufacture of gum base. Preferably, the microgranules comprise one or more polyalcohols, hydrocolloids, flavours, dyes, sweeteners and other additives, either alone or mixed together. In a preferred form of embodiment the microgranules contain more than 80% sorbitol, less than 2% gum arabic and more than 1% zinc salt. "Microgranules" means a particulate matter, prepared before the manufacture of the gum, having a mean particle size of less than 1000 μm. In particular, a particle size such that at least 90% of the granules are between 800 μm and 300 μm is preferred. Although the microgranules can be introduced into the part with gum base or the fully water-soluble region, they are preferably contained in the region with gum base.

[0048] The synergic effect between vegetable extracts and zinc is more efficient when the content of zinc in ions ranges between 0.0005% and 0.05% by weight, and the vegetable extract ranges between 0.02% and 2% (percentages of finished product).

[0049] A single portion of chewing gum is particularly effective if it contains zinc ions ranging between 0.012 mg and 1.2 mg, and magnolia bark extract between 0.5 mg and 50 mg. As an alternative to magnolia extract, green tea extract can be used, either alone or mixed with magnolia bark extract.

[0050] The chewing gum according to the invention preferably consists of at least one region with gum base and one region without gum base, which is fully water-soluble. The region with gum base comprises zinc ions from 0.005% to 0.04% of the finished product, and the region without gum base contains magnolia bark extract ranging from 0.07% to 0.5% of the finished product.

[0051] The zinc can be wholly or partly carried by the microgranules previously described. Preferably at least 10%, and even more preferably at least 20% of the zinc is carried by the microgranules previously described, the rest being carried by salts directly included in the region with gum base.

[0052] In order for the zinc to be carried in the form of ions, the zinc ion is preferably present as salt selected from zinc chloride, acetate, lactate, gluconate, butyrate, glycerate, glycolate, formate, lactate, picolinate, propionate, salicylate, tartrate, sulphate, ascorbate, bisglycinate, lysinate, malate, mono-L-methionine sulphate, pidolate and mixtures thereof.

[0053] Zinc acetate, lactate and gluconate, and mixtures thereof, are particularly preferred.

[0054] It is preferable for the zinc ion to be present as salt selected from those characterized by water-solubility

exceeding 0.5 g/100g at 25°C at a neutral pH. They are consequently water-soluble salts, which can be advantageously included in microgranules, while the microgranules can be included in the region with gum base.

[0055] In some embodiments of the invention the chewing gum contains an additional zinc salt selected from zinc oleate, stearate, citrate, phosphate, carbonate, borate, oxalate, aspartate, zinc oxide and mixtures thereof.

[0056] A single portion of chewing gum preferably contains said additional zinc salt in amounts that provide 0.1 to 10 mg of zinc.

[0057] In a preferred form of embodiment, the zinc salt inserted in the microgranules and the zinc salt not inserted in the microgranules are equal.

[0058] In an alternative form of embodiment, the zinc salt inserted in the microgranules is different from the zinc salt not inserted in the microgranules.

[0059] The chewing gums according to the invention reduce the oral content of volatile sulphur compounds more than a gum lacking said functional ingredients, and more than a gum containing only one of the two. The effect is greater both after chewing and over time, as will be demonstrated below.

[0060] Magnolia bark extract is particularly preferred.

[0061] Magnolia bark extract contains two neolignans, magnolol and honokiol, considered to be its active constituents. Analysis of traditional extracts originating from different regions of China demonstrates that the magnolol concentration ranges from a minimum of 0.005% to a maximum of 9.2%, while the honokiol concentration ranges from a minimum of 0.008% to a maximum of 9.7%. The sum of the two is always lower than 20% (Jiang, Y., et al, Phytochem. Anal, 2011, DOI 10.1002/pca.1369).

[0062] The two neolignans are extracted from bark prepared according to methods described (Pharmacopoeia of the PRC, (English edition), 1988, People's Medical Publishing House, Beijing, Cortex Magnoliae Officinalis, p23-24). The extraction can be performed with organic solvents or, more recently, with supercritical carbon dioxide.

[0063] An extract obtained by extraction in supercritical carbon dioxide, followed by crystallisation in ethanol, is preferred.

[0064] An extract with a magnolol content ranging between 80% and 88%, and a honokiol content ranging between 8% and 18%, wherein the sum of the two neolignans is preferably greater than 85%, and even more preferably greater than 95%, is preferably used.

[0065] Magnolia bark extract can be obtained from various plants belonging to the genus Magnolia, including *Magnolia obovata* and *Magnolia officinalis,* and the bark can derive from the branches, trunk and roots of the plant. It is preferable to use extracts obtained from the sub-species *Magnolia officinalis Rehder spp. Biloba.* The extract is preferably obtained from trunk bark.

[0066] Magnolia bark extract is present in the coating, and zinc in the core of a sugar-free chewing gum pellet. The magnolia bark extract is preferably present in amounts ranging from 0.5 mg to 50 mg per single portion of chewing gum, and even more preferably from 1 to 5 mg per single portion. The zinc is inserted, at least partly, in microgranules containing more than 80% sorbitol and less than 2% gum arabic, as described above, and a single portion of chewing gum preferably contains 0.012 mg to 1.2 mg of zinc, even more preferably 0.05 to 0.5 mg of zinc. The zinc concentration in the microgranules containing sorbitol preferably ranges between 0.06% and 6%, even more preferably between 0.5% and 3% (percentages of the weight of the microgranule).

[0067] The microgranules can contain edible additives such as dyes, thickeners, acidifiers, sweeteners, flavours, vitamins and other mineral salts.

[0068] A single portion of chewing gum made according to the preferred form just described presents a surprising ability to reduce the volatile sulphur compounds in the air exhaled by persons with clinical halitosis, and can therefore be used to treat the symptoms of halitosis.

[0069] In fact, in consumers with a minimum VSC value of 75 ppb in the air exhaled immediately before chewing gum, a single portion of chewing gum, chewed for 10 minutes, reduces the mean concentration of volatile sulphur compounds in the exhaled air by a minimum of 40% after chewing, compared with the value before chewing.

[0070] Moreover, a single portion of chewing gum, chewed for 10 minutes by consumers with a minimum VSC value of 75 ppb in the exhaled air, reduces the mean concentration of volatile sulphur compounds in the exhaled air by at least 15% one hour after the start of chewing.

[0071] VSC is measured with the OralChroma portable gas chromatograph© (OralChromaTM, Abilit Corp., Osaka, Japan), which is readily available on the market.

[0072] Chewing gum formulations without zinc, magnolia or both (reference formulations A, B and C) were compared with the formulations according to the invention containing both zinc and magnolia extracts (formulations D, F and E). The composition of the formulations was otherwise identical. In particular, gums in pellet form were used wherein the zinc was introduced into microgranules in the core (first region), and the magnolia bark extract was introduced into the coating (second region). The amounts of zinc and magnolia bark extract are set out in table 1.

[0073] The volatile sulphur compounds were evaluated in 10 volunteers with a minimum VSC level of 75 ppb (regardless of the time of day, and without stimulating VSC production with amino acids or particular foods). The evaluation was

conducted, by the method described, before chewing, immediately after chewing a single portion (10 minutes), and after one hour. Table 1 shows the % reductions in VSC compared with the starting condition. At the end of chewing, the volunteers conducted a sensory evaluation of the chewing gum.

[0074] Similarly, the ability to reduce VSC was evaluated in a preferred form of embodiment (formulation G) wherein at least 15% zinc (as a percentage of the total zinc) is inserted into microgranules containing more than 80% sorbitol and less than 2% gum arabic, as described above, and preferably, a single portion of chewing gum contains 0.012 mg to 1.2 mg of zinc, even more preferably 0.05 to 0.5 mg of zinc. The zinc carried by the microgranules is inserted as ion of a salt selected from zinc chloride, acetate, lactate, gluconate and mixtures thereof. The remainder of the zinc, below 85% (as a percentage of the total zinc) is carried by one or more of zinc chloride, acetate, lactate, gluconate and mixtures thereof inserted directly into the region containing gum base, or the core, in the case of chewing gum pellets.

Table 1 - influence of some formulations on the VSC in the breath

Ingredients	A reference no Zn or MBE	B reference Zn but no MBE	C reference MBE but no Zn	D invention Zn + MBE	E invention Zn + MBE	F invention Zn + MBE	G invention Zn + MBE
Core with Zn (mg/portion)	0	0.1	0	1.2	0.1	0.012	0.3
Coating with vegetable extracts (mg/portion)	0	0	3.5	0.5	3.5	50	3
% VSC after 10 min chewing.	-32	-34	-43	-45	-51	-57	-57
% VSC after 1 h.	-7	-22	-5	-35	-28	-27	-44
Sensory evaluation	fresh, pleasant mint flavour	similar to A	similar to A	freshness similar to A, astringent flavour	similar to A	freshness similar to A, bitter flavour	similar to A

Table 2 - % synergic effect

	D invention Zn + MBE	E invention Zn + MBE	F invention Zn + MBE	G invention Zn + MBE
% synergy after 10 min	0	46	92	92
% synergy after 1h	115	62	54	185

[0075] The data demonstrate that chewing gum A (reference) has a certain effect of reducing oral VSC, especially after chewing, but this effect is greatly reduced after 1 h. This effect is probably due to stimulation of salivation which, together with the mechanical rubbing action on the teeth, washes away some of the bacteria that cause bad breath. The reference gum containing zinc alone improves the reduction in oral VSC, but mainly in the long term. The reference gum containing magnolia bark extract alone is more effective immediately after chewing, but behaves in a similar way to the gum without magnolia and zinc after 1 hour.

[0076] The gums with synergic combinations of zinc and magnolia bark extract (D, E, F and G) markedly reduce the percentage of oral VSC immediately, after 10 minutes' chewing, and after 1 h. The reduction, at both times and in all four formulations (D, E, F and G), is greater than that elicited by the gum without zinc and MBE and by the two gums B and C only containing one of the two functional ingredients, indicating a synergic effect immediately after chewing and in the longer term (see data after 1 h).

[0077] By way of further demonstration of the synergic effect of the formulations with zinc and magnolia according to the invention, the percentage synergic effect can be calculated. It can be considered as the percentage reduction of VSC by the gum that exceeds the sum of the VSC-reducing effects of the gums containing only one of the two functional

ingredients, less the effect of the chewing gum not containing any functional ingredient. It is particularly important to subtract the effect of the plain chewing gum (Gum A in table 1) whenever the effect of a gum (whether inventive or reference) is added, similarly to the procedure used with background noise. The synergic effect is reported in table 2. Numbers higher than 0 indicate a synergic effect of the combination of zinc and vegetable extract in the inventive formulations.

[0078] Doses higher than those used in formulations D and F would produce unpleasant alterations (astringency, bitterness) in the flavour of the formulation, which could reduce compliance with treatment designed to reduce the symptoms of halitosis.

[0079] It is particularly advantageous for the fully water-soluble region without gum base to consist of a coating consisting of over 70% maltitol by dry weight, and preferably over 85% by dry weight (percentages of total coating). In an alternative, but equally advantageous form of embodiment, maltitol is replaced by a mixture of glucopyranosyl-mannitol and glucopyranosyl-sorbitol or a mixture of xylitol and mannitol.

[0080] The MBE released from the chewing gum thus formulated in 10 minutes' chewing ranges between 50% and 80% (of the total MBE).

[0081] It is advantageous to add zinc, in an amount ranging between 0.0005% and 0.05% of the chewing gum, through microgranules containing more than 80% sorbitol, less than 2% gum arabic and more than 1% zinc salt (percentages of the total microgranule), added to the zone containing gum base. The zinc released from the chewing gum thus formulated in 10 minutes' chewing ranges between 50% and 80% (of the total zinc).

[0082] The chewing gum wherein at least 15% zinc (as a percentage of the total zinc) is inserted in microgranules, which are inserted directly in the region containing gum base, as ion of a salt selected from zinc chloride, acetate, lactate, gluconate and mixtures thereof, and the remaining amount of zinc is carried by one or more of zinc chloride, acetate, lactate, gluconate and mixtures thereof inserted directly in the region containing gum base, also possesses a similar release over time.

[0083] The embodiment illustrated therefore allows the simultaneous release of comparable amounts of MBE and Zn, which can perform the synergic action in the oral cavity.

[0084] The addition of flavours containing spilanthol or pellitorine promotes the release of active agents, and is particularly indicated in combination with mint flavours.

[0085] The invention also relates to a method of treating the symptoms of halitosis in humans, comprising the following steps:

1) placing in the oral cavity of a patient with halitosis a piece of chewing gum consisting of at least:

a) a first region with gum base having a zinc content ranging from 0.0005% to 0.05% of the chewing gum, provided by microgranules, said microgranules containing more than 80% sorbitol, less than 2% gum arabic and more than 1% zinc salt (percentages of total microgranule);
b) a second region, without gum base, consisting of a fully water-soluble coating, characterized in that it contains more than 75% maltitol, glucopyranosyl-sorbitol and glucopyranosyl-mannitol mixture, or xylitol and mannitol mixture, and contains magnolia bark extract ranging from 0.02% to 2% of the chewing gum;

2) chewing of said one piece of chewing gum for 10 minutes,
said gum being able to release into the oral cavity, in 10 minutes' chewing, between 40% and 80% of its magnolia bark extract content (as a percentage of the total extract) and between 50% and 80% (as a percentage of the total zinc), so that said ingredients perform a synergic action against the symptoms of halitosis.

[0086] An example of a microgranule containing zinc, a microgranule according to the invention, a comparative example and an efficacy evaluation test are set out below.

Example 1: composition of microgranules used in the gum according to the invention

[0087]

Ingredients of microgranule	Example 1
	%
Sorbitol	85.00
Xylitol	8.00

(continued)

Ingredients of microgranule	Example 1
Acesulfame K	1.00
Flavours	0.80
Green colouring	0.20
Gum arabic	0.50
Zinc lactate	3.10
Water	1.40
Total microgranule	**100**

[0088] Tables 3 below illustrates the chewing gum compositions according to the invention (example 3) and a reference compositions (example 2). Said gums take the form of filled pellets, consisting of three separate regions: filling (region without gum base), core (region with gum base), and coating (region without gum base).

[0089] The percentages are expressed in relation to the total of the single portion. The values in mg refer to a portion weighing 2.2 g which, in the example, corresponds to a single piece.

Table 3

Ingredients	**Reference example 2**		**Example 3**	
Filling (region without gum base, fully water-soluble)	%	mg per piece	%	mg per piece
Maltitol syrup	6.700	147.400	6.700	147.400
Acesulfame K	0.001	0.022	0.001	0.022
Sucralose	0.001	0.022	0.001	0.022
Flavours	0.057	1.254	0.057	1.254
Blue colouring	0.001	0.022	0.001	0.022
Emulsifier	0.008	0.176	0.008	0.176
Glycerol	0.100	2.200	0.100	2.200
Thickener	0.002	0.044	0.002	0.044
Water	0.130	2.860	0.130	2.860
Total filling	**7.000**	**154.000**	**7.000**	**154.000**
Core (region with gum base)	%	mg per piece	%	mg per piece
Gum base	22.700	499.400	22.700	499.400
Microgranules, example 1	0.000	0.000	**0.600**	**13.200**
(of which Zn)			**(0.005)**	**(0.11)**
Aspartame	0.050	1.100	0.050	1.100
Acesulfame	0.050	1.100	0.050	1.100
Sucralose	0.030	0.660	0.030	0.660
Encapsulated aspartame	1.300	28.600	1.300	28.600
Maltitol syrup	1.870	41.140	1.870	41.140
Mannitol	5.800	127.600	5.800	127.600
Powdered maltitol	18.000	396.000	18.000	396.000
Xylitol	3.500	77.000	3.500	77.000
Flavours	2.000	44.000	2.000	44.000

(continued)

Ingredients	Reference example 2		Example 3	
Sorbitol	7.700	169.400	7.100	156.200
Total core	**63.000**	**1386.000**	**63.000**	**1386.000**
Coating (region without gum base, fully water-soluble)	%	mg per piece	%	mg per piece
Maltitol	27.5	605.000	27.35	601.700
Gelatin	0.07	1.540	0.07	1.540
Gum arabic	1.77	38.940	1.77	38.940
White colouring	0.47	10.340	0.47	10.340
Flavours	0.06	1.320	0.06	1.320
Aspartame	0.05	1.100	0.05	1.100
Acesulfame	0.05	1.100	0.05	1.100
Magnolia bark extract	0.00	0.000	0.15	**3.300**
Carnauba wax	0.03	0.660	0.03	0.660
Total coating	**30**	**660.000**	**30**	**660**
Total filling/core/coating	**100.000**	**2200.000**	**100.000**	**2200.000**

Activity test for treatment of symptoms of halitosis

[0090] A test was conducted with OralChroma on the gum according to the invention (example 3) compared with the reference gum (example 2), to measure the oral VSC of volunteers having a minimum oral VSC value of 75 ppb. A product available on the market was tested, consisting of sugar-free corrugated tablets with herbal extracts (0.36% green coffee beans and 0.36% burdock). The methodology used to measure the VSC is as previously described.

[0091] The results are summarized in table 4 below.

Table 4

% reduction in oral VSC concentration compared with concentration before chewing			
time	**gum according to the invention (Example 3)**	**control gum not containing Zn or MBE (Example 2)**	**tablet on the market**
after 10 min chewing	50.9	31.2	23.9
after 1 h	27.6	6.9	5.1
after 2 h	13.6	2.3	4.9

[0092] The gum according to the invention is clearly able to reduce the oral concentration of VSC to a greater extent than (i) gum not containing any functional ingredients and (ii) the product on the market, both immediately after chewing and after one or two hours.

Claims

1. A chewing gum consisting of at least a first region with gum base and at least a second fully water-soluble region without gum base, said gum being **characterized by** the presence of a synergic combination of:

   a) an effective amount of vegetable extracts selected from magnolia bark extract, green tea extract and combinations thereof,
   b) an effective amount of zinc ions, at least partly contained in fully water-soluble microgranules.

2. A chewing gum according to claim 1 wherein the vegetable extract is magnolia bark extract comprising magnolol and honokiol, preferably in a concentration higher than 80% by weight on the extract.

3. A chewing gum according to claim 1 wherein the vegetable extract is green tea extract comprising catechin, preferably in a concentration higher than 40% by weight on the extract.

4. A chewing gum according to one or more of claims 1-3 wherein said vegetable extracts are contained in said second region.

5. A chewing gum according to one or more of claims 1-3 wherein said vegetable extracts are contained in said first region.

6. A chewing gum according to one or more of claims 1-5 wherein zinc is contained in said first region.

7. A chewing gum according to one or more of claims 1-6 wherein said water-soluble microgranules comprise one or more polyalcohols, hydrocolloids, flavours, dyes, sweetening agents and other excipients, alone or in a mixture thereof, said microgranules having an average particle-size distribution lower than 1000 μm.

8. A chewing gum according to any one of the above claims wherein the zinc ion content ranges from 0.0005% to 0.05% by weight and the vegetable extract content ranges from 0.02% to 2%.

9. A chewing gum according to any one of the above claims containing per single portion zinc ions from 0.012 mg to 1.2 mg, and magnolia bark extract from 0.5 mg to 50 mg.

10. A chewing gum according to any one of the above claims, wherein a single portion chewed for 10 minutes by a consumer with a minimum VSC value in the oral air of 75 ppb is capable of reducing, immediately after chewing, the average concentration of volatile sulfur compounds in the oral air by at least 40% compared with the value before chewing.

11. A chewing gum according to any one of the above claims, wherein a single portion chewed for 10 minutes by a consumer with a minimum VSC value in the oral air of 75 ppb is capable of reducing, one hour after starting chewing, the average concentration of volatile sulfur compounds in the oral air by at least 15% compared with the value before chewing.

12. A chewing gum according to any one of the above claims, wherein the zinc ion is present as a salt selected from the group consisting of zinc chloride, acetate, lactate, gluconate, butyrate, glycerate, glycolate, formate, lactate, picolinate, propionate, salicylate, tartrate, sulfate, ascorbate, bisglycinate, lysinate, malate, mono-L-methionine sulfate, pidolate and mixtures thereof.

13. A chewing gum according to claims 8 and 9 wherein an additional zinc salt is present, selected from the group consisting of zinc oleate, stearate, citrate, phosphate, carbonate, borate, oxalate, aspartate, oxide and mixtures thereof.

14. A chewing gum according to claim 13 wherein a single portion of chewing gum contains said additional zinc salt in such amounts as to supply 0.1 to 10 mg of zinc.

15. A chewing gum according to any one of the above claims, wherein said first region with gum base forms a core and said second fully water-soluble region, without gum base, forms a coating layer that at least partially coats the first region.

16. A chewing gum according to claim 15 wherein more than 70% by dry weight of the coating layer consists of maltitol or a mixture of glucopyranosyl-mannitol and glucopyranosyl-sorbitol.

17. A chewing gum according to claims 15 or 16 wherein a filling is also present inside said first region.

18. A chewing gum according to claim 17 wherein said filling contains one or more of polyalcohols, excipients, emulsifiers, vitamins, mineral salts, including zinc salts, green tea extracts and magnolia bark extracts, dyes, acidifiers and flavours.

19. A chewing gum according to any one of claims 1-14 wherein said first region and said second region are configured as regions in the form of overlapping, alternating layers.

20. A chewing gum according to any one of the above claims comprising at least one flavour selected from those deriving from species of the genera Mentha, Citrus, Spilanthes and menthol, artificial and natural flavours which act as cooling and salivating agents and combinations thereof.

21. A chewing gum according to claims 1-20 for use in the treatment of halitosis symptoms.

Patentansprüche

1. Kaugummi bestehend aus mindestens einem ersten Bereich mit Kaugummigrundstoff und mindestens einem zweiten, vollständig wasserlöslichen Bereich ohne Kaugummigrundstoff, wobei das Kaugummi **gekennzeichnet ist durch** die Anwesenheit einer synergetischen Kombination von:

   a) einer wirksamen Menge von Pflanzenextrakten, die aus Magnolienrindenextrakt, Grünteeextrakt und Kombinationen davon ausgewählt sind,
   b) einer wirksamen Menge von Zinkionen, die zumindest teilweise in vollständig wasserlöslichen Mikrogranalien enthalten sind.

2. Kaugummi nach Anspruch 1, wobei der Pflanzenextrakt Magnolienrindenextrakt ist, der Magnolol und Honokiol enthält, vorzugsweise in einer Konzentration von mehr als 80 Gew.-% bezogen auf den Extrakt.

3. Kaugummi nach Anspruch 1, wobei der Pflanzenextrakt Grünteeextrakt ist, der Catechin enthält, vorzugsweise in einer Konzentration von mehr als 40 Gew.-% bezogen auf den Extrakt.

4. Kaugummi nach einem oder mehreren der Ansprüche 1-3, wobei die Pflanzenextrakte in dem zweiten Bereich enthalten sind.

5. Kaugummi nach einem oder mehreren der Ansprüche 1-3, wobei die Pflanzenextrakte in dem ersten Bereich enthalten sind.

6. Kaugummi nach einem oder mehreren der Ansprüche 1-5, wobei Zink in dem ersten Bereich enthalten ist.

7. Kaugummi nach einem oder mehreren der Ansprüche 1-6, wobei die wasserlöslichen Granalien einen oder mehrere Polyalkohole, Hydrokolloide, Aromastoffe, Farbstoffe, Süßstoffe und andere Bestandteile enthalten, allein oder eine Mischung davon, wobei die Mikrogranalien eine mittlere Partikelgrößenverteilung von weniger als 1000 μm haben.

8. Kaugummi nach einem der obigen Ansprüche, wobei der Zinkionengehalt von 0,0005 Gew.-% bis 0,05 Gew.-% und der Pflanzenextraktgehalt von 0,02% bis 2% reicht.

9. Kaugummi nach einem der obigen Ansprüche, der pro Einzelportion 0,012 mg bis 1,2 mg Zinkionen und 0,5 mg bis 50 mg Magnolienrindenextrakt enthält.

10. Kaugummi nach einem der obigen Ansprüche, wobei eine Einzelportion, die von einem Konsumenten mit einem minimalen VSC-Wert von 75 ppb in der oralen Luft für 10 Minuten gekaut wird, unmittelbar nach dem Kauen die durchschnittliche Konzentration flüchtiger Schwefelverbindungen (volatile sulfur compounds) in der oralen Luft um mindestens 40% im Vergleich zu dem Wert vor dem Kauen reduzieren kann.

11. Kaugummi nach einem der obigen Ansprüche, wobei eine Einzelportion, die von einem Konsumenten mit einem minimalen VSC-Wert von 75 ppb in der oralen Luft für 10 Minuten gekaut wird, eine Stunde nach dem Beginn des Kauens die durchschnittliche Konzentration flüchtiger Schwefelverbindungen (volatile sulfur compounds) in der oralen Luft um mindestens 15% im Vergleich zu dem Wert vor dem Kauen reduzieren kann.

12. Kaugummi nach einem der obigen Ansprüche, wobei das Zinkion als Salz vorliegt, das aus der Gruppe ausgewählt ist, die aus Zinkchlorid, -acetat, -laktat, -gluconat, -butyrat, -glycerat, -glycolat, -formiat, -laktat, -picolinat, -propionat, -salicylat, -tartrat, -sulfat, -ascorbat, -bisglycinat, -lysinat, -malat, -mono-L-methioninsulfat, -pidolat und Mischungen

davon besteht.

13. Kaugummi nach den Ansprüchen 8 und 9, wobei ein zusätzliches Zinkalz vorhanden ist, das aus der Gruppe ausgewählt ist, die aus Zinkoleat, -stearat, -citrat, -phosphat, -carbonat, -borat, -oxalat, -aspartat, -oxid und Mischungen davon besteht.

14. Kaugummi nach Anspruch 13, wobei eine Einzelportion des Kaugummis das zusätzliche Zinksalz in solchen Mengen enthält, um 0,1 bis 10 mg Zink zuzuführen.

15. Kaugummi nach einem der obigen Ansprüche, wobei der erste Bereich mit Kaugummigrundstoff einen Kern bildet und der zweite vollständig wasserlösliche Bereich, ohne Kaugummigrundstoff, eine Hüllschicht bildet, die den ersten Bereich zumindest teilweise umhüllt.

16. Kaugummi nach Anspruch 15, wobei mehr als 70% bezogen auf das Trockengewicht der Hüllschicht aus Maltitol oder einer Mischung von Glukopyranosylmannitol und Glukopyranosylsorbitol bestehen.

17. Kaugummi nach den Ansprüchen 15 oder 16, wobei innerhalb des ersten Bereichs auch eine Füllung vorhanden ist.

18. Kaugummi nach Anspruch 17, wobei die Füllung einen oder mehrere Polyalkohole, sonstige Bestandteile, Emulgatoren, Vitamine, Mineralsalze, einschließlich von Zinksalzen, Grünteeextrakten und Magnolienrindenextrakten, Farbstoffen, Säuerungsmitteln und Aromastoffen enthält.

19. Kaugummi nach einem der Ansprüche 1-14, wobei der erste Bereich und der zweite Bereich als Bereiche in Form von sich überlappenden, alternierenden Schichten konfiguriert sind.

20. Kaugummi nach einem der obigen Ansprüche, der mindestens einen Aromastoff enthält, der von denjenigen, die von einer Spezies der Gattung Mentha, Zitrusgewächsen, Spilanthes und Menthol stammen, künstlichen und natürlichen Aromastoffen, die als kühlende und speichelfördernde Mittel wirken, und Kombinationen davon ausgewählt ist.

21. Kaugummi nach einem der Ansprüche 1-20 zur Verwendung bei der Behandlung von Symptomen des Mundgeruchs.

Revendications

1. Pâte à mâcher constituée par au moins une première zone comprenant une base de gomme et au moins une deuxième zone complètement soluble dans l'eau, ladite gomme étant **caractérisée par** la présence d'une combinaison synergique de :

    a) une quantité efficace d'extraits végétaux choisis parmi un extrait d'écorce de magnolia, un extrait de thé vert, ainsi que leurs combinaisons ;
    b) une quantité efficace d'ions de zinc, contenus au moins en partie dans des microgranules complètement solubles dans l'eau.

2. Pâte à mâcher selon la revendication 1, dans laquelle l'extrait végétal représente un extrait d'écorce de magnolia comprenant du magnolol et du honokiol, de préférence en une concentration supérieure à 80 % en poids en se basant sur l'extrait.

3. Pâte à mâcher selon la revendication 1, dans laquelle l'extrait végétal représente un extrait de thé vert comprenant du catéchol, de préférence en une concentration supérieure à 40 % en poids en se basant sur l'extrait.

4. Pâte à mâcher selon une ou plusieurs des revendications 1 à 3, dans laquelle lesdits extraits végétaux sont contenus dans ladite deuxième zone.

5. Pâte à mâcher selon une ou plusieurs des revendications 1 à 3, dans laquelle lesdits extraits végétaux sont contenus dans ladite première zone.

6. Pâte à mâcher selon une ou plusieurs des revendications 1 à 5, dans laquelle du zinc est contenu dans ladite

première zone.

7. Pâte à mâcher selon une ou plusieurs des revendications 1 à 6, dans laquelle lesdits microgranules solubles dans l'eau comprennent un ou plusieurs excipients choisis parmi des polyalcools, des hydrocolloïdes, des aromatisants, des colorants, des agents édulcorants, ainsi que d'autres excipients, seuls ou sous la forme d'un de leurs mélanges, lesdits microgranules possédant une distribution granulométrique moyenne inférieure à 1000 μm.

8. Pâte à mâcher selon l'une quelconque des revendications ci-dessus, dans laquelle la teneur en ions de zinc se situe dans la plage de 0,0005 % à 0,05 % en poids et la teneur en extrait végétal se situe dans la plage de 0,02 % à 2 %.

9. Pâte à mâcher selon l'une quelconque des revendications ci-dessus, contenant, par portion unique, des ions de zinc de 0,012 mg à 1,2 mg et un extrait d'écorce de magnolia de 0,5 mg à 50 mg.

10. Pâte à mâcher selon l'une quelconque des revendications ci-dessus, dans laquelle une portion unique mâchée pendant 10 minutes par un consommateur présentant une valeur VSC dans l'air oral de 75 ppb est capable de réduire, directement après avoir mâché, la concentration moyenne des composés soufrés volatils dans l'air oral à concurrence d'au moins 40 % par rapport à la valeur en vigueur avant le mâchage.

11. Pâte à mâcher selon l'une quelconque des revendications ci-dessus, dans laquelle une portion unique mâchée pendant 10 minutes par un consommateur présentant une valeur VSC dans l'air oral de 75 ppb est capable de réduire, une heure après avoir commencé à mâcher, la concentration moyenne des composés soufrés volatils dans l'air oral à concurrence d'au moins 15 % par rapport à la valeur en vigueur avant le mâchage.

12. Pâte à mâcher selon l'une quelconque des revendications ci-dessus, dans laquelle l'ion de zinc est présent sous la forme d'un sel choisi parmi le groupe constitué par un chlorure, un acétate, un lactate, un gluconate, un butyrate, un glycérate, un glycolate, un formiate, un lactate, un picolinate, un propionate, un salicylate, un tartrate, un sulfate, un ascorbate, un bisglycinate, un lysinate, un malate, un mono-L-méthionine sulfate, un pidolate de zinc, ainsi que leurs mélanges.

13. Pâte à mâcher selon les revendications 8 et 9, dans laquelle est présent un sel de zinc supplémentaire choisi parmi le groupe constitué par un oléate, un stéarate, un citrate, un phosphate, un carbonate, un borate, un oxalate, un aspartate, un oxyde de zinc, ainsi que leurs mélanges.

14. Pâte à mâcher selon la revendication 13, dans laquelle une portion unique de pâte à mâcher contient ledit sel de zinc supplémentaire dans des quantités permettant d'obtenir de 0,1 à 10 mg de zinc.

15. Pâte à mâcher selon l'une quelconque des revendications ci-dessus, dans laquelle ladite première zone comprenant une base de gomme forme une partie centrale et ladite deuxième zone complètement soluble dans l'eau, exempte d'une base de gomme, forme une couche de revêtement qui enrobe au moins en partie la première zone.

16. Pâte à mâcher selon la revendication 15, dans laquelle plus de 70 % en poids à sec de la couche de revêtement sont constitués par du maltitol ou par un mélange de glucopyranosyl-mannitol et de glucopyranosyl-sorbitol.

17. Pâte à mâcher selon la revendication 15 ou 16, dans laquelle une matière de charge est également présente à l'intérieur de ladite première zone.

18. Pâte à mâcher selon la revendication 17, dans laquelle ladite matière de charge contient un ou plusieurs éléments choisis parmi des polyalcools, des excipients, des émulsifiants, des vitamines, des sels minéraux, y compris des sels de zinc, des extraits de thé vert et des extraits d'écorce de magnolia, des colorants, des acidifiants et des aromatisants.

19. Pâte à mâcher selon l'une quelconque des revendications 1 à 14, dans laquelle ladite première zone et ladite deuxième zone sont configurées sous la forme de zones prenant la forme de couches alternantes qui se chevauchent.

20. Pâte à mâcher selon l'une quelconque des revendications ci-dessus, comprenant au moins un arôme choisi parmi ceux qui dérivent d'espèces des genres Mentha, Citrus, Spilanthes et du menthol, des arômes artificiels et naturels qui font office d'agents de refroidissement et de salivation, ainsi que leurs combinaisons.

21. Pâte à mâcher selon les revendications 1 à 20, pour son utilisation dans le traitement de symptômes d'halitose.

REFERENCES CITED IN THE DESCRIPTION

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Szabadalmi igénypontok

1. Rágógumi, ami legalább egy gumi bázisos első régióból és legalább egy, teljesen vízoldható, gumi bázis nélküli második régióból áll, a gumi a következők szinergikus kombinációjának jelenlétével jellemzett:

a) magnólia kéreg extraktum, zöld tea extraktum, és ezek kombinációi közül választott növényi extraktumok hatásos mennyisége,

b) cink ionok hatásos mennyisége, amely cink ionokat legalább részben teljesen vízoldható mikrogranulátumok tartalmazzák.

2. Az 1. igénypont szerinti rágógumi, ahol a növényi extraktum magnólia kéreg extraktum, amely magnololt és honokiolt tartalmaz, előnyösen az extraktum tömegére vonatkoztatott 80 tömeg%-nál nagyobb koncentrációban.

3. Az 1. igénypont szerinti rágógumi, ahol a növényi extraktum zöld tea extraktum, amely katekint tartalmaz, előnyösen az extraktum tömegére vonatkoztatott 40 tömeg%-nál nagyobb koncentrációban.

4. Az 1-3. igénypontok bármelyike szerinti rágógumi, ahol a növényi extraktumot a második régió tartalmazza.

5. Az 1-3. igénypontok bármelyike szerinti rágógumi, ahol a növényi extraktumot az első régió tartalmazza.

6. Az 1-5. igénypontok bármelyike szerinti rágógumi, ahol a cinket az első régió tartalmazza.

7. Az 1-6. igénypontok bármelyike szerinti rágógumi, ahol a vízoldható mikrogranulátumok tartalmaznak egy vagy több polialkoholt, hidrokolloidot, aromát, festéket, édesítőszert és egyéb segédanyagot, önmagában vagy ezek keverékében, a mikrogranulátumok 1000 µm-nél kisebb átlagos részecskeméret-eloszlással rendelkeznek.

8. Az előző igénypontok bármelyike szerinti rágógumi, ahol a cink ion tartalom a 0,0005-0,05 tömeg% tartományba, és a növényi extraktum tartalom a 0,02-2 % tartományba esik.

9. Az előző igénypontok bármelyike szerinti rágógumi, amely egységnyi adagonként 0,012-1,2 mg cink iont tartalmaz és 0,5-50 mg magnólia kéreg extraktumot tartalmaz.

10. Az előző igénypontok bármelyike szerinti rágógumi, ahol a szájában lévő levegőben 75 ppb-s minimális VSC értékkel rendelkező fogyasztó által 10 percig rágott egységnyi adag képes a rágást követően azonnal legalább 40 %-kal csökkenteni a szájban lévő levegőben az illékony kénvegyületek (volatile sulfur compounds, VSC) átlagos koncentrációját a rágás előtti értékhez képest.

11. Az előző igénypontok bármelyike szerinti rágógumi, ahol a szájában lévő levegőben 75 ppb-s minimális VSC értékkel rendelkező fogyasztó által 10 percig rágott egységnyi adag képes a rágás megkezdését követően 1 óra múlva legalább 15 %-kal csökkenteni a szájban lévő levegőben az illékony kénvegyületek (volatile sulfur compounds, VSC) átlagos koncentrációját a rágás előtti értékhez képest.

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12. Az előző igénypontok bármelyike szerinti rágógumi, ahol a cink ion a következők alkotta csoportból választott só formájában van jelen: cink-klorid, -acetát, -laktát, -glükonát, -butirát, -glicerát, -glikolát, -formiát, -laktát, -pikolinát, -propionát, -szalicilát, -tartarát, -szulfát, -aszkorbát, -biszglicinát, -lizinát, -malát, -mono-L-metionin-szulfát, -pidolát és ezek keverékei.

13. A 8. vagy 9. igénypont szerinti rágógumi, ahol a következők alkotta csoportból választott további cink só van jelen: cink-oleát, -sztearát, -citrát, -foszfát, -karbonát, -borát, -oxalát, -aszpartát, -oxid és ezek keverékei.

14. A 13. igénypont szerinti rágógumi, ahol a rágógumi egységnyi adagja a további cink sót olyan mennyiségben tartalmazza, hogy 0,1-10 mg cinket biztosítson.

15. Az előző igénypontok bármelyike szerinti rágógumi, ahol a gumi bázisos első régió magot alakít ki, és a teljesen vízoldható, gumi bázis nélküli második régió bevonó réteget alakít ki, amely legalább részben bevonja az első régiót.

16. A 15. igénypont szerinti rágógumi, ahol a bevonó réteg száraz tömegének több, mint 70 tömeg%-a maltitból vagy glükopiranozil-mannit és glükopiranozil-szorbit keverékéből áll.

17. A 15. vagy 16. igénypont szerinti rágógumi, ahol az első régión belül töltőanyag is jelen van.

18. A 17. igénypont szerinti rágógumi, ahol a töltőanyag a következők közül tartalmaz egyet vagy többet: polialkoholok, segédanyagok, emulgeálószerek, vitaminok, ásványi sók, ideértve a cink sókat, zöld tea extraktumok és magnólia kéreg extraktumok, festékek, savanyító szerek és aromák.

19. Az 1-14. igénypontok bármelyike szerinti rágógumi, ahol az első régiót és második régiót átfedő, alternáló rétegek formájában lévő régiókként alakítjuk ki.

20. Az előző igénypontok bármelyike szerinti rágógumi, amely tartalmaz legalább egy aromát a következő nemzetségek fajaiból származóak közül: menta, citrus, iskolavirág és mentol, mesterséges és természetes aromákat, amelyek hűtő és nyálelválasztást segítő szerként hatnak, és ezek keverékeit.

21. Az 1-20. igénypontok bármelyike szerinti rágógumi halitózis tüneteinek kezelésében történő alkalmazásra.